Maximising the benefits from Australia's formal linkages to global scientific activities

Australian Research Council

Linkage–Learned Academies Special Projects

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April 2005

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This publication is also available online at www.science.org.au/reports/linkages.htm.

ISBN 0 85847 224 4

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Foreword

Science by nature is an international enterprise. Contributing to the progress in science, to the development of excellence of Australian science, and to maximise the benefits of science requires that Australia participates fully in this enterprise. This country's research and development effort is small on the global scale but international linkages provide access to the global resources. Access to the international effort takes different forms: from bilateral programs between individuals or agencies to international programs. The benefits from the bilateral exchanges have previously been demonstrated[1] and this study examines the benefits from Australia's participation in major international science organisations. This follows on from an earlier study of Australia's linkages with international climate research programs[2]. Historically most of the international science activities were coordinated by the International Council for Science (ICSU). But with increasing research across disciplines and with an increasing trend to use science to address issues of importance for society so has the breadth and nature of the international network expanded. Not only is it involved with the scientific issues of the day but also with the policy issues. Scientific issues are increasingly influential in matters of international environmental policy, international economic policy, national security and capacity building in developing countries and Australia needs to participate in the agenda-setting and decision-making activities. Thus it is appropriate that the Academy has reviewed Australia's role in this network of international science linkages at this time.

This report is a snapshot of the current situation of Australia's participation in global scientific activities. These global activities, as well as Australia's engagement in them, evolve with time and because of the many agencies involved, some working outside the usual academic sphere, this report may not be complete, even within the limited categories covered. Thus the Academy will endeavour to periodically review the information and we encourage readers to report any omissions or otherwise comment.

The study has been made possible thanks to support from the Australian Research Council Learned Academies Linkage Grant. It has been guided by its Steering Committee and has benefited from input from the Chairs of National Committees and from numerous individuals.

Professor Kurt Lambeck, FAA
Chair of Steering Group
Australian Academy of Science

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1 Australian Academy of Science, 1999, *International Networks and the Competitiveness of Australia's Science and Technology*. ISBN: 0 85847 213 9.

2 Australian Academy of Science, 2003, *International Climate Change Science: Australia's Role, Links and Opportunities*. A report prepared for the Australian Greenhouse Office (www.science.org.au/reports/ago.pdf)

Executive summary

This report assembles an inventory of significant global scientific organisations and collaborative opportunities in which Australian scientists and scientific institutions might reasonably be expected to be involved, and maps the extent to which Australia is currently engaged in these programs and the benefits that flow from that engagement. The nature and extent of any gaps between current participation in global scientific programs and potential opportunities are assessed. Mechanisms to enhance Australian scientific involvement in global scientific programs, including the mechanism of subscriptions to international scientific organisations, are also evaluated.

The report finds that Australia is reasonably well engaged with global scientific activities. Approximately 100 major global scientific organisations are identified, along with many more significant activities and organisations under these. Australia is formally engaged to variable degrees with almost all of the global scientific organisations in which Australian scientists and scientific institutions might reasonably be expected to be involved.

The Australian Academy of Science administers funds on behalf of the Commonwealth government to engage with international scientific organisations with a minimum of bureaucracy and administrative cost for maximum effect. An analysis of the subscription levels and mechanisms to the major global scientific organisations suggests that Australia is paying at appropriate levels to most of these organisations. However, because the subscription levels are constantly rising while the government funding received by the Academy for support for international activities has remained essentially static for many years, the Academy is under increasing pressure to meet its international obligations. This has forced the Academy to reduce or cut its membership subscriptions to some global scientific organisations and reduce its funding to support National Committee activities and travel support for Australian voting delegates to General Assemblies of ICSU Scientific Unions. This reduces the benefits from Australia's engagement in global science activities, and is preventing Australia's scientific community (via the Academy) from formally engaging with new and potentially worthwhile global activities that are emerging. The Academy welcomes further discussion regarding funding for subscriptions to global scientific activities in the upcoming five-year review into the Academy's responsibilities.

Several clear benefits from Australia's formal engagement with global scientific organisations are identified in the report. From Australia's relatively modest formal membership contributions, it has a high number of scientists involved in leadership roles in global scientific organisations. Australia's formal engagement has also resulted in a large number of significant international scientific conferences being held in Australia, including the General Assemblies of almost all of the ICSU Unions (which attract up to 6000 delegates). Other benefits include the development of formal and informal links with overseas scientists (resulting in increased international collaboration in Australian scientific publications), involvement in cutting-edge international science (particularly science that can only be carried out on a global scale), showcasing of Australian science, leveraging off scientific funding provided by larger nations, political influence and capacity building in developing countries (particularly in Australia's region).

Although Australia is well engaged with the main global scientific organisations, this study has identified several strategically important gaps. It is recommended that Australia closes these gaps by becoming a formal member of the following organisations:

- An Integrated Programme of Biodiversity (DIVERSITAS);
- International Group of Funding Agencies for Global Change Research (IGFA);
- International Human Dimensions Programme on Global Environmental Change (IHDP);
- Integrated Ocean Drilling Program (IODP); and
- Millennium Ecosystem Assessment (MA).

Australia should also consider rejoining:

- the Committee on Data for Science and Technology (CODATA); and
- the Scientific Committee on Problems of the Environment (SCOPE).

These organisations deal with scientific topics of global prominence that cut across national boundaries, and complement the activities of global science organisations to which Australia is already a member. Australia must formally engage with these organisations, and maintain existing arrangements with other globally relevant scientific organisations, in order to maximise the benefits of Australia's linkages with global scientific activities.

1. Project objectives, background and methodology

Purpose of the project

This study aims to assemble an inventory of significant global scientific programs in which Australian scientists and scientific institutions might reasonably be expected to be involved. This will allow Australia's current participation to be evaluated against the wider set of opportunities for international engagement. The report evaluates mechanisms that enhance Australian scientific involvement in global programs, including the mechanism of subscriptions to international scientific organisations. The intended outcomes are to ensure more targetted investment in areas of national priority and increased leverage of international scientific resources for the benefit of Australia.

The specific aims of the project are to:

- Assemble an inventory of significant global scientific organisations and collaborative opportunities in which Australian scientists and scientific institutions might reasonably be expected to be involved.
- Describe the aims and objectives of those research programs, the sponsoring bodies and involved governments and countries, and the progress and outputs to date.
- Map the extent to which Australia is currently engaged in these programs and the benefits that flow from that engagement.
- Assess the nature and extent of any gap between current participation in global scientific programs and potential opportunities, with a particular emphasis on the National Research Priorities.
- Evaluate mechanisms to enhance Australian scientific involvement in global scientific programs, including the mechanism of subscriptions to international scientific organisations.

Background

Australia, through subscriptions administered by the Australian Academy of Science, is a member of the **International Council for Science** (ICSU) that aims to 'strengthen international science for the benefit of society'. Australia is one of the 73 National Scientific Members that adhere to ICSU through their principal scientific academy, in order to effectively represent the broad range of national scientific activities. ICSU is the umbrella organisation for 27 International Scientific Unions, 21 International Scientific Associates, and 20 ICSU Interdisciplinary Bodies and Joint Initiatives. Australia is a formal member of 59 of these 68 ICSU activities, with the Australian Academy of Science directly responsible for managing formal subscriptions to 30 of them (Australian scientific societies and government agencies manage the subscriptions to the others – see Chapter 2). The Academy administers funds on behalf of the Commonwealth government to engage with these

international scientific organisations with minimum bureaucracy and administrative cost for maximum effect.

Other academies overseas subscribe to different sets of international science programs to the Australian Academy of Science. For instance, the US National Academy of Sciences adheres to the International Union of Soil Sciences but not to the International Union for Toxicology, in contrast to the Australian Academy which adheres to the latter Union but not to the former. The reasons behind why we are members of some, but not others, are largely historical and in need of a systematic review.

In addition to ICSU-related activities, the Australian Academy of Science is a member of the InterAcademy Panel (IAP) and the InterAcademy Council (IAC). The InterAcademy Panel is a global network of 91 science academies designed to help its members develop tools to participate in science policy discussions. In 2002, the world's science academies created the InterAcademy Council to mobilise the best scientists worldwide to provide high quality advice to international bodies such as the United Nations and the World Bank.

Australia also has formal links to other global science activities that are not administered by the Australian Academy of Science. These include global scientific activities run by UN bodies (described in Chapter 2), to which Australia is formally linked via membership administered directly by the Commonwealth government; and other, independent global scientific activities (described in Chapter 2), which attract formal membership from any interested groups (eg, government agencies or relevant scientific institutions or groups).

This project builds upon a previous study by the Australian Academy of Science in 1999 on 'International Networks and the Competitiveness of Australia's Science and Technology'[1]. That study focused on individual international participation by Australian scientists ('bottom-up') rather than the 'top-down' approach taken here, where significant global programs are identified and Australia's existing and potential engagement in them is assessed. The current project also builds on a consultancy project of the Australian Academy of Science to the Australian Greenhouse Office in 2003, which assessed Australia's international participation in the area of climate change science[2].

Scope

The activities covered in the study are limited to:

- 'Global' science activities and bodies only, not bilateral or regional activities between individual scientists or research groups.
- 'Significant' activities only, referring to the principal disciplinary umbrella-type organisations, rather than the smaller subdiscipline-based organisations. Although much significant scientific activity does take place at the lower levels, it is necessary to put some boundaries on the study. There are many global science activities, perhaps thousands – too numerous to cover in a single report. Although we have attempted to include as many activities as possible, this report focuses on activities from the 'top down'.
- Natural science activities only, not arts or humanities or social sciences, or activities that are considered as political or regulatory.

- Formal linkages only (ie, linkages involving membership subscriptions or other formal agreements), not informal links (although these will be discussed where they are apparent).

Methodology and governance

The study was overseen by a Steering Group consisting of eminent scientists and Fellows of the Australian Academy of Science.

Steering Group:

- *Chair*: Professor Kurt Lambeck, FAA, Professor of Geophysics, Research School of Earth Sciences, Australian National University;
- Professor Philip Kuchel, FAA, Professor of Biochemistry, University of Sydney;
- Professor Bruce McKellar, FAA, Foreign Secretary, Australian Academy of Science; Professor of Theoretical Physics, University of Melbourne;
- Professor Sue Serjeantson, Executive Secretary, Australian Academy of Science;
- Dr Judy West, Director, Centre for Plant Biodiversity Research, Australian National Herbarium, CSIRO Plant Industry.

Professor Lambeck and Professor Serjeantson were also responsible for project liaison with overseas academies and with ICSU and other global scientific organisations.

The study also drew upon the resources of the Australian Academy of Science's National Committees, which are a focal point for Australia's interaction with many of the global scientific activities.

Web searches were used to obtain detailed information on global scientific activities, including their aims and objectives, sponsoring bodies, involved governments and countries, major programs or projects and the progress and outputs to date, membership subscription mechanisms, and Australia's involvement.

The ISI Web of Knowledge database (http://isi6.newisiknowledge.com/portal.cgi) was used to carry out a bibliometric analysis in an attempt to quantify the effects of global engagement on Australia's scientific publications output.

2. Inventory of significant global science activities

Overview

This project deals only with **significant global** scientific activities. By 'significant', we refer to the principal disciplinary umbrella-type organisations, rather than the smaller subdiscipline-based organisations. Although much significant scientific activity does take place at the lower levels, this approach is necessary to put some boundaries on the study. There are hundreds, perhaps thousands,

of international scientific organisations – too many to cover in a report such as this, so this report attempts to take a 'top down' approach to global scientific activities. By 'Global', we refer to organisations that are truly global in their focus, rather than regional groupings or bilateral international collaboration between scientists or scientific groups. Although bilateral arrangements represent a significant portion of international science, these are dealt with in other studies[1, 3] and this project focuses on activities that have formal global participation and membership requirements.

Global science activities can be generally grouped under four broad categories, as shown schematically in Figure 1. These categories are:

- Global scientific activities under ICSU
  - ICSU International Scientific Unions (see Appendix 1);
  - ICSU International Scientific Associates (see Appendix 2);
  - ICSU Interdisciplinary Bodies and Joint Initiatives (see Appendix 3);
  - International scientific associations and services under ICSU bodies (see Appendix 4).
- Global scientific activities under UN organisations
  - UNESCO scientific activities (see Appendix 5);
  - World Meteorological Organization (WMO) (see Appendix 6);
  - United Nations Environment Programme (UNEP);
  - World Health Organization (WHO);
  - Food and Agriculture Organization of the United Nations (FAO).
- Scientific academy groupings
- Independent global scientific activities (see Appendix 7).

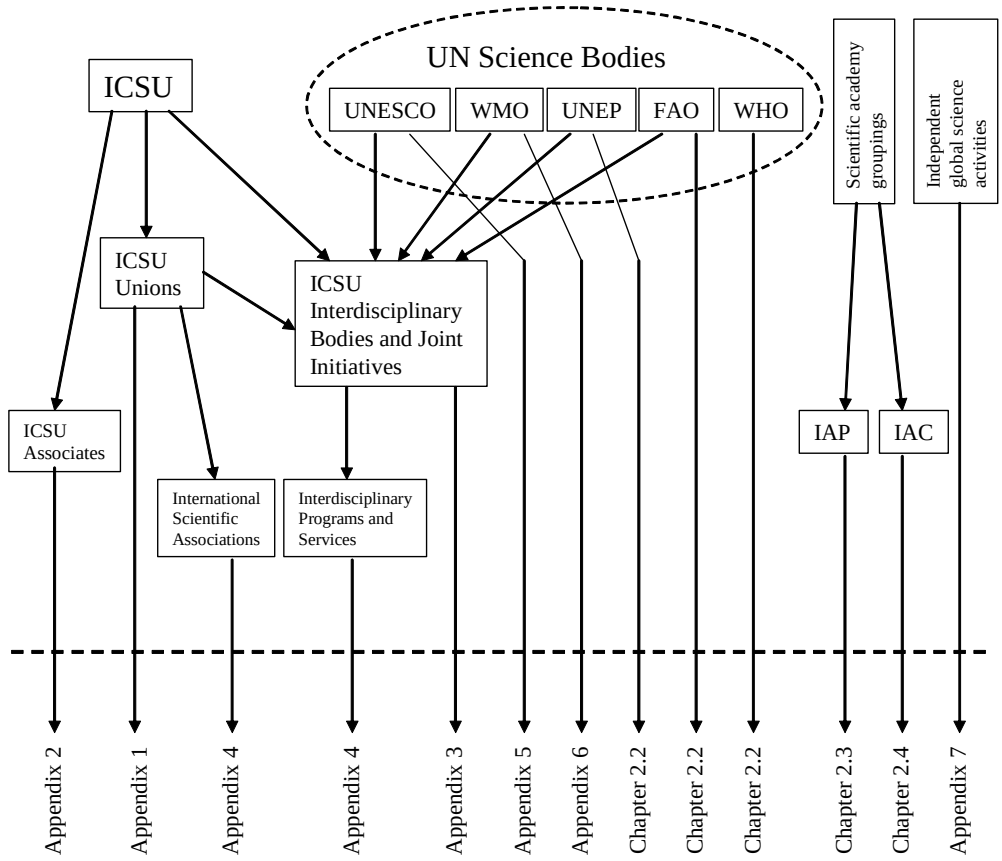
Most of these global scientific activities have formal membership requirements. In general, the activities under ICSU bodies require membership from a country's academy of science or from the country's relevant professional scientific society, while activities under UN bodies require membership from government agencies. The independent global scientific activities accept membership from any interested groups.

Brief descriptions of the four broad categories and Australia's formal membership status in them are given below. More detailed descriptions of the specific activities and of Australia's involvement are provided in Appendices 1–7.

A list of global scientific activities grouped by disciplines is provided in Appendix 8.

Formal membership in these global scientific activities confers certain benefits, which are discussed in Chapter 4. However, it should be noted that it is still possible for individual scientists to participate in the various projects without their country being a formal member.

Figure 1 – The structure of global scientific programs



Global scientific activities under ICSU

(www.icsu.org/index.php)

The International Council for Science (ICSU) is a non-governmental organisation representing a global membership that includes both national scientific bodies (101 members) and international scientific Unions (27 members). Through this extensive international network, ICSU provides a forum for discussion of issues relevant to policy for international science and the importance of international science for policy issues and undertakes the following core activities:

- planning and coordinating interdisciplinary research to address major issues of relevance in both science and society;
- actively advocating for freedom in the conduct of science, promoting equitable access to scientific data and information, and facilitating science education and capacity building;
- acting as a focus for the exchange of ideas, the communication of scientific information and the development of scientific standards;
- supporting in excess of 600 scientific conferences, congresses and symposia per year all around the world, as well as the production of a wide range of newsletters, handbooks, learned journals and proceedings.

The Australian Academy of Science pays annual membership subscriptions to ISCU. Further information about ICSU is given in Box 1.

Box 1 – ICSU develops its strategy for the twenty-first century

Report from Dr Graeme Pearman, FAA, Deputy Chair of the ICSU Committee for Scientific Planning and Review (CSPR), December 2004.

The International Council of Science (ICSU) is undertaking major change in an effort to align its activities to the 21st century needs of the international science community. The ICSU Committee for Scientific Planning and Review (CSPR) is charged with underpinning these changes by developing a new Strategic Plan for consideration by the General Assembly (the representation of academies, including the Australian Academy of Science, and the Scientific Unions) when it next meets in October 2005.

There is little doubt that ICSU was in need of some new directions reflecting the changing needs of its members and the changing circumstances of science in general. The CSPR over the past several years has undertaken a number of projects that have been designed to collect views on the most appropriate role for ICSU in this new century. These projects have included:

- contracting the University of Sussex to prepare a meta-database of various foresight studies from around the world on emerging issues in science and society;
- commissioning several assessments on priority areas identified by the foresight study and input from the Scientific Unions and targeted expert input as to how ICSU can contribute to the areas. The areas include capacity building in science, scientific data and information, environment and its relationship to sustainable development;
- establishing several working groups to provide input with respect to other emerging issues such as sustainability science and society, basic research, energy futures, etc;
- receiving input from national academies and the Scientific Unions, and ICSU's bodies concerning different views on science needs.

On 29 November – 1 December, the CSPR met in Paris to draft the new Strategic Plan which will be forwarded to ICSU members for comment in the first weeks of January 2005. The Plan contains background information about the changing context of international science, and a little about the past role of achievements of ICSU. But it concentrates on the future vision and role of ICSU including:

- addressing major issues of importance for science and society, including the environment, the International Polar Year (2007-2008), natural and human-induced hazards, human health and new horizons such as in genetics or biotechnology and others;
- facilitating interactions amongst scientists by reaching out to scientists in all countries, the establishment of regional offices of ICSU in four developing regions of the world, and facilitating planning and the identification and seeding of new initiatives;
- promotion of the participation in science and the concept of the universality of science including such things as the availability of data and information;
- science and policy, the role of good science in policy development and the interface with societies.

Aside from the development of the Strategic Plan the CSPR considered other issues such as the future of its Grants Program, the Reviews of the International Human Dimensions Program, and the Millennium Assessment (of biodiversity). Following on from ICSU's very successful representation of Science at the World Summit on Sustainable Development (WSSD, Johannesburg, September 2002), published as part of the ICSU series on Science for Sustainable Development, discussion has centred on the on-going role of ICSU in this forum and the preparation for the next meeting of the WSSD in 2007.

The CSPR meeting was, as usual demanding, yet rewarding: demanding, because the ICSU Executive Board and the CSPR itself have set significant targets for the development of ICSU in all aspects of its work. Rewarding in the sense that huge advances have already been made with exciting consequences and with great anticipation for the next few years.

ICSU International Scientific Unions

Under ICSU are the 27 discipline-based Scientific Union Members, defined by ICSU as 'an international non-governmental organization devoted to the promotion of activities in a particular area of science and shall have been in existence for at least 6 years.'

Descriptions of the ICSU International Scientific Unions are provided in Appendix 1. Several of these discipline-based Unions have membership from subdiscipline-based international scientific associations, which are listed in Appendix 4.

As well as paying membership subscriptions to ICSU directly, the Australian Academy of Science also pays membership subscriptions to 21 of the 27 ICSU Unions:

- International Astronomical Union (IAU);
- International Geographical Union (IGU);
- International Mathematical Union (IMU);
- International Union of Biochemistry and Molecular Biology (IUBMB);
- International Union of Biological Sciences (IUBS);
- International Union of Crystallography (IUCr);
- International Union of Geodesy and Geophysics (IUGG);
- International Union of Geological Sciences (IUGS);
- International Union of History and Philosophy of Science (IUHPS);
- International Union of Immunological Societies (IUIS)
  Subscription shared 50/50 with the Australasian Society for Immunology;
- International Union of Microbiological Societies (IUMS);
- International Union of Nutritional Sciences (IUNS);
- International Union for Pure and Applied Biophysics (IUPAB);
- International Union of Pure and Applied Chemistry (IUPAC);
- International Union of Pure and Applied Physics (IUPAP);
- International Union of Pharmacology (IUPHAR);
- International Union of Physiological Sciences (IUPS);
- International Union of Psychological Science (IUPsyS);
- International Union of Theoretical and Applied Mechanics (IUTAM);
- International Union of Toxicology (IUTOX);
- International Union of Radio Science (URSI).

Other Australian organisations pay membership subscriptions to the other six ICSU Unions, as listed below:

- International Brain Research Organisation (IBRO)
  Australian Neuroscience Society;

- International Society for Photogrammetry and Remote Sensing (ISPRS)
  Remote Sensing and Photogrammetry Association of Australasia;
- International Union of Anthropological and Ethnological Sciences (IUAES);
- International Union of Food Science and Technology (IUFoST)
  Australian Institute of Food Science;
- International Union for Physical and Engineering Sciences in Medicine (IUPESM)
  Membership is via the two constituent organisations: the International Federation for Medical and Biological Engineering (IFMBE) and the International Organization for Medical Physics (IOMP). The Australian Federation for Medical and Biological Engineering pays dues to IFMBE. The Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM) pays dues to IOMP;
- International Union of Soil Sciences (IUSS)
  Australian Society of Soil Science.

There are no ICSU Unions that Australia is not formally involved with in some way.

More details of Australia's involvement in each ICSU Union are provided in Appendix 1.

ICSU International Scientific Associates

ICSU also has a number of ICSU Associates under it. An International Scientific Associate is defined by ICSU as

> an international non-governmental organization in the natural sciences or an organization in a field cognate to those of ICSU, such as the humanistic, medical, social and technical sciences whose association with ICSU is likely to be of mutual benefit or to advance the cause of science, and whose scientific activities do not fall primarily within the scope of a single Scientific Union Member.

A Regional Scientific Associate is defined by ICSU as

> a non-governmental Scientific Academy, Science Council, or other scientific institution, to which scientists or scientific bodies from more than one nation adhere, whose association with ICSU is likely to be of mutual benefit and will facilitate the attainment of ICSU's objectives, and whose scientific activities do not fall primarily within the scope of a single Scientific Union Member.

ICSU Associates are generally composed of smaller groups of scientists than the ICSU Unions. Descriptions of the ICSU International Scientific Associates are provided in Appendix 2.

The Australian Academy of Science pays subscriptions to three ICSU Scientific Associates:

- Federation of Asian Scientific Academies and Societies (FASAS);
- International Foundation for Science (IFS);
- International Union for Quaternary Research (INQUA).

Other Australian organisations pay membership subscriptions to the following 14 ICSU Scientific Associates, as listed below:

- Federation Internationale des Geometres (International Federation of Surveyors) (FIG)
  Institution of Surveyors, Australia;
- International Association of Hydraulic Engineering and Research (IAHR)
  Five Australian organisations are corporate members: SunWater Technical Services, Hargrave-Andrew Library Monash, University of Queensland Central Library, Snowy Mountains Engineering Corporation and the University of Adelaide Acquisitions Department. Individual Australian scientists are also members;
- International Cartographic Association (ICA)
  Mapping Sciences Institute, Australia;
- International Council for Laboratory Animal Science (ICLAS)
  Australian and New Zealand Society for Laboratory Animal Science (ANZSLAS);
- International Council for Scientific and Technical Information (ICSTI)
  CSIRO;
- International Federation of Information Processing (IFIP)
  Australian Computer Society;
- Federation of Library Associations and Institutions (IFLA)
  Australian Library and Information Association;
- International Federation of Societies for Microscopy (IFSM)
  Australian Microscopy and Microanalysis Society Inc.;
- International Radiation Protection Association (IRPA)
  Australasian Radiation Protection Society;
- International Society of Endocrinology (ISE)
  Endocrine Society of Australia;
- International Union of Forest Research Organizations (IUFRO)
  24 Australian organisations are members, including government agencies (such as the Bureau of Rural Sciences), CSIRO Divisions, universities and Cooperative Research Centres;
- International Union for Vacuum Science Techniques and Applications (IUVSTA)
  Vacuum Society of Australia;
- International Water Association (IWA)
  Australian Water Association;
- Pacific Science Association (PSA)
  National Academies Forum.

Australia is NOT a formal member of:

- Academia de Ciencias de América Latina (ACAL);
- International Cell Research Organization (ICRO) – membership consists of elected individuals only;

- International Institute for Applied System Analysis (IIASA);
- Third World Academy of Sciences (TWAS) – membership consists of elected individuals only. Scientists from developed countries can only be associate members.

More details of Australia's involvement in each ICSU Associate are provided in Appendix 2.

ICSU Interdisciplinary Bodies and Joint Initiatives

ICSU participates in international science initiatives in two ways: by establishing its own **Interdisciplinary Bodies** or by lending its support to **Joint Initiatives** that have multiple sponsors and partners.

Initially established by ICSU General Assemblies, Interdisciplinary Bodies focus on specific areas of international research that are of interest to all or many ICSU Members. Their roles vary depending on the area of science and on the related needs of the international science community, but usually combine operational and policy or advisory functions. They are designed to become self-sufficient and independent in terms of day-to-day operations and financing. Most Interdisciplinary Bodies have their own secretariat.

Joint Initiatives, co-sponsored by ICSU and other international organisations (eg, from the UN system), are an important means of bringing together a range of partners to address a particular issue or area. One of the key features of these collaborative programs is the ability to consider the issue from the broadest possible perspective while minimising overlap and duplication of effort.

Descriptions of the ICSU International Interdisciplinary Bodies and Joint Initiatives are provided in Appendix 3.

The Australian Academy of Science pays direct subscriptions to six ICSU International Interdisciplinary Bodies and Joint Initiatives:

- Committee on Space and Research (COSPAR);
- International Geosphere-Biosphere Programme (IGBP);
- Scientific Committee on Antarctic Research (SCAR) – also has membership subscriptions from the Australian Antarctic Division;
- Scientific Committee on Oceanic Research (SCOR);
- Scientific Committee on Solar Terrestrial Physics (SCOSTEP);
- World Climate Research Programme (WCRP).

Australia is also a formal member of:

- International Network for the Availability of Scientific Publications (INASP) – via financial contributions from the Australian Centre for International Agricultural Research (ACIAR).

Australia can also be considered a formal member of another eight ICSU International Interdisciplinary Bodies and Joint Initiatives, listed below. These organisations do not require

membership subscriptions from individual nations – formal involvement with these bodies is via membership to their sponsoring bodies:

- Astronomical and Geophysical Data Analysis Services (FAGS)
  via membership subscriptions to sponsoring organisations (IAU, IUGG and URSI);
- Global Climate Observing System (GCOS)
  via membership of sponsoring bodies IOC, WMO and ICSU;
- Global Ocean Observing System (GOOS)
  via membership of sponsoring bodies IOC, WMO and ICSU;
- Global Terrestrial Observing System (GTOS)
  via membership of sponsoring organisations FAO, UNESCO and WMO;
- Integrated Global Observing Strategy (IGOS)
  via membership to several sponsoring organisations;
- Committee on Allocation of Radio Frequency (IUCAF)
  via membership subscriptions to sponsoring organisations IAU, URSI and COSPAR;
- Scientific Committee on the Lithosphere (SCL)
  via membership subscriptions to sponsoring organisations ICSU, IUGG and IUGS;
- Panel on World Data Centres (WDC)
  Australia hosts the WDC for Solar-Terrestrial Science in Sydney, through IPS Radio and Space Services.

Australia has only indirect membership and involvement with the following five ICSU International Interdisciplinary Bodies and Joint Initiatives. Direct formal membership to these organisations is achieved via subscriptions from individual nations. Australia does not pay subscriptions directly to these organisations, but is indirectly involved via membership to bodies that sponsor these organisations, or through the participation of individual Australian scientists.

- Committee on Data for Science and Technology (CODATA)
  via Australian Academy of Science subscriptions to the various ICSU unions that sponsor CODATA. Australian scientists play a significant role in CODATA as representatives of other scientific unions. The Academy paid direct membership subscriptions to CODATA up until 1999/2000, but no longer pays subscriptions;
- An Integrated Programme of Biodiversity (DIVERSITAS)
  via Australian Academy of Science subscriptions to DIVERSITAS sponsoring organisations (ICSU, IUBS and IUMS);
- International Human Dimensions Programme on Global Environmental Change (IHDP)
  via membership to sponsoring organisations ICSU and ISSC;
- Millennium Ecosystem Assessment (MA)
  via UN agencies and programs;
- Scientific Committee on Problems of the Environment (SCOPE)
  via membership to various sponsoring organisations. Although direct Australian Academy of Science subscriptions stopped in 2002, Australia is still listed as a formal member on the SCOPE website.

More details of Australia's involvement in each ICSU Interdisciplinary Body and Joint Initiative are provided in Appendix 3.

International scientific associations and services under ICSU bodies

The ICSU Unions, Interdisciplinary Bodies and Joint Initiatives also have some significant programs or associations under them. Several of the discipline-based ICSU Unions have membership from subdiscipline-based international scientific associations. Likewise, the Interdisciplinary Bodies and Joint Initiatives often have significant programs or services under them. These are listed in Appendix 4.

Most of the international associations consist of individual scientists as members. However, the Australian Academy of Science pays direct subscriptions to:

- International Association of Geochemistry and Cosmochemistry (IAGC)
  IAGC is affiliated with IUGS, to which the Academy also pays subscriptions.
- International Commission for Optics (ICO)
  ICO is an affiliated commission of IUPAP, to which the Academy also pays subscriptions. The Australian Optical Society is also a member.

Global scientific activities under UN organisations

UNESCO scientific activities

(www.unesco.org)

From the UNESCO website:

> The United Nations Educational, Scientific and Cultural Organization (UNESCO) is a specialized United Nations agency working to promote international co-operation among its 190 Member States and six Associate Members in the fields of education, science, culture and communication. The mission of UNESCO's science program is to be a promoter and broker of science throughout the world, and its goals are:
>
> - Advancement and sharing of scientific knowledge;
> - Application of scientific knowledge to sustainable development and technology;
> - Contribution of science and technology to peace;
> - Understanding the role of ethics in science and technology;
> - Promotion of equity of access to S&T knowledge and benefits;
> - Enhancement of productive linkages between scientists and decision makers.
>
> UNESCO's scientific thematic areas are Fresh Water; People, Biodiversity and Ecology; Oceans; Earth Sciences; Basic & Engineering Sciences; Coastal Regions & Small Islands; and Science Policy.

The Commonwealth government is a member of UNESCO.

UNESCO funds the following major international scientific programs. All programs have involvement from Australian scientists.

- International Union Geological Correlation Programme (IGCP) – Joint Program of UNESCO and IUGS;
- International Hydrological Programme (IHP);
- Intergovernmental Oceanographic Commission (IOC);
- Man and the Biosphere (MAB);
- United Nations World Water Assessment Programme (WWAP).

More detailed descriptions of the UNESCO scientific programs, and Australia's involvement in them, are provided in Appendix 5.

World Meteorological Organization (WMO) activities

(www.wmo.ch)

WMO facilitates international cooperation in the establishment of networks for making meteorological, hydrological and other observations, and promotes the rapid exchange of meteorological information for public, private and commercial use. The scientific activities coordinated by WMO include weather predictions, climate change, air pollution, ozone depletion studies and tropical storm forecasting.

As of August 2003, there were 187 Members (including Australia), comprising 181 Member States and six Member Territories, all of which maintain their own National Meteorological and Hydrological Services. Australia has been a member of WMO since its establishment and participates strongly in its programs (eg, in the formal framework of the constituent bodies, especially the WMO Congress, the Executive Council, South-West Pacific Regional Association and all eight Technical Commissions). The nominated Permanent Representative for Australia with WMO is the Director of Meteorology.

WMO supports a number of climate and weather research programs at an International Level. The Australian Bureau of Meteorology and Australian scientists are involved in all of these programs. These include:

- Applications of Meteorology Programme (AMP);
- Atmospheric Research and Environment Programme (AREP);
- Global Climate Observing System (GCOS)
  co-sponsored by WMO, IOC of UNESCO, UNEP and ICSU;
- Hydrology and Water Resources Programme (HWRP);
- Intergovernmental Panel on Climate Change (IPCC)
  joint program of WMO and UNEP;
- WMO/IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM)
  joint program of WMO and IOC of UNESCO;

- Technical Cooperation Programme (TCO);
- World Climate Programme (WCP);
- World Climate Research Programme (WCRP)
  joint program of WMO, ICSU and IOC of UNESCO;
- WMO Space Program;
- World Weather Watch (WWW).

More detailed descriptions of the WMO Scientific programs, and Australia's involvement in them, are provided in Appendix 6.

Other UN organisations that have scientific activities

United Nations Environment Programme (UNEP)

(www.unep.org)

UNEP was established in 1972 and is the designated authority of the United Nations system in environmental issues at the global and regional level. Its mandate is 'to coordinate the development of environmental policy consensus by keeping the global environment under review and bringing emerging issues to the attention of governments and the international community for action.' UNEP collaborates with a wide range of partners throughout the UN system and beyond to provide information on the state of the planet's natural resources and their contribution to sustainable development. UNEP is implementing or participating in several global environmental assessments, including the Global International Waters Assessment, the Global Environment Monitoring System Freshwater Quality Programme and the Millennium Ecosystem Assessment. UNEP aims to:

- assess global, regional and national environmental conditions and trends;
- develop international and national environmental instruments;
- strengthen institutions for the wise management of the environment;
- facilitate the transfer of knowledge and technology for sustainable development;
- encourage new partnerships and mind-sets within civil society and the private sector.

There are 60 member nations on the UNEP governing council. Although Australia is not currently a member state of the governing council, Australia has a permanent Mission in Nairobi that is accredited to UNEP, and represents Australia at various meetings, including the Committee of Permanent Representatives. The Commonwealth government's Department of the Environment and Heritage describes Australia's involvement in UNEP on its website as follows:

> Australia has been actively involved in UNEP activities since the inception of the program, including through the provision of funding. We have been particularly active at various times with UNEP on issues such as cleaner production, sustainable consumption, marine environment, chemicals and ozone. Australia has assisted UNEP with work in our region, including contributing funding for regional meetings on specific issues. We have also had major involvement at various times with some of the sector-specific work of UNEP. Officers of Australian government departments represent Australia's interests at various UNEP meetings, including the Governing Council and Global Ministerial Environment Forum and meetings and workshops related to specific issues.

World Health Organization (WHO)
(www.who.int/en)

The World Health Organization, the United Nation's specialised agency for health, was established on 7 April 1948. The objective of WHO is 'the attainment by all peoples of the highest possible level of health. Health is defined in WHO's Constitution as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.' WHO's activities include scientific research in health and medicine, and there are projects dealing with approximately 240 health topics.

WHO is governed by 192 Member States through the World Health Assembly. Australia is a member state. There are 49 WHO Collaborating Centres in Australia.

Food and Agriculture Organization of the United Nations (FAO)
(www.fao.org)

The mission of the FAO is

> to raise levels of nutrition, improve agricultural productivity, better the lives of rural populations and contribute to the growth of the world economy. FAO helps developing countries and countries in transition modernize and improve agriculture, forestry and fisheries practices and ensure good nutrition for all. Since its founding in 1945, FAO has focused special attention on developing rural areas, home to 70 percent of the world's poor and hungry people.

FAO supports scientific activities related to climate change and improved weather forecasting, biotechnology, and sustainable agriculture. FAO is funded by its 188 member nations. Australia is a member nation, and is also a current member of the 49-nation governing council of FAO.

Scientific academy groupings

The following organisations are groupings of scientific academies. The purpose of these organisations is to represent the views of the world's scientific academies, independently of UN organisations and discipline-based ICSU Scientific Unions and associations. They are becoming an increasingly important influence in international science.

InterAcademy Panel (IAP)
(www.interacademies.net)

The IAP is

> a global network of the world's science academies, launched in 1993. Its primary goal is to help member academies work together to advise citizens and public officials on the scientific aspects of critical global issues. IAP is particularly interested in assisting young and small academies achieve these goals and, through the communication links and networks created by IAP activities, all academies will be able to raise both their public profile among citizens and their influence among policy makers.

Since its inception, IAP has issued statements on population growth (1994); urban development (1996); sustainability (2000); human reproductive cloning (2003); science education (2003); health of

mothers and children (2003); scientific capacity building (2003); science and the media (2003); and access to scientific information (2003).

The IAP has membership from 91 scientific academies from around the world, including the Australian Academy of Science, which was a member of the IAP executive from 2001-2003.

InterAcademy Medical Panel (IAMP)

(www.interacademies.net/iamp/iamphome.nsf)

The IAMP is a voluntary association of the world's medical academies or the medical divisions of science academies. The IAMP

> is committed to improving health around the world. This includes collaboration to strengthen the role of all academies to alleviate the burden of the poorest, to build scientific capacity for health, and to provide independent scientific advice on promoting health science and health care policy to national governments and global organizations.

