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## COMMITTEES

### Scientific Organizing Committee (SOC)

#### Co-chairs:

Prof. Tom Beer, Centre for Australian Weather and Climate Research (CAWCR),  
CSIRO, Australia

Prof. Jianping Li, LASG, Institute of Atmospheric Physics (IAP), Chinese  
Academy of Sciences (CAS), China

#### Secretary General:

Dr. Keith Alverson, Climate Change Adaptation and Terrestrial Ecosystems  
Branch, Division of Environmental Policy Implementation, United Nations  
Environment Program, Kenya

#### Members:

Dr. Michael MacCracken, Climate Institute, USA

Prof. Guoxiong Wu, LASG, Institute of Atmospheric Physics (IAP), Chinese  
Academy of Sciences (CAS), China

Prof. Ian Allison, Antarctic Climate & Ecosystems Cooperative Research Centre,  
Australia

Prof. Michael Sideris, Dept. of Geomatics Engineering, University of Calgary,  
Canada

Dr. Tonie Van Dam, Faculté des Sciences, de la Technologie et de la  
Communication, University of Luxembourg, Luxembourg

Prof. Eigil Friis-Christensen, DTU Space, Technical University of Denmark,  
Denmark

Prof. Dan Rosbjerg, Dept. of Environmental Engineering, Technical University  
of Denmark, Denmark

Prof. Makoto Taniguchi, Research Institute for Humanity and Nature (RIHN),  
Japan

Prof. Lawrence Mysak, Dept. of Atmospheric and Oceanic Sciences, McGill  
University, Canada

Dr. Sersuya Nakada, Earthquake Research Institute, University of Tokyo, Japan

Prof. Stepher Self, Dept. of Environment, Earth and Ecosystems, The Open  
University, UK

Dr. Serhat Sensoy, Engineer in Climatology Division, Turkish State  
Meteorological Service, Turkey

Dr. Athena Coustenis, ESIA, Paris-Meudon Observatory, France

Dr. Pingfan Rao, Fuzhou University, China

Dr. Jun Chen, National Geomatics Center of China, China



## **LOCAL ORGANIZING COMMITTEE (LOC)**

### **Chair:**

Dr. Ruiqiang Ding, LASG, IAP, CAS, China

### **Members:**

Dr. Qing Bao, LASG, IAP, CAS, China

Dr. Bo Wu, LASG, IAP, CAS, China

Dr. Jie Song, LASG, IAP, CAS, China

Dr. Yanjie Li, LASG, IAP