The Australian Academy of Science is a member. There are 47 member nations.

InterAcademy Council (IAC)

(www.interacademycouncil.net)

In 2002, the world's science academies created the IAC to 'mobilize the best scientists worldwide to provide high quality advice to international bodies such as the United Nations, the World Bank, and other organisations.'

The report of the first IAC study on building worldwide capacities in science and technology was presented in February 2004 to a meeting at UN Headquarters presided over by UN Secretary-General, Kofi Annan. A second IAC study commissioned by Secretary-General, Kofi Annan, resulted in a report entitled 'Realizing the promise and potential of African agriculture', and was presented to Mr Annan at a special meeting at UN Headquarters in June 2004.

The Australian Academy of Science is a member of the IAC.

Independent global scientific activities

There are a number of significant global science activities that do not fit under ICSU or UN categories. The main organisations are listed below, and are described in more detail in Appendix 7.

Australia is a member of:

- Global Biodiversity Information Facility (GBIF)
  via the CSIRO;
- Global Water Research Coalition (GWRC)
  the CRC for Water Quality and Treatment and the Water Services Association of Australia are formal members;
- Human Frontier Science Program
  via the National Health and Medical Research Council (NHMRC);

- International Federation for the Promotion of Mechanism and Machine Science (IFToMM)
  The Australian Academy of Science pays formal membership subscriptions;
- International Union Against Cancer (UICC)
  Several Australian national and state cancer organisations are members;
- World Conservation Union (IUCN)
  31 Australian organisations are members, including 22 NGOs, nine state government environment departments, and the Commonwealth government's Department of the Environment and Heritage.

Australia is NOT a member of:

- Global Forum for Health Research;
- International Group of Funding Agencies for Global Change Research (IGFA);
- Integrated Ocean Drilling Program (IODP).

More detailed descriptions of these independent global scientific activities, and Australia's involvement in them, are provided in Appendix 7.

3. Membership subscription levels and mechanisms

This chapter deals only with the membership subscriptions to ICSU-related bodies (ICSU Unions, ICSU Associates, ICSU International Interdisciplinary Bodies and Joint Initiatives), as the Australian Academy of Science is responsible for administering the membership subscriptions to many of these bodies. Membership to the UN-related global science bodies is administered directly by the Commonwealth government.

The Academy receives annual grants from the Department of Education, Science and Training (DEST) and the Department of the Environment and Heritage (DEH) for:

- membership subscriptions to international scientific organisations;
- travel support for Australian voting delegates to General Assemblies of ICSU Scientific Unions (note – no money is provided for *bidding for* or *hosting* General Assemblies in Australia);
- support for regular meetings of Australian scientific National Committees.

The Academy administers these funds on behalf of the government to engage with international scientific organisations with minimum bureaucracy and administrative cost for maximum effect.

In the financial year 2002-2003, the Academy received about $500,000 from the two departments ($66,600 from DEH, the remainder from DEST). Approximately two-thirds of this money goes towards annual membership subscriptions to the various international scientific organisations.

These subscriptions are rising year by year (as the international organisations periodically raise their subscription levels) and are subject to international currency fluctuations, while government funding has remained essentially static for several years.

As government funding has remained essentially static, the Academy has made continual adjustments to its expenditure in order to fulfil its international obligations with the available money. Currently, the amount spent by the Academy on support for the National Committees and Australian voting delegates to ICSU bodies is approximately one-tenth of the amount spent on membership subscriptions. Therefore, the pressure to cut costs inevitably falls onto the membership subscriptions to global scientific organisations, as cutting support for the National Committees and Australian delegates would effectively reduce the benefits from being a member. In the past, the Academy has been forced to cancel or negotiate a temporary reduction in subscription levels to some ICSU bodies in order to deal with the rising cost of subscriptions. There are also some new and potentially worthwhile international science activities that are emerging that the Academy is unable to fund because of its budget limitations. A review of the subscription levels and mechanisms to global scientific organisations is therefore required to assess whether extra funding is warranted, or if some of the membership subscriptions can be shed without adverse affects to Australia's science efforts.

A table summarising the membership subscription mechanisms for the ICSU-related bodies, and Australia's subscription details is provided in Appendix 9. Although information was not available for every ICSU body, information on enough of the bodies was collected to allow some general observations. The table shows that:

- Membership subscription mechanisms vary. There is no standard mechanism. All of the organisations designate a number of categories of membership level and assign a country to a particular level based on some criteria. Some Unions and programs have specific criteria on which they base the subscription levels (eg, number of active scientists), but in most cases the category of adherence is agreed to between the international body and the particular country.
- A higher category of membership means higher annual membership subscription, but confers a greater number of voting rights and delegates at general assemblies, which in turn confers a greater level of influence in the operations of the international body.
- In most cases, Australia's membership category is comparable with nations with similar economies and populations (where this information is available) – the same or slightly lower than Canada, the same or slightly higher than the Netherlands and Sweden.
- Australia's contribution to the total membership subscriptions for each organisation is generally between 2 and 3 per cent (for the 20 organisations where this information is available). This is consistent with Australia's contribution to global science publications, which represent about 2.7 per cent of the total[4].
- In some fields, such as astronomy and earth sciences, Australia produces 4-5 per cent of the world's publications but still only contributes around 2-3 per cent of the total membership subscriptions to the relevant global Scientific Unions and Programs.

- These observations suggest that Australia's membership contributions to ICSU-related global science organisations are broadly in line with (or small in comparison to) its presence in the pool of global science publications. It certainly does not appear that Australia's membership subscriptions are too high in comparison with the rest of the world, suggesting that there is scope for Australia to extend its membership to participate in additional worthwhile global scientific programs that may arise in the future.

It is worth noting that the 'outcomes' from Australia's investment in global science activities are more important than the 'inputs', and these are discussed in Chapter 4.

The above analysis suggests that the membership subscriptions to most of the international scientific organisations managed by the Australian Academy of Science are at an appropriate level for Australia. There does not seem to be justification for Australia to further reduce its membership subscriptions to these organisations. In order to continue to support these subscriptions, the Academy is therefore in a position where it either needs to:

- obtain more funding from government to support the Academy's international activities;
- decide to stop paying membership subscriptions to some of the international organisations;
- ignore opportunities to formally engage with potentially worthwhile global scientific organisations that may emerge in the future; or
- cut funding to support National Committees and travel support for Australian voting delegates to General Assemblies of ICSU Scientific Unions (however, the National Committees serve as a focal point for Australia's interaction with many of the international science organisations, so cutting back on support for National Committee activities would lead to reduced benefits from Australia's membership to those international science organisations).

The Academy welcomes further discussion regarding funding for subscriptions to global scientific activities in the forthcoming five-year review into the Academy's responsibilities.

4. Benefits that flow from engagement

It is widely acknowledged that Australian participation in global scientific activities is not only critical to achieving excellence, but also that global engagement provides a means of leveraging Australia's comparatively small research and development effort through access to global resources. Global engagement delivers national benefit through:

- prior and immediate access to the 97 per cent of research that is done overseas;
- benchmarking and maintenance of the highest of standards in our own scientific research;
- influence in international science directions and policy for science;
- leverage of international research in the Australian region;

- Australian public awareness of internationally emerging science and technology issues relevant to Australia.

If Australia is to continue to increase the excellence of its science then effective global engagement is considered essential. This chapter attempts to describe some of the benefits that flow from Australia's engagement in global scientific activities.

General qualitative benefits

Some science can only be carried out at a global level

In many fields of science, cooperation and collaboration with scientists around the world is essential for cutting edge-science to be done, especially in climate change science, astronomy, and some aspects of earth sciences. For Australia to be at the cutting edge of these fields, it needs linkages with countries around the world to obtain and share global-scale measurements from satellite imagery, aircraft, ships and so on. Sharing of this expensive scientific infrastructure is often coordinated by the peak global scientific organisations.

Involvement in cutting edge science

Global scientific programs allow Australian scientists to do science that they couldn't otherwise do, by providing access to global databases and access to and integration with comparative studies elsewhere in the world.

Participation in global science programs provides an opportunity to work with world-leading scientists as they decide on the future directions for the field, and to have input into defining that direction. Australian scientists working on global science projects get inspiration from and exposure to the expertise of world-leading scientists. A list of Australian scientists involved in leadership roles in global scientific activities is given in Appendix 11. The fact that this list is quite extensive indicates that Australian scientists are having a large influence in global scientific activities compared with Australia's relatively modest formal financial contributions.

By being involved in global science activities, Australian scientists showcase Australian science to the world, effectively advertising Australia as a strong science nation and leading to further interest and collaboration from overseas scientists.

Australian science has the comparative advantage of being quick to respond to directions set by new discoveries and advances in science, but needs to be involved with the global science programs that are defining the frontiers in order to make the most of this advantage.

Leveraging off scientific funding provided by larger nations

For a relatively modest subscription, Australia gets a voice in the organisations that direct and administer projects and results obtained from huge funding provided by the US, the EU and Japan.

National Committees

Many of Australia's global science activities are underpinned by Australia's National Committees (see www.science.org.au/natcoms) that serve as a focal point for the various disciplines within Australia, stimulate collaborative research within Australia and overseas, and develop strategic disciplinary reviews and scoping studies. Without formal involvement in global science activities, there would be less motivation for these National Committees to exist, and these benefits would subsequently be diminished.

Access to direct funding

Many of the global science activities award funding to individual scientists from member countries, for activities such as travel funding for Australian scientists to attend scientific steering committee meetings and travel scholarships for young scientists. Often the amount of money awarded to Australian scientists by an international organisation exceeds the annual subscription that Australia pays to that organisation.

Providing a forum for Australian scientists to develop formal and informal personal links with overseas scientists

Many Australian scientists build up informal personal international linkages through ICSU Union activities (such as congresses and steering committee meetings). These lead to collaborative research programs and provide the corner-stone of the development of international programs. The benefits are that many useful informal international scientific linkages are developed via Australia's formal global scientific linkages.

Political influence

Some countries use their involvement in global science programs as a direct foreign policy tool, by hosting the secretariats, driving the agendas, and directing aid to developing countries via these organisations.

The benefits of being involved with global science activities are important not just for science, but for **science politics**. Australia needs to be involved to have access to the decision-making and agenda-setting activities. Scientific issues are increasingly influential in matters of national security (eg, bioterrorism, infectious diseases, military technologies), international economic policy (eg, trade in genetically modified foods and products, international telecommunications, microelectronics), international environmental policy (eg, global climate change, protection of biodiversity), capacity building in developing countries, and other areas. In this regard, Australia could benefit from better links between the science community (represented by the Australian Academy of Science) and the Commonwealth government's Department of Foreign Affairs.

Australia's involvement in SCAR (Scientific Committee on Antarctic Research) provides an example of how political influence is enhanced through participation in science programs. SCAR, by initiating, developing and coordinating international scientific research in Antarctica, provides scientific advice to the Antarctic Treaty consultative meetings. Australia's significant involvement in scientific activities directed by SCAR therefore strengthens its standing within the Antarctic treaty (see Box 4).

Australia's participation in the Federation of Asian Scientific Academies and Societies (FASAS) provides an example of enhancing Australia's regional standing through science. The Academy has recently increased its membership contributions to FASAS in recognition of the importance of science for capacity building in Australia's region. The Academy will also host the FASAS meeting in 2005, which will be used to strengthen scientific as well as diplomatic ties between the member nations.

Capacity building in developing countries

Many of the global science activities have specific programs aimed at building the scientific capacity of developing countries, leading to improved national security in our region and the rest of the world. Examples include work by the InterAcademy Panel (IAP) and the InterAcademy Council (IAC) on regional capacity building in Africa and the Caribbean, and work by FASAS on capacity building in the Asian region (see www.interacademies.net, www.interacademycouncil.net and www.akademisains.gov.my/FASAS for details).

Fostering international relations and peace

By collaborating together in scientific activities, individuals and nations build up a greater sense of mutual understanding and co-operation that strengthens ties and relations between nations.

Global Commercialisation of Research

In an increasingly globalised economic environment, Australian scientists need to be globally linked at the forefront of world science in order to be able to fully commercialise their research.

Ability to bid for and host major international science congresses

Formal membership in global scientific bodies allows Australia to bid to host the major international congresses of those bodies. For the ICSU Unions, these congresses are often the major international events in the related discipline, attracting thousands of participant scientists. Without formal membership, Australia would not be able to bid successfully for these congresses. In most cases, the Australian Academy of Science (via its discipline-based National Committees) is the only legal entity entitled to bid for ICSU-sponsored international congresses. The guidelines for international scientific meetings held in Australia at the invitation of the Academy are provided in Appendix 10 and are also available on the Academy's website at www.science.org.au/internat/guidelines.htm.

There are many benefits to Australia from hosting major scientific congresses, such as:

- Showcasing Australian science to the rest of the world.
- Profiling Australia's young scientists.
- Allowing Australian scientists to meet and establish links with international scientists – this is particularly important for young Australian scientists.
- Exposing Australian scientists to the latest scientific results that are often presented at these congresses.

- Raising the profile of Australian science to the general public in Australia, as these big events tend to attract significant exposure in the local media.
- Bringing the local scientific community together, as hosting large congresses often requires the entire discipline-based community to contribute (both financially and with their time). This builds up useful working relationships within the local scientific community.
- Advertising Australia as a good place to do science (ie, demonstrating that it is a safe place, pleasant climate, friendly people, good infrastructure etc.), thus establishing Australia as a destination for scientists for short-term visits. This not only increases Australia's interaction with world leading scientists, but improves Australia's chances of securing investment in large scale projects.
- Economic benefits to the Australian community in general, especially the tourism industry, from attracting a large number of international visitors. Scientific Union General Assemblies generally attract between 2000 and 6000 delegates. Based on the findings of a report by the Cooperative Research Centre for Sustainable Tourism, it is estimated that for 2003 each international delegate to business events (such as scientific conferences) spent an average of $3526 per trip[5]. This represents a significant direct contribution to the Australian economy.
- Effectively managed international congresses have enabled the local scientific communities to make profits that have been used for the benefit of Australian science. For example, profit from hosting the 1976 International Geological Congress in Sydney was used to set up a trust fund that for 30 years has been providing annual support for holding scientific meetings and lectures in the earth sciences in Australia, and for travel scholarships for young Australian scientists to international geological congresses. Similar funds have been established after hosting IAU, IUNS, IUPAC and IUPS congresses in Australia.

A recent example of the benefits from hosting an international congress in Australia was highlighted by the hosting of the International Astronomical Union General Assembly in Sydney in 2003. This example is given as a case study in Box 2.

Box 2 – Case Study: Benefits from the hosting of the International Astronomical Union General Assembly in Sydney in 2003

The following is adapted from a report given by Dr Rachel Webster at a meeting of the Chairs of the Australian Academy of Science's National Committees in April 2004.

In July 2003, the astronomical community of Australia hosted the triennial General Assembly (GA) of the International Astronomical Union in Sydney. The proposal to host the GA was submitted by the Australian Academy of Science's National Committee for Astronomy. The GA was extremely successful with over 2000 astronomers attending. Positive outcomes from the congress included:

1. **Scientific**
   A broad scientific program was presented, including presentations of the latest results in key areas of the field. Local scientists, especially young scientists, were thus exposed to key people, results, presentations and inspiration that they would not otherwise have had access to.
2. **International exposure**
   Interaction throughout the congress events (formal and informal) allowed Australian scientists to meet with leading scientists from around the world, thus building up important linkages and establishing future collaboration possibilities. Many young Australian scientists had the opportunity to present their work at the congress, thus raising their international profile in a way that would otherwise be difficult.

3. **Overcoming the 'tyranny of distance'**
   The successful running of the congress established Australia as a positive destination for scientists for future short-term visits. Using our positive tourist image, Australia was promoted as an ideal place for return visits (scientific and/or recreation). The success of the congress also demonstrated that Australia is a safe place, with a pleasant climate, friendly people, good infrastructure etc. This has undoubtedly enhanced Australia's bid to have the proposed multi-million dollar Square Kilometre Array project hosted here. If successful, this project will bring in millions of dollars of foreign investment, enhance Australia's reputation as a world leader in astronomy, and provide local scientists with easy access to an important piece of research infrastructure.

4. **Local political influence**
   The high profile of the international congress meant that the organisers were able to arrange for the congress to be opened by the Australian Prime Minister and the Science Minister. This provided the local astronomical community with a valuable opportunity to promote itself to politicians and government officials. The involvement of such high profile figures also attracted significant coverage of the event in the local media, particularly in NSW, which raised the profile of astronomy within the general Australian community in a way that science often finds difficult to achieve.

5. **Local glue**
   Due to the large scale of the congress, the entire Australian astronomical community needed to contribute, both financially and with their time. This helped to strengthen and enhance existing linkages within Australian astronomy, which should have positive future benefits.

A list of major international scientific conferences that have been held or are scheduled to be held in Australia is provided in Appendix 10. The list shows that a considerable number of global scientific organisations have held major conferences in Australia, or are planning to do so, indicating that Australia is accessing positive benefits from its engagement with these organisations.

Increased international collaboration in Australian scientific publications

On average, scientific publications that have international collaboration are more highly cited and have higher impact than papers without international collaboration, demonstrating the value of international collaboration in raising the quality of the overall science output and in raising the visibility of Australia's science effort. Thus, Australian scientists must continue to develop extensive links with international scientists. These links can be built up through informal interaction between individual scientists, or through formal links between the Australian science community and global scientific activities. A bibliometric analysis using the ISI Web of Knowledge online database (http://isi6.newisiknowledge.com/portal.cgi), shown in Table 4.1, indicates that for the disciplines in which Australia has significant formal engagement with global science activities (eg, space science, earth sciences), Australian publications have a higher level of international collaboration than the disciplines in which Australia has little formal engagement with global science activities (eg, clinical immunology and infectious disease, environment or ecology). The table also shows that the level of international collaboration in Australian publications has increased since 1997. While the analysis does have its limitations, the results suggest that formal linkages with global scientific activities do indeed result in higher levels of international collaboration (see Box 3 for a description of the methodology used).

Box 3 – Methodology for bibliometric analysis

The bibliometric analysis was done using the ISI Web of Knowledge 'Current Contents Connect' online search facility. This allowed searching for publications from journals and books that are grouped within a specific discipline category. For the analysis, disciplines were chosen from the available list provided by ISI that corresponded with the activities of global scientific bodies discussed in this report. The database was searched for publications from each discipline that had 'Australia' in the author address field. This produced the figures given in the column '# Australian publications'. Next, the database was searched for publications from each discipline or subject that had an author address containing 'Australia' AND an overseas country address. This produced the figures in the column '# Australian publications with international collaboration'. The search facility limited the number of terms that could be entered at any one time, so the 40 countries with the most number of publications (as reported on the ISI Essential Science Indicators website, isi6.newisiknowledge.com/portal.cgi) were entered. These 40 countries account for most of the world's scientific publications (>95 per cent).

Table 4.1 – Percentage of Australian publications with international collaboration, for selected disciplines

Using ISI Web of Science 'Current Contents' search, for 'all years' (Nov 2004 to Nov 1997)

Discipline	Related international bodies	# Australian publications	# Australian publications with international collaboration	% of Australian publications with international collaboration
Australian Average (latest 6 months to 16 November 2004 only)		13,314	5,584	41.9
Australian Average for the year 1997		20,806	7,538	30.4
Space science	IAU, URSI, COSPAR, SCOSTEP, FAGS	2,703	2,210	81.8
Chemistry & physics, pure and applied	IUPAC, IUPAP	2,207	1,431	64.8
Mathematics	IMU	2,337	1,430	61.2
Physics	IUPAP	4,414	2,582	58.5
Earth sciences	IGBP, IGU, INQUA, IUGG, IUGS, IUSS, SCAR, SCL, SCOR, WCRP	7,222	4,007	55.5
Molecular biology and genetics	IUBMB	2,716	1,504	55.4
Biology	IUBS	2,280	1,150	50.4
Biotechnology and applied microbiology	IUMS	576	306	53.1
Inorganic and nuclear chemistry	IUCr	1,175	570	48.5
Biochemistry and biophysics	IUBMB, IUPAB	3,837	1,774	46.2
Animal and plant Science	IUBS,	1,841	847	46.0
Physiology	IUPS	1,532	692	45.2
Immunology	IUIS	3,356	1,469	43.8
Microbiology	IUMS	3,720	1,630	43.8
Clinical immunology and infectious disease	IUIS, WHO	1,401	571	40.8
Neurology	IBRO	1,896	751	39.6
Chemistry	IUPAC	2,120	833	39.3
Environment/Ecology	DIVERSITAS, MA, SCOPE	6,377	2,472	38.8
Psychology	IUPsyS	4,944	1,646	33.3
Pharmacology/Toxicology	IUPHAR, IUTOX	3,237	1,068	33.0
Food Science/Nutrition	IUNS, IUFoST	1,545	462	29.9

These disciplines were chosen from the list of fields provided by ISI for analysis as they relate to the work of corresponding global science bodies. There were no directly relevant discipline fields available for searching in the ISI Web of Knowledge database relating to the activities of IGU, IUHPS, IUTAM, IUAES, IUPESM and IHDP.

Case studies

Some case studies highlighting the benefits to Australia from formal linkages to global science activities are given in Boxes 4 and 5.

Box 4 – Antarctic research/SCAR
(www.scar.org)

The Scientific Committee on Antarctic Research (SCAR) is an interdisciplinary scientific committee of ICSU, and is charged with the initiation, promotion and coordination of scientific research in Antarctica. SCAR is the primary body providing international, independent scientific advice to the Antarctic Treaty system and other organisations on issues of science and conservation affecting the management of Antarctica and the Southern Ocean.

The membership of SCAR comprises national scientific academies or research councils that are active in Antarctic research, together with the relevant Scientific Unions of ICSU. Australia is one of 27 full members of SCAR, via membership subscriptions from the Australian Academy of Science and the Australian Antarctic Division.

Australia has stewardship for 42 per cent of Antarctica, and has been a major player in SCAR since its inception, underpinned by the activities of the Commonwealth government's Antarctic Division and the Australian Academy of Science's National Committee for Antarctic Research.

Antarctica is a region of global scientific relevance, and Antarctic processes are global in extent and influence. It is the 'hub' of world oceans and a major driver of circulation in the oceans and atmosphere, making it a driver of long-term global climate change and short-term regional weather. It is a major sink for CO_2 and acts as an early warning signal for the globe (for processes such as ozone depletion, global warming and sea-level rise). Improved short and long-term weather and climate forecasting represents significant economic benefits to Australian agriculture, catchment management etc.

Antarctica has a unique ecology and biodiversity of plants and animals that have adapted to live under extreme conditions. Australian involvement in SCAR is contributing to the understanding, preservation and sustainable management of this biodiversity, including the potential economic harvesting of marine resources such as fish and krill that will require careful scientific management.

International collaboration via SCAR enhances the effectiveness of Australia's Antarctic science programs by providing:

- Access to data (eg, satellite observations, ocean buoy data and observations) that would be impossible or prohibitively expensive for Australia to acquire on its own.
- Access to the expertise and inspiration of leading international scientists.
- Logistic support from other nations involved in Antarctic science. Antarctica is a cold and inhospitable place that presents unique challenges to researchers, so it is important for nations to work together to overcome these challenges.
- Validation of Australian research by comparison and contrast with the work of other nations.
- Training of new scientists and the building of links with overseas scientists.
- Adding value to the Australian Antarctic Science Program by leveraging off activities funded by other nations.

Antarctica also has important political implications for Australia. The Antarctic Treaty has maintained Antarctica as a zone of peace and international cooperation since its signing in 1959. Australia's involvement in Antarctic science and SCAR has allowed Australia to shape the international Antarctic Treaty, which has enhanced its standing on the world stage and contributed to increased national security as a result of having a significant presence in its southern border region.

To ensure long-term sustainable use of and access to Antarctica, Australia must remain actively involved in SCAR to underpin its political influence with sound scientific advice.

Box 5 – International Geosphere-Biosphere Programme (IGBP)
(www.igbp.kva.se/cgi-bin/php/frameset.php)

IGBP's scientific objective is 'to describe and understand the interactive physical, chemical and biological processes that regulate the total Earth System, the unique environment that it provides for life, the changes that are occurring in this system, and the manner in which they are influenced by human actions'. IGBP works towards its objective in close collaboration with its partners in the Earth System Science Partnership (ESSP) – a partnership for the integrated study of the earth system, the changes that are occurring to the system and the implications of these changes for global sustainability. The ESSP consists of IGBP, the International Human Dimensions Programme on Global Environmental Change (IHDP), the World Climate Research Programme (WCRP), and DIVERSITAS, an international program of biodiversity science.

Australia is a member of IGBP via membership subscriptions from the Australian Academy of Science. For a more detailed description of IGBP and Australia's involvement, see Appendix 3.

IGBP adds value to a large number of individual, national and regional research projects through integrating activities to achieve enhanced scientific understanding. The benefits from Australia being involved in IGBP include:

- Access to the research networks formed by IGBP to tackle focused scientific questions. Australian scientists have taken advantage of these ready made IGBP networks to build their own personal scientific linkages and programs.
- Involvement of Australian scientists in leadership roles in IGBP, such as on the Scientific Steering Committee. For a relatively small annual membership subscription (which is often directly offset by return funding from IGBP to Australian scientists for travel to IGBP Scientific Steering Committee meetings), Australia gets an influence in the types of projects the IGBP does, ensuring that the work of this global organisation is of relevance to Australia.
- The development and promotion of standardised methodologies. This allows Australian scientists to more easily cross-compare their research with overseas scientists, so Australian science can more readily use and contribute to international research. This includes faster access to standardised global datasets (as well as a say in the design of the datasets and access systems), and the ability to undertake model intercomparisons (leading to enhanced models by seeing what others are doing and fine tuning the models). An example is research looking at the impacts of elevated global CO_2 levels to Australian forestries and catchments – access to IGBP networks, datasets, methodologies and model comparisons allows Australian scientists to develop more effective models for Australian environments and conditions, representing potential direct economic benefits to Australia.
- The hosting of the Global Carbon Project (GCP) in Canberra gives Australia a strong influence in how the GCP proceeds. The GCP is one of the four core projects of the ESSP in which IGBP is involved. Australia is a key player and has a strong interest in carbon cycle research, especially the policy side where the GCP plays an important role in advising the IPCC (International Panel on Climate Change). Hosting the GCP makes Australia the centre of world carbon cycle research, as well as ensuring that the southern hemisphere and Australian climate types are taken into account.

5. Gaps in Australia's current formal links to global scientific programs

Summary

Australia is a formal member of 59 of the 68 ICSU activities, with the Australian Academy of Science directly responsible for managing formal subscriptions to 30 of them, while Australian scientific societies and government agencies subscribe to another 21. There are also eight ICSU bodies that do not have membership from individual nations, but are sponsored by other ICSU bodies that Australia is a member of, so Australia can be considered a member of these bodies via formal membership to those sponsoring bodies. Another two ICSU bodies consist of individual scientists as members (rather than membership from a national body), so these are not considered as gaps in Australia's formal linkages. This list shows that although there are a few gaps in Australia's engagement, Australia is still extensively involved with global scientific activities on at least some level.

The following is a list of global science programs and activities that Australia does not currently have formal links with:

ICSU Unions

There are no gaps in Australia's formal links to the ICSU Unions. This does not necessarily imply that the formal links are at an appropriate level, merely that formal links exist.

ICSU Associates

- Academia de Ciencias de América Latina (ACAL);
- International Institute for Applied System Analysis (IIASA).

ICSU Interdisciplinary Bodies and Joint Initiatives

- Committee on Data for Science and Technology (CODATA);
- Scientific Committee on Problems of the Environment (SCOPE);
- An Integrated Programme of Biodiversity (DIVERSITAS);
- International Human Dimensions Programme on Global Environmental Change (IHDP);
- Millennium Ecosystem Assessment (MA).

Global scientific activities under UN organisations

- Council for International Organizations of Medical Sciences (CIOMS).

Other global science programs

- Global Forum for Health Research;
- International Group of Funding Agencies for Global Change Research (IGFA);
- Integrated Ocean Drilling Program (IODP).

The following pages describe the gaps in Australia's participation in more detail, and identify which activities that Australia should seek to become formally involved in.

ICSU Unions

There are 27 ICSU Unions. The Australian Academy of Science subscribes to 21 of them. The remaining six are subscribed to by the relevant Australian scientific society. Therefore there are no gaps in Australia's formal links to the ICSU Unions. This does not necessarily mean that the formal links are appropriate, merely that formal links exist.

ICSU Associates

There are 21 ICSU Associates. The Australian Academy of Science subscribes to three of them, and the relevant Australian scientific societies subscribe to another 14. Another two consist of individual scientists as members (rather than membership from a national body), so these are not considered as gaps in Australia's formal linkages.

There are two ICSU Associates that Australia does not appear to be formally involved with in some way. They are:

- Academia de Ciencias de América Latina (ACAL) (www.acal-scientia.org)
  Australia is not a Latin American country, so it is not appropriate for Australia to be involved;
- International Institute for Applied System Analysis (IIASA) (www.iiasa.ac.at)
  There are 16 member countries, but Australia is not a member.

It is not recommended that Australia should seek to become formal members of these organisations at this stage.

ICSU Interdisciplinary Bodies and Joint Initiatives

There are 20 ICSU Interdisciplinary Bodies and Joint Initiatives. The Australian Academy of Science subscribes directly to six of them (COSPAR, IGBP, SCAR, SCOR, SCOSTEP and WCRP). Australia is also formally involved with another eight - FAGS, GCOS, GOOS, GTOS, IGOS, IUCAF, SCL and WDC. These bodies do not receive direct funding from individual nations – they are funded by ICSU and ICSU Unions, to which Australia pays membership subscriptions. So, although there is no direct formal Australian membership to these bodies, membership to their sponsoring ICSU bodies seems the

appropriate way to be linked. Australia is particularly active in GCOS, GOOS and WDC via contributing data or hosting nodes.

There are six ICSU Interdisciplinary Bodies and Joint Initiatives that Australia is not formally involved with. They are listed below. Note that the Academy paid formal membership subscriptions to CODATA and SCOPE in the past, so although these subscriptions were stopped in recent times, there is still much Australian involvement in these bodies.

Committee on Data for Science and Technology (CODATA)
(www.codata.org)

CODATA is an interdisciplinary Scientific Committee of ICSU that works to improve the quality, reliability, management and accessibility of data of importance to all fields of science and technology. CODATA is a resource that provides scientists and engineers with access to international data activities for increased awareness, direct cooperation and new knowledge. CODATA was established 33 years ago by ICSU to promote and encourage, on a worldwide basis, the compilation, evaluation and dissemination of reliable numerical data of importance to science and technology. CODATA is concerned with all types of data resulting from experimental measurements, observations and calculations in every field of science and technology, including the physical sciences, biology, geology, astronomy, engineering, environmental science, ecology and others. Particular emphasis is given to data management problems common to different disciplines and to data used outside the field in which they were generated. In summary, the purpose of CODATA is to help foster and advance science and technology through developing and sharing knowledge about data and the activities that work with data. Twenty-three countries are members, and 14 International Scientific Unions have assigned liaison delegates. For more details see Appendix 3.

The Academy paid direct membership subscriptions to CODATA up until 1999-2000, but no longer pays membership subscriptions. Membership subscriptions were cut due to budget limitations that forced the Academy to reduce its international subscriptions. The Academy consulted with the chair of the Australian National Committee for CODATA at the time, who indicated that there was little activity related to CODATA in Australia and that the relevant Australian scientific communities would not be adversely affected by cancelling the subscription. Australia is still informally linked via Academy subscriptions to the various ICSU Unions that sponsor CODATA, and Australian scientists also play a role in CODATA as representatives of other Scientific Unions. There is still significant involvement in CODATA from Australian scientists, including a newly reformed Australian working group for CODATA, indicating that activity in Australia is increasing.

If more funding were available, the Academy would consider formally rejoining CODATA.

Scientific Committee on Problems of the Environment (SCOPE)
(www.icsu-scope.org)

SCOPE is an interdisciplinary body of natural and social science expertise focused on global environmental issues, operating at the interface between scientific and decision-making instances. It is a worldwide network of scientists and scientific institutions developing syntheses and reviews of scientific knowledge on current or potential environmental issues. There are 40 member countries and 22 ISCU Unions and International Bodies. For more details see Appendix 3.

The Australian Academy of Science paid membership subscriptions up until 2001-2002, but stopped subscriptions in 2002-2003. The decision to stop subscriptions was made due to the perception that the fees were too high (SCOPE was one of the more expensive international subscriptions managed by the Academy). The subscriptions were high because in the past there was very active involvement from several Australian scientists and positive benefits were flowing back to the Australian science community through their involvement. However, when these individuals reduced their involvement Australia's influence in SCOPE diminished, and budget limitations were at that time putting pressure on the Academy to cut the total cost of subscriptions to global science bodies. The Academy informed the relevant National Committees that they were considering cancelling the SCOPE subscription and asked for feedback, and when there were no strong objections the decision was made to cancel the subscription. Since then there have been requests from the science community to renew Australia's subscription to SCOPE.

Australia and the Australian Academy of Science are still listed as members on the SCOPE website. Several Australian scientists are involved in various SCOPE projects. Australia is informally linked via Academy subscriptions to the various ICSU bodies that sponsor SCOPE.

Australian involvement in SCOPE will contribute to the National Research Priority of 'An Environmentally Sustainable Australia', particularly for the Priority Goals of 'Water – a critical resource', 'Overcoming soil loss, salinity and acidity' and 'Sustainable use of Australia's biodiversity'. It is also relevant to the National Research Priority of 'Safeguarding Australia', specifically the Priority Goal of 'Protecting Australia from invasive diseases and pests'.

If more funding were available, the Academy would consider formally rejoining SCOPE.

An Integrated Programme of Biodiversity (DIVERSITAS)

(www.diversitas-international.org)

DIVERSITAS is an international global environmental change research program, sponsored by ICSU, SCOPE, IUBS, IUMS and UNESCO. DIVERSITAS's missions are:

- to promote integrative biodiversity science, linking biological, ecological and social disciplines in an effort to produce socially relevant new knowledge;
- to provide the scientific basis for an understanding of biodiversity loss, and to draw out the implications for the policies for conservation and sustainable use of biodiversity.

For more details see Appendix 3.

DIVERSITAS relies mainly (90 per cent) on voluntary national contributions from ten nations for funding – USA, Germany, Switzerland, the Netherlands, Norway, Mexico, Sweden, Austria, United Kingdom and China-Taipei. IGFA, the International Group of Funding Agencies for global environmental change research, facilitates the dialogue between national funding agencies and DIVERSITAS. The remaining 10 per cent of funding is provided by the sponsors (ICSU, SCOPE, IUBS and IUMS). Research projects contributing to DIVERSITAS are funded by national and regional agencies, on a competitive basis.

Australia does not contribute any funding directly to DIVERSITAS, although it contributes indirectly via Academy membership subscriptions to ICSU, IUBS and IUMS. Scientists from the CSIRO and the

Australian Network for Plant Conservation are involved in the DIVERSITAS collaborative research network (in-kind support), and Australian scientists are active in various DIVERSITAS committees. There are some informal Australian activities and networks related to DIVERSITAS activities that could be developed into a formal National Committee.

A recent report by the Australian Academy of Science to the Australian Greenhouse Office in 2003, which assessed Australia's international participation in the area of climate change science, recommended the following:

> The issue of climate change in relation to biodiversity in Australia is a growing policy concern. Australia should seek more direct participation in DIVERSITAS by strengthening the membership of the DIVERSITAS Australian National Committee. This may also provide important linkages and support for the proposed National Biodiversity and Climate Change Action Plan currently under development through the Department of the Environment and Heritage. It should be noted that Australia currently has in place several high-level committees that deal with global change, environment and sustainability issues. Suitable resourcing may provide the opportunity for such committees to be brought together periodically, thereby enhancing Australia's effectiveness at the international level.[2]

Australian involvement in DIVERSITAS will contribute to the National Research Priority of 'An Environmentally sustainable Australia', particularly for the Priority Goal of 'Sustainable use of Australia's biodiversity'.

It is recommended that Australia seek to become a formal member of DIVERSITAS.

International Human Dimensions Programme on Global Environmental Change (IHDP) (www.ihdp.org)

IHDP is an international, interdisciplinary, non-governmental science program dedicated to promoting and coordinating research. IHDP's mission is to generate scientific knowledge on coupled human-environment systems, achieve comprehensive understanding of global environmental change processes and their consequences for sustainable development, and make contributions to explore:

- the anthropogenic drives of global environmental change;
- the impact of such change on human welfare; and
- societal responses to mitigate and adapt to global environmental change.

Australia does not provide direct funding to IHDP, but contributes indirectly via membership to ICSU and ISSC. No Australians are currently on the IHDP Scientific Committee. However, Australian scientists are involved in IHDP core projects.

A recent report by the Australian Academy of Science to the Australian Greenhouse Office in 2003, which assessed Australia's international participation in the area of climate change science, recommended that:

> The human aspect of climate change is an area of research attracting increasing attention and Australia would be well suited to seek greater involvement in this issue. It is recommended that Australia make a direct contribution to IHDP (as it now does for IGBP and WCRP).[2]

Australian involvement in IHDP will contribute to the National Research Priority of 'An Environmentally sustainable Australia', particularly for the Priority Goal of 'Responding to climate change and variability'.

It is recommended that Australia seek to become a formal member of IHDP.

Millennium Ecosystem Assessment (MA)
(www.millenniumassessment.org)

The Millennium Ecosystem Assessment is an international work program designed to meet the needs of decision makers and the public for scientific information concerning the consequences of ecosystem change for human well-being and options for responding to those changes. MA was launched by UN Secretary-General Kofi Annan in June 2001 to help to meet assessment needs of the Convention on Biological Diversity, Convention to Combat Desertification, the Ramsar Convention on Wetlands, and the Convention on Migratory Species, as well as needs of other users in the private sector and civil society. MA focuses on ecosystem services (the benefits people obtain from ecosystems), how changes in ecosystem services have affected human well-being, how ecosystem changes may affect people in future decades, and response options that might be adopted at local, national, or global scales to improve ecosystem management and thereby contribute to human well-being and poverty alleviation. MA will:

- identify priorities for action;
- provide tools for planning and management;
- provide foresight concerning the consequences of decisions affecting ecosystems;
- identify response options to achieve human development and sustainability goals;
- help build individual and institutional capacity to undertake integrated ecosystem assessments and to act on their findings.

The four-year MA budget is approximately US$17 million, with more than $7 million of additional support through in-kind contributions. Major financial support for the MA is being provided by the Global Environment Facility (GEF), United Nations Foundation, the David and Lucile Packard Foundation, World Bank, United Nations Environment Programme (UNEP), the government of Norway, and the Kingdom of Saudi Arabia.

Eighteen countries and regions are affiliated via their national academies of science, but Australia is not one of those affiliated countries, so is not a formal member nation. Australian scientists do provide in-kind support for MA activities, and have been involved in several peer reviews of MA programs, particularly in round 2.

Australian involvement in MA will contribute to the National Research Priority of 'An Environmentally sustainable Australia'.

It is recommended that Australia seek to become a formal member, via the Academy becoming an affiliated scientific organisation.

Global scientific activities under UN organisations

The Commonwealth government is a formal member of UNESCO, the World Meteorological Organisation (WMO), the United Nations Environment Programme (UNEP), the World Health Organisation (WHO), the Food and Agriculture Organization of the United Nations (FAO), the International Telecommunication Union (ITU), the International Atomic Energy Agency (IAEA), and Australian scientists are involved in these global science programs.

Australia is NOT a member of:

The Council for International Organizations of Medical Sciences (CIOMS)
(www.cioms.ch)

CIOMS is an international, non-governmental, non-profit organisation established jointly by WHO and UNESCO in 1949. The main objectives of CIOMS are:

- to facilitate and promote international activities in the field of biomedical sciences;
- to maintain collaborative relations with the United Nations and its specialised agencies;
- to serve the scientific interests of the international biomedical community in general.

To achieve its objectives, CIOMS has initiated and coordinates the following main long-term programs:

- Bioethics;
- Health Policy, Ethics and Human Values - An International Dialogue;
- Drug Development and Use;
- International Nomenclature of Diseases.

The membership of CIOMS includes 48 international member organisations, representing many of the biomedical disciplines, and 18 national members mainly representing national academies of sciences and medical research councils. Australia is not a member country.

It is not recommended that Australia seek to become formally involved in CIOMS at this stage.

Other global science programs

Australia has formal membership links to the Global Biodiversity Information Facility (GBIF), the Human Frontier Science Program (HFSP), the International Federation for the Promotion of Mechanism and Machine Science (IFToMM) (Academy subscription), the International Union against Cancer (UICC), the Global Water Research Coalition (GWRC), and the World Conservation Union (IUCN). The Academy is a member of the InterAcademy Council (IAC), InterAcademy Panel (IAP) and InterAcademy Medical Panel (IAMP), but does not currently provide any formal funding and is not currently represented on the governing councils or executive.

Australia does NOT have formal membership links with the following organisations:

Global Forum for Health Research
(www.globalforumhealth.org/pages/index.asp)

The Global Forum for Health Research is an independent international foundation established in Geneva (Switzerland) in 1998 with the objective of helping correct the 10/90 gap in health research. The Global Forum is currently supported by donations from the Rockefeller Foundation, World Bank, World Health Organization and the governments of Canada, Denmark, the Netherlands, Norway, Sweden and Switzerland. In addition, individual networks supported by the Global Forum receive funding from the Bill and Melinda Gates Foundation, the Institute of Medicine of the US Academy of Sciences, the UK Department of International Development, and others. Australia is not a formal member.

International Group of Funding Agencies for Global Change Research (IGFA)
(www.igfagcr.org)

The goal of IGFA is to foster global change research. IGFA is a forum through which national agencies that fund research on global change identify issues of mutual interest and ways to address these through national and, when appropriate, through coordinated international actions. There are 23 member nations. Australia is not a member.

A recent report by the Australian Academy of Science to the Australian Greenhouse Office in 2003, which assessed Australia's international participation in the area of climate change science, recommended that:

> It seems strategically profitable for Australia to seek membership and involvement in other international and regional groupings such as IGFA, so as to enhance Australia's influence in international planning and to increase its access to information and data sets.[2]

It is therefore recommended that Australia seek to become formally involved in IGFA.

Integrated Ocean Drilling Program (IODP)
(www.iodp.org)

IODP is an international research program that explores the history and structure of the earth as recorded in seafloor sediments and rocks. IODP builds upon the earlier successes of the Deep Sea Drilling Project (DSDP) and Ocean Drilling Program (ODP), which revolutionised our view of earth history and global processes through ocean basin exploration. IODP greatly expands the reach of these previous programs by using multiple drilling vessels, including riser, riserless, and mission-specific platforms, to achieve its scientific goals. The IODP is perhaps the largest international earth sciences program.

Australia is not currently a formal member of IODP. Membership is in the order of US$5 million per annum, up from $1.5 million for the ODP. Australia had a 1/3 membership in the ODP (shared with Canada and Taiwan), funded by a consortium of Geoscience Australia, CSIRO, ARC, and 14 Australian universities. The Australian consortium decided not to go with IODP in 2004 due to increased cost and a change in Geoscience Australia's priorities for funding.

Australian involvement in IODP will contribute to the National Research Priority of 'An Environmentally sustainable Australia', specifically for the Priority Goal of 'Developing deep earth resources'.

It is recommended that Australia seek to become formally involved in IODP. Some justification for this is given in Box 6.

Box 6 – Justification for Australian membership of the International Ocean Drilling Program (IODP)

The Integrated Ocean Drilling Program (IODP) is the largest international program in the earth and ocean sciences and represents the next phase of scientific ocean exploration, following on from the Ocean Drilling Program (ODP). IODP takes ODP a stage further by using multiple platforms with range of capabilities allowing for drilling and sampling in new regions of the world's oceans that have previously been inaccessible. As a result of the multiple platforms and increased range of activities, membership of IODP is more expensive than the ODP program. The cost for a full membership in IODP is US$5.6 million, although Australia could also join as part of an Australasian consortium membership in IODP which would cost in the range of US$2.5-3 million per annum.

The following is taken from a proposal for the initial round of the National Collaborative Research Infrastructure Strategy (NCRIS) put together by the Australian Marine Geoscience Council, 'MARGO' (see ems.anu.edu.au/margo/html/IODP.htm).

Australia is at a critical point in marine geoscience. Under national and international legislation Australia has stewardship of a vast marine territory stretching almost 14 million square kilometres, most of which is unexplored and unknown. It requires management and assessment of both living and non-living resources. Australia is also in the prime location in the understudied Southern Hemisphere, surrounded by three of the four major oceans. This is the ideal position to potentially be driving Southern Hemisphere research in climate change, understanding the deep ocean, earth dynamics and geological processes, new mineralogical and energy resources, the sub-seafloor biosphere, hazards such as tsunamis caused by earthquakes in the region, and changes in marine life resulting from climate change.

As a result of not being involved in the IODP, Australia's marine geoscience community no longer has access to facilities and technology to undertake significant deep-earth research. Australia needs to participate in the science driven IODP to provide Australian scientists with access to infrastructure and state-of-the-art technology to support such research. Participation in the IODP will also enhance collaboration between Australians and the broader global geoscience community, in much the same way that Australian researchers played a major role during Australia's involvement with the previous Ocean Drilling Program.

Valued outcomes from Australian participation in the IODP will include:

- Revitalisation of Australian marine geoscience research;
- Exciting opportunities for young Australian researchers to be part of international projects;
- Exchange of skills, concepts and access to new technology;
- Improved understanding of marine ecosystems, biodiversity and potential climate change impacts;
- Critical data to assist natural hazard forecasting;
- New information to motivate offshore mineral exploration;
- Stimulus to offshore oil and gas explorers;
- Emphatic demonstration of Australia's active investigation of its marine jurisdiction.

For Australia to be a leading player in the international marine geoscience community, we need to be an active and financial member of this community. Participation in IODP, the largest international geoscience research activity, will bring Australia back to the forefront of international scientific partnership in multidisciplinary marine geoscience.

6. Mechanisms to enhance Australia's involvement in global science activities

Close the key gaps identified in Australia's participation in global scientific activities

Although Australia is well engaged in the major global scientific organisations, some strategically important gaps were identified in Chapter 5. It is recommended that Australia closes these gaps by becoming a formal member of the following organisations:

- An Integrated Programme of Biodiversity (DIVERSITAS);
- International Group of Funding Agencies for Global Change Research (IGFA);
- International Human Dimensions Programme on Global Environmental Change (IHDP);
- Integrated Ocean Drilling Program (IODP);
- Millennium Ecosystem Assessment (MA).

Australia should also consider rejoining:

- the Committee on Data for Science and Technology (CODATA);
- the Scientific Committee on Problems of the Environment (SCOPE).

However, it should be noted that adopting these recommendations will require additional funding or a redistribution of existing funds (which carries the risk of creating other gaps).

Increased government funding to maintain and enhance the Australian Academy of Science's linkages with global scientific activities

Currently, the Academy receives annual grants from the Department of Education, Science and Training and the Department of the Environment and Heritage to pay for subscriptions to global scientific organisations, for support for Australian voting delegates to General Assemblies of ICSU Scientific Unions and for meetings of Australian scientific National Committees. As discussed in Chapter 3, the Academy is under pressure from the rising costs of international subscriptions and is in a position where it either needs to:

- obtain more government funding to support the Academy's international activities;
- decide to stop paying membership subscriptions to some global scientific organisations;
- ignore opportunities to formally engage with potentially worthwhile global scientific organisations that may emerge in the future; or
- reduce funding to support National Committees and travel support for Australian voting delegates to General Assemblies of ICSU Scientific Unions (which would lead to a reduced benefit from being involved with global science organisations).

The Academy welcomes further discussion regarding funding for subscriptions to global scientific activities in the forthcoming five-year review into the Academy's responsibilities.

Conference support

Chapter 4 described the many positive benefits from hosting international scientific congresses in Australia. It is apparent that Australia's involvement in global scientific activities could be enhanced by attracting more of these congresses to Australia. There are two main ways in which Australia might improve its ability to attract major scientific congresses:

1. Pay a higher membership subscription level to ICSU Scientific Unions, which would give Australia more influence in the decision making bodies of the Unions, in particular more delegates and voting rights at the General Assemblies.
2. Provide greater support for National Committees or other organisations to bid to host international congresses in Australia, as happens in many other countries. There is currently a barrier for Australia's scientific National Committees or other organisations that might like to bid for these congresses, in that there is very little 'seed' funding available to support the preparation and maintenance of bids. In most cases, there are several years between the date of initial acceptance of a bid and the date at which income begins to come in from registrations and sponsorship. This can put a significant burden on a prospective host organisation and presents a barrier to these organisations from attempting to put together bids for large international science congresses.

Enhancing the use of Australia's involvement in global science activities as a foreign policy tool

Scientific issues are increasingly influential in matters of national security (eg, bioterrorism, infectious diseases, military technologies), international economic policy (eg, trade in genetically modified foods and products, international telecommunications, microelectronics), international environmental policy (eg, global climate change, protection of biodiversity), capacity building in developing countries, and other areas. International science relations should be seen as part of Australia's international and trade relations. In this regard, Australia could benefit from better links between the science community (represented by the Australian Academy of Science) and the Commonwealth government's Department of Foreign Affairs and Trade.

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Appendix 1 – ICSU International Scientific Unions

An ICSU Scientific Union Member is 'an international non-governmental organisation devoted to the promotion of activities in a particular area of science and shall have been in existence for at least 6 years.' The information below was collected from the ICSU website, and from the individual Unions' websites and reports. The information was current as of December 2004.

International Astronomical Union (IAU)

(www.iau.org)

The mission of the IAU, founded in 1919, is to promote and safeguard the science of astronomy in all its aspects through international cooperation. The IAU continues to play a key role in promoting and coordinating worldwide cooperation in astronomy. IAU activities range from the definition of fundamental astronomical and dynamical constants and unambiguous astronomical nomenclature, rapid dissemination of new discoveries, organisation of international observing campaigns, and promotion of educational activities in astronomy to early informal discussions of possible future international large-scale facilities. The IAU is the sole internationally recognised authority for giving designations and names to celestial bodies and their surface features. The IAU is also active in promoting astronomical education and research in countries where astronomy is not yet fully developed through the IAU International Schools for Young Astronomers, Teaching for Astronomy Development, and other programs carried out in concert with other ICSU bodies and UN organisations.

Involved countries or organisations

There are 67 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- Australia has 217 individual members (2.39% of the total IAU membership).
- The current IAU President is Ron Ekers (CSIRO).
- Several Australian scientists are involved in leadership roles in the various IAU Divisions and Commissions.
- The 2003 IAU General Assembly was held in Sydney.

Main programs

There are 12 Scientific Divisions (with 37 specialised Commissions and 83 Working and Program Groups):

- Division I: Fundamental Astronomy;
- Division II: Sun and Heliosphere;
- Division III: Planetary Systems Sciences;
- Division IV: Stars;
- Division V: Variable Stars;
- Division VI: Interstellar Matter;
- Division VII: Galactic System;

- Division VIII: Galaxies and the Universe;
- Division IX: Optical and Infrared Techniques;
- Division X: Radio Astronomy;
- Division XI: Space and High Energy Astrophysics;
- Division XII: Union-Wide Activities.

International Brain Research Organisation (IBRO)

(www.ibro.info)

IBRO is a multinational organisation of neuroscientists dedicated to the promotion of teaching, research and communication worldwide. When first created about 40 years ago in a politically divided world, IBRO was intended to offer an international forum to encourage scientific discussion and training of neuroscientists. With the passage of time, IBRO has adapted its objectives to better serve the current international situation and now focuses on training and education of students and scientists in regions with special needs. In particular, IBRO wishes to assist in giving neuroscientists in different parts of the world a direct voice in defining their own needs and priorities in research and science education. IBRO publishes the high-quality journal, *Neuroscience*, which provides IBRO with substantial annual income, making it possible to fund the various programs described above. Another much smaller source of income is a minor portion of membership dues from the various member neuroscience organisations. IBRO can be looked upon as a federation of neuroscience organisations encompassing the world, and members are encouraged to actively participate in the various programs described above to foster and develop neuroscience and scientific dialogue everywhere.

Involved countries or organisations

There are 45 member countries.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions.
- The Australian Neuroscience Society (ANS) is a member and pays membership dues.
- The current IBRO Treasurer is SJ Redman (Australian National University).

Main programs

See background above.

International Geographical Union (IGU)

(www.igu-net.org/uk/igu.html)

IGU has the following aims:

- to promote the study of geographical problems;
- to initiate and co-ordinate geographical research requiring international co-operation and to promote its scientific discussion and publication;
- to provide for the participation of geographers in the work of relevant international organisations;
- to facilitate the collection and diffusion of geographical data and documentation in and between all member countries;

- to promote International Geographical Congresses, regional conferences and specialised symposia related to the objectives of the Union;
- to participate in any other appropriate form of international co-operation with the object of advancing the study and application of geography;
- to promote international standardisation or compatibility of methods, nomenclature, and symbols employed in geography.

The International Geographical Union adheres to ICSU and the International Social Science Council (ISSC).

Involved countries or organisations

There are 89 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- No Australians are on the executive committee, but Australian scientists are involved in some of the 32 Commissions if IGU.
- The 2006 IGU regional congress is to be held in Brisbane. The 1988 congress was in Sydney.

Main programs

Main IGU activities consist of 32 specialist Commissions, 2 task forces (the MegaCity Task Force and the Vulnerability Task Force), and a Special Committee (World Map on the 'State of the Environment').

International Mathematical Union (IMU)

(www.mathunion.org)

IMU is an international non-governmental and non-profit scientific organisation, with the purpose of promoting international cooperation in mathematics. The objectives of the IMU are:

- to promote international cooperation in mathematics;
- to support and assist the International Congress of Mathematicians and other international scientific meetings or conferences;
- to encourage and support other international mathematical activities considered likely to contribute to the development of mathematical science in any of its aspects, pure, applied, or educational.

Involved countries or organisations

There are 65 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- No IMU congress has ever been held in Australia.

Main programs

- International Congress of Mathematicians (ICM);
- ICM related and other Grants;
- Developing Countries (CDE);
- Mathematical Instruction (ICMI) (has involvement from Australian scientists);
- Electronic Information and Communication (CEIC) (has involvement from Australian scientists).

International Society for Photogrammetry and Remote Sensing (ISPRS)

(www.isprs.org)

ISPRS is a non-governmental organisation devoted to the development of international cooperation for the advancement of photogrammetry and remote sensing and their applications. The Society's scientific interests include photogrammetry, remote sensing, spatial information systems and related disciplines, as well as applications in cartography, geodesy, surveying, natural, Earth and engineering sciences, and environmental monitoring and protection. Further applications include industrial design and manufacturing, architecture and monument preservation, medicine and others. The principal activities of the Society are:

- stimulating the formation of national or regional Societies of Photogrammetry and Remote Sensing;
- initiating and coordinating research in photogrammetry and remote sensing;
- holding international Symposia and Congresses at regular intervals;
- ensuring worldwide circulation of the records of discussion and the results of research by publication of the International Archives of Photogrammetry and Remote Sensing;
- encouraging the publication and exchange of scientific papers and journals dealing with photogrammetry and remote sensing;
- promoting cooperation and coordination with related international scientific organisations.

Involved countries or organisations

There are 54 sustaining members (mainly companies), plus subscriptions from ICSU and 103 member countries.

Australian involvement

- The Australian Academy of Science is not a member.
- The Remote Sensing and Photogrammetry Association of Australia is a member and pays membership dues.
- No ISPRS congress has ever been held in Australia.
- John Trinder (University of New South Wales) is the current President of ISPRS.

Main programs

- Seven Technical Commissions, with several working groups under each;
- Three Permanent Committees.

International Union of Anthropological and Ethnological Sciences (IUAES)

(www.leidenuniv.nl/fsw/iuaes)

IUAES is a world organisation of social and biological anthropological scientists and institutions working in the fields of anthropology and ethnology. It is also of interest to archaeologists and linguistics specialists, among others. Its aim is to enhance exchange and communication among scholars of all regions of the world, in a collective effort to expand human knowledge. In this way it hopes to contribute to a better understanding of human society, and to a sustainable future based on harmony between nature and culture. Through its International Congresses of Anthropological and Ethnological Sciences (ICAES), held every five years, it provides a world forum for the discussion and dissemination of research in these fields. It also holds Inter-Congresses, seminars and symposia, and encourages the participation of anthropologists in other international meetings and projects. Through its Commissions, the IUAES stimulates the convergence of research interests among anthropologists, and the dissemination of research findings through publications.

Involved countries or organisations

There are more than 50 member countries.

Australian involvement

- No formal Australian Academy of Science involvement.
- Australia is a member country, so an Australian organisation must be paying membership dues, but details were not available.
- Australia has five delegates on permanent council (reflects membership level).
- Australian scientists are involved in some of the 27 IUAES commissions.
- No IUAES congresses have been held in Australia.

Main programs

There are 27 IUAES commissions.

International Union of Biochemistry and Molecular Biology (IUBMB)

(www.iubmb.unibe.ch)

The Mission of the IUBMB is to foster and support the growth and advancement of biochemistry and molecular biology as the foundation from which the biomolecular sciences derive their basic ideas and techniques in the service of mankind. It has particular concern for areas where biochemistry is less well developed, by promoting international cooperation and high standards in research, discussion, application and publication, and through international standardisation of methods, nomenclature and symbols, in biochemistry and molecular biology. The IUBMB aims to accomplish this by:

- serving as a scientific, international, non-governmental body in objectively addressing global issues that involve the sciences of biochemistry and molecular biology. Where appropriate, the IUBMB will represent these interests in governmental and non-governmental forums;
- contributing to the advancement of research in biochemistry and molecular biology throughout the world;
- promoting the service of biochemistry and molecular biology to society;

- facilitating the development of effective channels of communication in the international community of biochemists and molecular biologists;
- assisting the biotechnology industry in its contributions to sustainable development, wealth creation and improvement of the quality of life;
- utilising its global perspective to contribute toward the enhancement of education in biochemistry and molecular biology and to advance the public understanding of these disciplines and the scientific method;
- making special efforts to encourage the career development of young biochemists and molecular biologists;
- broadening the geographical base of the Union and ensuring that its human capital is drawn from all segments of the world community of biochemists and molecular biologists;
- encouraging worldwide dissemination of information about the activities of the Union.

Involved countries or organisations

There are 74 member countries. The International Federation of Clinical Chemistry and Laboratory Medicine, International Society for Neurochemistry, International Organisation for Free Radical Research and International Society of Vitamins and Related Biofactors are Associated Organisations of IUBMB.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- There is not much evidence on the IUBMB website of significant Australian involvement.

Main programs

- Sponsoring meetings and conferences;
- Travel scholarships;
- Publishes 7 journals.

International Union of Biological Sciences (IUBS)

(www.iubs.org)

IUBS is a non-governmental, non-profit organisation, established in 1919. Its objectives are:

- to promote the study of biological sciences;
- to initiate, facilitate and coordinate research and other scientific activities necessitating international, interdisciplinary cooperation;
- to ensure the discussion and dissemination of the results of cooperative research, particularly in connection with IUBS scientific programs;
- to support the organisation of international conferences and assist in the publication of their reports.

The IUBS scientific programs are of an interdisciplinary nature; they are undertaken in collaboration with the national scientific authorities and in cooperation with other international organisations, both intergovernmental (UNESCO, UNEP, FAO, EC, etc.) and non-governmental. These programs address issues in integrative biology, biodiversity (DIVERSITAS), bioethics, biotechnology, bio-indicators, biological education, biological nomenclature, biosystematics, reproductive biology and aquaculture, biological complexity and other fields. IUBS publishes a quarterly journal, Biology International, which

channels information on the Union's programs and activities to the IUBS Members and cooperating institutions and individuals. IUBS has around 80 international scientific society members.

Involved countries or organisations

IUBS is sponsored by UNESCO, ICSU and 44 member nations.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- Alan Bittles of Edith Cowan University is an executive committee member.

Main programs

- Diversitas (1991 -) (joint program with ICSU, SCOPE, IUMS and UNESCO);
- Human Dimensions of Biodiversity (1994 -);
- Systematics Agenda 2000 – International;
- Towards An Integrative Biology – TAIB (1997 -);
- Biological Education (1974 -);
- Bioethics (1974 -);
- Bionomenclature (1974 -);
- International Biological Programme – IBP (1964 – 1974, completed);
- Decade of the Tropics – DOT (1983 - 1994, completed);
- Bioindicators (1983 - 1994, completed);
- Biocomplexity and Theoretical Biology (completed);
- Reproductive Biology and Aquaculture – RBA (1988 - 2000, completed).

International Union of Crystallography (IUCr)

(www.iucr.org)

The IUCr is a scientific union adhering to ICSU. Its objectives are to promote international cooperation in crystallography and to contribute to all aspects of crystallography, to promote international publication of crystallographic research, to facilitate standardisation of methods, units, nomenclatures and symbols, and to form a focus for the relations of crystallography to other sciences. The IUCr fulfils these objectives by publishing in print and electronically primary scientific journals through *Crystallography Journals Online*, the series of reference volumes *International Tables for Crystallography*, distributing the quarterly *IUCr Newsletter*, maintaining the online *World Directory/Database of Crystallographers*, awarding the Ewald Prize and organising the triennial Congress and General Assembly.

Involved countries or organisations

There are 40 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- The 1987 IUCr congress was held in Perth.
- Several Australian scientists are involved in IUCr commissions.

Main programs

There are 18 IUCr commissions.

International Union of Food Science and Technology (IUFoST)

(www.iufost.org)

IUFoST is the sole global food science and technology organisation. It is a voluntary, non-profit association of national food science organisations linking the world's best food scientists and technologists. Its main objectives are:

- international co-operation and exchange of scientific and technical information among scientists, food technologists and specialists of member nations;
- supporting international progress in both theoretical and applied areas of food science;
- advancing technology in the processing, manufacturing, preservation, storage and distribution of food products;
- stimulating appropriate education and training in food science and technology;
- fostering professionalism and professional organisation among food scientists and technologists.

Involved countries or organisations

There are 65 member countries.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions.
- The Australian Institute of Food Science and Technology is a member and pays subscriptions.
- Several Australians are involved in various IUFoST committees.
- Alan Mortimer is the current President of IUFoST.
- The 1999 IUFoST congress was held in Sydney.

Main programs:

There are 6 working groups:

- SDC 1 - Conferences/Workshops;
- SDC 2 - Global Information Systems;
- SDC 3 - Advice and Expert Opinion;
- SDC 4 - Food Science and Technology Development;
- SDC 5 - Education and Professionalism;
- SDC6 - Marketing and Support Services.

International Union of Geodesy and Geophysics (IUGG)

(www.iugg.org)

IUGG is a non-governmental, scientific organisation, established in 1919. IUGG is dedicated to the international promotion and coordination of scientific studies of Earth (physical, chemical, and mathematical) and its environment in space. These studies include the shape of the Earth, its gravitational and magnetic fields, the dynamics of the Earth as a whole and of its component parts, the Earth's internal structure, composition and tectonics, the generation of magmas, volcanism and rock formation, the hydrological cycle including snow and ice, all aspects of the oceans, the atmosphere, ionosphere, magnetosphere and solar-terrestrial relations, and analogous problems associated with the Moon and other planets. IUGG encourages the application of this knowledge to societal needs, such as mineral resources, mitigation of natural hazards and environmental preservation. **IUGG is comprised of seven semi-autonomous Associations**, each responsible for a specific range of topics or themes within the overall scope of Union activities. In addition, IUGG establishes Inter-Association Commissions, and relationships with several other scientific bodies with similar interests. IUGG holds General Assemblies at four-year intervals, and each of its Associations organise Scientific Assemblies as well as topical symposia in the intervening period between General Assemblies.

Involved countries or organisations

There are 66 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- Geoscience Australia also contributes membership fees.
- Tom Beer (CSIRO) is the current vice pres of IUGG.
- Several Australian scientists are involved in various IUGG committees.
- The National Committees of Earth Sciences and Space Science are currently bidding to host the 2011 IUGG congress in Australia.

Main programs

The seven Associations under IUGG are:

- IAG – International Association of Geodesy;
- IAGA – International Association of Geomagnetism and Aeronomy (Charles Barton is the current President of IAGA);
- IAHS – International Association of Hydrological Sciences;
- IAMAS – International Association of Meteorology and Atmospheric Sciences;
- IAPSO – International Association for the Physical Sciences of the Ocean;
- IASPEI – International Association of Seismology and Physics of the Earth's Interior;
- IAVCEI – International Assoc of Volcanology and Chemistry of the Earth's Interior.

IUGG is also involved in the following Joint programs:

- FAGS (with IAU and URSI);
- Scientific Committee on the Lithosphere (with ICSU and IUGS).

International Union of Geological Sciences (IUGS)

(www.iugs.org)

IUGS is one of the largest and most active non-governmental scientific organisations in the world. IUGS promotes and encourages the study of geological problems, especially those of world-wide significance, and supports and facilitates international and interdisciplinary cooperation in the earth sciences. At present IUGS gives special consideration to:

- initiatives related to the identification and assessment of energy and mineral resources;
- global change;
- geologic hazards; and
- environmental geology.

IUGS Commissions, Committees, and Boards are concerned with a wide range of geologic research of direct interest to governments, industry, and academic groups within the earth sciences. IUGS believes that it is of mutual benefit to establish close links with other organisations engaged in geoscience activities, and especially those organisations whose work relates to some of the major activities of IUGS. IUGS fosters dialogue and communication among the various specialists in earth sciences around the world. It achieves this by organising international projects and meetings, sponsoring symposia and scientific field trips, and producing publications.

Involved countries or organisations

There are 84 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- Several Australian scientists are involved in leadership roles of various IUGS commissions.
- The 1976 IUGS congress was held in Sydney. Australia is bidding for the 2012 congress.

Main programs

Commissions are established for broad scientific undertakings, the nature of which clearly requires long-term (~8-12 years) attention and funding. The IUGS commissions are:

- Geological Sciences for Environmental Planning;
- Global Sedimentary Geology;
- History of Geological Sciences;
- Management and Applications of Geoscience Information;
- Stratigraphy;
- Systematics in Petrology.

Task Groups are formal, project-oriented activities, pursuing limited objectives of shorter duration. The IUGS Task Groups are:

- Fossil Fuels;
- Global Geochemical Baselines;

- Geochronological Decay Constants;
- Public Affairs.

Joint Programs are scientific enterprises, principally of long duration, carried out in collaboration with one or more other organisations that share with the IUGS the responsibility for funding and/or managing the activity. Joint Programs involving IUGS are:

- International Geoscience Programme, IGCP (with UNESCO);
- Scientific Committee on the Lithosphere (with ICSU and IUGG);
- Geological Applications of Remote Sensing (with UNESCO);
- Mineral Resource Sustainability Program (with UNESCO);
- International Geological Congress.

International Union of History and Philosophy of Science (IUHPS)

(http://ppp.unipv.it/dhs)

The IUHPS is composed of two divisions: the DHS (Division of History and Science) and the DLMPS (Division of Logic, Methodology, and Philosophy of Science). Each division organises its own international congress once every four years. Its scholarly work is conducted mainly through its 13 scientific commissions, five inter-union commissions, and three independent scientific sections. With such a structure, the quality of the DHS's work is largely determined by the vigour of its commissions and sections, and inevitably the profile of activity over the years has been variable. But aided by the modest support that DHS has been able to give, several commissions and sections have achieved positive results, in the form of meetings, newsletters, and scholarly publications.

Involved countries or organisations

Financial support for IUHPS comes from ICSU and 49 member countries.

Australian involvement

The Australian Academy of Science is a member and pays subscriptions (to DHS and DLMPS).

Main programs

- 13 Commissions – Ancient and Medieval Astronomy, Bibliography and Documentation, East Asia, Islamic Civilisation, Meteorology, Modern Chemistry, Modern Physics, Oceanogaphy, Pacific Circle, Science and Empire, Scientific Instruments, Teaching, Women in Science;
- 5 Inter-Union Commissions – History of Astronomy (with IAU), History of Geography (with IGU), History of Geological Science (with IUGS), History of Mathematics (with IMU), History of Soil Science (with ISSS);
- 3 Independent Scientific Sections;
- International Committee for Cooperation in the History of Technology (ICOHTEC);
- International Committee for the History of Metrology (CIMH);
- International Association for Science and Cultural Diversity (IASCUD).

International Union of Immunological Societies (IUIS)

(www.iuisonline.org)

IUIS is an umbrella organisation for many of the regional and national societies of immunology throughout the world. The objectives of IUIS are:

- to organise international co-operation in immunology and to promote communication between the various branches of immunology and allied subjects;
- to encourage within each scientifically independent territory co-operation between the Societies that represent the interests of immunology;
- to contribute to the advancement of immunology in all its aspects.

International Congresses of Immunology are held every three years under the auspices of IUIS. IUIS also contributes to the staging of regular congresses and conferences by each of the four Regional Federations and to various educational activities in immunology. *The Immunologist* is the official journal of IUIS. The journal publishes article and reviews in basic and clinical immunology and provides a forum for discussing issues of importance for the discipline of immunology.

Involved countries or organisations

There are 54 member countries.

IUIS is affiliated to ICSU, the World Health Organisation (WHO), and the Council for International Organisations of Medical Sciences (CIOMS).

The following organisations are affiliated to IUIS:

- International Society of Immunopharmacology (ISIP);
- International Society of Developmental and Comparative Immunology (ISDCI);
- International Association of Allergology and Clinical Immunology (IAACI);
- International Society for Immunology of Reproduction (ISIR);
- Society for Mucosal Immunology (SMI);
- 54 national immunological societies.

Australian involvement

- The Australasian Society for Immunology (ASI) pays the membership subscription to IUIS, and the Australian Academy of Science reimburses ASI for 50% of the fees.
- 1977 IUIS congress was held in Sydney.
- Peter Doherty (University of Melbourne) is the current Vice President.
- The current IUIS President, Rolf Zinkernagel, is a member of the Australasian Society for Immunology.
- Christopher Parish (Australian National University) is also on the IUIS executive committee.
- Australia has had continuous representation on the executive committee for the last 12 years.

Main programs

Several Committees have been established to conduct activities of ongoing interest to IUIS, currently in the areas of clinical immunology, education, nomenclature, quality assessment and standardisation, and veterinary immunology.

International Union of Microbiological Societies (IUMS)

(www.iums.org)

The objectives of IUMS are:

- to promote the study of microbiological sciences internationally;
- to initiate, facilitate and coordinate research and other scientific activities which involve international cooperation;
- to ensure the discussion and dissemination of the results of international cooperative research;
- to promote the organisation of international conferences, symposia and meetings and assist in the publication of their reports;
- to represent microbiological sciences in ICSU and maintain contact with other international organisations.

The International Journal of Systematic and Evolutionary Microbiology, the International Journal of Food Microbiology and International Virology News in Archives of Virology are some of the publications published on behalf of IUMS. IUMS sponsors scientific meetings worldwide and actively supports the development of microbiology in the Third World by the provision of travel grants and the provision of newsletters and journals to member societies considered to be underserved with respect to publications. IUMS presents three international awards at its congresses; the Stuart Mudd Award for Studies in Basic Microbiology, the Arima Award for Applied Microbiology, and the Van Niel International Prize for Studies in Bacterial Systematics.

Involved countries or organisations

There are 62 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- The Australian Society of Microbiology is also a member.
- John S. Mackenzie (University of Queensland) is on the current executive committee, as Secretary-General.
- Australian scientists are involved in various IUMS committees.
- The 1999 IUMS congress was held in Sydney.

Main programs

Scientific activities of IUMS are conducted by three Divisions (Bacteriology and Applied Microbiology Division, Mycology Division, Virology Division), six specialist international committees, nine commissions and two federations. Their major activities include the classification and nomenclature of bacteria and viruses, culture collections, food microbiology, antigens and molecular diagnostics, and enteric phage typing. Divisions are responsible for organising their International Congresses.

IUMS also participates in the following joint programs:

- DIVERSITAS (with ICSU, SCOPE, IUBS and UNESCO);
- Species 2000 (with IUBS and CODATA);
- International Committee on Nomenclature (with IUBS).

International Union of Nutritional Sciences (IUNS)

(www.iuns.org)

The objectives of IUNS are:

- to promote international cooperation in the scientific study of nutrition and its application;
- to encourage research and the exchange of scientific information in the nutritional sciences, by the holding of congresses and conferences, by publication, and by other suitable means;
- to establish task forces and other bodies as may be required in the pursuit of the first two objectives;
- to provide a means of communication with other organisations, and to encourage participation in the activities of ICSU, of which the Union is a member;
- to develop activity regarded as helpful and appropriate in achieving the objectives of the Union.

Involved countries or organisations

There are 68 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- Mark Wahlqvist of Monash University is the current President of IUNS.
- The 1993 IUNS congress was held in Adelaide.

Main programs

The main scientific work of IUNS is done by its task forces and committees. Partnerships with other international organisations foster IUNS in achieving its objectives. Some committees are joint IUNS/IUFoST Committees. IUNS has special consultative status with FAO, WHO and the United Nations Children's Fund, is an associate member of CIOMS, and has signed a Memorandum of Understanding with the United Nations University. Close cooperation exists with UNESCO, IAEA, UNEP and with various ICSU bodies, and with IUFoST. The IUNS tasks forces are:

- Diet Nutrition and Long-Term Health;
- Indigenous Peoples' Food Systems and Nutrition;
- Nutrition in Transition (with WHO);
- INFOODS (International Food Nomenclature and Compositional Committee);
- Eco-Nutrition;
- Nutrition and Technologies;
- Evidence Based Nutrition;
- Nutritional Resistance to Infection;
- School Children Nutrition and Health.

International Union for Pure and Applied Biophysics (IUPAB)

(www.iupab.org)

The objectives of IUPAB are:

- to organise international cooperation in biophysics;
- promote communication between the societies that are interested in the advancement of biophysics in all aspects;
- to support research and teaching in biophysics.

Involved countries or organisations

There are 50 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- The Australian Society for Biophysics is also involved with IUPAB.
- Professor Cris dos Remedios (University of Sydney) is the current vice president.
- Frances Separovic (University of Melbourne) is also a member of the executive committee.
- Several Australian scientists are involved in IUPAB task forces.

Main programs

IUPAB has four Task Forces concerned with major areas of biophysics:

- Bioinformatics (Joint Initiative of IUPAB, IUBMB, IUCr, IUPAC and CODATA);
- Capacity Building and Education in Biophysics;
- NMR in Biological Sciences;
- Biomedical Spectroscopy.

The Task Forces also arrange specialist meetings either associated with the Congresses or, more commonly, in the intervals between Congresses. The Union has funds that it uses to support conferences, schools and workshops; these funds are very limited and are normally used to provide 'pump-priming' support to meeting organisers. The Union gives priority in the allocation of its funds to events that will promote biophysics in the developing countries and that will facilitate the participation of young scientists in the conferences that it supports.

International Union of Pure and Applied Chemistry (IUPAC)

(www.iupac.org/dhtml_home.html)

IUPAC aims to advance the worldwide aspects of the chemical sciences and to contribute to the application of chemistry in the service of Mankind. As a scientific, international, non-governmental and objective body, IUPAC addresses many global issues involving the chemical sciences. The Union fosters worldwide communications in the chemical sciences and aims to unite academic, industrial and public sector chemistry in a common language. IUPAC is recognised as the world authority on chemical nomenclature, terminology, standardised methods for measurement, atomic weights and many other critically evaluated data. The Union sponsors major international meetings that range from specialised scientific symposia to CHEMRAWN meetings with societal impact.

Involved countries or organisations

There are 65 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- The Royal Australian Chemical Institute (RACI) has close links with IUPAC.
- 28 Australians are members of 38 committees of IUPAC, and include the Secretary General of IUPAC (Prof. David StC. Black of the University of New South Wales).
- Several IUPAC sponsored events have been held in Australia.
- RACI has used the profits from running an IUPAC sponsored conference to fund its *Organometallic Chemistry Award*.

Main programs

Almost 1000 chemists throughout the world are engaged on a voluntary basis in the scientific work of the eight IUPAC Divisions and several other Committees. The eight Divisions are:

- Physical and Biophysical Chemistry;
- Inorganic Chemistry;
- Organic and Biomolecular Chemistry;
- Macromolecular;
- Analytical Chemistry;
- Chemistry and the Environment;
- Chemistry and Human Health;
- Chemical Nomenclature and Structure Representation.

The other Committees and special projects are:

- CHEMRAWN;
- Chemistry Education;
- Chemistry and Industry;
- Printed and Electronic Publication;
- Interdivisional Committee on Terminology, Nomenclature and Symbols;
- Chemistry's contributions to humanity - A feasibility study;
- International research funding in the chemical sciences.

International Union of Pure and Applied Physics (IUPAP)

(www.iupap.org)

The aims of IUPAP are:

- to stimulate and promote international cooperation in physics;
- to sponsor suitable international meetings and to assist organising committees;
- to foster the preparation and publication of abstracts of papers and tables of physical constants;

- to promote international agreements on the use of symbols, units, nomenclature and standards;
- to foster free circulation of scientists;
- to encourage research and education.

The Union is governed by its General Assembly, which meets every three years. The Council is its top executive body, supervising the activities of the twenty specialised Commissions and the three Affiliated International Commissions. As one of the basic sciences, physics relates to all branches of natural science. Many of the most exciting developments take place in the border areas between different disciplines. To cover interdisciplinary activities IUPAP maintains close liaison with several of the other Unions. In some cases this collaboration is manifested in the form of associate members of IUPAP Commissions. The Union also participates in many of the ICSU Interdisciplinary Bodies and global projects.

Involved countries or organisations

There are 45 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- Several Australian scientists are involved in leadership roles of the various IUPAP commissions.

Main programs

IUPAP has three Affiliated International Commissions (these Commissions may have their own Members and dues structures, statutes and assemblies):

- International Commission for Optics;
- International Commission on General Relativity and Gravitation;
- International Commission for Acoustics.

There are also twenty specialised Commissions – Finance; SUNAMCO (Symbols, Units, Nomenclature, Atomic Masses and Fundamental Constants); Statistical Physics; Cosmic Rays; Low Temperature Physics; Biological Physics; Semiconductors; Magnetism; The Structure and Dynamics of Condensed Matter; Particles and Fields; Nuclear Physics; Physics for Development; Physics Education; Atomic, Molecular and Optical Physics; Plasma Physics; Quantum Electronics; Mathematical Physics; Astrophysics; Computational Physics.

IUPAP is also involved with the following Inter-Union Commissions:

- Committee on Data for Science and Technology (CODATA);
- Committee on Space Research (COSPAR);
- International Council for Scientific and Technical Information (ICSTI);
- Scientific Committee on Problems of the Environment (SCOPE);
- Scientific Committee on Solar-Terrestrial Physics (SCOSTEP);
- IUPAC Macromolecular Division;
- IUPAC Committee on Atomic Weights and Isotopic Abundances;
- IUPAC Interdivisional Committee on Nomenclature and Symbols;

- Bureau International des Poids et Mesures (BIPM);
- International Union of Pure and Applied Biophysics (IUPAB).

International Union for Physical and Engineering Sciences in Medicine (IUPESM)

(www.iupesm.org)

The International Union for Physical and Engineering Sciences in Medicine was founded in 1980 by its Constituent Organisations – the International Federation for Medical and Biological Engineering (IFMBE, www.ifmbe.org), and the International Organisation for Medical Physics (IOMP, www.iomp.org). The Union comprises a global network of physical scientists and engineers dedicated to improving health care and well being worldwide, especially in developing countries. The objectives of IUPESM are:

- to contribute to the advancement of medical science and technology;
- to organise international cooperation and promote communication among those engaged in health care science and technology;
- to coordinate activities of mutual interest to the engineering and physical sciences within the health care field, such as international and regional scientific conferences, seminars, working groups, regional support programs and scientific and technical publications; and
- to represent the professional interests and views of engineers and physical scientists in the health care community.

IUPESM has sponsored triennial World Congresses for around 20 years. The proceedings have been published as supplements of Physics in Medicine and Biology and/or Medical and Biological Engineering and Computing, two of the official journals of IUPESM.

Involved countries or organisations

There are 80 member countries.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions to IFMBE or IOMP;
- The Australian Federation for Medical and Biological Engineering is a member of IFMBE and pays membership dues;
- The Australasian College of Physical Scientists and Engineers in Medicine is a member of IOMP and pays membership dues;
- Prof Barry Allen (St George Hospital Cancer Care Centre) is the current IOMP Vice President;
- Several Australian Scientists are involved in leadership roles of IFMBE and IOMP committees;
- The 2003 World Congress for Medical Physics and Biomedical Engineering was held in Sydney.

Main programs

IUPESM has established Key Programs aimed at being complementary to those of ICSU. IUPESM is establishing collaboration with other members of the ICSU family on these and related projects.

IUPESM Key Programs include:

- Public and Governmental Understanding of Health Sciences;

- Education, Training and Continued Professional Development for the 21st Century and Global Biomedical Information Networking for developing countries (for which a Global On-line Medical Physics Textbook and a Biomedical Engineering Encyclopedia are being developed);
- Evidence Based Health Technology;
- Medical Equipment Evaluation.

International Union of Pharmacology (IUPHAR)

(www.iuphar.org)

Founded in 1959 as a section of the International Union of Physiological Sciences, IUPHAR has been independent since 1966. The main objectives of IUPHAR are to foster international cooperation in pharmacology by:

- promoting cooperation between societies that represent pharmacology and related disciplines throughout the world;
- sponsoring international and regional congresses and meetings, and helping in their organisation by establishing advisory committees;
- encouraging international coordination and free exchange of scientists and of ideas in research;
- acting as a body through which pharmacologists can participate with other branches of science in international activities, either directly or under the aegis of international scientific bodies such as ICSU, WHO and UNESCO;
- helping in all ways the development of pharmacology throughout the world;
- promoting programs of public awareness on pharmacological issues.

Involved countries or organisations

There are 55 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- The Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists is also a member.
- James A. Angus is the current 1st Vice President.
- Australian scientists are active in various IUPHAR divisions, sections and committees.
- IUPHAR sponsored congresses and meetings have been held and are scheduled to be held in Australia.

Main programs

IUPHAR currently has one Division:

- The IUPHAR Division on Clinical Pharmacology.

Seven Sections:

- The IUPHAR Section on Bioinformatics;
- The IUPHAR Section on Drug Metabolism;
- The IUPHAR Section on Gastrointestinal Pharmacology;

- The IUPHAR Section on Neuropsychopharmacology;
- The IUPHAR Section on Pharmacogenomics and Pharmacogenetics;
- The IUPHAR Section on Safety Pharmacology;
- The IUPHAR Section on Teaching;

and one Committee:

- The IUPHAR Committee on Receptor Nomenclature and Drug Classification.

International Union of Physiological Sciences (IUPS)

(www.iups.org)

IUPS is an organisation that brings together physiologists from throughout the world. The unifying objective for physiologists is to increase mankind's understanding of the functions of cells, tissues, organs and organ systems of animals and humans. The objectives of the IUPS are:

- to encourage the advancement of the physiological sciences;
- to facilitate the dissemination of knowledge in the field of physiological sciences;
- to promote the International Congresses of Physiological Sciences;
- to promote such other meetings as may be useful for the advancement of the physiological sciences; and
- to promote such other measures as will contribute to the development of physiological sciences in developing countries.

IUPS publishes a journal, *News in Physiological Sciences* in cooperation with the American Physiological Society. It is an adhering member of CIOMS and participates in the work of several Scientific Committees of ICSU.

Involved countries or organisations

There are 51 member countries and two Affiliate Members – the International Society for Pathophysiology, and the International Society of Nephrology.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- The Australian Physiological and Pharmacological Society is involved as a supporting society.
- Australian scientists are involved with various IUPS commissions and committees.
- IUPS sponsored events have been held in Australia.

Main programs

The IUPS has eight Scientific Commissions and two Committees:

- Commission I – Locomotion;
- Commission II – Circulation / Respiration;
- Commission III – Endocrine, Reproduction and Development;
- Commission IV – Senses;

- Commission V – Secretion and Absorption;
- Commission VI – Neural Control;
- Commission VII – Comparative Physiology: Evolution, Adaptation and Environment;
- Commission VIII – Genomics and Biodiversity;
- Education Committee;
- Committee on the Physiome and Bioengineering.

International Union of Psychological Science (IUPsyS)

(www.iupsys.org)

IUPsyS works to promote 'the development of psychological science, whether biological or social, normal or abnormal, pure or applied'. It represents psychology in its full breadth as a science and as a profession. The aims of the Union are:

- to develop the exchange of ideas and scientific information between psychologists of different countries, and in particular to organise International Congresses and other meetings on subjects of general or special interest in psychology;
- to contribute to psychological documentation in different countries by fostering exchange of publications of all kinds, including reviews, films, and biographies;
- to aid scholars of different countries to go abroad to universities, laboratories, libraries, and other institutions;
- to foster the exchange of students and of young research workers;
- to collaborate with other international and national organisations in matters of mutual interest;
- to engage in other activities to further the development of the science of psychology.

IUPsyS maintains close relations with the World Health Organisation and holds special consultative status with the Economic and Social Council of the United Nations. Every second month, IUPsyS publishes the International Journal of Psychology (together with the International Platform Section). It also produces the annual IUPsyS Psychology Resource File (in CD-ROM).

Involved countries or organisations

There are 68 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- The Australian Psychological Society is also a member.
- The 1988 International Congresses of Psychology was held in Sydney.
- An international IUPsyS meeting is to be held in Melbourne in 2010.

Main programs

Special IUPsyS projects relate to the development of psychology in developing countries, (e.g., Advanced Research Training Seminars and Regional Conferences), cognitive psychology in a multidisciplinary environment, data archiving, psychological dimensions of global change, psychology and health, science literacy and communication studies.

International Union of Soil Sciences (IUSS)

(www.iuss.org)

The purpose of IUSS is:

- to foster all branches of soil science and its applications,
- to promote contacts among scientists and other persons engaged in the study and the application of soil science;
- to stimulate scientific research and to further the application of such research, for the benefit of mankind.

Involved countries or organisations

There are 86 member countries.

Australian involvement

- Australian Academy of Science does not pay membership subscriptions.
- Australian Society of Soil Science is a member.
- Several Australian scientists are involved in leadership roles with various IUSS committees.
- The 1968 IUSS congress was held in Adelaide, and the 2010 IUSS congress will be held in Brisbane.

Main programs

The IUSS cooperates with IGU, IUGS, IUPAC, IUBS and IUMS and with many interdisciplinary ICSU bodies and joint initiatives, such as CODATA, COSPAR, IGBP and SCOPE.

The structure of the Union is comprised of Divisions, Commissions, Working Groups, and Standing Committees. There are four Divisions each with Commissions:

- Division 1 (Soils in Time and Space) has four Commissions;
- Division 2 (Soil Properties and Processes) has four Commissions;
- Division 3 (Soil Use and Management) has five Commissions;
- Division 4 (The Role of Soils in Sustaining Society and the Environment) has five Commissions.

There are currently 19 Working Groups and three Standing Committees.

International Union of Theoretical and Applied Mechanics (IUTAM)

(www.iutam.net)

IUTAM was formed in 1946 with the object of creating a link between persons and national or international organisations engaged in scientific work (theoretical or applied) in solid and fluid mechanics or in related sciences. It does so mainly by organising international meetings to deal with scientific problems. An International Congress on Theoretical and Applied Mechanics is held every four years. Additionally a number of specialised Symposia with invited participants are held every year. These IUTAM Symposia are sometimes held in cooperation with other Unions in ICSU or with organisations affiliated to IUTAM.

Involved countries or organisations

There are 51 member countries. The following organisations are affiliated to IUTAM:

- International Centre for Mechanical Sciences (CISM);
- International Centre for Heat and Mass Transfer (ICHMT);
- International Committee on Rheology (ICR);
- International Association for Vehicle System Dynamics (IAVSD);
- International Society for the Interaction of Mechanics and Mathematics (ISIMM);
- International Congress on Fracture (ICF);
- International Congress on Mechanical Behaviour of Materials;
- International Association for Computational Mechanics (IACM);
- International Association for Boundary Element Methods (IABEM);
- International Society for Structural and Multidisciplinary Optimisation (ISSMO);
- International Association for Hydromagnetic Phenomena and Applications (HYDROMAG);
- International Institute of Acoustics and Vibration (IIAV);
- International Commission for Acoustics (ICA);
- International Congresses on Thermal Stresses (ICTS).

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- No International Congress on Theoretical and Applied Mechanics has been held in Australia, but IUTAM symposia have been held in Australia in the past.
- Australian scientists are involved in various IUTAM working parties.

Main programs:

There are nine IUTAM Working Parties. A Working Party in a certain sub field of the mechanics is meant to structure the overlapping activities between IUTAM on the one hand and the relevant Affiliated Organisations and sister International Unions on the other. Also, Working Parties should identify important growth areas of the field. The current Working Parties are:

- WP-1 (Non-Newtonian Fluid Mechanics and Rheology);
- WP-2 (Dynamical Systems and Mechatronics);
- WP-3 (Mechanics of Materials);
- WP-4 (Materials Processing);
- WP-5 (Computational Fluid and Solid Mechanics: acts as link between IUTAM and IACM);
- WP-6 (Biomechanics);
- WP-7 (Nano- and Micro-Scale Phenomena in Mechanics);
- WP-8 (Geophysical and Environmental Mechanics);
- WP-9 (Education in Mechanics and Capacity Building).

International Union of Toxicology (IUTOX)

(www.iutox.org)

The mission of IUTOX is to foster international scientific cooperation among toxicologists and promote global acquisition, dissemination, and utilisation of knowledge in the science of toxicology and ensure continued training and development of toxicologists worldwide. The general objectives of IUTOX are:

- to be the leading international organisation in providing toxicologists world-wide with the latest and complete account of global issues in the toxicological sciences;
- to broaden the geographical base of toxicology as a discipline and a profession to all countries of the world;
- to assist in education and career development of young toxicologists; and
- to pursue capacity building in toxicology, particularly in developing countries.

Involved countries or organisations

There are 43 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- The Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists is also a member.
- Several Australian scientists are involved with the various IUTOX committees.
- The 2001 International Congress on Toxicology was held in Brisbane.

Main programs

Main scientific programs of IUTOX are the GM Foods Monograph and Environmental Estrogens. Other activities are organisation of congresses, meetings and awards.

International Union of Radio Science (URSI)

(www.ursi.org)

Radio science encompasses the knowledge and study of all aspects of electromagnetic fields and waves. The International Union of Radio Science (Union Radio-Scientifique Internationale, URSI), a non-governmental and non-profit organisation under ICSU, is responsible for stimulating and co-ordinating, on an international basis, studies, research, applications, scientific exchange, and communication in the fields of radio science. Included within the objectives are the following:

- to encourage and promote international activity in radio science and its applications, for the benefit of humanity;
- to encourage the adoption of common methods of measurement, and the intercomparison and standardisation of the measuring instruments used in scientific work;
- to stimulate and co-ordinate studies of:
    - the scientific aspects of telecommunications using electromagnetic waves, guided and unguided;

- the generation, emission, radiation, propagation, reception, and detection of fields and waves, and the processing of the signals embedded in them;

- to represent radio science to the general public, and to public and private organisations.

Involved countries or organisations

There are 45 member countries.

Australian involvement

- The Australian Academy of Science is a member and pays membership subscriptions.
- Several Australian scientists are involved with various URSI commissions.

Main programs

URSI supports IUCAF, the Steering Committee on Frequency Allocation for Radio Astronomy and Space Science (of which it is a parent Union), and ISES, the International Space Environment Service, which provides information relevant to disciplines related to the Sun-Earth environment. There are 10 Scientific Commissions, with various working groups:

- Commission A: Electromagnetic Metrology;
- Commission B: Fields and Waves;
- Commission C: Radio-Communication Systems and Signal Processing;
- Commission D: Electronics and Photonics;
- Commission E: Electromagnetic Noise and Interference;
- Commission F: Wave Propagation and Remote Sensing;
- Commission G: Ionospheric Radio and Propagation;
- Commission H: Waves in Plasmas;
- Commission J: Radio Astronomy;
- Commission K: Electromagnetics in Biology and Medicine.

Appendix 2 – ICSU International Scientific Associates

An International Scientific Associate is defined by ICSU as

> an international non-governmental organisation in the natural sciences or an organisation in a field cognate to those of ICSU, such as the humanistic, medical, social and technical sciences whose association with ICSU is likely to be of mutual benefit or to advance the cause of science, and whose scientific activities do not fall primarily within the scope of a single Scientific Union Member.

A Regional Scientific Associate is

> a non-governmental Scientific Academy, Science Council, or other scientific institution, to which scientists or scientific bodies from more than one nation adhere, whose association with ICSU is likely to be of mutual benefit and will facilitate the attainment of ICSU's objectives, and whose scientific activities do not fall primarily within the scope a single Scientific Union Member.

The information below was collected from the ICSU website and from the individual ICSU Scientific Associates' websites and reports. The information was current as of December 2004.

Academia de Ciencias de América Latina (ACAL)

(www.acal-scientia.org)

The purpose of ACAL is to promote and contribute to the advancement of the mathematical, physical, chemical, earth, and life sciences, and to their application to the development and integration of Latin America and the Caribbean. There is no Australian involvement.

Federation of Asian Scientific Academies and Societies (FASAS)

(www.akademisains.gov.my/FASAS)

The main objective of FASAS is the promotion of excellence and generation of a self-reliant base of science and technology for the benefit of humanity. It utilises regional expertise and aims to stimulate regional cooperation, identify problems of regional interest, determine priorities and organise programs and projects of mutual interest in the region. Specific objectives of FASAS are:

- to promote the advancement of science and technology for development in Asia;
- to promote the integration of science and technology into national development planning and policy making processes;
- to promote greater awareness of the roles of science and technology in nation building among the general public, business, policy and decision makers;
- to enhance the contribution and impact of academies and societies in national and regional development;
- to collect, collate and disseminate scientific information relevant to the objectives of FASAS.

To achieve the above objectives, FASAS focuses on:

- promoting best practices in the teaching of science at all levels;
- increasing awareness of the importance of science and technology in governance, in business and in everyday life; and
- carrying out other functions to achieve the overall objectives.

Involved countries or organisations

At present there are 14 member countries – Afghanistan, Australia, Bangladesh, China, India, Republic of Korea, Malaysia, Nepal, New Zealand, Pakistan, Philippines, Singapore, Sri Lanka, and Thailand.

Australian involvement

The Australian Academy of Science pays membership subscriptions to FASAS. Kurt Lambeck is on the FASAS council.

Federation Internationale des Geometres (International Federation of Surveyors) (FIG)

(www.fig.net)

FIG is a federation of national associations and is the only international body that represents all surveying disciplines. It is a UN-recognised non-government organisation and its aim is to ensure that the disciplines of surveying and all who practise them meet the needs of the markets and communities that they serve. It realises its aim by promoting the practice of the profession and encouraging the development of professional standards. FIG's activities are governed by a plan of work that is regularly reviewed against a longer-term strategic plan. The current plan of work focuses on the surveyor's response to social, economic, technological and environmental change and the particular needs of countries in economic transition. FIG also recognises that markets for surveyors' services are constantly changing. The plan accordingly lays emphasis on strengthening professional institutions; promoting professional development; and encouraging surveyors to acquire new skills and techniques so that they may be properly equipped to meet the needs of society and the environment.

Involved countries or organisations

There are 72 member countries.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions to FIG.
- The Institution of Surveyors, Australia pays membership dues to FIG.
- Several Australians are involved in FIG Commissions and working groups.

Main programs

- Commission 1 – Professional Standards and Practice;
- Commission 2 – Professional Education;
- Commission 3 – Spatial Information Management;
- Commission 4 – Hydrography;
- Commission 5 – Positioning and Measurement;
- Commission 6 – Engineering Surveys;
- Commission 7 – Cadastre and Land Management;
- Commission 8 – Spatial Planning and Development;
- Commission 9 – Valuation and the Management of Real Estate;
- Commission 10 - Construction Economics and Management.

International Association of Hydraulic Engineering and Research (IAHR)

(www.iahr.net)

IAHR promotes the advancement and exchange of knowledge through working groups, specialty symposia, congresses, and publications on water resources, river and coastal hydraulics, risk analysis, energy, environment, disaster prevention, industrial processes. Among the variety of activities that are undertaken to achieve its mission are:

- organising events: congresses, specialty conferences, workshops and continuing education courses;
- technical meetings through its Sections;
- regional meetings through its Regional Divisions;
- European Engineering Graduate School Environment Water: IAHR-EGW, Stuttgart;
- participation in international programs such as UNESCO, WMO and ICSU;
- promotion of student activities;
- publications.

The objectives of applied research, scientific exchange, technology transfer and research management provide an umbrella for all IAHR endeavours. The scope of IAHR involves research, engineering applications and their interactions, to cater to the needs of both individual and corporate members. Hydraulics covers only one part of the water resources domain and most applications, developments, policies, and engineering works must consider all aspects of that domain. IAHR provides a basis for co-operation with other water-related associations, where common interests call for combined efforts in hydrology (IAHS), urban water (IWA), development of water resources (IWRA), coastal and maritime engineering, etc.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions to IAHR.
- Five Australian organisations are corporate members: SunWater Technical Services, Hargrave-Andrew Library Monash, University of Queensland Central Library, Snowy Mountains Engineering Corporation and the University of Adelaide Acquisitions Department.

Main programs

There are three Technical Divisions:

- Methods in Hydraulics – has 6 sub Sections;
- Applied Hydraulics – has 6 sub Sections;
- Geophysical Hydraulics – has 5 sub Sections.

International Cartographic Association (ICA)

(www.icaci.org)

The mission of ICA is to promote the discipline and profession of cartography in an international context. ICA is the world authoritative body for cartography, the discipline dealing with the conception, production, dissemination and study of maps. A map is a symbolised image of geographical reality, representing selected features or characteristics, resulting from the creative effort of its author's execution of choices, and is designed for use when spatial relationships are of primary relevance.

The aims of ICA are:

- to contribute to the understanding and solution of world-wide problems through the use of cartography in decision-making processes;
- to foster the international dissemination of environmental, economic, social and spatial information through mapping;
- to provide a global forum for discussion of the role and status of cartography;
- to facilitate the transfer of new cartographic technology and knowledge between nations, especially to the developing nations;
- to carry out or to promote multi-national cartographic research in order to solve scientific and applied problems;
- to enhance cartographic education in the broadest sense through publications, seminars and conferences;
- to promote the use of professional and technical standards in cartography.

The Association works with national and international governmental and commercial bodies and with other international scientific societies to achieve these aims.

Involved countries or organisations

There are 78 member countries.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions to ICA.
- The Mapping Sciences Institute, Australia is a formal member of ICA.
- William Cartwright of the Royal Melbourne Institute of Technology is the current Vice-President.
- Australian scientists are involved in the various ICA commissions.
- The 1984 ICA conference was held in Perth.

Main programs

There are 19 ICA Commissions – Cartography and Children; Education and Training; Gender and Cartography; Generalisation and Multiple Representation; History of Cartography; Incremental Updating and Versioning; Management and Economics of Map Production; Mapping from Satellite Imagery; Map Projections; Maps and Graphics for the Blind and the Partially Sighted; Maps and the Internet; Marine Cartography; Mountain Cartography; National and Regional Atlases; Planetary Cartography; Spatial Data Standards; Theoretical Cartography; Ubiquitous Mapping; Visualisation and Virtual Environments.

International Council for Laboratory Animal Science (ICLAS)

(www.iclas.org)

ICLAS is an international scientific organisation dedicated to advancing human and animal health by promoting the ethical care and use of laboratory animals in research worldwide. The aims of ICLAS are:

- to promote and coordinate the development of Laboratory Animal Science throughout the world and as a matter of priority in developing countries;
- to promote international collaboration in Laboratory Animal Science;

- to promote quality definition and monitoring of Laboratory Animals;
- to collect and disseminate information on Laboratory Animal Science;
- to promote world-wide harmonisation in the care and use of laboratory animals;
- to promote the humane use of animals in research through recognition of ethical principles and scientific responsibilities.

Involved countries or organisations

There are 40 member countries.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions to ICLAS.
- The Australian and New Zealand Society for Laboratory Animal Science is a formal member and pays membership subscriptions.

International Cell Research Organisation (ICRO)

(www.unesco.org/icro)

The mission of ICRO is to foster, in close cooperation with UNESCO, the development of basic research in cellular and molecular biology, mainly by organising international training courses in various countries. By the end of 2003 ICRO had organised a total of 465 training courses, which took place in 80 countries, with the participation of about 12,000 students from all over the world. The Australian Academy of Science does not pay membership subscriptions. Membership consists of elected individual scientists only.

International Council for Scientific and Technical Information (ICSTI)

(www.icsti.org)

ICSTI offers a forum for interaction between organisations that create, disseminate and use scientific and technical information. ICSTI's mission cuts across scientific and technical disciplines, as well as international borders, to give member organisations the benefit of a global community. ICSTI seeks to reduce or eliminate barriers to effective transfer of information by:

- providing leadership in promoting recognition of the value of scientific and technical information to the world's economic, research, scholarly and social progress;
- promoting the value of scientific and technical information to the world's economic, research, scholarly, and social progress;
- enhancing access to and delivery of information for all constituencies in business, industry, academia, government and the public through the exchange of information and the sharing of experience among international peers;
- forging better relations among the different communities involved in information transfer, from generator to disseminator to user;
- being a forum for interaction among all participants in information flow.

Involved countries or organisations

There are 8 Class A Full Members and 32 Class B Full Members of ICSTI. Class A Full Members consists of organisations with principal interests in either the generation or use of new scientific or technical

information, or the coordination of activities within a geographical area or within a discipline. Class A includes organisations primarily representing the interests of scientific and technical information users, such as scientific unions, learned societies, national academies. Class B Full Members consists of organisations with principal activities in the collection, storage, organisation, or dissemination of scientific or technical information. Class B includes abstracting and indexing services, data centres and services, representatives of primary publishers, online vendors, networks, libraries, information centres, and also policy making bodies, sponsors and coordinators of information activities.

Australian involvement

The CSIRO pays membership dues (Class B Full Member).

International Federation of Information Processing (IFIP)

(www.ifip.or.at)

IFIP's mission is to be the leading international, apolitical organisation which encourages and assists in the development, exploitation and application of Information Technology for the benefit of all people. Its principal aims are:

- to stimulate, encourage and participate in research, development and application of Information Technology (IT) and to foster international co-operation in these activities;
- to provide a meeting place where national IT Societies can discuss and plan courses of action on issues which are of international significance and thereby to forge increasingly strong links between them and IFIP;
- to promote international co-operation directly and through national IT Societies in a free environment between individuals, national and international governmental bodies and kindred scientific and professional organisations;
- to pay special attention to the needs of developing countries and to assist them in appropriate ways to secure the optimum benefit from the application of IT;
- to promote professionalism, incorporating high standards of ethics and conduct, among all IT practitioners;
- to provide a forum for assessing the social consequences of IT applications; to campaign for the safe and beneficial development and use of IT and the protection of people from abuse through its improper application;
- to foster and facilitate co-operation between academics, the IT industry and governmental bodies and to seek to represent the interest of users;
- to provide a vehicle for work on the international aspects of IT development and application including the necessary preparatory work for the generation of international standards;
- to contribute to the formulation of the education and training needed by IT practitioners, users and the public at large.

IFIP was initially established under UNESCO.

Involved countries or organisations

IFIP has 48 organisations as Full Members, three Corresponding Members and 11 Affiliate Members, representing countries from all regions of the world.

Australian involvement

- The Australian Academy of Science does not pay membership dues.
- The Australian Computer Society is a full member and pays membership subscriptions.
- Several Australians are involved in the various Technical Committees and Working Groups.
- The 1980 IFIP congress was held in Melbourne and the 1996 IFIP congress was held in Canberra.

Main programs

There are 13 IFIP Technical Committees:

- TC 1: Foundations of Computer Science;
- TC 2: Software: Theory and Practice;
- TC 3: Education;
- TC 5: Computer Applications in Technology;
- TC 6: Communication Systems;
- TC 7: System Modelling and Optimisation;
- TC 8: Information Systems;
- TC 9: Relationship between Computers and Society;
- TC 10: Computer Systems Technology;
- TC 11: Security and Protection in IP Systems;
- TC 12: Artificial Intelligence;
- TC 13: Human-Computer Interaction.

Federation of Library Associations and Institutions (IFLA)

(www.ifla.org)

IFLA is the leading international body representing the interests of library and information services and their users. It is the global voice of the library and information profession. IFLA is an independent, international, non-governmental, not-for-profit organisation. Its aims are to:

- promote high standards of provision and delivery of library and information services;
- encourage widespread understanding of the value of good library and information services;
- represent the interests of its members throughout the world.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions.
- The Australian Library and Information Association is Australia's formal Association Member.
- Alex Byrne of the University of Technology, Sydney is the current President-Elect.
- A number of Australian libraries are Institutional members.

Main programs:

There are 8 Divisions, with 47 Sections under these Divisions:

- I. General Research Libraries;
- II. Special Libraries;
- III. Libraries Serving the General Public;
- IV. Bibliographic Control;
- V. Collection and Services;
- VI. Management and Technology;
- VII. Education and Research;
- VIII. Regional Activities.

Core Activities of IFLA are:

- ALP – Action for Development through Libraries Programme;
- CLM – Committee on Copyright and other Legal Matters;
- FAIFE – Committee on Free Access to Information and Freedom of Expression;
- ICABS – IFLA/CDNL Alliance for Bibliographic Standards;
- PAC – Preservation and Conservation;
- UNIMARC – IFLA UNIMARC.

International Foundation for Science (IFS)

(www.ifs.se)

IFS is an NGO providing support to developing country scientists to conduct, in a developing country, relevant and high quality research on the management, use, and conservation of biological resources and their environment. IFS believes that the interests of both science and development are best served by promoting and nurturing the research efforts of young science graduates, who are at the beginning of their research careers. The IFS achieves its mission by identifying, through competitive grants and a careful selection process, young promising scientists and supporting them in their early careers to enable them to become established and recognised in national and international circles. Since 1974, IFS has provided support, mainly in the form of small research grants, to over 3,200 scientists in 100 developing countries.

Involved countries or organisations

IFS has 135 Affiliated Organisations in 86 countries, of which three-quarters are in developing countries and one-quarter in industrial countries.

Australian involvement

The Australian Academy of Science is a member and pays membership subscriptions.

International Federation of Societies for Microscopy (IFSM)

(www.ifsm.umn.edu)

IFSM was created by ICSU in 1951 as a Joint Commission for Electron Microscopy, before becoming an independent federation in 1955. Its aims are to contribute to the advancement of Microscopy in all its aspects, and to further international cooperation between microscopists.

Involved countries or organisations

There are 39 member countries.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions.
- Australia is a formal member through the Australian Microscopy and Microanalysis Society Inc.

International Institute for Applied System Analysis (IIASA)

(www.iiasa.ac.at)

IIASA is a non-governmental research organisation. It conducts inter-disciplinary scientific studies on environmental, economic, technological and social issues in the context of human dimensions of global change. IIASA's research scholars study environmental, economic, technological, and social developments. The research areas covered link a variety of natural and social science disciplines. The work is based on original state-of-the-art methodology and analytical approaches. The methods and tools generated are useful to both decision makers and the scientific community. Its goals are:

- to choose problems solutions for which will benefit the public, the scientific community, and national and international institutions;
- to address critical issues in an innovative manner;
- to provide timely and relevant information and policy analyses.

Involved countries or organisations

There are 16 member countries.

Australian involvement

The Australian Academy of Science does not pay membership subscriptions and Australia is not a member country.

Main programs

- Research and Education;
- Energy and Technology - Dynamic Systems, Energy, New Technologies;
- Environment and Natural Resources - Adaptive Dynamics, Air Pollution, Forestry, Land Use, Radiation Safety;
- Population and Society - International Negotiation, Population, Risk, Modelling and Society;
- General Research - Rural Development;
- Young Scientist Programs.

International Union for Quaternary Research (INQUA)

(www.inqua.tcd.ie)

INQUA was founded in 1928 by a group of scientists seeking to improve understanding of environmental change during the glacial ages through interdisciplinary research. INQUA's basic goal – promoting improved communication and international collaboration in basic and applied aspects of Quaternary research – is achieved mainly through the activities of its commissions and committees.

Involved countries or organisations

There are 45 member countries.

Australian involvement

- The Australian Academy of Science pays formal membership subscriptions.
- Several Australian scientists are involved in leadership roles in INQUA committees and activities.
- The 2007 INQUA congress is to be held in Cairns.

Main programs

There are five Scientific Commissions – Coastal and marine processes, Palaeoclimate, Palaeoecology and Human Evolution, Stratigraphy and Chronology, and Terrestrial Processes, Deposits and History.

International Radiation Protection Association (IRPA)

(www.irpa.net)

The primary purpose of IRPA is to provide a medium whereby those engaged in radiation protection activities in all countries may communicate more readily with each other and through this process advance radiation protection in many parts of the world. This includes relevant aspects of such branches of knowledge as science, medicine, engineering, technology and law, to provide for the protection of man and his environment from the hazards caused by radiation, and thereby to facilitate the safe use of medical, scientific, and industrial radiological practices for the benefit of mankind. A major task for IRPA is to provide support for international meetings for the discussion of radiation protection. The International Congresses of IRPA itself are the most important of these meetings. These have been held about every four years since 1966. Further objectives are to:

- encourage the establishment of radiation protection societies throughout the world as a means of achieving international cooperation;
- provide for and support international meetings for the discussions of all aspects of radiation protection;
- encourage international publications dedicated to radiation protection;
- encourage research and educational opportunities in those scientific and related disciplines which support radiation protection;
- encourage the establishment and continuous review of universally acceptable radiation protection standards or recommendations through the international bodies concerned.

Involved countries or organisations

There are 49 member countries.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions.
- The Australasian Radiation Protection Society is Australia's formal member.
- The 1988 IRPA congress was held in Sydney.

International Society of Endocrinology (ISE)

(www.endosociety.com)

ISE was established in 1960 to advance the profession and to improve the efficiency and effectiveness of endocrinology information exchange at the international level. The vision of ISE is to be the key international clinical and research organisation working towards improving the care provided to people with endocrine diseases and towards finding prevention strategies for these diseases. The mission of ISE is to disseminate knowledge of endocrinology through coordinating and organising international congresses and conferences on endocrinology, by facilitating collaboration among national and international endocrine and other learned societies and qualified persons interested in endocrinology and by publication of books, reports, and other papers.

Involved countries or organisations

ISE membership consists of 63 societies from 61 countries.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions.
- The Endocrine Society of Australia is Australia's formal member.
- The 2000 ISE congress was held in Sydney.

International Union of Forest Research Organisations (IUFRO)

(www.iufro.org)

IUFRO is a voluntary, non-profit, non-governmental, international scientific body open to all organisations involved in forestry research. The mission of IUFRO is to promote international cooperation in forestry research and related sciences. Its objectives are attained through:

- promoting and facilitating an international dialogue on forest science and the role of forests in human welfare;
- collecting and disseminating scientific knowledge on forest ecosystems, their products and services;
- enhancing cooperation between forest research organisations and individual scientists by means of a global network;
- promoting the dissemination and application of relevant research results and expertise using publications, recommendations, information technologies, training courses, work shops, conferences and congresses;
- providing and promoting science input into policy-making;
- compiling state-of-knowledge reports;
- harmonising research terminology and techniques;
- addressing issues of regional and global significance with inter-agency or inter-disciplinary actions;

- recognising outstanding work contributing to the advancement of forest science;
- assisting developing countries or countries with economies in transition to strengthen their research knowledge and capability.

Involved countries or organisations

IUFRO has more than 15,000 cooperating member scientists in over 700 member institutions in over 100 countries.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions.
- 24 Australian organisations are formal members, including government agencies (such as the Bureau of Rural Sciences), CSIRO Divisions, universities and CRC's.
- Several Australian scientists are involved in the various IUFRO Divisions and Task Forces.
- The 2005 IUFRO World Congress will be held in Brisbane.

Main programs

IUFRO's activities are organised primarily through its eight Technical Divisions, 12 Task Forces and for Special Projects:

- Division 1 – Silviculture;
- Division 2 – Physiology and Genetics;
- Division 3 – Forest Operations;
- Division 4 – Inventory, Growth, Yield, Quantitative and Management Sciences;
- Division 5 – Forest Products;
- Division 6 – Social, Economic, Information and Policy Sciences;
- Division 7 – Forest Health;
- Division 8 – Forest Environment.

Task Forces:

- Task Force 1 – Environmental Change;
- Task Force 2 – Forests in Sustainable Mountain Development;
- Task Force 4 – Management and Conservation of Forest Gene Resources;
- Task Force 5 – Water and Forests;
- Task Force 8 – Science/Policy Interface;
- Task Force 9 – Public Relations in Forest Science;
- Task Force 10 – The Role of Forests in Carbon Cycles, Sequestration and Storage;
- Task Force 11 – Information Technology and the Forest Sector;
- Task Force 12 – Forest Biotechnology.

Special Projects:

- IUFRO Special Programme for Developing Countries;
- SilvaVoc Terminology Project;
- IUFRO Special Project on World Forests, Society and Environment;
- IUFRO Special Programme on Global Forest Information Service.

International Union for Vacuum Science Techniques and Applications (IUVSTA)

(www.iuvsta.org)

IUVSTA is an international federation of national vacuum organisations, whose purpose is to promote vacuum science and technology on an international level. This includes promotion of vacuum education and research, the establishment of international vacuum standards and the organisation of international congresses, conferences and workshops. It encourages the establishment of national vacuum societies or committees on vacuum in countries where no such national group currently exists.

Involved countries or organisations

There are 30 national member societies.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions.
- The Vacuum Society of Australia is Australia's formal member society.
- Prof. John L. Robins was President from 1995-1998.
- No IUVSTA International Vacuum Congress has been held in Australia.

Main programs

There are eight IUVSTA Divisions – Applied Surface Science, Electronic Materials and Processing, Nanometer Structures, Plasma Science and Technique, Surface Science, Thin Film, Vacuum Metallurgy, and Vacuum Science.

International Water Association (IWA)

(www.iwahq.org.uk)

IWA was established in 1999 from a merger of the International Association on Water Quality (IAWQ) and the International Water Services Association (IWSA). It is an independent non-governmental organisation and its purpose is to exchange information and experience on all aspects, theoretical and practical, of water supply, wastewater, water quality and water quantity management.

Involved countries or organisations

Over 100 countries and regions are represented in IWA.

Australian involvement

- The Australian Academy of Science does not pay membership subscriptions.
- The Australian Water Association is Australia's formal member.
- Several Australian scientists are involved in the various Specialist Groups.

Main programs

The main activities of IWA include conferences, publications and information services, forums, task forces, interest groups (representing specific sectors of the water industry such as utilities, regulators, researchers, consultants and manufacturers), web-based knowledge networks, Regional Associations, Support for developing countries, and Specialist Groups (50 of them covering all important topics in the urban water management sector).

IWA is also involved in the Global Water Research Coalition – an international water research alliance of twelve world leading research organisations in affiliation with IWA.

Pacific Science Association (PSA)

(www.pacificscience.org)

The objectives of the PSA are:

- to promote cooperation and communication in science and technology among the communities of the Pacific region;
- to review common scientific concerns and priorities in the Pacific Basin and to provide a multidisciplinary forum for discussion of these concerns through Congresses and Inter-Congresses and other scientific meetings;
- to stimulate study of scientific problems of the Pacific region directly affecting the prosperity and welfare of its people;
- to strengthen the bonds among Pacific peoples by promoting a feeling of cooperation among the scientists of all the Pacific countries.

Scientific Task Forces have been established to investigate interdisciplinary and multidisciplinary areas identified as relevant. Scientific Committees have been long-established to study and to stimulate solutions to important problems of Pacific interest.

Involved countries or organisations

There are 20 member countries or regions.

Australian involvement

The National Academies Forum is Australia's formal member organisation.

Main programs

There are six Scientific Task Forces – Biodiversity, Energy, Global Environmental Change, Globalisation and Human Dynamics, Natural Disaster Reduction and Division of Resources for the Future. There are six Scientific Committees – Coral Reefs, Communicating Science and Science Education, Freshwater Sciences, Meteorology and Atmospheric Sciences, Public Health and Medical Sciences, and Solid Earth Sciences.

Third World Academy of Sciences (TWAS)

(www.ictp.trieste.it/~twas)

TWAS represents the best of science in the developing world. Its principal aim is to promote scientific capacity and excellence for sustainable development in 'the South'. Its objectives are:

- to recognise, support and promote excellence in scientific research in the South;
- to provide promising scientists in the South with research facilities necessary for the advancement of their work;
- to facilitate contacts between individual scientists and institutions in the South;
- to encourage South-North cooperation between individuals and centres of scholarship;
- to encourage scientific research on major Third World problems.

Membership consists of elected individuals only. Scientists from Developed countries can only be associate members. Only one Australian scientist is an associate member.

Appendix 3 – ICSU Interdisciplinary Bodies and Joint Initiatives

ICSU participates in international science initiatives in two ways: by establishing its own **Interdisciplinary Bodies** or by lending its support to **Joint Initiatives** that have multiple sponsors and partners. Initially established by ICSU General Assemblies, Interdisciplinary Bodies focus on specific areas of international research that are of interest to all or many ICSU Members. Their roles vary depending on the area of science and on the related needs of the international science community, but usually combine operational and policy/advisory functions. They are designed to become self-sufficient and independent in terms of day-to-day operations and financing. Most Interdisciplinary Bodies have their own secretariat. Joint Initiatives, co-sponsored by ICSU and other international organisations (eg, from the UN system), are an important means of bringing together a range of partners to address a particular issue or area. One of the key features of these collaborative programs is the ability to consider the issue from the broadest possible perspective while minimising overlap and duplication of effort.

The information below was collected from the ICSU website and from websites and reports from the individual Interdisciplinary Bodies and Joint Initiatives. The information was current as of December 2004.

Committee on Data for Science and Technology (CODATA)

(www.codata.org)

CODATA is an interdisciplinary Scientific Committee of ICSU that works to improve the quality, reliability, management and accessibility of data of importance to all fields of science and technology. CODATA is a resource that provides scientists and engineers with access to international data activities for increased awareness, direct cooperation and new knowledge. CODATA was established by ICSU to promote and encourage, on a world-wide basis, the compilation, evaluation and dissemination of reliable numerical data of importance to science and technology. CODATA is concerned with all types of data resulting from experimental measurements, observations and calculations in every field of science and technology, including the physical sciences, biology, geology, astronomy, engineering, environmental science, ecology and others. Particular emphasis is given to data management problems common to different disciplines and to data used outside the field in which they were generated. Its objectives are:

- the improvement of the quality and accessibility of data, as well as the methods by which data are acquired, managed, analysed and evaluated, with a particular emphasis on developing countries;
- the facilitation of international cooperation among those collecting, organising and using data;
- the promotion of an increased awareness in the scientific and technical community of the importance of these activities;
- the consideration of data access and intellectual property issues.

In short, the purpose of CODATA is to help foster and advance science and technology through developing and sharing knowledge about data and the activities that work with data.

Involved countries or organisations

There are 23 member countries and 14 ICSU Scientific Unions have assigned liaison delegates.

Australian involvement

- The Australian Academy of Science paid membership subscriptions up until 1999/2000, but no longer pays subscriptions.
- Australia has a national working group for CODATA, chaired by Professor Richard Simpson.

Main programs

CODATA has four primary activities, all in support of its fundamental aim of fostering worldwide cooperation in scientific and technical data:

- Sponsorship of a Biennial CODATA International Conference on data, which attracts approximately 300 data specialists from around the world.
- Specialist meetings of scientific data experts, which address issues specific to one discipline or topic.
- Publications on data handling, data compilation, surveys of data activities, and conference proceedings.
- Sponsorship of Task Groups, Working Groups, Commissions and other groups addressing specific data issues.

The national committees of CODATA often organise data activities on a national level. Much of the most important work of CODATA, however, lies outside its formal activities in its providing a milieu in which data experts from different countries can interact, cooperate directly, develop bilateral collaborations outside of CODATA, and exchange ideas and knowledge.

Committee on Space and Research (COSPAR)

(www.cosparhq.org)

COSPAR's objectives are to promote on an international level scientific research in space, with emphasis on the exchange of results, information and opinions, and to provide a forum, open to all scientists, for the discussion of problems that may affect scientific space research. These objectives are achieved through the organisation of Scientific Assemblies, publications and other means. In its first years of existence COSPAR played an important role as an open bridge between East and West for cooperation in space. When this role became less prominent with the decline in rivalry between the two blocks, COSPAR, as an interdisciplinary scientific organisation, focused its objectives on the progress of all kinds of research carried out with the use of space means (including balloons). COSPAR acts mainly:

- as a forum, with strong contributions from most countries engaged in space research, for the presentation of the latest scientific results, for the exchange of knowledge and also for the discussion of space research problems;
- as a scientific committee advising, as required, the UN and other intergovernmental organisations on space research matters or on the assessment of scientific issues in which space can play a role;
- as a panel for the preparation of scientific and technical standards related to space research;
- as an entity promoting, on an international level, research in space, much of which has grown into large international collaborative programs in the mainstream of scientific research.

COSPAR strives to promote the use of space science for the benefit of mankind and for its adoption by developing countries and new space-faring nations.

Involved countries or organisations

There are 42 member countries.

Australian involvement

- The Australian Academy of Science pays formal membership subscriptions.
- No Australian scientists appear to be involved in leadership roles in any of the Scientific Commissions, sub-commissions, Panels, or Task Groups.

Main programs

Two primary types of scientific body are active in COSPAR – Scientific Commissions (SCs) and Panels:

- SC A on Space Studies of the Earth's Surface, Meteorology and Climate;
- SC B on Space Studies of the Earth-Moon System, Planets, and Small Bodies of the Solar System;
- SC C on Space Studies of the Upper Atmospheres of the Earth and Planets Including Reference Atmospheres;
- SC D on Space Plasmas in the Solar System, Including Planetary Magnetospheres;
- SC E on Research in Astrophysics from Space;
- SC F on Life Sciences as Related to Space;
- SC G on Materials Sciences in Space;
- SC H on Fundamental Physics in Space;
- Technical Panel on Satellite Dynamics;
- Panel on Technical Problems Related to Scientific Ballooning;
- Panel on Potentially Environmentally Detrimental Activities in Space;
- Panel on Space Research in Developing Countries;
- Panel on Standard Radiation Belts;
- Panel on Space Weather;
- Panel on Planetary Protection;
- Panel on Capacity Building.

An Integrated Programme of Biodiversity (DIVERSITAS)

(www.diversitas-international.org)

DIVERSITAS is an international global environmental change research program. Its missions are:

- to promote integrative biodiversity science, linking biological, ecological and social disciplines in an effort to produce socially relevant new knowledge;
- to provide the scientific basis for an understanding of biodiversity loss, and to draw out the implications for the policies for conservation and sustainable use of biodiversity.

DIVERSITAS aims to achieve these goals by synthesising existing scientific knowledge, identifying gaps and emerging issues of global importance, promoting new research initiatives, building bridges across countries and disciplines, investigating policy implications of biodiversity science, and communicating these to policy makers and international conventions.

Sponsoring countries and organisations

DIVERSITAS relies mainly (90%) on voluntary national contributions for funding.

The following countries provide financial support to DIVERSITAS: USA; Germany; Switzerland; Netherlands; Norway; Mexico; Sweden; Austria; United Kingdom; and China-Taipei. IGFA, the International Group of Funding Agencies for global environmental change research, facilitates the dialog between national funding agencies and DIVERSITAS. The remaining 10% of funding is provided by the sponsors (ICSU, SCOPE, IUBS, IUMS and UNESCO). Research projects contributing to DIVERSITAS are funded by national and regional agencies, on a competitive basis.

Australian involvement

Australia does not contribute any funding directly to DIVERSITAS, although it contributes indirectly via Australian Academy of Science membership subscriptions to ICSU, IUBS and IUMS. Prof. Stork (James Cook University) was on the DIVERSITAS Task Force, which was replaced by a formal Scientific Committee in 2002. Dr Meryl Williams is on the current Scientific Committee. There is no formal Australian national committee for DIVERSITAS (19 other countries have DIVERSITAS NCs), although there are some informal Australian activities/networks related to DIVERSITAS activities that could be developed into a formal national committee. Scientists from the CSIRO and the Australian Network for Plant Conservation are involved in the DIVERSITAS collaborative research network.

Main programs

DIVERSITAS pursues its science plan in the form of three core projects and several cross-cutting networks. In addition, the International Biodiversity Observation Year was an initiative of DIVERSITAS that spanned the whole program. It was a one-time event to celebrate biodiversity during 2001 and 2002.

The core projects of DIVERSITAS are:

- **bioDISCOVERY (Core Project 1)** seeks to assess how much biodiversity there is on Earth, develop the scientific basis for monitoring biodiversity and promote the establishment of biodiversity observatories, and understand and predict biodiversity changes.
- **ecoSERVICES (Core Project 2)** strives to expand the science of biodiversity and ecosystem functioning to larger scales and over a greater breadth of the biological hierarchy, to develop an effective means for linking changes in ecosystem structure and functioning to changes in ecosystem services, to assess human response to ecosystem services changes, and feedbacks onto ecological systems; and to Examine the impacts of biodiversity change on human health.
- **bioSUSTAINABILITY (Core Project 3)** develops new knowledge to guide policy and decision making. Its four main objectives are to evaluate the effectiveness of current measures for the conservation and sustainable use of biodiversity, to study the social, political and economic drivers of biodiversity loss, to investigate social choice and decision making, and to understand the interactions between humans and biodiversity in urban ecosystems. Collectively, these activities comprise a cycle of discovery, analysis and information sharing that supports the application of socially relevant knowledge.

The cross-cutting networks of DIVERSITAS are:

- Global Invasive Species Programme (GISP);
- Global Mountain Biodiversity Assessment (GMBA).

DIVERSITAS and its partner global change programs IGBP, IHDP and WCRP have formed the Earth System Science Partnership (ESSP), with the joint projects:

- Global Carbon Project (GCP);
- Global Change System for Analysis, Research and Training (START);
- Global Environmental Change and Food Systems (GECAFS);
- Global Environmental Change and Human Health;
- Global Water System Project (GWSP).

Astronomical and Geophysical Data Analysis Services (FAGS)

(www.kms.dk/fags)

FAGS was formed by ICSU in 1956 and includes today twelve Permanent Services each operating under the authority of one or more of the interested Scientific Unions – International Astronomical Union (IAU), International Union of Geodesy and Geophysics (IUGG), and Union Radio-Scientifique Internationale (URSI). Their tasks are to:

- continuously collect observations, information and data related to astronomy, geodesy, geophysics and allied sciences;
- to analyse, synthesise, and draw conclusions from them;
- to distribute data;
- to publish the results obtained.

Sponsoring organisations

FAGS is sponsored by IAU, IUGG, and URSI. There is no direct national membership.

Australian involvement

Australia does not contribute any funding directly to FAGS, but contributes indirectly via Australian Academy of Science membership subscriptions to IAU, IUGG and URSI. P.Wilkinson (from the Australian Government IPS Radio and Space Services) is on the FAGS Council (as the URSI Representative).

Main programs

The current Services within FAGS are:

- International Earth Rotation and Reference system Services (IERS);
- Bureau Gravimetrique International (BGI);
- International GPS Service for Geodynamics (IGS);
- International Centre for Earth Tides (ICET);
- Permanent Service for Mean Sea Level (PSMSL);
- International Service of Geomagnetic Indices (ISGI);
- Quarterly Bulletin on Solar Activity (QBSA);
- International Space Environment Service (ISES);
- World Glacier Monitoring Service (WGMS);

- Centre des Données astronomiques de Strasbourg (CDS);
- Sunspot Index Data Centre (SIDC);
- International VLBI Service for Geodesy and Astrometry (IVS).

Global Climate Observing System (GCOS)

(www.wmo.ch/web/gcos/gcoshome.html)

GCOS was established in 1992 to ensure that the observations and information needed to address climate-related issues are obtained and made available to all potential users. GCOS is intended to be a long-term, user-driven operational system capable of providing the comprehensive observations required for monitoring the climate system, for detecting and attributing climate change, for assessing the impacts of climate variability and change, and for supporting research toward improved understanding, modelling and prediction of the climate system. It addresses the total climate system including physical, chemical and biological properties, and atmospheric, oceanic, hydrologic, cryospheric and terrestrial processes. GCOS does not itself directly make observations nor generate data products. It stimulates, encourages, coordinates and otherwise facilitates the taking of the needed observations by national or international organisations in support of their own requirements as well as of common goals. GCOS is intended to meet the needs for:

- climate system monitoring, climate change detection and monitoring the impacts of and the response to climate change, especially in terrestrial ecosystems and mean sea-level;
- climate data for application to national economic development;
- research toward improved understanding, modelling and prediction of the climate system.

GCOS priorities are:

- the earliest possible detection of climate trends and climate change due to human activities;
- seasonal-to-interannual climate prediction;
- reduction of the major uncertainties in long-term climate prediction;
- improved data for impact analysis.

Sponsoring organisations

GCOS is sponsored by WMO, IOC of UNESCO, UNEP and ICSU. There is no direct national membership.

Australian involvement

- Mike Manton of Australia's Bureau of Meteorology (BOM) is Chair of one of the three science panels of GCOS;
- Australian scientists played a significant role in the preparation of GCOS 2nd Report on Adequacy of the Global Observing Systems for Climate, and have been very active in the development of GCOS over the last decade;
- Australia's BOM contributes observational data to GCOS.

Main programs

GCOS is directed by a Steering Committee that provides guidance, coordination and oversight to the program. Three science panels, reporting to the Steering Committee, have been established to define

the observations needed in each of the main global domains (atmosphere, oceans, and land), to prepare specific program elements and to make recommendations for implementation. The science panels are:

- Atmospheric Observation Panel for Climate (AOPC) – sponsored by GCOS and WCRP;
- Ocean Observing Panel for Climate (OOPC) – sponsored by GCOS, GOOS and WCRP;
- Terrestrial Observation Panel for Climate (TOPC) – sponsored by GCOS and GTOS.

GCOS will build, to the extent possible, on existing operational and research observing, data management and information distribution systems, and further enhancements of these systems. The GCOS will be based upon, inter alia:

- Existing and enhanced World Weather Watch (WWW) systems;
- The Global Atmosphere Watch (GAW) and related atmospheric constituent observing systems;
- The Global Ocean Observing System (GOOS) for physical, chemical and biological measurements;
- The Global Terrestrial Observing System (GTOS) for land surface ecosystem, hydrosphere, and cryosphere measurements;
- The maintenance and enhancement of programs monitoring other key components of the climate system, such as terrestrial ecosystems (including IGBP), as well as clouds and the hydrological cycle, the earth's radiation budget, ice sheets and precipitation over the oceans (including WCRP);
- Programs to monitor the key physical, chemical and biological aspects of the impacts of climate change (including the World Climate Impact Assessment and Response Strategies Programme);
- Data communication and other infrastructures necessary to support operational climate forecasting (including the World Climate Data and Monitoring Programme and the Climate Information and Prediction Services).

Global Ocean Observing System (GOOS)

(http://ioc.unesco.org/goos)

GOOS is part of an Integrated Global Observing Strategy (IGOS) in which UN agencies are working together with ICSU and satellite agencies. In that context, GOOS forms the ocean component of GCOS (the Global Climate Observing System) and the marine coastal component of the GTOS (the Global Terrestrial Observing System). The vision guiding the development of GOOS is one of a world where the information needed by governments, industry, science and the public to deal with marine related issues, including the effects of the ocean upon climate, is supported by a unified global network to systematically acquire, integrate and distribute oceanic observations, and to generate analyses, forecasts and other useful products. The primary objectives of GOOS are:

- to specify the marine observational data needed on a continuing basis to meet the needs of the world community of users of the oceanic environment;
- to develop and implement an internationally coordinated strategy for the gathering, acquisition and exchange of these data;
- to facilitate the development of uses and products of these data, and encourage and widen their application in use and protection of the marine environment;
- to facilitate means by which less-developed nations can increase their capacity to acquire and use marine data according to the GOOS framework;
- to co-ordinate the ongoing operations of GOOS and ensure its integration within wider global observational and environmental management strategies.

Involved countries or organisations

There are 71 member countries. GOOS is sponsored by the IOC of UNESCO, WMO, UNEP and ICSU.

Australian involvement

Tom Trull of the Antarctic CRC is on the GOOS Steering committee.

In partnership with the Government of Western Australia, and the Commonwealth of Australia through its Bureau of Meteorology and other Commonwealth marine agencies, the IOC is establishing a new regional office in Perth, Western Australia. The Perth Office will co-ordinate the full range of IOC activities, including those that use resources from other UNESCO sectors, but its primary role is to facilitate the balanced development and enhancement of programs of the Global Ocean Observing System (GOOS) in the region.

Australian scientists have played substantial roles in the development of GOOS, and in the establishment of the international bodies to maintain standards and coordination. The principal national contact for GOOS is Phil Parker, Bureau of Meteorology. The mechanism for national coordination of GOOS is the Australian National GCOS-GOOS Working Group.

Australian agencies involved with GOOS are the Bureau of Meteorology, CSIRO Marine Research, Australian Oceanographic Data Centre, Royal Australian Navy, Australian Institute of Marine Science, National Tidal Facility of Australia, Australian Antarctic Division, Joint Australian Facility for Ocean Observing Systems and the Bureau of Meteorology Research Centre. These agencies contribute to many core elements of the observing system.

Main programs

Existing Operational Systems and Bodies are:

- JCOMM: Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology;
- JCOMMOPS: JCOMM in situ Observing Platform Support centre;
- DBCP: Data Buoy Co-operation Panel;
- SOOP: Ship-of-Opportunity Programme;
- GLOSS: Global Sea Level Observing System;
- TIP: Tropical Moored Buoys Implementation Panel;
- TAO: Tropical Atmosphere Ocean project;
- TRITON: Triangle Trans-Ocean buoy Network;
- PIRATA: Pilot Research Moored Array in the Tropical Atlantic;
- CPR: Continuous Plankton Recorder Programme;
- GCRMN: Global Coral Reef Monitoring Network.

GOOS Pilot Projects include:

- GODAE: Global Ocean Data Assimilation Experiment;
- ARGO: ‘Observing the global ocean in real time’;
- GEO: Global Eulerian Observations;
- RAMP: Rapid Assessment of marine pollution.

Global Terrestrial Observing System (GTOS)

(www.fao.org/gtos)

GTOS is a program for observations, modelling, and analysis of terrestrial ecosystems to support sustainable development. GTOS facilitates access to information on terrestrial ecosystems so that researchers and policy makers can detect and manage global and regional environmental change.

GTOS was established in January 1996 in response to international calls for a deeper understanding of global changes and their impacts on the Earth System and its ability to support sustainable development. The GTOS mission is to provide policy-makers, resource managers and researchers with access to the data and information they need to detect, quantify, locate, and warn of changes (especially reductions) in the capacity of terrestrial ecosystems to support sustainable development. The program focuses on five issues of global concern – changes in land quality, availability of freshwater resources, loss of biodiversity, climate change, and impacts of pollution and toxicity.

Sponsoring organisations

GTOS is sponsored by FAO, UNEP, UNESCO and WMO. There is no direct national membership.

Australian involvement

Australia has minimal formal involvement in GTOS, through work at the technical level only.

Main programs

- Global Terrestrial Network;
- Net Primary Productivity Demonstration Project;
- Terrestrial Carbon Observations Network;
- Terrestrial Observation Panel for Climate;
- Global Observation of Forest and Land Cover Dynamics Panel;
- Terrestrial Ecosystem Monitoring Sites Database;
- Terrestrial Coastal Environments;
- Regional Programs and Networks.

International Geosphere-Biosphere Programme (IGBP)

(www.igbp.kva.se)

IGBP's mission is to deliver scientific knowledge to help human societies develop in harmony with Earth's environment. Its scientific objective is to describe and understand the interactive physical, chemical and biological processes that regulate the total Earth System, the unique environment that it provides for life, the changes that are occurring in this system, and the manner in which they are influenced by human actions. As one of four international global environmental change research programs, IGBP works towards its objective in close collaboration with the International Human Dimensions Programme on Global Environmental Change (IHDP), the World Climate Research Programme (WCRP), and DIVERSITAS, an international program of biodiversity science. IGBP is an international scientific research program built on interdisciplinarity, networking and integration. It addresses scientific questions where an international approach is the best or the only way to provide an answer. It adds value to a large number of individual, national and regional research projects through integrating activities to achieve enhanced scientific understanding.

IGBP's integrating activities add value by:

- developing common international frameworks for collaborative research based on agreed agendas;
- forming research networks to tackle focused scientific questions;
- promoting standardised methodologies;
- guiding and facilitating construction of global databases;
- undertaking model intercomparisons and comparisons with data;
- facilitating efficient patterns of resource allocation;
- undertaking analysis, synthesis and integration activities on broad Earth System themes.

Involved countries and organisations

IGBP's central budget mostly comes from national contributions from about 50 countries around the world. The rest comes from ICSU grants earmarked for specific activities.

Australian involvement

- The Australian Academy of Science pays formal membership subscriptions.
- Australia is one of eight countries to provide direct support to International Project Offices, through the Global Carbon Project based in Canberra and the START project based in Canberra headed by Graeme Pearman (CSIRO). Graeme Pearman is also on the IGBP scientific committee.
- Most IGBP projects have Australian scientists on their scientific steering committees.

Main programs

IGBP has adopted a new structure of eight projects in total. Six projects are centred on the three major Earth System compartments - ocean, land and atmosphere - and the interfaces between them. Two projects - PAGES and GAIM - focus on a whole system perspective, from the past into the future. In general, there is a focus on interaction between and integration across the IGBP projects.

- Past Global Changes (PAGES);
- Global Analysis, Integration, and Modelling (GAIM) Task Force;
- Global Ocean Ecosystem Dynamics (GLOBEC);
- International Global Atmospheric Chemistry (IGAC);
- Land-Ocean Interactions in the Coastal Zone (LOICZ);
- Surface Ocean Lower Atmosphere Study (SOLAS);
- Integrated Land Ecosystem – Atmosphere Processes Study (ILEAPS);
- Land-Use and Land-Cover Change (LUCC) – finishes in 2005;
- Global Change and Terrestrial Ecosystem (GCTE)- finished in 2003;
- Joint Global Ocean Flux Study (JGOFS)- finished in 2003;
- Biospheric Aspects of the Hydrological Cycle (BAHC) – finished in 2002.

IGBP is also involved in the following joint projects with the other members of the ESSP (DIVERSITAS, IGBP, IHDP and WCRP):

- Global Carbon Project (GCP);
- Global Change System for Analysis, Research and Training (START);
- Global Environmental Change and Food Systems (GECAFS);
- Global Environmental Change and Human Health;
- Global Water System Project (GWSP).

The Integrated Global Observing Strategy (IGOS)

(www.igospartners.org)

IGOS is a strategic planning process involving a number of partners that addresses how well user requirements are being met by the existing mix of international observational networks, and how these requirements might be better met in the future. Users include international decision-making bodies and organisations, national governments, non-governmental and public service organisations, the scientific community, the private sector, the media and the general public. IGOS serves as guidance to those responsible for defining and implementing individual observing systems. IGOS aims to:

- provide an overarching view to help improve understanding by governments of the significance of global monitoring;
- provide a framework for decisions to ensure continuity in the observation of key variables;
- offer a forum for exchange of information;
- identify gaps in existing observation systems;
- encourage specific activities to develop and enhance individual components of the strategy;
- promote amongst different user groups all aspects of strategy implementation by national and international agencies.

IGOS covers all forms of data collection concerning the physical, chemical, biological and human environment including the associated impacts.

Sponsoring organisations

IGOS is sponsored by GCOS, GOOS, GTOS, FAO, ICSU, IOC, UNEP, UNESCO, WMO, CEOS, WCRP and IGBP. There is no direct national membership.

Australian involvement

Australia does not pay any formal membership subscriptions to IGOS – Australian involvement is via formal membership to some of the sponsoring bodies.

Main programs

- Approved themes – Global Carbon Cycle; Geohazards; Ocean; Water cycle;
- Themes under preparation – Atmospheric chemistry; Coastal observations; Coral Reefs Sub-Theme;
- Proposed themes – Land Cover; Cryosphere.

International Human Dimensions Programme on Global Environmental Change (IHDP)

(www.ihdp.org)

IHDP is an international, interdisciplinary, non-governmental science program dedicated to promoting and co-ordinating research. IHDP's mission is to generate scientific knowledge on coupled human-environment systems, achieve comprehensive understanding of global environmental change processes and their consequences for sustainable development, and make contributions to explore:

- the anthropogenic drives of global environmental change;
- the impact of such change on human welfare; and
- societal responses to mitigate and adapt to global environmental change.

IHDP fosters high-quality research. The dynamics of land-use and land-cover change, interactions between institutions and global environment, human security, sustainable production and consumption systems as well as food and water issues, urbanisation and the global carbon cycle are investigated in the context of global environmental change.

Sponsoring countries and organisations

Funding is provided by annual contributions from IHDP's scientific sponsors, ICSU and ISSC, and a number of supporting countries. In 2001, IHDP was supported by grants from Germany, USA, the Netherlands, Sweden, Norway, Switzerland, Austria, Spain, New Zealand and Finland.

Australian involvement

Australia does not provide direct funding to IHDP, but contributes indirectly via membership to ICSU and ISSC. No Australians are currently on the IHDP Scientific committee. However, Australian scientists are involved in IHDP core projects. Graeme Pearman is an ex-officio member of the scientific steering committee as the START representative. Australia does not have a National Committee for IHDP – several other countries do.

Main programs

IHDP presently has four Core Science Projects:

- Global Environmental Change and Human Security (GECHS);
- Institutional Dimensions of Global Environmental Change (IDGEC);
- Industrial Transformation (IT);
- Land-Use and Land-Cover Change (LUCC) – finishes in 2005.

IHDP is also involved in the following joint projects with the other members of the ESSP (DIVERSITAS, IGBP, IHDP and WCRP):

- Global Carbon Project (GCP);
- Global Change System for Analysis, Research and Training (START);
- Global Environmental Change and Food Systems (GECAFS);
- Global Environmental Change and Human Health;
- Global Water System Project (GWSP).

International Network for the Availability of Scientific Publications (INASP)

(www.inasp.info)

INASP is a cooperative network of partners. Its mission is to enhance the flow of information within and between countries, especially those with less developed systems of publication and dissemination. INASP was established in 1992 by ICSU as a program of the Committee for the Dissemination of Scientific Information. Its objectives are:

- to map, support and strengthen existing activities promoting access to and dissemination of scientific and scholarly information and knowledge;
- to identify, encourage and support new initiatives that will increase local publication and general access to quality scientific and scholarly literature;
- to promote in-country capacity building in information production, organisation, access and dissemination.

Sponsoring countries and organisations

INASP receives financial support from the Australian Centre for International Agricultural Research, Association of Commonwealth Universities, British Medical Association, Carnegie Corporation of New York, European Commission Exchange, Gibbs Trust, ICSU, INTAS, International Institute for Communication and Development, Morel Trust, National Academy of Sciences, Norwegian Agency for Development Co-operation, Royal Danish Ministry of Foreign Affairs, Royal Swedish Academy of Sciences, Swedish International Development Cooperation Agency, Technical Centre for Agricultural and Rural Cooperation ACP-EU, United Kingdom Department for International Development, Wellcome Trust, Wenner Gren, and the World Health Organisation.

Australian involvement

Australia is involved via the Australian Centre for International Agricultural Research (ACIAR).

Main programs

- INASP-Health;
- Initiative on networking organisations and networks in rural development (South-South);
- Library support programs;
- Programme for the Enhancement of Research Information (PERI);
- African Journals OnLine Publishing Project (AJOPP);
- ICT Training;
- Publications.

Committee on Allocation of Radio Frequency (IUCAF)

(www.iucaf.org)

IUCAF is an international committee (set up in 1960 by URSI, IAU, and COSPAR) that works in the field of spectrum management on behalf of the passive radio sciences, like radio astronomy, remote sensing, space research, and meteorological remote sensing. The IUCAF brief is to study and coordinate the requirements for radio frequency allocations established by the afore-mentioned sciences and to make these requirements known to the national and international bodies responsible for frequency

allocations. IUCAF has official standing as a non-voting organisation at the International Telecommunication Union. IUCAF takes action aimed at ensuring that disruptive emissions do not interfere with the above sciences (when operating within allocated bands) by other radio services. IUCAF is particularly concerned about radio transmissions from aircraft, space vehicles, and land-based telecom services.

Sponsoring organisations

IUCAF is sponsored by IAU, COSPAR and URSI. There is no direct national membership.

Australian involvement

The Australian Academy of Science pays membership subscriptions to the three sponsoring organisations. Anastasios Tzioumis (CSIRO Australia Telescope National Facility) is on the IUCAF Committee.

Millennium Ecosystem Assessment (MA) (www.millenniumassessment.org)

MA is an international work program designed to meet the needs of decision makers and the public for scientific information concerning the consequences of ecosystem change for human well-being and options for responding to those changes. MA was launched by U.N. Secretary-General Kofi Annan in June 2001 and aims to help to meet the assessment needs of the Convention on Biological Diversity, Convention to Combat Desertification, the Ramsar Convention on Wetlands, and the Convention on Migratory Species, as well as needs of other users in the private sector and civil society. If the MA proves to be useful to its stakeholders, it is anticipated that an assessment process modelled on the MA will be repeated every 5–10 years and that ecosystem assessments will be regularly conducted at national or sub-national scales. MA focuses on ecosystem services (the benefits people obtain from ecosystems), how changes in ecosystem services have affected human well-being, how ecosystem changes may affect people in future decades, and response options that might be adopted at local, national, or global scales to improve ecosystem management and thereby contribute to human well-being and poverty alleviation. MA aims to:

- identify priorities for action;
- provide tools for planning and management;
- provide foresight concerning the consequences of decisions affecting ecosystems;
- identify response options to achieve human development and sustainability goals;
- help build individual and institutional capacity to undertake integrated ecosystem assessments and to act on their findings.

Sponsoring countries and organisations

The four-year MA budget is approximately US$17 million, with more than $7 million of additional support through in-kind contributions. Major financial support is being provided by the Global Environment Facility, United Nations Foundation, the David and Lucile Packard Foundation, World Bank, United Nations Environment Programme, the government of Norway, and the Kingdom of Saudi Arabia.

18 countries/regions are affiliated via their National Academies of Science, but Australia is not one of those affiliated countries.

Australian involvement

Australia has no formal involvement. However, Australian scientists do provide some in-kind support for MA activities, and have been involved in several peer reviews of MA programs, particularly in round 2.

Scientific Committee on Antarctic Research (SCAR)

(www.scar.org)

SCAR is a scientific committee of ICSU and is charged with the initiation, promotion and co-ordination of scientific research in Antarctica. SCAR also provides international, independent scientific advice to the Antarctic Treaty system. The principal objectives of SCAR are:

- to initiate, promote, and co-ordinate international scientific activity in the Antarctic with a view to framing and reviewing scientific programs of circumpolar scope and significance;
- to keep under review scientific matters pertaining to the integrity of the Antarctic environment, including the conservation of its terrestrial and marine ecosystems;
- to provide, upon request, scientific and technological advice to the Antarctic Treaty Consultative Meetings and other organisations, both governmental and non-governmental.

Sponsoring countries or organisations

Funding comes from member countries relevant Scientific Unions of ICSU. There are 27 member countries, including Australia.

Australian involvement

The Australian Academy of Science and the Australian Antarctic Division share the cost of formal membership subscriptions to SCAR. Australian scientists are involved with the various scientific committees of SCAR.

Scientific Committee on the Lithosphere (SCL)

(www.sclilp.org)

The International Lithosphere Program (ILP), instituted in 1980 as the successor to the International Geodynamics Project, seeks to elucidate the nature, dynamics, origin and evolution of the lithosphere, with special attention to the continents and their margins. Believing these goals are best attained through international, interdisciplinary collaboration, the Inter-Union Commission on the Lithosphere has established international, multidisciplinary working groups and coordinating committees to pursue its specific research objectives. The International Lithosphere Program is guided by the Scientific Committee on the Lithosphere (SCL), which was established by ICSU.

Sponsoring countries or organisations

The ILP and SCL are sponsored by ICSU, IUGG and IUGS. There is no direct national membership.

Australian involvement

Australia is a member of the three sponsoring bodies, via Australian Academy of Science membership subscriptions. There does not appear to be much involvement by Australian scientists in leadership roles of any of the various SCL projects.

Main programs

- Geoscience of global change;
- Contemporary dynamics and deep processes;
- Continental lithosphere;
- Oceanic lithosphere;
- Coordinating Committees.

Scientific Committee on Problems of the Environment (SCOPE)

(www.icsu-scope.org)

SCOPE is an interdisciplinary body of natural and social science expertise focused on global environmental issues, operating at the interface between scientific and decision-making instances. It is a worldwide network of scientists and scientific institutions developing syntheses and reviews of scientific knowledge on current or potential environmental issues. SCOPE's scientific program is designed to cover environmental issues - either global or shared by several nations - in need of interdisciplinary approaches through synthesis, assessment, and evaluation of information available on natural and human-made environmental changes and the effects of these changes on people. SCOPE reviews existing and potential environmental problems and has played an important role in the development of major international research programs. It is a recognised authority at the interface between the science and decision-making spheres, providing analytical tools to promote sound management and policy practices.

Sponsoring countries or organisations

SCOPE is supported by 40 member countries and 22 ISCU Unions and International Bodies.

Australian involvement

The Australian Academy of Science paid membership subscriptions up until 2001-2002 but stopped subscriptions in 2002-2003. Australia and the Academy are still listed as members on the SCOPE website. Several Australian scientists are involved in various SCOPE projects. The Academy is also a formal member of various bodies that sponsor SCOPE.

Main programs

Cluster 1 – Managing Societal and Natural Resources. Projects founded on scientific research, but emphasising its applications in developing options for practices and policies for a more sustainable biosphere:

- Global Invasive Species Programme;
- Southern African Savannas Network;
- Peri-Urban Environmental Change;
- Urban Solid Waste Management;
- Adaptive Ecopolis Development to Meet the Challenge of Environmental Change;
- Forest Management and Conservation in an Information-rich World;
- Bridging the gap between ecology researchers and managers of protected areas;

- Assessment of Sustainability Indicators;
- Consequences of Industrialised Animal Production.

Cluster 2 – Ecosystem Processes and Biodiversity. Projects focused on ecosystem processes, their interactions with human activities, and the relation between biological diversity and ecosystem functioning:

- Earth Surface Processes, Material Use and Urban Development;
- Land-Ocean Nutrient Fluxes: Silica Cycle;
- International Program on Ecosystem Change;
- Biodiversity and Ecosystem Functioning;
- Emerging Ecosystem;
- Monsoon Asia Integrated Regional Studies;
- International Nitrogen Initiative and Fertilizer Nitrogen;
- Microbial genomes in the environment.

Cluster 3 - Health and Environment. Projects that develop methods to assess chemical risks to human and non-human species and use case studies of environmental contamination to assess the health and environmental risks of specific chemicals:

- Scientific Group on Methodologies for the Safety Evaluation of Chemicals;
- Radioactivity at Nuclear Sites;
- Cadmium in the Environment;
- Biological Measures of Water Quality: Their Relevance to Present and Future Contaminants;
- Biodiversity, Health and the Environment.

Scientific Committee on Oceanic Research (SCOR)

(www.jhu.edu/~scor)

SCOR is the leading non-governmental organisation for the promotion and coordination of international oceanographic activities. SCOR does not have the resources to fund research directly, but focuses on promoting international cooperation in planning and conducting oceanographic research, and solving methodological and conceptual problems that hinder research. Scientists from thirty-five nations participate in SCOR working groups and scientific steering committees for the large-scale ocean research projects. SCOR promotes capacity building for marine scientists in developing countries through special efforts to include such scientists in SCOR activities, through travel grants to as many as 75 individuals each year, and through a new activity on Regional Graduate Schools of Oceanography and Marine Environmental Sciences.

Sponsoring countries or organisations

SCOR is supported by its 35 Member countries, plus grants from various organisations.

Australian involvement

The Australian Academy of Science pays formal membership subscriptions. Several Australian scientists are involved in various SCOR projects.

Main programs

- 11 Current Working Groups;
- Large-Scale Ocean Research Programs:
  - Global Ecology and Oceanography of Harmful Algal Blooms;
  - GEOTRACES Planning Group;
  - Global Ocean Ecosystem Dynamics;
  - Joint Global Ocean Flux Study (JGOFS);
  - Integrated Marine Biogeochemistry and Ecosystem Research Project;
  - Surface Ocean-Lower Atmosphere Study.
- SCOR-IOC Ocean Carbon Activities;
- Capacity-Building Activities.

Scientific Committee on Solar Terrestrial Physics (SCOSTEP)

(www.ngdc.noaa.gov/stp/SCOSTEP)

The principal tasks of SCOSTEP are:

- to promote international interdisciplinary programs in solar-terrestrial physics, and to organise and coordinate such programs of interest to, and approved by, at least two of the following bodies: IAU, IUGG, IUPAP, URSI, and COSPAR;
- to define the data relating to these programs that should be exchanged through the World Data Centres;
- to provide such advice as may be required by the ICSU bodies and World Data Centres concerned with these programs;
- to work with other ICSU bodies in the coordination of symposia in solar-terrestrial physics, especially on topics related to SCOSTEP's programs.

During the years 2004-2008, SCOSTEP's comprehensive international program is CAWSES (Climate and Weather of the Sun-Earth System).

Sponsoring countries or organisations

SCOSTEP is sponsored by ICSU, IAU, IUGG (IAGA), IUGG (IAMAS), IUPAP, URSI and COSPAR plus contributions from 30 national member bodies.

Australian involvement

The Australian Academy of Science pays formal membership subscriptions. Australian scientists are involved in various SCOSTEP committees and projects.

World Climate Research Programme (WCRP)

(www.wmo.ch/web/wcrp)

The objectives of WCRP are to develop the fundamental scientific understanding of the physical climate system and climate processes needed to determine to what extent climate can be predicted and the extent of human influence on climate. The program encompasses studies of the global atmosphere, oceans, sea and land ice, and the land surface which together constitute the Earth's physical climate system. WCRP studies are specifically directed to provide scientifically founded quantitative answers to the questions being raised on climate and the range of natural climate variability, as well as to establish

the basis for predictions of global and regional climatic variations and of changes in the frequency and severity of extreme events.

Sponsoring countries or organisations

WCRP is sponsored by ICSU, IOC of UNESCO, and WMO. There is no direct national membership.

Australian involvement

The Australian Academy of Science pays formal membership subscriptions. Australian scientists are involved in various WCRP projects and steering committees.

Main programs

- Climate and Cryosphere (CliC);
- Climate Variability and Predictability (CLIVAR);
- The Global Energy and Water Cycle Experiment (GEWEX);
- Stratospheric Processes And their Role in Climate (SPARC);
- Surface Ocean-Lower Atmosphere Study (SOLAS) – cosponsored by WCRP, IGBP and SCOR;
- Working Group on Numerical Experimentation (WGNE);
- Working Group on Coupled Modelling (WGCM);
- Working Group on Surface Fluxes (WGSF).

WCRP is also involved in the following joint projects with the other members of the ESSP (DIVERSITAS, IGBP, IHDP and WCRP):

- Global Carbon Project (GCP);
- Global Change System for Analysis, Research and Training (START);
- Global Environmental Change and Food Systems (GECAFS);
- Global Environmental Change and Human Health;
- Global Water System Project (GWSP).

Panel on World Data Centres (WDC)

(www.ngdc.noaa.gov/wdc)

WDC was established in 1968 to advise ICSU on the management of the World Data Centres, and to carry out related activities. It succeeded the other ICSU bodies that created the World Data Centre system for the International Geophysical Year (IGY) of 1957-1958 and which supervised its operation during and after the IGY. Currently, the Panel oversees about forty World Data Centres in 12 countries. WDCs are funded and maintained by their host countries on behalf of the international science community, and are responsible for collecting, archiving, and distributing a wide range of data. These data cover time-scales ranging from seconds to millennia and provide baseline information for research in many disciplines, especially for monitoring changes in the geosphere and biosphere - gradual or sudden, foreseen or unexpected, natural or man-made. All data held in WDCs are available for no more than the cost of copying and sending the requested information.

Through its varied activities and initiatives, the Panel promotes the use of new technology, enabling good science to be done with both new and old data by the scientists of many nations.

Involved countries

Twelve countries host World Data Centres, including Australia.

Australian involvement

Australia hosts the WDC for Solar-Terrestrial Science in Sydney, via the Commonwealth government's IPS Radio and Space Services.

Appendix 4 - International Scientific Associations and Services under ICSU bodies

Several of the ICSU Unions have membership from sub-discipline based international scientific associations, some of which have separate membership requirements. These are listed below.

The Australian Academy of Science pays direct subscriptions to:

- International Association of Geochemistry and Cosmochemistry (IAGC) – IAGC is also affiliated with IUGS, to which the Australian Academy of Science pays membership subscriptions;
- International Commission for Optics (ICO) – ICO is also an affiliated commission of IUPAP, to which the Australian Academy of Science pays membership subscriptions. The Australian Optical Society is also a member.

Australia has indirect formal involvement with the following international bodies, via membership to the ICSU Unions and organisations to which these bodies are affiliated:

Federation of Astronomical and Geophysical Data Analysis Services (FAGS)

- International Earth Rotation and Reference system Services (IERS);
- Bureau Gravimetrique International (BGI);
- International GPS Service for Geodynamics (IGS);
- International Centre for Earth Tides (ICET);
- Permanent Service for Mean Sea Level (PSMSL);
- International Service of Geomagnetic Indices (ISGI);
- Quarterly Bulletin on Solar Activity (QBSA);
- International Space Environment Service (ISES);
- World Glacier Monitoring Service (WGMS);
- Centre des Données astronomiques de Strasbourg (CDS);
- Sunspot Index Data Centre (SIDC);
- International VLBI Service for Geodesy and Astrometry (IVS).

International Society for Photogrammetry and Remote Sensing (ISPRS)

- International Association for Pattern Recognition (IAPR).

International Union of Biochemistry and Molecular Biology (IUBMB)

- International Federation of Clinical Chemistry and Laboratory Medicine (IFCC);
- International Society for Free Radical Research (ISFRR);
- International Society for Neurochemistry (ISN).

International Union of Biological Sciences (IUBS)

- Cell Stress Society International (CSSI);
- International Association for Aerobiology (IAA);
- International Association for Biological Oceanography (IABO);
- International Association for Comparative Physiology and Biochemistry;
- International Association for Ecology;
- International Association for Lichenology;
- International Association for Radiation Research;
- International Association for the Plant Protection Sciences (IAPPS);
- International Association of Botanic and Mycological Societies (IABMS);
- International Association of Botanic Gardens (IABG);
- International Association of Environmental Mutagen Societies;
- International Association of Human Biologists (IAHB);
- International Association of Plant Physiology (IAPP);
- International Association of Plant Taxonomy (IAPT);
- International Association of Sexual Plant Reproduction Research (IASPRR);
- International Bee Research Association (IBRA);
- International Biometric Society (IBS);
- International Bryozoology Association;
- International Commission for Invertebrate Survey;
- International Commission for Plant-Bee Relationships (ICPBR);
- International Commission for the Nomenclature of Cultivated Plants;
- International Commission of Soil Zoology;
- International Commission on Small Scale Vegetation Mapping;
- International Commission on the Taxonomy of Fungi;
- International Commission on Vegetation Science;
- International Commission on Zoological Nomenclature (ICZN);
- International Committee on Microbial Ecology;
- International Congress of Zoology (ICZ);
- International Congresses of Dipterology;
- International Congresses of Entomology;
- International Council for Medicinal and Aromatic Plants (ICMAP);
- International Ethological Committee;
- International Federation for Cell Biology (IFCB);
- International Federation of Palynological Societies;
- International Federation of Societies for Histochemistry and Cytochemistry;
- International Genetics Federation (IGF);

- International Mycological Association (IMA);
- International Organisation for Biological Control (IOBC);
- International Organisation of Paleobotany;
- International Organisation for Plant Information (IOPI);
- International Organisation for Succulent Plant Study (IOS);
- International Organisation of Systematic and Evolutionary Biology (IOSEB);
- International Ornithological Committee;
- International Palaeontological Association;
- International Phycological Society;
- International Polychaetological Association;
- International Primatological Association;
- International Seed Testing Association;
- International Society for Animal Genetics;
- International Society for Developmental and Comparative Immunology;
- International Society for Horticultural Science (ISHS);
- International Society for Mushroom Science;
- International Society for Plant Pathology;
- International Society for Tropical Root Crops;
- International Society of Arachnology (ISA);
- International Society of Biometeorology (ISB);
- International Society of Developmental Biologists (ISDB);
- International Society of Environmental Botanists (ISEB);
- International Society of Invertebrate Reproduction and Development;
- International Society of Vertebrate Morphologists;
- International Union for the Study of Social Insects;
- International Union of Photobiology;
- International Union of Protozoology Societies;
- International Union of Reticuloendothelial Societies;
- International Working Group on Taxonomic Databases (TDWG);
- Societas Internationalis Limnologiae;
- Society for Invertebrate Pathology (SIP);
- Unitas Malacologica;
- World Congress of Herpetology;
- World Federation for Culture Collections (WFCC);
- World Federation of Parasitologists.

International Union of Crystallography (IUCr)

- International Centre for Diffraction Data (ICDD);
- International Organisation of Crystal Growth (IOCG).

International Union of Food Science and Technology (IUFoST)

- International Dairy Federation;
- International Life Sciences Institute (ILSI);
- International Institute of Refrigeration (IIR).

International Union of Geodesy and Geophysics (IUGG)

- International Association of Geodesy (IAG);
- International Association of Geomagnetism and Aeronomy (IAGA);
- International Association of Hydrological Sciences (IAHS);
- International Association of Meteorology and Atmospheric Sciences;
- International Association for the Physical Sciences of the Ocean (IAPSO);
- International Association of Seismology and Physics of the Earth's Interior (IASPEI);
- International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI).

International Union of Geological Sciences (IUGS)

- Association of Exploration Geochemists;
- Association of Geoscientists for International Development;
- Association internationale pour l'etude des argiles;
- Centre International pour la Formation et les Echanges Géologiques;
- Commission for the Geological Map of the World;
- Geochemical Society;
- International Association for Engineering Geology and the Environment;
- International Association of Geochemistry and Cosmochemistry;
- International Association of Geomorphologists;
- International Association on the Genesis of Ore Deposits;
- International Association of Hydrogeologists;
- International Association for Mathematical Geology;
- International Association of Sedimentologists;
- International Federation of Palynological Societies;
- International Geoscience Education Association;
- International Mineralogical Association;
- International Palaeontological Association;
- International Permafrost Association;
- International Society for Rock Mechanics;
- International Union for Quaternary Research;
- Meteoritical Society;
- Society of Economic Geologists;

- Society for Geology Applied to Mineral Deposits;
- Society for Sedimentary Geology.

International Union of Immunological Societies (IUIS)

- International Society of Immunopharmacology (ISIP);
- International Society of Developmental and Comparative Immunology (ISDCI);
- International Association of Allergology and Clinical Immunology (IAACI);
- International Society for Immunology of Reproduction (ISIR);
- Society for Mucosal Immunology (SMI).

International Union of Microbiological Societies (IUMS)

- International Society for Human and Animal Mycology (ISHAM);
- International Society for Microbial Ecology (ISME);
- International Society for Plant Pathology (ISPP);
- International Organisation for Biotechnology and Bioengineering (IOBB).

International Union of Pure and Applied Chemistry (IUPAC)

- International Association for Environmental Analytical Chemistry (IAEAC);
- International Association of Catalysis Societies;
- International Association of Chemical Thermodynamics;
- International Association of Colloid and Interface Scientists;
- International Association of Geochemistry and Cosmochemistry;
- International Carbohydrate Organisation;
- International Board on Applications of the Mössbauer Effect;
- International Committee on Imaging Science;
- International Confederation for Thermal Analysis and Calorimetry;
- International Federation of Clinical Chemistry and Laboratory Medicine;
- International Group for Correlation Analysis in Chemistry;
- International Mechanochemical Association;
- International Organisation for Biotechnology and Bioengineering;
- International Organisation for Chemical Sciences in Development (IOCD);
- International Organisation of Crystal Growth;
- International Society of Electrochemistry;
- International Society of Heterocyclic Chemistry;
- International Society of Magnetic Resonance;
- International Water Association;
- International Zeolite Association.

International Union of Pure and Applied Physics (IUPAP)

- International Commission For Optics;
- International Commission On General Relativity And Gravitation;
- International Commission for Acoustics.

International Union for Physical and Engineering Sciences in Medicine (IUPESM)

- International Federation for Medical and Biological Engineering (IFMBE);
- International Organisation for Medical Physics (IOMP).

International Union of Pharmacology (IUPHAR)

- Association for Ocular Pharmacology and Therapeutics (AOPT);
- Collegium Internationale Neuro-Psychopharmacologicum (CINP);
- International Society of Anesthetic Pharmacology (ISAP);
- International Society of Anti-Infective Pharmacology (ISAP);
- International Society of Ethnopharmacology (ISE);
- International Society of Immunopharmacology (ISIP);
- International Society of Regulatory Toxicology and Pharmacology (ISRTP);
- Safety Pharmacology Society (SPS);
- Serotonin Club.

International Union of Physiological Sciences (IUPS)

- International Society for Pathophysiology;
- International Society of Nephrology.

International Union of Psychological Science (IUPsyS)

- International Association for Cross-Cultural Psychology (IACCP);
- International Association of Applied Psychology (IAAP);
- International Council of Psychologists (ICP);
- International Neurological Society (INS);
- International Society for the Study of Behavioral Development (ISSBD);
- International Society of Comparative Psychology (ISCP).

International Union of Theoretical and Applied Mechanics (IUTAM)

- International Centre for Mechanical Sciences (CISM);
- International Centre for Heat and Mass Transfer (ICHMT);
- International Committee on Rheology (ICR);
- International Association for Vehicle System Dynamics (IAVSD);
- International Society for the Interaction of Mechanics and Mathematics (ISIMM);
- International Congress on Fracture (ICF);

- International Congress on Mechanical Behaviour of Materials (ICM);
- International Association for Computational Mechanics (IACM);
- International Association for Boundary Element Methods (IABEM);
- International Society for Structural and Multidisciplinary Optimisation (ISSMO);
- International Association for Hydromagnetic Phenomena and Applications (HYDROMAG);
- International Institute of Acoustics and Vibration (IIAV);
- International Commission for Acoustics (ICA);
- International Congresses on Thermal Stresses (ICTS).

International Union of Toxicology (IUTOX)

- International Neurotoxicology Association.

Appendix 5 – UNESCO scientific bodies and programs

International Union Geological Correlation Programme (IGCP)

(www.unesco.org/science/earthsciences/igcp)

IGCP is a joint endeavour of UNESCO and IUGS. It was launched in 1972 to facilitate cooperation among geoscientists across frontiers and boundaries. Its objective is to bring scientists from all over the world together and enhance interaction, particularly between North and South, through joint research work, meetings and workshops. IGCP is interdisciplinary, covering the different fields in earth sciences, and is linked with other UNESCO scientific programs. It maintains active interfaces with disciplines such as water, ecological, marine, atmospheric and biological sciences. Reflecting the contemporary needs of society, the four main objectives of IGCP are:

- to increase the understanding of the different factors influencing the environment in order to improve human living conditions and wise management of the Earth as a human habitat;
- to develop more effective ways to search and assess natural resources of energy and minerals;
- to enhance knowledge of the Earth's geological processes and concepts through correlative studies of sites and locations around the globe;
- to improve standards of research methods and techniques.

Involved countries and organisations

IGCP funds are a combination of UNESCO, IUGS and U.S. Academy of Sciences financial contribution. IGCP operates in about 150 countries and involves several thousand scientists.

Australian involvement

- Australia does not contribute any funds directly to IGCP. However, Australia is a member of the sponsoring bodies UNESCO and IUGS.
- Australia has a National Committee for IGCP, funded by Geosciences Australia.
- Several Australian scientists are involved in the leadership of various IGCP projects.

Main programs

IGCP currently has 42 projects.

International Hydrological Programme (IHP) (www.unesco.org/water/ihp)

IHP, UNESCO's intergovernmental scientific co-operative program in water resources, is a vehicle through which Member States can upgrade their knowledge of the water cycle and thereby increase their capacity to better manage and develop their water resources. It aims at the improvement of the scientific and technological basis for the development of methods for the rational management of water resources, including the protection of the environment. As UNESCO's principal mechanism to contribute to the priority issue of water resources and related ecosystems, the IHP strives to minimise the risks to water resources systems, taking fully into account social challenges and interactions and developing appropriate approaches for sound water management.

Australian involvement

Australia has a national IHP network that acts as the IHP National Committee for Australia. Australian scientists are active in IHP projects.

Main programs

There are five Themes plus three crosscutting program components:

- Theme 1 - Global Changes and Water Resources;
- Theme 2 - Integrated Watershed and Aquifer Dynamics;
- Theme 3 - Land Habitat Hydrology;
- Theme 4 - Water and Society;
- Theme 5 - Water Education and Training;
- Flow Regimes From International Experimental And Network Data (FRIEND) - An International Collaborative Study in Regional Hydrology;
- Hydrology for the Environment, Life and Policy (HELP) – Joint program of UNESCO's IHP and WMO. Has Australian involvement;
- Joint International Isotopes in Hydrology Programme (JIIHP) – joint program of UNESCO's IHP and IAEA endeavour.

Intergovernmental Oceanographic Commission (IOC)

(http://ioc.unesco.org/iocweb)

The IOC provides member states of the United Nations with an essential mechanism for global co-operation in the study of the ocean. IOC assists governments to address their individual and collective ocean and coastal problems through the sharing of knowledge, information and technology, and through the co-ordination of national programs. The work of IOC has focused on promoting marine scientific investigations and related ocean services, with a view to learning more about the nature and resources of the oceans. IOC focuses on four major themes:

- develop, promote and facilitate international oceanographic research programs to improve our understanding of critical global and regional ocean processes and their relationship to the sustainable development and stewardship of ocean resources;
- ensure effective planning, establishment and co-ordination of an operational global ocean observing system to provide the information needed for oceanic and atmospheric forecasting, for oceans and coastal zone management by coastal nations, and for global environmental change research;
- provide international leadership for education and training programs and technical assistance essential for systematic observations of the global ocean and its coastal zone and related research; and
- ensure that ocean data and information obtained through research, observation and monitoring are efficiently handled and made widely available.

Involved countries

There are 129 member states.

Australian involvement

Australia is a member, and is also a member of the executive council. Australian scientists are involved in various IOC projects.

Main programs

- Harmful Algal Bloom Programme;
- Working Group on Coral Bleaching and Local Ecological – Joint program of IOC and the World Bank;
- Study Group on Benthic Indicators;
- Global Ocean Ecosystem Dynamics (GLOBEC) – Joint program of IOC and SCOR;
- World Climate Research Program (WCRP) – Joint program of IOC, WMO and ICSU;
- Advisory Panel on Ocean CO_2 – Joint program of IOC and SCOR;
- The International Ocean-Colour Coordinating Group (IOCCG);
- Integrated Coastal Area Management (ICAM);
- Global Nutrient Export from Watersheds – Joint program of IOC, UNEP, US-NSF, and US-NOAA.

Man and the Biosphere (MAB)

(www.unesco.org/mab)

MAB develops the basis, within the natural and the social sciences, for the sustainable use and conservation of biological diversity, and for the improvement of the relationship between people and their environment globally. MAB encourages interdisciplinary research, demonstration and training in natural resource management. MAB contributes not only to better understanding of the environment, including global change, but to greater involvement of science and scientists in policy development concerning the wise use of biological diversity.

Involved countries

The MAB governing body consists of 34 member states elected by UNESCO's biennial general conference.

Australian involvement

Australia is not currently a member of the MAB governing body.

United Nations World Water Assessment Programme (WWAP)

(www.unesco.org/water/wwap)

The UN-wide WWAP seeks to develop the tools and skills needed to achieve a better understanding of those basic processes, management practices and policies that will help improve the supply and quality of global freshwater resources. Its goals are to:

- assess the state of the world's freshwater resources and ecosystems;
- identify critical issues and problems;
- develop indicators and measure progress towards achieving sustainable use of water resources;
- help countries develop their own assessment capacity;
- document lessons learned and publish a World Water Development Report at regular intervals.

WWAP has input from agencies across the UN system.

Appendix 6 – World Meteorological Organization (WMO) scientific programs

WMO facilitates international cooperation in the establishment of networks for making meteorological, hydrological and other observations, and promotes the rapid exchange of meteorological information for public, private and commercial use. The scientific activities coordinated by WMO include weather predictions, climate change, air pollution, ozone depletion studies and tropical storm forecasting.

As of August 2003, there were 187 member nations (including Australia), comprising 181 member states and six member territories, all of which maintain their own national meteorological and hydrological services. Members are grouped into six regional associations (Africa, Asia, South America, North and Central America, South-West Pacific and Europe). Australia has been a member of WMO since its establishment and participates strongly in its programs (eg, in the formal framework of the constituent bodies, especially the WMO Congress, the executive council, South-West Pacific regional association and all eight Technical Commissions). The nominated permanent representative for Australia with WMO is the Director of Meteorology.

WMO supports a number of weather research programs that are directly relevant to climate change research at an international level. These include:

World Weather Watch (WWW)

(www.wmo.ch/web/www/www.html)

WWW is the backbone of WMO's activities, and provides up-to-the-minute worldwide weather information and support for developing international programs related to global climate and other environmental issues, and to sustainable development. WWW comprises three core components: the Global Observing System (GOS), the Global Data-Processing System (GDPS) and the Global Telecommunication System (GTS).

The Australian Bureau of Meteorology (BOM) is involved through one of three World Meteorological Centres in Melbourne, regional specialised meteorological centres in Melbourne and Darwin, and a regional instruments centre of the South-West Pacific regional association. Two Australians are on the management group of the Commission for Basic Systems (CBS) of WWW.

Applications of Meteorology Programme (AMP)

(www.wmo.ch/web/aom/aom.html)

The AMP consists of four component activities:

- Public Weather Services Programme – several Australians from BOM are involved in expert teams and co-ordination committees;
- Agricultural Meteorology Programme – projects overseen by the Commission for Agricultural Meteorology (CAgM);
- Aeronautical Meteorology Programme – Australia's BOM is involved, but no Australians are involved in the management group;
- Marine Meteorology and Related Oceanographic Activities Programme – part of JCOMM (see below).

Atmospheric Research and Environment Programme (AREP)

(www.wmo.ch/web/arep/arep-home.html)

The main programs of AREP are:

- Global Atmosphere Watch (GAW) – There are several Scientific Advisory Groups under GAW and Australian scientists are involved in these. Australia has observing stations involved with the GAW network;
- World Weather Research Programme;
- Tropical Meteorology Research Programme;
- Physics and Chemistry of Clouds and Weather Modification.

AREP is overseen by the Commission for Atmospheric Sciences (CAS). Dr John Gras, CSIRO Division of Atmospheric Research, is a member of the CAS working group.

Global Climate Observing System (GCOS)

(www.wmo.ch/web/gcos/gcoshome.html)

(See also Appendix 3)

GCOS was established in 1992 to ensure that the observations and information needed to address climate-related issues are obtained and made available to all potential users. It is co-sponsored by the World Meteorological Organisation (WMO), the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the United Nations Environment Programme (UNEP) and the International Council for Science (ICSU). GCOS is intended to be a long-term, user-driven operational system capable of providing the comprehensive observations required for monitoring the climate system, for detecting and attributing climate change, for assessing the impacts of climate variability and change, and for supporting research toward improved understanding, modelling and prediction of the climate system. It addresses the total climate system including physical, chemical and biological properties, and atmospheric, oceanic, hydrologic, cryospheric and terrestrial processes.

Mike Manton of Australia's BOM is chair of one of the three science panels of GCOS. Australia contributes observational data to GCOS.

Hydrology and Water Resources Programme (HWRP)

(www.wmo.ch/web/homs/hwrpframes.html)

The overall objective of HWRP is to apply hydrology to meet the needs for sustainable development and use of water and related resources; to the mitigation of water-related disasters; and to effective environmental management at national and international levels. HWRP is implemented through five mutually supporting components:

- Programme on Basic Systems in Hydrology (including HOMS and WHYCOS);
- Programme on Forecasting and Applications in Hydrology;
- Programme on Sustainable Development of Water Resources;
- Programme on Capacity Building in Hydrology and Water Resources;
- Programme on Water-related Issues.

Projects are primarily implemented by regional working groups. Australia is involved with the South West Pacific groups through the BOM's Hydrometeorological Advisory Service (HAS).

Intergovernmental Panel on Climate Change (IPCC)

(www.ipcc.ch)

Recognising the problem of potential global climate change, the World Meteorological Organisation (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) in 1988. It is open to all members of the UN and WMO. The role of the IPCC is to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation. The IPCC does not carry out research nor does it monitor climate related data or other relevant parameters. It bases its assessment mainly on peer reviewed and published scientific/technical literature. The IPCC has three Working Groups and a Task Force:

- Working Group I assesses the scientific aspects of the climate system and climate change.
- Working Group II assesses the vulnerability of socio-economic and natural systems to climate change, negative and positive consequences of climate change, and options for adapting to it.
- Working Group III assesses options for limiting greenhouse gas emissions and otherwise mitigating climate change.
- The Task Force on National Greenhouse Gas Inventories is responsible for the IPCC National Greenhouse Gas Inventories Programme.

A main activity of the IPCC is to provide in regular intervals an assessment of the state of knowledge on climate change. The IPCC also prepares Special Reports and Technical Papers on topics where independent scientific information and advice is deemed necessary and it supports the UN Framework Convention on Climate Change (UNFCCC) through its work on methodologies for National Greenhouse Gas Inventories. The First IPCC Assessment Report was completed in 1990. The Report played an important role in establishing the Intergovernmental Negotiating Committee for a UN Framework Convention on Climate Change by the UN General Assembly. The UN Framework Convention on Climate Change (UNFCCC) was adopted in 1992 and entered into force in 1994. It provides the overall policy framework for addressing the climate change issue. The IPCC Second Assessment Report, Climate Change 1995, provided key input to the negotiations, which led to the adoption of the Kyoto Protocol to the UNFCCC in 1997. The Third Assessment Report (TAR), Climate Change 2001, was completed in 2001. The IPCC has decided to continue to prepare comprehensive assessment reports and agreed to complete its Fourth Assessment Report in 2007. Considerations about scope and outline are about to start.

Australian scientists have been actively involved in the IPCC and the preparation of its assessment reports.

Technical Cooperation Programme (TCO)

(www.wmo.ch/web/tco/TCOHome.html)

The objective of TCO is to ensure, through collaborative efforts of Members, for their mutual benefit, the enhancement and development of the capabilities of the national Meteorological and Hydrological Services (NMHSs) so that they can contribute to and participate efficiently in the implementation of WMO Programs, for the benefit of the global community and in support of national socio-economic development activities.

(More of a funding/infrastructure program than a scientific program.)

World Climate Programme (WCP)

(www.wmo.ch/web/wcp/wcp-home.html)

WCP comprises the following components, all administered by the Commission of Climatology (CCL), which has involvement from Australia's BOM:

- World Climate Data and Monitoring Programme (WCDMP);
- World Climate Applications and Services Programme (WCASP);
- World Climate Impact Assessment and Response Strategies Programme (WCIRP);
- World Climate Research Programme (WCRP);
- Climate Information and Prediction Services (CLIPS).

World Climate Research Programme (WCRP)

(www.wmo.ch/web/wcrp/wcrp-home.html)

(See Appendix 3)

WMO/IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM)

(www.wmo.ch/web/aom/marprog)

JCOMM is an intergovernmental body of experts, which provides the international, intergovernmental coordination, regulation and management mechanism for an operational oceanographic and marine meteorological observing, data management and services system. Until the formation of JCOMM in 1999, the coordination of these activities was provided by two separate bodies: the WMO Commission for Marine Meteorology (CMM) and the Joint IOC/WMO Committee for the Integrated Global Ocean Services System (IGOSS). JCOMM is the result of the recognition of the increasing demand for integrated marine meteorological and oceanographic data and services, and the efficiencies that may be achieved by combining the expertise and technological capabilities of the WMO and IOC systems.

Phillip Parker of Australia's BOM is on the nine-member management group of JCOMM.

Appendix 7 – Other international scientific activities

Other international science activities that do not fit under ICSU or UN bodies are described below.

Global Biodiversity Information Facility (GBIF)

(www.gbif.org)

The mission of GBIF is to make the world's primary data on biodiversity freely and universally available via the Internet. The GBIF vision is that it will contribute to economic growth, ecological sustainability, social outcomes and scientific research by increasing the utility, availability and completeness of primary scientific biodiversity information available on the Internet. Functionally, GBIF encourages, coordinates and supports the development of worldwide capacity to access the vast amount of biodiversity data held in natural history museum collections, libraries and databanks. Near term GBIF developments will focus on species and specimen-level data. Technically, GBIF is evolving to be an interoperable network of biodiversity databases and information technology tools using web services and Grid technologies. In the near term, GBIF will provide a global metadata registry of the available biodiversity data with open interfaces. Anyone can then use it to construct thematic portals and specialised search facilities. Building on the contents of this registry, GBIF will provide its own central portal that enables simultaneous queries against biodiversity databases held by distributed, worldwide sources. In the long term, molecular, genetic, ecological and ecosystem level databases can be linked to the system. These will facilitate and enable data mining of unprecedented utility and scientific merit. As its work programs progress, GBIF will enable users to navigate and put to use the world's vast quantities of biodiversity information. This information is vital to generating economic, environmental, social and scientific benefits from the sustainable use, conservation and study of biodiversity resources.

Involved countries

There are 25 full member countries and 16 associate member countries.

Australian involvement

Australia is a member via the CSIRO. Several Australian scientists are involved in GBIF committees. The Australian Biodiversity Information Facility (ABIF) is the Australian participant node for GBIF, supported by the government‘s Department of the Environment and Heritage.

Main programs

GBIF work is organised around six major programs:

- Data Access and Database Interoperability;
- Digitisation of Natural History Collections;
- Electronic Catalogue of Names of Known Organisms;
- Outreach and Capacity Building;
- Digital Biodiversity Literature Resources;
- Species Bank.

Global Forum for Health Research

(www.globalforumhealth.org)

The Global Forum for Health Research is an independent international foundation established in Geneva in 1998 with the objective of helping correct 'the 10/90 gap' in health research. Health research is essential to improve the design of health interventions, policies and service delivery. Every year more than US $70 billion is spent on health research and development by the public and private sectors. An estimated 10 per cent of this is used for research into 90 per cent of the world's health problems. This is what is called 'the 10/90 gap'. The Global Forum for Health Research's central objective is to help correct the 10/90 gap by focusing research efforts on diseases representing the heaviest burden on the world's health and facilitating collaboration between partners in both the public and private sectors. The Global Forum's main strategies include organising annual meetings; helping develop priority-setting methodologies; and supporting networks in priority health research areas.

Sponsoring countries and organisations

The Global Forum is currently supported by donations from the Rockefeller Foundation, World Bank, World Health Organisation and the governments of Canada, Denmark, Netherlands, Norway, Sweden and Switzerland. In addition, individual networks supported by the Global Forum receive funding from the Bill and Melinda Gates Foundation, the Institute of Medicine of the US Academy of Sciences, the UK Department of International Development and others.

Australian involvement

Australia is not a formal member.

Global Water Research Coalition (GWRC)

(www.globalwaterresearchcoalition.net)

Twelve world leading research organisations have established an international water research alliance – the Global Water Research Coalition (GWRC). GWRC is a non-profit organisation that serves as the collaborative mechanism for water research. The Coalition will focus on water supply and wastewater issues and renewable water resources: the urban water cycle. The GWRC function will be to leverage funding and expertise among the participating research organisations, coordinate research strategies, secure additional funding not available to single country research foundations, and actively manage a centralised approach to global issues. The GWRC was officially formed in April 2002 with the signing of the partnership agreement at the International Water Association 3rd World Water Congress.

The founding members of the GWRC are:

- Awwa Research Foundation (US);
- CRC for Water Quality and Treatment (Australia);
- Kiwa (Netherlands);
- Suez Environmental - CIRSEE (France);
- Stowa - Foundation for Applied Water Research (Netherlands);
- DVGW TZW- Water Technology Center (Germany);
- UK Water Industry Research (UK);
- Anjou Recherche - Veolia Water (France);
- Water Environment Research Foundation (US);

- Water Research Commission (South Africa);
- WateReuse Foundation (US);
- Water Services Association of Australia.

Human Frontier Science Program (HFSP)

(www.hfsp.org)

HFSP supports novel, innovative and interdisciplinary basic research focused on the complex mechanisms of living organisms; topics range from molecular and cellular approaches to systems and cognitive neuroscience. A clear emphasis is placed on novel collaborations that bring biologists together with scientists from fields such as physics, mathematics, chemistry, computer science and engineering to focus on problems at the frontier of the life sciences.

Involved countries

There are 31 member countries.

Australian involvement

Australia is a member via the National Health and Medical Research Council (NHMRC).

International Group of Funding Agencies for Global Change Research (IGFA)

(www.igfagcr.org)

The goal of IGFA is to foster global change research. IGFA is a forum through which national agencies that fund research on global change identify issues of mutual interest and ways to address these through national and when appropriate through coordinated international actions. Important issues for consideration in IGFA include:

- information exchange about national global change research programs, as well as about supporting initiatives and facilities;
- approaches to the integration and implementation of global change research in light of available resources;
- optimisation of funding allocations for global change research and its international coordination;
- infrastructural topics of mutual interest, including data accessibility and observation systems;
- ways to improve the interaction between science and policy; and
- possible fields of action for the future in the light of a constantly changing scientific landscape, eg, changing scopes of the international research programs.

Note that IGFA is NOT a funding agency and does NOT fund research projects.

Involved countries

There are 23 member countries.

Australian involvement

Australia is not a member.

International Federation for the Promotion of Mechanism and Machine Science (IFToMM)

(www.robots.neu.edu/iftomm/)

The mission of IFToMM is the promotion of mechanism and machine science. Its aims are:

- to promote research and development in the field of machines and mechanisms by theoretical and experimental methods, along with their practical application;
- to broaden contacts among persons and organisations of different countries engaged in scientific or engineering work in the field of machines and mechanisms, or related sciences;
- to organise the World Congress on machine and mechanism science; to sponsor national, or regional conferences and symposia with international participation;
- to promote the exchange of scientific and engineering information and experts; to assist in the publication of the proceedings of the international congresses and symposia of the Federation, and other special publications;
- to encourage the visits of experts and students between the countries, either as individuals or as teams;
- to assist the developing countries in their work in mechanism and machine science by sponsoring the visits of experts, organising special courses, and other undertakings;
- to honour eminent scientists, engineers and organisations in the field of mechanism and machine science;
- to establish the necessary relationships with other international organisations and unions whose activities are of interest to the Federation.

Involved countries

There are 45 national member organisations (as of 1999).

Australian involvement

The Australian Academy of Science pays formal membership subscriptions. James Trevelyan of UWA is on the executive council.

Integrated Ocean Drilling Program (IODP)

(www.iodp.org)

IODP is an international research program that explores the history and structure of the Earth as recorded in seafloor sediments and rocks. IODP builds upon the earlier successes of the Deep Sea Drilling Project (DSDP) and the Ocean Drilling Program (ODP), which revolutionised our view of Earth history and global processes through ocean basin exploration. IODP greatly expands the reach of these previous programs by using multiple drilling vessels, including riser, riserless, and mission-specific platforms, to achieve its scientific goals. IODP is perhaps the largest Earth Sciences program internationally.

Sponsoring countries and organisations

Membership consists of scientific institutions involved in deep sea drilling. Currently it has thirty-three members, 15 from the US, eight from Japan, and 14 from Europe.

The program costs $90 million per year, over half funded by the US. IODP is funded by four entities acting as international partners - The US National Science Foundation and Japan's Ministry of Education, Culture, Sports, Science and Technology are Lead Agencies. The ECORD Managing Agency is a Contributing Member. The People's Republic of China Ministry of Science and Technology is an Associate Member. The Ocean Drilling Program office at NSF (part of the Marine Geosciences section of the Division of Ocean Sciences, within the Directorate for Geosciences) is responsible for administering commingled funds directed towards the science operating costs of all IODP operations. These commingled funds come from the international partners as part of their membership fees used for the conduct of IODP science. Platform operating costs are the responsibility of the agency supplying the platform capability.

Australian involvement

Australia is not currently a formal member of IODP. Australia was involved in the predecessor to IODP (the ODP) via a 1/3 membership (with Taiwan and Canada) of $1.5 million contributed by 14 Australian universities, CSIRO, AGSO, and the ARC. Australia was a part player in first phase of ODP, because membership costs were beyond our available funds. Dr Patrick Dedekker of ANU is the Australian contact for IODP. For more information on Australia's efforts to become a member of IODP, see http://ems.anu.edu.au/margo/html/IODP.htm

International Union Against Cancer (UICC)

(www.uicc.ch)

UICC is the only international non-governmental organisation that is dedicated exclusively to the global control of cancer. Its vision is of a world where cancer is eliminated as a major life-threatening disease for future generations. Its mission is to build and lead the global cancer control community engaged in:

- sharing and exchanging cancer control knowledge and competence equitably;
- transferring scientific findings to clinical settings;
- systematically reducing and eventually eliminating disparities in prevention, early detection, treatment and care of cancers;
- delivering the best possible care to all cancer patients.

As the largest independent, non-profit, non-governmental association of 280 cancer-fighting organisations in over 80 countries, UICC is a global resource for action and voice for change. UICC brings together individuals in the global campaign against cancer from a wide range of organisations including advocacy groups, patient and survivor support networks, voluntary cancer societies, public health authorities, and research and treatment centres.

Involved countries and organsisations

UICC has involvement from 280 cancer-fighting organisations in over 80 countries.

Australian involvement

Several national and state cancer organisations are members. Several Australian scientists are involved with UICC committees, including the governing council.

World Conservation Union (IUCN)

(www.iucn.org)

The mission of IUCN is 'to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable'. Its members include 77 States, 114 government agencies, and 800-plus NGOs from some 140 countries. More than 10,000 internationally-recognised scientists and experts volunteer their services to its six global commissions. Its 1000 staff members in offices around the world are working on some 500 projects. A priority of the IUCN program (2001–2004) is to build recognition of the many ways that the livelihoods of the poor depend on the sustainable management of natural resources. Through its projects IUCN works to apply sound ecosystem management to demonstrate the way to sustainable livelihoods for those directly dependent on natural resources. Since 1948 IUCN's databases, assessments, guidelines and case studies prepared by its global membership, commissions and secretariat have become frequently cited sources of information and reference on the environment. IUCN has launched an electronic network to create a 'Green Web' of conservation knowledge and to take advantage of the opportunities of information technology. The aim is to bring this resource within everyone's reach, facilitating access to IUCN policy and management advice.

Involved countries

Organisations from 145 countries are involved in IUCN.

Australian involvement

31 Australian organisations are members, including 22 NGO's, nine state government environment departments, and the Commonwealth government's Department of the Environment and Heritage.

Appendix 8 – Inventory of significant global science organisations, grouped by disciplines

Biology, agriculture and food

Main activities

- Food and Agriculture Organisation of the United Nations (FAO);
- Global Biodiversity Information Facility (GBIF);
- International Cell Research Organisation (ICRO);
- International Union of Biological Sciences (IUBS);
- International Union of Food Science and Technology (IUFoST);
- International Union of Forestry Research Organisations (IUFRO);
- International Union of Microbiological Societies (IUMS);
- International Union of Nutritional Sciences (IUNS);
- World Conservation Union (IUCN).

Other activities

- International Centre for Genetic Engineering and Biotechnology;
- International Dairy Federation (IDF);
- International Life Sciences Institute (ILSI).

Earth sciences, climate and environment

Main activities

- Global Climate Observing System (GCOS);
- Global Ocean Observing System (GOOS);
- Global Terrestrial Observing System (GTOS);
- Integrated Global Observing Strategy (IGOS);
- Integrated Ocean Drilling Program (IODP);
- Intergovernmental Oceanographic Commission (IOC);
- International Cartographic Association (ICA);
- International Federation of Surveyors (FIG);
- International Geographic Union (IGU);
- International Geological Correlation Programme (IGCP);
- International Group of Funding Agencies for Global Change Research (IGFA);
- International Hydrological Programme (IHP);
- International Polar Year (IPY);

- International Programme of Biodiversity Science (DIVERSITAS);
- International Society for Photogrammetry and Remote Sensing (ISPRS);
- International Society of Soil Science (IUSS);
- International Union of Geodesy and Geophysics (IUGG);
- International Union of Geological Sciences (IUGS);
- International Union for Quaternary Research (INQUA);
- Joint Global Ocean Flux Study (JGOFS);
- Man and the Biosphere (MAB);
- Millennium Ecosystem Assessment (MA);
- International Geosphere-Biosphere Programme (IGBP);
- Scientific Committee on Antarctic Research (SCAR);
- Scientific Committee on the Lithosphere (SCL);
- Scientific Committee on Oceanic Research (SCOR);
- Scientific Committee on Problems of the Environment (SCOPE);
- United Nations Environment Program (UNEP);
- United Nations Framework Convention on Climate Change (UNFCCC);
- United Nations World Water Assessment Programme (WWAP);
- World Climate Research Programme (WCRP);
- World Meteorological Organisation (WMO).

Other activities

- ICSU Advisory Committee on the Environment (ACE);
- GEWEX;
- Global Change System for Analysis, Research and Training (START);
- Global Water Research Coalition (GWRC);
- International Association of Geochemistry and Cosmochemistry (IAGC);
- International Association of Geodesy (IAG);
- International Association of Geomagnetism and Aeronomy (IAGA);
- International Association of Hydraulic Engineering and Research (IAHR);
- International Association of Hydrological Sciences (IAHS);
- International Association of Meteorology and Atmospheric Sciences (IAMAS);
- International Association for the Physical Sciences of the Ocean (IAPSO);
- International Association of Seismology and Physics of the Earth's Interior (IASPEI);
- International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI);
- International Mineralogical Association (IMA);
- International Palaeontological Association (IPA);
- International Water Association (IWA).

Education

- International Council of Associations for Science Education (ICASE);
- International Technology Education Association (ITEA).

Information and communications

Main activities

- Committee on Data for Science and Technology (CODATA);
- International Council for Scientific and Technical Information (ICSTI);
- International Federation for Information Processing (IFIP);
- International Federation of Library Associations and Institutions (IFLA);
- International Federation of Science Editors (IFSE);
- International Network for the Availability of Scientific Publications (INASP);
- International Telecommunication Union (ITU);
- Panel on World Data Centres (WDC).

Other activities

- ICSU Committee on the Dissemination of Scientific Information (CDSI);
- ICSU Committee on Freedom in the Conduct of Science (SCFCS);
- International Federation for Information and Documentation (FID).

Medical, health and physiology

Main activities

- Council for International Organisations of Medical Sciences (CIOMS);
- Global Forum for Health Research;
- Human Frontier Science Program;
- International Brain Research Organisation (IBRO);
- International Council for Laboratory Animal Science (ICLAS);
- International Union Against Cancer (UICC);
- International Union of Immunological Societies (IUIS);
- International Union of Pharmacology (IUPHAR);
- International Union for Physical and Engineering Sciences in Medicine (IUPESM);
- International Union of Physiological Sciences (IUPS);
- International Union of Psychological Science (IUPsyS);
- International Union of Toxicology (IUTOX);
- World Health Organisation (WHO).

Other activities

- Inter-Academy Medical Panel (IAMP);
- International Society of Endocrinology (ISE);
- Tobacco Control Network (TCN).

Physical and social systems

Main activities

- Committee on Disaster Reduction (CDR);
- International Human Dimensions Programme on Global Change (IHDP);
- International Institute for Applied Systems Analysis (IIASA);
- International Social Science Council (ISSC);
- International Union of Anthropological and Ethnological Sciences (IUAES);
- International Union of the History and Philosophy of Science (IUHPS).

Other activities

- ICSU Economics and Social Committee (ECOSOC);
- ICSU International Decade for Natural Disaster Reduction (IDNDR).

Physics, mathematics and chemistry

Main activities

- International Federation for the Promotion of Mechanism and Machine Science (IFToMM);
- International Federation of Societies for Electron Microscopy (IFSEM);
- International Mathematical Union (IMU);
- International Radiation Protection Association (IRPA);
- International Union of Biochemistry and Molecular Biology (IUBMB);
- International Union of Crystallography (IUCr);
- International Union of Pure and Applied Biophysics (IUPAB);
- International Union of Pure and Applied Chemistry (IUPAC);
- International Union of Pure and Applied Physics (IUPAP);
- International Union of Theoretical and Applied Mechanics (IUTAM);
- International Union for Vacuum Science Technique and Applications (IUVSTA);
- Scientific Committee on Solar-Terrestrial Physics (SCOSTEP).

Other activities

- International Commission for Acoustics (ICA);
- International Commission for Optics (ICO);
- International Institute of Refrigeration (IIR).

Radio and space

- Committee on Space Research (COSPAR);
- Federation of Astronomical and Geophysical Data Analysis Services (FAGS);
- International Astronomical Union (IAU);
- International Space Environment Service (ISES);
- Committee on Frequency Allocations for Radio Astronomy and Space Science (IUCAF);
- Union Radio Scientifique Internationale (URSI).

Regional and world groupings

- Academia De Ciencias de America Latina (ACAL);
- ICSU Committee on S & T in Developing Countries (COSTED);
- Federation of Asian Scientific Academies and Societies (FASAS);
- Inter-Academy Council (IAC);
- Inter-Academy Panel (IAP);
- International Atomic Energy Agency (IAEA);
- International Council for Science (ICSU);
- International Energy Agency (IEA);
- International Foundation for Science (IFS);
- Organisation for Economic Co-operation and Development (OECD);
- Pacific Science Association (PSA);
- ICSU Programme on Capacity Building in Science (PCBS);
- Scientific Committee on Antarctic Research (SCAR);
- Third World Economy of Sciences (TWAS);
- United Nations Educational, Scientific and Cultural Organisation (UNESCO).

Appendix 9 – Membership subscription details and mechanisms

ICSU

Name	Academy subscription	Subscription details
The International Council for Science (ICSU)	Yes	Each member shall pay annual dues within a scale determined by the General Assembly. Each member may choose its own category for payment. **Australia is category 10.** No information was available on how this compares to other countries.

ICSU Unions

Name	Academy subscription	Subscription details
International Astronomical Union (IAU)	Yes	Annual dues are paid as a number of Units of Contribution defined by the Category of Adherence of each country. The amount of the unit of contribution is decided by the IAU General Assembly (CHF 3260, 3355, 3460 and 3580 for the years 2003, 2004, 2005 and 2006). **Australia is Category IV = 6 units.** Category IV is the same as Belgium, India, Netherlands, and Spain (Canada = category V, Sweden = category III). Total units of subscription = 260, ie Australia contributes 2.3% of the total membership subscriptions. Australia has 217 individual members of IAU (2.39% of total membership).
International Brain Research Organisation (IBRO)	Nil	**Australian Neuroscience Society (ANS) pays membership dues**. Australia has 2 votes. Most member societies have 1 or 2 votes. China, France = 3 votes, Japan = 5 votes, US = 7 votes.
International Geographical Union (IGU)	Yes	Each country applying for membership of the Union shall specify in which category it wishes to be classed. There are 15 categories. **Australia is category IV = 5 units.** Unit subscription value is US$375. Total subscription units = 264, so Australia contributes 1.9% of total membership subscriptions. 46 countries are in lower categories, five are in the same category, nine countries are in higher categories. Netherlands = category III, Canada = VI, Sweden = IV.
International Mathematical Union (IMU)	Yes	The adherence of a country is in one of five categories (I-V) with corresponding voting powers and contributions. A country may change group with the approval of the Union upon recommendation of the Executive Committee. The unit subscription for 2003-06 = 1320 Sw Fr. **Australia is category III = 4 units**. Total subscription units = 212, so Australia contributes 1.9% of total membership subscriptions. Other countries in category III are Belgium, Brazil, Hungary, India, Poland, and Spain. Canada = category V, Sweden = IV. Twelve countries are in higher categories than Australia.
International Society for Photogrammetry and Remote Sensing (ISPRS)	Nil	**Remote Sensing and Photogrammetry Association of Australia pays dues.** **Australia is category 5 = 1600 Sw Fr.** Membership dues are based on the number of active specialists in the country.

International Union of Anthropological and Ethnological Sciences (IUAES)	Nil	Dues = 50c per member. Five Australian delegates are on the permanent council (reflects membership level), so an Australian organisation must be paying dues, but that information was not provided on website, and correspondence with the Union was unsuccessful.
International Union of Biochemistry and Molecular Biology (IUBMB)	Yes	Subscription level is based on the category to which the member is assigned (determined by the Union), with each category having a corresponding number of units of subscription. The unit value is determined every 3 years at the general assembly. In 2000 the unit subscription was US$500. No info was available regarding Australia's Category, or the current value of unit subscription. Academy records show a subscription payment that looks like 10 units = category IID. The IUBMB budget for 2000-2002 was for total membership subscriptions of US$576,400. Australia contributes about 1.0% of this total.
International Union of Biological Sciences (IUBS)	Yes	The General Assembly determines the amount of a unit contribution for members. **Australia is category 5A**. In 2003, the AAS requested that its dues be halved, and IUBS accepted. So the Academy is still listed as category 5A but is paying at half the required level. Total annual contributions average around 351 616 Euros per year. Australia contributes about 1.8% of this total (it would be 3.3% of the total if Australia paid at category 5A).
International Union of Crystallography (IUCr)	Yes	Membership Category is based on the number of Australian Crystallographers registered with IUCr. **Australia is Category III = 6 units.** Category III is the same as Brazil, Canada, Italy, and Spain. Seven countries are in higher categories. Netherlands, Sweden are category II. The subscription unit is CHF 1,000 for 1999-2005. The total IUCr budget for 2002-2004 is for total membership subs of $150,000 CHF per annum. Australia contributes about 4% of this total.
International Union of Food Science and Technol (IUFoST)	Nil	**Australian Institute of Food Science and Technology pays membership dues**. There are 5 categories of membership, with corresponding voting rights of 1-5 delegates, and dues of US$330, 1320, 2640, 3960, and 6600.
International Union of Geodesy and Geophysics (IUGG)	Yes	**Australia is Category 5 = 7 units**. A country shall specify the category in which it proposes to adhere. Its application for admission may be refused if the category proposed is considered inadequate. Category 5 is the same as India and Spain; Canada = Category 6, Sweden = Category 4; Netherlands = Category 4; 9 countries are in a higher category than Australia. The IUGG budget for 2004 is for 250 units, ie Australia pays 2.8% of this total.
International Union of Geological Sciences (IUGS)	Yes	The organisation shall specify in which category it proposes to adhere. The category may be changed upon agreement between the organisation and the Union. The unit of contribution is US$450 in 2003, US$460 in 2004. **Australia is Category 5 = 12 units**. This is the same category as Canada and India. Netherlands = 4, Sweden = 3; There are eight countries in higher categories – China, France, Germany, Italy, Japan, Russia, UK, USA. Total membership dues for 2003 were US$192,857. Australia contributes about 2.8% of this total. Australia's membership has been upgraded to Category 6 = 20 units in 2005.
International Union of History and Philosophy of Science (IUHPS)	Yes	Dues for the Division of History and Science (DHS) – Australia's fee for 2003 was the same as Belgium, Canada, China, India, Netherlands, and Sweden. Seven countries pay more. Dues for the Division of Logic, Methodology, and Philosophy of Science (DLMPS) – Australia is category C.

International Union of Immunological Societies (IUIS)	Yes	Members shall pay annual dues at a rate set by the Council. The Australasian Society for Immunology is listed as Australia's formal member to IUIS. Payment of dues is split 50/50 between the Academy and the Australasian Society for Immunology. No information was available regarding Australia's dues category, or any other country's dues.
International Union of Microbiological Societies (IUMS)	Yes	Dues are based on the number of microbiologists registered with the national society (approximately US$1 per member). The Australian Society of Microbiology has a membership of around 3,200. Total annual dues to IUMS are around US$70,000. Australia contributes about 2.7% of that total.
International Union of Nutritional Sciences (IUNS)	Yes	Dues structure changed in 2001. New categories loosely based on the formula population x GNP x "Nutrition Strength". Nutrition strength is a rating of nutrition professionals and nutrition publications. **Australia should be Category 4** (same as Canada and India; Netherlands = 3, Sweden = 3; seven countries are in higher categories - Italy, UK, France, Germany, China, Japan, USA). Member nations having difficulty meeting the new dues structure were given leeway not to have to meet new dues category until 2004, so Australia is still paying at the previous level (about half the level it should be paying). Total membership dues = US$74,400 pa. Australia should contribute 4.0% of total (but is currently contributing 2%).
International Union for Pure and Applied Biophysics (IUPAB)	Yes	There are three categories of membership for adhering bodies, with corresponding rights to send one, two, or three delegates to the General Assembly. The amount of the corresponding subscriptions is set by the General Assembly. **Australia is category 3.** No information was available regarding other country's categories or subscription levels for the categories. Total subscriptions from member countries are around US$70,000 pa. Australia contributes about 1.5% of that total.
International Union of Pure and Applied Chemistry (IUPAC)	Yes	Subscriptions are based on the average of the recent five years of chemical turnover data. No information was available regarding Australia's or any country's dues. Total subscriptions from member countries in 2003 were US$717,735. Australia contributes about 1.9% of that total.
International Union of Pure and Applied Physics (IUPAP)	Yes	A member joins the Union with a number of shares negotiated by the Council and approved by the General Assembly. Member dues per share are 1750, 1800 and 1850 Euros for the years 2003, 200, and 2005 respectively. **Australia pays 4 units** (same as comparable countries). Total subscriptions from member countries in 2003 were US$278,000 (should be US$321,500 if all members paid). Australia pays about 3.2% of that total (should be 2.75% of total if all members paid up).
International Union for Physical and Engineering Sciences in Medicine (IUPESM)	Nil	Membership is via IFMBE and IOMP. Australian Federation for Medical and Biological Engineering pays dues to IFMBE. Annual subscriptions from Members are based on the number of individual members in their organisation. The Australasian College of Physical Scientists and Engineers in Medicine pays dues to IOMP.
International Union of Pharmacology (IUPHAR)	Yes	A Full Member shall pay proportional annual dues according to the number individuals constituting its Membership. The Council will determine at each General Assembly the value of the dues. There shall be one Delegate to council for every 300 pharmacological scientists or fraction thereof. The Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists is listed as having 548 members. No details were available regarding Australia's or any country's dues.

International Union of Physiological Sciences (IUPS)	Yes	Each Adhering Body shall pay annual dues to the Union at a rate determined by the General Assembly upon recommendation by Council. **Australia is category 3 = 4 units.** No details were available about how this compares to other nations.
International Union of Psychological Science (IUPsyS)	Yes	Each National Member chooses the category to which it wishes to belong, subject to approval by the Executive Committee. **Australia is category G = 30 units** = 2 delegates (the highest category = M =100 units = USA; Canada, France = G; Italy = F; Netherlands = D; Sweden=H). The annual unit subscription is US$125, effective 1 January 1997 (this may have increased).
International Union of Soil Sciences (IUSS)	Nil	The Australian Society of Soil Science is Australia's member organisation. Countries are classified as Group I (High-income country), Group II (Middle Income country), or Group III (Low Income Country) depending on a combination of their Gross National Product (GNP) per capita and their Gross Domestic Product (GDP) per capita. The annual subscription is equal to SxNxR, where S is one of the three groups, N is the number of members, and R is the General Rate. Through 2006, R = US $1 and the R*S rates for Full Members are US 5$, $3, and 1$ for Group I, II, and III members, respectively. No information was available on the Australian Society of Soil Science subscription level.
International Union of Theoretical and Applied Mechanics (IUTAM)	Yes	The amount of the annual subscription to be paid by an adhering organisation will be regulated according to one of 5 categories, as proposed by the adhering organisation and after approval of the General Assembly of the Union. **Australia is category 2 = 3 units** (same as Denmark, Finland, Israel, and Poland. Canada = 8; Netherlands = 5; Sweden = 5. 13 countries pay more units). The 2002 GA decided that the unit subscription should be US$656 in 2003 and 2004, and US$670 in 2005. Total IUTAM membership is 143 units, ie Australia contributes about 2.1% of total.
International Union of Toxicology (IUTOX)	Yes	Member Societies shall be asked to pay annual dues in the ratio of 1, 2.5, 5, 7.5, or 10 units, according to the number of delegates (1 to 5) to the Council. The Council determines the value of the dues unit at each General Assembly. Total IUTOX membership dues for 2003 were around US$40,000. Australia contributes about 1.75% of this total.
International Union of Radio Science (URSI)	Yes	Each Member Committee is free to choose the Category (7 categories) in which it will adhere to the Union. The number of units of contribution and the number of votes allocated are determined by the Category chosen. **Australia is category 4 = 8 units, 8 votes.** The total dues for 2002 were 185,106 Euros. Australia contributes about 3.8% of this total.

ICSU Associates

Name	Academy subscription	Subscription details
Academia de Ciencias de América Latina (ACAL)	nil	Australia is not a member.
Federation of Asian Scientific Academies and Societies (FASAS)	Yes	The Academy pays membership subscriptions.

Federation Internationale des Geometres (International Federation of Surveyors) (FIG)	nil	Institution of Surveyors, Australia pays membership dues.
International Association of Hydraulic Engineering and Research (IAHR)	nil	Five Australian organisations are corporate members: SunWater Technical Services, Hargrave-Andrew Library Monash, University of Queensland Central Library, Snowy Mountains Engineering Corporation, and the University of Adelaide Acquisitions Department. Individual Australian scientists are also members.
International Cartographic Association (ICA)	nil	Mapping Sciences Institute, Australia pays membership dues.
International Council for Laboratory Animal Science (ICLAS)	nil	The Australian and New Zealand Society for Laboratory Animal Science pays membership dues.
International Cell Research Organisation (ICRO)	nil	Membership from individual scientists only.
International Council for Scientific and Technical Information (ICSTI)	nil	CSIRO pays membership dues.
International Federation of Information Processing (IFIP)	nil	Australian Computer Society (ACS) pays membership dues.
Federation of Library Associations and Institutions (IFLA)	nil	Australian Library and Information Association pays membership dues. A number of Australian libraries are Institutional members.
International Foundation for Science (IFS)	Yes	The Academy pays membership subscriptions.
International Federation of Societies for Microscopy (IFSM)	nil	Australian Microscopy and Microanalysis Society pays membership dues.
International Institute for Applied System Analysis (IIASA)	nil	Australia is not a formal member country.
International Union for Quaternary Research (INQUA)	Yes	Members adhering to the Union are divided into six categories, with corresponding units of subscription. The Academy pays Australia's membership subscriptions. No information was available regarding Australia or any other country's category, or the unit subscription amount.
International Radiation Protection Association (IRPA)	nil	Australian Radiation Protection Society pays membership dues.
International Society of Endocrinology (ISE)	nil	Endocrine Society of Australia pays membership dues.

International Union of Forest Research Organisations (IUFRO)	nil	24 Australian orgs are members, including government agencies (such as the Bureau of Rural Sciences), CSIRO Divisions, Universities and Cooperative Research Centres.
International Union for Vacuum Science Techniques and Applications (IUVSTA)	nil	Vacuum Society of Australia pays membership dues.
International Water Association (IWA)	nil	Australian Water Association is member.
Pacific Science Association (PSA)	nil	National Academies Forum is Australia's member organisation.
Third World Academy of Sciences (TWAS)	nil	Membership consists of elected individuals only. Scientists from Developed countries can only be associate members.

ICSU Joint Initiatives and Interdisciplinary Bodies

Name	Academy subscription	Subscription details
Committee on Disaster Reduction (CDR)	nil	Funded by ICSU.
Committee on Data for Science and Technology (CODATA)	nil	Each National Member will pay annual dues in accordance with the category of membership approved by the General Assembly. The AAS paid subscriptions up until 1999/2000, but no longer pays.
Committee on Space and Research (COSPAR)	Yes	**Australia is Category 2 = 3 units.** No information was available on how this compares to other nations.
An Integrated Programme of Biodiversity (DIVERSITAS)	nil	Australia does not provide direct contributions. Australia is indirectly involved via Academy subscriptions to DIVERSITAS sponsoring organisations (ICSU, IUBS and IUMS).
Astronomical and Geophysical Data Analysis Services (FAGS)	nil	FAGS is funded by IAU, IUGG and URSI. Australia is a member of all these organisations via Academy subscriptions.
Global Climate Observing System (GCOS)	nil	Funded by WMO, IOC of UNESCO, UNEP and ICSU. Australia is a member of all these organisations.
Global Ocean Observing System (GOOS)	nil	Sponsored by the IOC, WMO, UNEP and ICSU. Australia is a member of all these organisations.
Global Terrestrial Observing System (GTOS)	nil	Sponsored by the FAO, UNEP, UNESCO and WMO. Australia is a member of all these organisations.
International Geosphere-Biosphere Programme (IGBP)	Yes	IGBP's central budget is approximately US$2.1M per annum, of which US$1.5M comes from national contributions from about 50 countries around the world. Australia is the 11th highest contributor (in 2003), contributing about 2.3% of the total.

The Integrated Global Observing Strategy (IGOS)	nil	Sponsored by GCOS, GOOS, GTOS, FAO, ICSU, IOC, UNEP, UNESCO, WMO, CEOS, IGFA, WCRP and IGBP. Australia is a member of most of these organisations.
International Human Dimensions Programme on Global Environmental Change (IHDP)	nil	Sponsored by ICSU and ISSC and a number of supporting countries. In 2001, IHDP was supported by grants from Germany, USA, Netherlands, Sweden, Norway, Switzerland, Austria, Spain, NZ and Finland. Australia does not provide any direct contributions.
International Network for the Availability of Scientific Publications (INASP)	nil	The Australian Centre for International Agricultural Research (ACIAR) contributes funds.
Committee on Allocation of Radio Frequency (IUCAF)	nil	IUCAF is funded by IAU, URSI and COSPAR. Australia is a member of all these organisations via Academy subscriptions.
Millennium Ecosystem Assessment (MA)	nil	Australia does not provide any formal membership contributions.
Scientific Committee on Antarctic Research (SCAR)	Yes	Members pay an annual contribution at a category determined by a country's own assessment of the scale of their national scientific activity in the Antarctic. Payment of Australia's dues is split 50/50 between the Academy and the Australian Antarctic Division. **Australia is Category B** (same as Argentina, France, Japan, UK, Germany, India, and Italy. Only Russia and USA are in the higher category A). Total membership subscriptions in 2004 were US$322,000. Australia contributes about 4.3% of this total.
Scientific Committee on the Lithosphere (SCL)	nil	Joint program of ICSU, IUGG and IUGS. Australia is a member of all these organisations via Academy subscriptions.
Scientific Committee on Problems of the Environment (SCOPE)	nil	The Academy paid membership subscriptions up until 2001/2002, but no longer pays. The Academy is still listed as a member on the SCOPE website.
Scientific Committee on Oceanic Research (SCOR)	Yes	A nation's membership category is roughly based on the gross domestic product of the nation, as well as the nation's level of activity in ocean sciences. **Australia is Category II**. Same category as Belgium, Chile, China (Beijing), China (Taipei), Denmark, Finland, India, Netherlands, and Norway. Ten countries are in higher categories. Canada = IV, Sweden = III. Total membership subscriptions in 2001 were US$238,939. Australia contributes about 2.0% of this total.
Scientific Committee on Solar Terrestrial Physics (SCOSTEP)	Yes	A scale of annual subscriptions for Adherents shall be determined by the Council. Each Adherent shall select the level at which it wishes to subscribe. **Australia category IV** = 10 units. Total membership subscriptions in 2004 were US$76,000. Australia contributes about 5.3% of this total.
World Climate Research Programme (WCRP)	Yes	The Academy pays membership subscriptions. No information was available regarding membership subscription levels or mechanisms.
Panel on World Data Centres (WDC)	nil	Australia hosts the WDC for Solar-Terrestrial Science in Sydney, via IPS Radio and Space Services.

Discipline	Australia's contribution to World publications 1995-99 [1]
Mathematical Sciences	2.6%
Physical Sciences (excluding Astronomy)	1.7%
Astronomical Sciences	3.9%
Chemical Sciences	1.7%
Earth Sciences	5.1%
Biological Sciences - Biochemistry and Cell Biology, Genetics	2.6%
Biological Sciences - Biotechnology, Botany, Ecology and Evolution, Zoology, Other	4.2%
Information, Computing and Communication Sciences	2.5%
Engineering and Technology	2.0%
Agricultural, Veterinary and Environmental Sciences	4.9%
Medical and Health Sciences	2.8%
Behavioural and Cognitive Sciences	3.2%
All Science	2.7%

[1] Butler, L., Australian Academy of Science, 2001, *Monitoring Australia's Scientific Research: Partial Indicators of Australia's Research Performance.*

Appendix 10 – Major international scientific conferences held in Australia

The information below was obtained from websites; Appendix 16 of *The Australian Academy of Science – The First Fifty Years*, edited by Frank Fenner; Judy Richmond's knowledge; and correspondence with National Committees.

ICSU Unions	Conferences in Australia
International Astronomical Union (IAU)	Fifteenth General Assembly of the IAU was held in Sydney, 21-30 Aug 1973 Twenty-fifth General Assembly of the IAU was held in Sydney 13-26 July 2003.
International Brain Research Organisation (IBRO)	**IBRO World Congress will be held in Melbourne July 2007.**
International Geographical Union (IGU)	**IGU regional congress 2006 to be held in Brisbane.** Twenty-sixth Congress of IGU was held in Sydney, 21-26 August 1988
International Mathematical Union (IMU)	No IMU congress ever held in Australia Fifth International Congress on Mathematical Education was held in Adelaide, 24--30 Aug 1984 International Congress on Industrial and Applied Mathematics (ICIAM 2003) was held in Sydney, 7-11 July 2003
International Society for Photogrammetry and Remote Sensing (ISPRS)	
International Union of Anthropological and Ethnological Sciences (IUAES)	No IUAES congresses have been held in Aust. Brisbane bid unsuccessfully for 2008 congress
International Union of Biochemistry and Molecular Biology (IUBMB)	Twelfth International Congress of Biochemistry (IUB) was held in Perth, 15-22 August 1982
International Union of Biological Sciences (IUBS)	Twenty-third General Assembly of IUBS was held in Canberra, 16-22 Oct 1988 Fourteenth International Congress of Entomology (sponsored by IUBS) was held in Canberra, 22-30 Aug 1972 Sixteenth Ornithological Congress (sponsored by IUBS) was held in Canberra, 10-18 Aug 1974 Thirteenth International Botanical Congress (sponsored by IUBS) was held in Sydney, 21-28 Aug 1981 Twenty-second International Congress of Entomology (sponsored by IUBS) was held in Brisbane, 15-21 Aug 2004
International Union of Crystallography (IUCr)	International Congress and Fourteenth General Assembly of IUCr was held in Perth, 12-20 Aug 1987
International Union of Food Science and Technology (IUFoST)	1999 IUFoST congress held in Sydney
International Union of Geodesy and Geophysics (IUGG)	**NC's currently bidding for 2011 IUGG congress (possibly accepted?)** Seventeenth General Assembly of IUGG was held in Canberra, 2-15 Dec 1979 Combined Assembly of IAMAP and IASPO, Melbourne, 14-25 Jan 1974 IAVCEI General Assembly, Canberra, 25 Sept-1 Oct 1993
International Union of Geological Sciences (IUGS)	Twenty-fifth International Geological Congress (IUGS) was held in Sydney, 16-26 Aug 1976 **2012 IUGS congress will be held in Brisbane.** Twenty-fifth Congress of the International Association of Hydrogeologists (IAH), Adelaide, 21-25 November 1994

International Union of History and Philosophy of Science (IUHPS)	IUHPS Meeting was held in Melbourne, 23-25 Aug 1979
International Union of Immunological Societies (IUIS)	Third International Congress of Immunology was held in Sydney, 3-8 July 1977
International Union of Microbiological Societies (IUMS)	General Assembly of IUMS was held in Sydney, 15 Aug 1999
International Union of Nutritional Sciences (IUNS)	Fifteenth International Congress of Nutrition (IUNS) was held in Adelaide, 26 Sept-1 Oct 1993
International Union for Pure and Applied Biophysics (IUPAB)	
International Union of Pure and Applied Chemistry (IUPAC)	International Congress on Pure and Applied Chemistry (IUPAC) and International Conference on Coordination Chemistry, was held in Sydney, 20-27 Aug 1969 Thirty-eighth IUPAC Congress was held in Brisbane, 1-8 July 2001 Several IUPAC sponsored events have been held in Aust. RACI has used profits from running an IUPAC sponsored conference to fund its *Organometallic Chemistry Award*.
International Union of Pure and Applied Physics (IUPAP)	No IUPAP GA's have been held in Australia Eleventh International Congress on Plasma Physics was held in Sydney, 15-19 July 2002
International Union for Physical and Engineering Sciences in Medicine (IUPESM)	2003 World Congress for Medical Physics and Biomedical Engineering was held in Sydney
International Union of Pharmacology (IUPHAR)	2004 IUPHAR congress was in Brisbane Tenth International Congress and General Assembly of IUPHAR was held in Sydney, 23-28 Aug 1987
International Union of Physiological Sciences (IUPS)	IUPS sponsored events have been held in Aust. 29th Congress of IUPS was held in Sydney, 28 Aug-3 Sept1983 IUPS Regional Meeting held in Sydney, 21-25 Aug 1972
International Union of Psychological Science (IUPsyS)	**International meeting of IUPsySto be held in Melbourne in 2010.** Twenty-fourth International Congress of Psychology (IUPsS) was held in Sydney, 28 Aug-3 Sept1988
International Union of Soil Sciences (IUSS)	1968 congress was in Adelaide, **2010 IUSS congress will be held in Brisbane**
International Union of Theoretical and Applied Mechanics (IUTAM)	IUTAM symposia held in Aust in past. **2008 IUTAM congress to be held in Adelaide**
International Union of Toxicology (IUTOX)	2001 IUTOX Intl Congress on Toxicology held in Brisbane
International Union of Radio Science (URSI)	

ICSU Associates	Conferences in Australia
Academia de Ciencias de América Latina (ACAL)	
Engineering Committee on Oceanic Resources (ECOR)	
Federation of Asian Scientific Academies and Societies (FASAS)	
Federation Internationale des Geometres (International Federation of Surveyors) (FIG)	
International Association of Hydraulic Engineering and Research (IAHR)	Twenty-first Congress of IAHR held in Melbourne, 20-24 Aug 1985

International Cartographic Association (ICA)	1984 ICA conference held in Perth
International Council for Laboratory Animal Science (ICLAS)	
International Cell Research Organisation (ICRO)	
International Council for Scientific and Technical Information (ICSTI)	
International Federation of Information Processing (IFIP)	IFIP congresses held in Canberra 1996. IFIP Congress held in Melbourne, 14-17 Oct 1980
Federation of Library Associations and Institutions (IFLA)	General Conference of IFLA was held in Sydney, 30 Aug-4 Sept 1988
International Foundation for Science (IFS)	
International Federation of Science Editors (IFSE)	
International Federation of Societies for Microscopy (IFSM)	Eighth International Congress on Electron Microscopy was held in Canberra, 25-31 Aug 1974
International Institute for Applied System Analysis (IIASA)	
International Union for Quaternary Research (INQUA)	**INQUA congress 2007 to be held in Cairns**
International Radiation Protection Association (IRPA)	Seventh International Congress of IRPA was held in Sydney, 10-17 March 1988
International Society of Endocrinology (ISE)	Sixth International Congress of Endocrinology was held in Melbourne, 10-16 Feb 1980 2000 ISE congress was held in Sydney
International Union of Forest Research Organisations (IUFRO)	
International Union for Vacuum Science Techniques and Applications (IUVSTA)	
International Water Association (IWA)	
Pacific Science Association (PSA)	Twelfth Pacific Science Congress was held in Canberra, 18-27 Aug 1971
Third World Academy of Sciences (TWAS)	

ICSU Interdisciplinary Bodies and Joint Initiatives	Conferences in Australia
Committee on Disaster Reduction (CDR)	
Committee on Data for Science and Technology (CODATA)	
Committee on Space and Research (COSPAR)	
An Integrated Programme of Biodiversity (DIVERSITAS)	
Astronomical and Geophysical Data Analysis Services (FAGS)	
Global Climate Observing System (GCOS)	
Global Ocean Observing System (GOOS)	
Global Terrestrial Observing System (GTOS)	

International Geosphere-Biosphere Programme (IGBP)	
Integrated Global Observing Strategy (IGOS)	
International Human Dimensions Programme on Global Environmental Change (IHDP)	
International Network for the Availability of Scientific Publications (INASP)	
Committee on Allocation of Radio Frequency (IUCAF)	
Millennium Ecosystem Assessment (MA)	
Scientific Committee on Antarctic Research (SCAR)	Third Meeting of SCAR, Canberra, 2-6 March 1959 Twelfth Meeting of SCAR, Canberra, 14-19 Aug l972 Twentieth Meeting of SCAR, Hobart, 5-16 Sept 1988 **29th meeting of SCAR to be held in Australia July/ August 2006, probably in Hobart or Canberra TBC**
Scientific Committee on Lithosphere (SCL)	
Scientific Committee on Problems of the Environment (SCOPE)	First General Assembly of SCOPE, Canberra, 1-3 Sept 1971
Scientific Committee on Oceanic Research (SCOR)	18th General Meeting of SCOR, Hobart, 24-28 Nov 1986 **SCOR Exec Committee meeting + IAG/IAPSO/IABO to be held in Cairns 29 August - 1st Sept 2005**
Scientific Committee on Solar Terrestrial Physics (SCOSTEP)	
World Climate Research Programme (WCRP)	
Panel on World Data Centres (WDC)	

Other International Conferences:

- Eighth International Thyroid Congress, Sydney, 3-8 February 1980
- Second Asian Pacific Congress on Nephrology, Melbourne, 13-19 February 1983
- Fourth International Congress of Plant Pathology, Melbourne, 17-24 August 1983
- Eighteenth International Ethological Conference, Brisbane, 29 August-6 September 1983
- Second International Rangelands Congress, Adelaide, 14-18 May 1984
- Sixth International Congress on Parasitology, Brisbane, 24-29 August 1986
- International Congress of Sedimentology, Canberra, 24-30 September 1986
- Twenty-fourth International Dairy Congress, IDF, Melbourne, 18-22 September 1994
- Twenty first International Epilepsy Congress. Sydney, 3-8, September 3-8, 1995
- International Congress on Modelling and Simulation, MODSIM 95, Newcastle, 27-30 Nov 1995
- Tenth World Water Congress, Melbourne, March 12-17 2000
- Twelfth International Congress on Photosynthesis was held in Brisbane, August 18-23 2001
- Twenty-ninth International Congress on Ophthalmology, Sydney, 21-25 April 2002
- Sixteenth International Congress of Eye Research (ICER), Sydney, 29 Aug-3 Sept 2004.

List of international scientific conferences held in Australia, by year:

Future:

- SCOR Exec Committee meeting + IAG/IAPSO/IABO to be held in Cairns 29 August - 1st Sept 2005
- IGU Regional Congress 2006 to be held in Brisbane
- 29th meeting of SCAR to be held in Australia July/ August 2006, probably in Hobart or Canberra TBC
- IBRO World Congress to be held in Melbourne July 2007
- INQUA congress 2007 to be held in Cairns
- 2008 IUTAM congress to be held in Adelaide
- International meeting of IUPsyS to be held in Melbourne in 2010.
- 2010 IUSS congress will be held in Brisbane
- National Committees currently bidding for 2011 IUGG congress
- 2012 IUGS congress will be held in Brisbane

2004

- Twenty-second International Congress of Entomology (sponsored by IUBS) was held in Brisbane, 15-21 Aug 2004
- Sixteenth International Congress of Eye Research (ICER), Sydney, 29 Aug-3 Sept 2004
- 2004 IUPHAR congress was in Brisbane

2003

- International Congress on Industrial and Applied mathematics (ICIAM 2003) was held in Sydney, 7-11 July 2003
- Twenty-fifth General Assembly of the IAU was held in Sydney 13-26 July 2003
- 2003 World Congress for Medical Physics and Biomedical Engineering was held in Sydney

2002

- Twenty-ninth International Congress on Ophthalmology, Sydney, 21-25 April 2002
- Eleventh International Congress on Plasma Physics was held in Sydney, 15-19 July 2002

2001

- Thirty-eighth IUPAC Congress was held in Brisbane, 1-8 July 2001
- Twelfth International Congress on Photosynthesis was held in Brisbane, August 18-23 2001
- 2001 IUTOX Intl Congress on Toxicology was held in Brisbane

2000

- 2000 ISE congress was held in Sydney
- Tenth World Water Congress was held in Melbourne, March 12-17 2000

1999

- 1999 IUFoST congress was held in Sydney
- General Assembly of IUMS was held in Sydney, 15 Aug 1999

1996

- IFIP congresses held in Canberra 1996

1995

- Twenty first International Epilepsy Congress. Sydney, 3-8, September 3-8, 1995
- International Congress on Modelling and Simulation, MODSIM 95, Newcastle, 27-30 Nov 1995

1994

- Twenty-fourth International Dairy Congress, IDF, Melbourne, 18-22 September 1994
- Twenty-fifth Congress of the International Association of Hydrogeologists (IAH), Adelaide, 21-25 November 1994

1993

- IAVCEI General Assembly, Canberra, 25 Sept-1 Oct 1993
- Fifteenth International Congress of Nutrition (IUNS) was held in Adelaide, 26 Sept-1 Oct 1993

1988

- Seventh International Congress of IRPA was held in Sydney, 10-17 March 1988
- Twenty-sixth Congress of IGU was held in Sydney, 21-26 August 1988
- Twenty-fourth International Congress of Psychology (IUPsS) was held in Sydney, 28 Aug-3 Sept1988
- General Conference of IFLA was held in Sydney, 30 Aug-4 Sept 1988
- Twentieth Meeting of SCAR, Hobart, 5-16 Sept 1988
- Twenty-third General Assembly of IUBS was held in Canberra, 16-22 Oct 1988

1987

- International Congress and Fourteenth General Assembly of IUCr was held in Perth, 12-20 Aug 1987
- Tenth International Congress and General Assembly of IUPHAR was held in Sydney, 23-28 Aug 1987

1986

- Sixth International Congress on Parasitology, Brisbane, 24-29 August 1986
- International Congress of Sedimentology, Canberra, 24-30 September 1986
- 18th General Meeting of SCOR, Hobart, 24-28 Nov 1986

1985

- Twenty-first Congress of IAHR held in Melbourne, 20-24 Aug 1985

1984

- Second International Rangelands Congress, Adelaide, 14-18 May 1984
- Fifth International Congress on Mathematical Education was held in Adelaide, 24--30 Aug 1984
- 1984 ICA conference held in Perth

1983

- Second Asian Pacific Congress on Nephrology, Melbourne, 13-19 February 1983
- Fourth International Congress of Plant Pathology, Melbourne, 17-24 August 1983
- 29th Congress of IUPS was held in Sydney, 28 Aug-3 Sept 1983
- Eighteenth International Ethological Conference, Brisbane, 29 August-6 September 1983

1982

- Twelfth International Congress of Biochemistry (IUB) was held in Perth, 15-22 August 1982

1981

- Thirteenth International Botanical Congress (sponsored by IUBS) was held in Sydney, 21-28 Aug 1981

1980

- Eighth International Thyroid Congress, Sydney, 3-8 February 1980
- Sixth International Congress of Endocrinology was held in Melbourne, 10-16 Feb 1980
- IFIP Congress held in Melbourne, 14-17 Oct 1980

1979

- IUHPS Meeting was held in Melbourne, 23-25 Aug 1979
- Seventeenth General Assembly of IUGG was held in Canberra, 2-15 Dec 1979

1977

- Third International Congress of Immunology was held in Sydney, 3-8 July 1977

1976

- Twenty-fifth International Geological Congress (IUGS) was held in Sydney, 16-26 Aug 1976

1974

- Combined Assembly of IAMAP and IASPO, Melbourne, 14-25 Jan 1974
- Sixteenth Ornithological Congress (sponsored by IUBS) was held in Canberra, 10-18 Aug 1974
- Eighth International Congress on Electron Microscopy was held in Canberra, 25-31 Aug 1974

1973

- Fifteenth General Assembly of the IAU was held in Sydney 21-30 August 1973

1972

- Twelfth Meeting of SCAR, Canberra, 14-19 Aug l972
- IUPS Regional Meeting held in Sydney, 21-25 Aug 1972
- Fourteenth International Congress of Entomology (sponsored by IUBS) was held in Canberra, 22-30 Aug 1972

1971

- Twelfth Pacific Science Congress was held in Canberra, 18-27 Aug 1971
- First General Assembly of SCOPE, Canberra, 1-3 Sept 1971

1969

- International Congress on Pure and Applied Chemistry (IUPAC) and International Conference on Coordination Chemistry, was held in Sydney, 20-27 Aug 1969

1968

- 1968 IUSS congress was in Adelaide

1959

- Third Meeting of SCAR, Canberra, 2-6 March 1959

Guidelines for international scientific meetings held in Australia at the invitation of the Australian Academy of Science

(These guidelines are also available at www.science.org.au/internat/guidelines.htm)

These guidelines set out the Academy's policy on holding international meetings in Australia. The objective of this policy is to allow the Academy to invite International Unions and other scientific members of the ICSU family to hold international congresses, general assemblies and similar meetings, while at the same time, help the meeting organisers financially and in other ways without exposing the Academy to unknown or unlimited liability. The policy also applies to meetings of international bodies outside the umbrella of ICSU, for which the Academy has been asked to issue an invitation.

Introduction

International science meetings are an important means of communication among the scientific community. Major scientific international meetings, organised within individual disciplines, are convened on a regular, cyclical basis with the meeting locations rotating among interested countries. It is important for Australia to take its turn as a site for such meetings; particularly those sponsored by international organisations in which Australian researchers are active participants.

On behalf of the Australian research community, the Australian Academy of Science, serves as the adhering body of the major international, nongovernmental, disciplinary unions, which have as one of their prime tasks the sponsorship of scientific meetings. Most of these disciplinary unions are affiliated with the International Council for Science (ICSU), to which the Academy also adheres. As the adhering body, the Academy has responsibilities in relation to international meetings held in Australia under the auspices of these bodies.

In Australia, the organisation of international meetings requires the assistance and cooperation of a number of domestic institutions both private and public. These include the Academy, scientific societies, universities, research institutes and industries, as well as governmental bodies at both the federal and state levels.

For all types of meetings it can be anticipated that the appropriate National Committee and the Academy, will be involved to some extent. The measure of involvement will vary, depending on the circumstances of each meeting and the responsibilities that will have been agreed upon with respect to the designation of an organising body to handle the necessary fiscal and administrative arrangements, issuance of the invitation, and sponsorship.

This document sets out the Academy's policy on holding international meetings in Australia. The objective of this policy is to allow the Academy to invite International Unions and other scientific members of the ICSU family to hold international congresses, general assemblies and similar meetings, while at the same time, help the meeting organisers financially and in other ways without exposing the Academy to unknown or unlimited liability. The policy also applies to meetings of international bodies outside the umbrella of ICSU, for which the Academy has been asked to issue an invitation.

Organising body

It is central to this policy that there is only one organising body which will have responsibility for the logistical and financial aspects of the meeting. Responsibility for selecting or establishing the organising body rests with the sector of the Australian research community that requests the Academy to issue the invitation. The organising body (designated corporate agent) may choose to subcontract aspects of the meeting (eg the scientific program or the day-to-day administration) and enter into agreements (such as leases) with other parties but the Academy as adhering body and issuer of the invitation will have a relation only with the organising body not with any subcontractors.

As the Australian adhering organisation of the international body, the Academy should receive periodic reports from the organising body. Therefore, National Committees are responsible for keeping abreast of plans for the meeting. An organising body or corporate agent must be identified before an invitation is issued. This body must be technically competent to run the meeting, and must be likely to be in existence when the meeting occurs and the extent of any liability becomes apparent (which may be 10 or more years after the invitation is issued). If no suitable organising body can be identified, no invitation can be issued.

Issuance of invitations

For meetings held under the sponsorship of the ICSU unions or committees, the letter of invitation is normally issued by the President of the Academy, following discussion and approval by the Council of the Academy. The request to the President for such a letter is based on the recommendation of the appropriate National Committee and the agreement of the Academy's Foreign Secretary.

Early communication and continuous consultation by the meeting organisers with the Academy and the National Committee is strongly recommended – preferably twelve months before the meeting at which it is intended to submit the invitation and well before any signals are sent to the ICSU body as to the likelihood of an invitation from Australia – so that initiators have a clear understanding of the Academy's policy and responsibilities that will fall to them. The formal approach to the Academy should be not less than six months before the meeting, so that the Council of the Academy can give full consideration.

The Academy will issue an invitation only if it is satisfied that it has the broad support of the scientific community and that it will not incur any unacceptable liability by issuing such an invitation.

The organising body must accept, in writing, full responsibility for ensuring that the meeting takes place. It must, in effect, have a contract with the ICSU body to deliver the meeting, so that if for any reason the meeting does not materialise, that is a matter for the organising body and the ICSU body, and neither the ICSU body or the organising body will have a claim on the Academy.

The organising body and the ICSU body must agree between them to accept full responsibility for the finance of the meeting and for any costs or liabilities that may arise in connection with the meeting.

The ICSU body must confirm that, in respect to the meeting, any explicit or implicit responsibility falling on the Academy as adhering body has been negated, and either absorbed by the ICSU body or reassigned to the organising body.

The above conditions must be met before the Academy can issue an invitation.

Sponsorship

Meetings held under the auspices of an international organisation are normally considered to be sponsored by those bodies. It will be a matter of negotiation whether the Academy and/or other appropriate national groups or institutions also wish to be listed as official sponsors. Such multiple sponsorship may depend on possible financial and other material assistance offered.

Other organisational responsibilities

There are other organisational matters on which all responsible partners must collaborate to assure that the necessary action is taken to achieve a successful meeting. These include, but may not be limited to:

- *Organisation of the scientific program*
  In some cases, this will be the responsibility of the sponsoring international organisations with little or no involvement by the local organising committee. In other instances, it will devolve completely on the host organisation(s) to determine the program design; topics, speakers, and publication plans. In both cases, however, some consultation between the international and local bodies is required.

– *Formation of a local organising committee*
  It is the responsibility of the designated corporate agent to establish a local organising committee. This committee, which is responsible for assuring that the necessary logistical and hospitality matters are attended to through organised volunteers or through a contract by the corporate agent with a professional congress organiser.

– *Budget*
  It is the expectation of the Academy that international scientific meetings held in Australia at the invitation of the Academy will be self-supporting. This means that appropriate registration fees must be set by the responsible group(s) and realistic expectations developed with respect to anticipated income and expenditures. Other aspects, which must be considered, include start-up funding, identification of potential funders (governmental and nongovernmental), proposal preparation, etc. Appropriate offices of the Academy could be consulted for advice and assistance in these matters.

International scientific meetings held in Australia are of value to Australian researchers and provide a welcome opportunity to demonstrate the Australian commitment to international scientific cooperation. They offer young Australian researchers the prospect of establishing valuable professional contacts with colleagues from abroad and frequently have important economic and political benefits for the country as a whole. The Australian Academy of Sciences recognises its role as the Australian member of ICSU and its constituent unions to facilitate the hosting of successful international scientific meetings in Australia. It is prepared to pursue actively the responsibilities that have been outlined in this document, thereby demonstrating its strong commitment to the Australian research community and to international scientific cooperation.

Appendix 11 – Australians in leadership roles in global scientific organisations

This table lists Australian scientists that are listed on the respective global organisations' websites as holding leadership positions in the organisation, as of January 2005. Note that the list is unlikely to be completely comprehensive, as each organisation differs in the amount of information provided on their websites. However, the list serves as an indication of the breadth and depth of involvement by Australian scientists in leadership roles in global scientific organisations.

ICSU Unions

International Astronomical Union (IAU)

Ekers, Ron	IAU President
Green, Anne	Organising Committee, IAU Division X: Radio Astronomy
Norris, Raymond	IAU Representative to CODATA; Vice President, IAU Commission V
O'Byrne, John	Member, IAU Finance Sub-Committee
Melrose, Donald B.	Vice President, IAU Division II - Sun and Heliosphere; President, IAU Commission 10
Sadler, Elaine	Board Member, IAU Division VIII: Galaxies and the Universe; President, IAU Commission 28
Storey, John	IAU Representative to SCAR
Storey, Michelle	Vice President, IAU Commission 50
Webster, Rachel L.	Member, IAU Resolutions Committee; Vice President, IAU Commission 47

International Brain Research Organisation (IBRO)

Redman, S J	IBRO Treasurer
Calford, Michael B	Member, IBRO Committee on Animals in Research
McLachlan, Elspeth M	Member, IBRO Committee on By-Laws and Procedures
Paxinos, G	Australian Representative to IBRO Governing Council
Lots of other Australian scientists on other IBRO committees	

International Geographical Union (IGU)

Gillieson, Prof David	Chair, IGU Commission 04.22 - Karst

International Mathematical Union (IMU)

Galbraith, Peter L.	Member, IMU International Commission on Mathematical Instruction (ICMI)
Van der Poorten, Alf	Member, IMU Committee on Electronic Information and Communication

International Society for Photogrammetry and Remote Sensing (ISPRS)

Trinder, John C	ISPRS First Vice President
Fraser, Prof Clive	Member, ISPRS International Scientific Advisory Committee
Milne, Prof Tony	Member, ISPRS International Scientific Advisory Committee
Check Website later for Commissions details (haven't been updated for 2005 yet)	

International Union of Anthropological and Ethnological Sciences (IUAES)

Teal, Dr. Gregory	Chair, IUAES Commission on the Anthropology of Tourism
Christensen, Dr W.	Australian Delegate to the IUAES Permanent Council
Hiatt, Dr L.	Australian Delegate to the IUAES Permanent Council
Newell, Prof W.	Australian Delegate to the IUAES Permanent Council
Sansom, Prof. Basil	Australian Delegate to the IUAES Permanent Council
Tonkinson, Dr R.	Australian Delegate to the IUAES Permanent Council

International Union of Biochemistry and Molecular Biology (IUBMB)

Not much evidence on website of significant Australian involvement.

International Union of Biological Sciences (IUBS)

Bittles, Alan H.	IUBS Executive Committee Member

International Union of Crystallography (IUCr)

Guss, J. M.	Chair, IUCr Commission on Biological Macromolecules
Hall, S.R.	Member, IUCr Committee on Crystallographic Databases; Commission on Crystallographic Nomenclature; Commission on International Tables
Hambley, T. W.	Member, IUCr Commission on Structural Chemistry
Kennedy, S.J.	Member, IUCr Commission on Neutron Scattering
Madsen, I.	Member, IUCr Commission on Powder Diffraction
Roussouw, C.	Member, IUCr Commission on Electron Diffraction
Sabine, T. M.	Member, IUCr Commission on Small Angle Scattering
Spackman, M.A.	Consultant to the IUCr Commission on Charge, Spin and Momentum Densities
Wilkins, S. W.	Consultant to the IUCr Commission on Synchrotron Radiation
Withers, R.	Member, IUCr Commission on Aperiodic Crystals

International Union of Food Science and Technology (IUFoST)

Mortimer, Mr. Alan	IUFoST President
Buckle, Prof. Ken	Chair, IUFoST Scientific Council
Kennedy, G.	Chair, IUFoST Constitution Advisory Committee

International Union of Geodesy and Geophysics (IUGG)

Beer, Tom	IUGG Vice President
Barton, Charles	IAGA President
Jackson, Prof. Ian	Member, IASPEI Executive Committee
Kennett, Prof. B.L.N.	Part-President, IASPEI
McPhie, Prof Jocelyn	IAVCEI Vice President
Middleton, Dr. John F.	Member, IAPSO Executive Committee
Vincent , Prof. R.A.	IAMAS Vice-President
Baines, Dr Peter	President, IAMAS International Commission on Dynamic Meteorology
Cairns, Iver	Chair IAGA Division IV
Campbell , Ian H.	Co-Leader, IAVCEI Commission on Large-Volume Basaltic Provinces
Franks, Dr Stewart W.	Vice President, IAHS International Commission on Coupled Land-Atmosphere System

Gibson, Dr. Gary	Member, IASPEI Commission on Education and Outreach
Hall, Alan	Chair IAHS/WMO GEWEX Working Group
Holbrook, Dr. Neil	Secretary, IAMAS International Commission on Climate
Ivers, David	Co-Chair IAGA Working Group I-1
Lambeck, Kurt	Member, IUGG Commission on the Study of Earth's Deep Interior
Olley, Dr. Jonathan M.	Vice President, IAHS International Commission on Continental Erosion
Sivapalan, Murugesu	Chair, IAHS Prediction in Ungaged Basins (PUB) Working Group

International Union of Geological Sciences (IUGS)

Oldroyd, Prof David	Vice Pres, IUGS Intl. Commission on the History of Geological Sciences
Simpson, Dr Colin J	Member, IUGS Scientific Commission on Geoscience for Environmental Management
Walter, Prof Malcolm	Vice Chairman, Terminal Proterozic System Subcommission of the International Commission on Stratigraphy of IUGS
(more Australians listed in IUGS member directory pdf on IUGS website)	

International Union of History and Philosophy of Science (IUHPS)

Not much evidence on website of significant Australian involvement.

International Union of Immunological Societies (IUIS)

Doherty, Peter	Vice President, IUIS
Parish, Christopher	Member, IUIS Executive Council

International Union of Microbiological Societies (IUMS)

Mackenzie, John S.	IUMS Secertary-General
Fleet, Graham H.	Vice Chairman, IUMS Mycology Division
Gust, Dr Ian	Vice President, IUMS International Association for Biologicals

International Union of Nutritional Sciences (IUNS)

Wahlqvist, Prof Mark	President, IUNS
Worsley, Dr Anthony	Chair, IUNS Task Force on School Children Nutrition and Health

International Union for Pure and Applied Biophysics (IUPAB)

dos Remedios , Prof Cris	Vice President, IUPAB
Separovic, A/Prof Frances	Member, IUPAB Executive Council
Mountford, Carolyn	Member, IUPAB Task Force on Biomedical Spectroscopy

International Union of Pure and Applied Chemistry (IUPAC)

Black, Prof. David StC.	IUPAC Secretary General
Gilbert , Prof. Robert G.	Member, IUPAC Bureau
Beasley , Prof. Warren	Member, IUPAC Committee on Chemistry Education
Glasser , Prof. Leslie	IUPAC Committee on Printed and Electronic Publications

Hibbert, Prof. David	Committee Member, IUPAC Analytical Chemistry Division
Loss, Prof. Robert D.	Committee Member, IUPAC Inorganic Chemistry Division
Ralston, Prof. John	Member, IUPAC Union Advisory Committee

International Union of Pure and Applied Physics (IUPAP)

Bouwknegt, P.	Member, IUPAP Commission on Mathematical Physics
Dewar, R.	Member, IUPAP Commission on Plasma Physics
Drummond, P.	Member, IUPAP Commission on Computational Physics
Hannaford, P.	Member, IUPAP Commission on Atomic, Molecular, and Optical Physics
Protheroe, R. J.	Vice-Chair, IUPAP Commission on Cosmic Rays
Simmons, M. Y.	Member, IUPAP Commission on Semiconductors
Thomas, A. W.	Associate Member, IUPAP Commission on Nuclear Physics

International Union for Physical and Engineering Sciences in Medicine (IUPESM)

Allen, Prof Barry J.	IOMP Vice President
Coles, Dr John	Member, IOMP Awards and Honours Committee
Downing, Prof. Andrew	Member, IFMBE Publication and Publicity Committee
Kirsner, Prof. Richard	Co-Chair, IFMBE Finance Committee
Liley, Dr. David	Member, IFMBE Nueroengineering Working Group
Pattison, Mr. John E	Member, IOMP Publications Committee
Schindhelm, Prof. Klaus	Member, IFMBE Cellular Engineering Working Group
Thomas, Prof. Brian	Member, IOMP Scientific Committee

International Union of Pharmacology (IUPHAR)

Angus, James A.	IUPHAR First Vice-President
Birkett, Prof. Don	Vice-Chair, IUPHAR Division on Clinical Pharmacology
Jarrott, Bevyn	Member, IUPHAR Nominating Committee
Lew, Michael	Member, IUPHAR Section on Teaching
Miners, Prof. John	Chair, IUPHAR Drug Metabolism Section
Reid, Julianna	Member, IUPHAR Membership Committee

International Union of Physiological Sciences (IUPS)

Sefton, Ann	Member, IUPS Executive Council
Baudinette, Russell	Chair, Ecological and Evolutionary Section, IUPS Commission on Comparative Physiology: Evolution, Adaptation and Environment
Cook, David	Chair, Epitheliel Section, IUPS Commission on Secretion and Absorption
Gandevia, Simon	Chair, Exercise and Work Section of IUPS Locomotion Commission
Harding, Richard	Member, IUPS Commission on Endocrine, Reproduction and Development
McLachlan, Robert	Member, IUPS Commission on Endocrine, Reproduction and Development
McMillen, Caroline	Chair, Development Section, IUPS Commission on Endocrine, Reproduction and Development
Nordin, Christopher	Member, IUPS Commission on Secretion and Absorption
Perry, Michael	Member, IUPS Commission on Circulation and Respiration
Taylor, Nigel A.S.	Member, IUPS Commission on Comparative Physiology: Evolution, Adaptation and Environment

International Union of Psychological Science (IUPsyS)

Bretherton, Diane	Member, IUPsyS Committee for the Psychological Study of Peace
Sanson, Ann	Member, IUPsyS Committee for the Psychological Study of Peace

International Union of Soil Sciences (IUSS)

Abbott, L.	Member, IUSS Committee on awards and Prizes
Fitzpatrick, Rob	Chair, IUSS Commission on Soil Mineralogy
Gupta, Vadakattu	Chair, IUSS Commission on Soil Biology
Hazelton, Pam	Vice-Chair, IUSS Commission on Soil Education and Public Awareness
Humphreys, Geoff	Chair, IUSS Commission on Soil Morphology and Micromorphology
Naidu, Ravi	Chair, IUSS Commission on Soil Degradation Control, Remediation and Reclamation
Smiles, Davis	Member, IUSS Committee on Budget and Finances

International Union of Theoretical and Applied Mechanics (IUTAM)

Boger, Prof. David	Member, IUTAM Working Party 1 - Non-Newtonian Fluid Mechanics and Rheology
Tuck, Prof. Ernie	Member, IUTAM Congress Committee

International Union of Toxicology (IUTOX)

Wright, Paul	Member, IUTOX Education and Career Development Commission

International Union of Radio Science (URSI)

Wilkinson, Phil	Chair, URSI Working Group on Ionospheric Research to Support Radio Systems

ICSU Associates

Federation of Asian Scientific Academies and Societies (FASAS)

Lambeck, Prof Kurt	Member, FASAS Executive Council

Federation Internationale des Geometres (International Federation of Surveyors) (FIG)

Adcock, Simon	Vice Chair of Administration, FIG Commission 9
Higgins, Matt	ACCO Representative to FIG Executive Council
Newnham, Leonie	Chair, FIG Working Group 1.4
Sarib, Robert	Vice Chair of Administration, FIG Commission 5

International Cartographic Association (ICA)

Cartwright , William	ICA Vice President
Baker, Graham	Vice Chair, ICA Commission on Spatial Data Standards
Fraser, David	Vice Chair, ICA Commission on Education and Training
Furness, Ron	Chair, ICA Commission on Marine Cartography
Metternicht, Graciela	Editor ICA News

International Federation of Information Processing (IFIP)

Argent, Dr R.	Secretary, IFIP Working Group on Computers and Environment
Armstrong, Dr H.	Chair, IFIP Working Group on Information Security Education
Bernus, Dr P.	Chair, IFIP Working Group on Architectures for Enterprise Integration
Bertok, Dr P.	Secretary, IFIP Working Group on Computer-aided Manufacturing
Bunker, Dr D.	Secretary, IFIP Working Group on Transfer and Diffusion of Information Technology
Debenham, Dr J.	Secretary, IFIP Technical Committee on Artificial Intelligence
Dillon, Prof D	Chair, IFI Working Group on Web Semantics
Elliot, Prof S.	Chair, IFIP Working Group on E-Business Information Systems
Hughes, Prof J. M.	Vice-Chair, IFIP Working Group on Informatics and ICT in Higher Education
McDougall, Prof A.	Vice-Chair, IFIP Technical Committee on Education
Sharma, Prof A.	Chair, IFIP Working Group on Computational Learning Theory
Stacey, Dr E.	Vice-Chair, IFIP Working Group on Distance Learning
Tsui, Prof E.	Chair, IFIP Working Group on Knowledge Management

Federation of Library Associations and Institutions (IFLA)

Byrne, Alex	IFLA President-Elect

International Union for Quaternary Research (INQUA)

Chivas, Prof Allan R.	INQUA Treasurer
Murray-Wallace, Colin	President, INQUA Commission on Coastal and marine processes
Pillans, Brad	President, INQUA Commission on Stratigraphy and Chronology
Dodson, John	Member, INQUA Commission on Palaeoecology and Human Evolution
Gehling, James	Chair, ICS-INQUA joint task force on the Quaternary
McTainsh, Grant	Member, INQUA Commission on Terrestrial Processes, Deposits, and History
Nanson, Gerald	Member, INQUA Commission on Terrestrial Processes, Deposits, and History

International Radiation Protection Association (IRPA)

Carter, Mike	Member, IRPA Rules Committee
Higson, Donald	Member, IRPA Publications Committee
Mason, Ches	Member, IRPA International Congress Programme Committee
Smart, Richard	Member, IRPA Admissions Committee

International Society of Endocrinology (ISE)

Simpson, Evan	Member, ISE Executive Committee
Funder , John	Honorary President, 2008 ISE Congress

International Union of Forest Research Organisations (IUFRO)

Bacon, Gary John	Chair, IUFRO Congress Organising Committee
Croke, Jacky	Co-ordinator, IUFRO Task Force on Water and Forests
Fung, Paul Y. H.	Deputy Co-ordinator, IUFRO Division 5 - Forest Products
MacRae, Sharmane	Co-ordinator, IUFRO Task Force on Forest Biotechnology
Vanclay, Dr Jerry	Deputy Co-ordinator, IUFRO Division 1 - Siviculture

International Union for Vacuum Science Techniques and Applications (IUVSTA)

Martin, Phil	Member, IUVSTA Thin Film Division
Singh, Nagindar	Member, IUVSTA Surface Science Division

Pacific Science Association (PSA)

Ward, Dr R. Gerard	Past-President, PSA Executive Committee

ICSU Interdisciplinary Bodies and Joint Initiatives

Committee on Data for Science and Technology (CODATA)

Simpson, Prof Richard J.	Member, CODATA Task Group on Data Sources in Asian-Oceanic Countries
Wilson, Dr Karen	Member, CODATA Task Group on Data Sources in Asian-Oceanic Countries

An Integrated Programme of Biodiversity (DIVERSITAS)

Williams, Dr Meryl	Member, DIVERSITAS Scientific Committee

Astronomical and Geophysical Data Analysis Services (FAGS)

Wilkinson, Phil	Member, FAGS Executive Council

Global Climate Observing System (GCOS)

Manton, Dr Michael	Chair, GCOS Atmospheric Observation Panel for Climate

Global Ocean Observing System (GOOS)

Smith , Dr Neville	Director, GODAE Project of GOOS
Trull, Tom	Member, GOOS Steering Committee
Wijffels, Susan	Member, Steering Team of ARGO, Project of GOOS

Global Terrestrial Observing System (GTOS)

Barrett, Damian	Modelling Theme Leader, TCO Panel of GTOS

International Geosphere-Biosphere Programme (IGBP)

Stafford-Smith, Mark	Member, IGBP Scientific Committee
Bunn, Stuart	Member, Scientific Steering Committee, ESSP Global Water System Project
Canadell, Josep	Executive Director, ESSP Global Carbon Project
Finnigan, John	Member, Scientific Steering Committee, IGBP iLEAPS Project
Kershaw, Peter	Member, Scientific Steering Committee, IGBP Pages Project
McMichael, Tony	Co-Chair, Scientific Steering Committee, ESSP Global Change and Human Health Project
Parslow, John	Member, Scientific Steering Committee, IGBP LOICZ Project
Pearman, Graeme	Co-Chair, Scientific Steering Committee, ESSP START Project
Raupach, Michael	Co-Chair, Scientific Steering Committee, ESSP Global Carbon Project

International Human Dimensions Programme on Global Environmental Change (IHDP)

Cocklin, Chris	Member, Scientific Steering Committee, IHDP GECHS Project
Reichelt, Prof Russell	Deputy Chair, Scientific Steering Committee, IHDP IDGEC Project
Wasson, Dr Merrilyn	Member, Scientific Steering Committee, IHDP IDGEC Project

Committee on Allocation of Radio Frequency (IUCAF)

Tzioumis, Anastasios	Member, IUCAF Committee

Scientific Committee on Antarctic Research (SCAR)

Allison, Ian	Member, SCAR Group of Specialists on Global Change and the Antarctic
Belbin, Dr L.	Member, SCAR Group of Specialists on Global Change and the Antarctic
Bergstrom, Dr Dana	Chief Officer, SCAR Scientific Programme Group on Evolution and Biodiversity in Antarctica
Goodwin, Dr Ian	Programme Coordinator, SCAR Group of Specialists on Global Change and the Antarctic
Jacka, Dr T. H.	Secretary, SCAR Standing Scientific Group on Physical Sciences
Lytle, Dr V. I.	Member, Scientific Steering Committee, SCAR ASPeCT Project
Manning, John	Member, SCAR Group of Specialists on Antarctic Neotectonics
Reading, Dr Anya M.	Member, SCAR Group of Specialists on Antarctic Neotectonics
Stoddart, Prof Michael	Member, SCAR Standing Committee on the Antarctic Treaty System
Woehler, Dr Eric J	Chief Officer, SCAR Expert Group on Birds
Worby , Anthony	Member, Scientific Steering Committee, SCAR ASPeCT Project

Scientific Committee on Problems of the Environment (SCOPE)

Baker, Prof J. T.	Co-Chair, Scientific Advisory Committee, SCOPE Urban Solid Waste Management Project
Bax, Nic	Executive Board Member, SCOPE Global Invasive Species Programme
Freney, John	Member, SCOPE International Nitrogen Initiative
Hobbs, Richard	Co-Chair, SCOPE Emerging Ecosystem Project
Lonsdale, Mark	Chair, SCOPE Global Invasive Species Programme
McLaughlin, Michael	Member, Scientific Advisory Committee, SCOPE Cadmium in the Environment Project

Scientific Committee on Oceanic Research (SCOR)

Craig, Peter	Member, SCOR Working Group 111 on Coupling Waves, Currents, and Winds in Coastal Models
Hosie, Graham	SCOR Working Group 115 on Standards for the Survey and Analysis of Plankton
Mackey, Denis	Member, SCOR GEOTRACES Planning Group
Marchant, Harvey	SCOR Working Group 120 on Marine Phytoplankton and Global Climate Regulation
McDougall, Trevor J.	SCOR Working Group 121 on Ocean Mixing
Smith, A. D. M.	SCOR Working Group 119 on Quantitative Ecosystem Indicators for Fisheries Management
Tilbrook, Bronte	Member, Scientific Steering Committee, SCOR Joint Global Ocean Flux Study
Wolanski, Eric	SCOR Working Group 122 on Mechanisms of Sediment Retention in Estuaries

Scientific Committee on Solar Terrestrial Physics (SCOSTEP)

Dyson, Peter	Member, SCOSTEP PSMOS Steering Committee
Fraser, B. J.	Member, SCOSTEP S-RAMP Steering Committee
Vincent, R. A.	Co-Chair, SCOSTEP EPIC Steering Committee
Wilkinson, Phil	Member, SCOSTEP S-RAMP International Space Weather Committee

World Climate Research Programme (WCRP)

Allison, Dr Ian	Member, WCRP CliC Scientific Steering Group
Bradley, Dr E.	Member, WCRP Working Group on Surface Fluxes
Church, Dr J.	Member, WCRP Joint Scientific Committee
Hirst, Dr A.	Member, WCRP Working Group on Coupled Modelling
McAvaney, Dr B.	Member, WCRP Working Group on Coupled Modelling
Puri, Dr K.	Member, WCRP Working Group on Numerical Experimentation

Panel on World Data Centres (WDC)

Cole, Dr David	Co-Director, WDC for Solar-Terrestrial Science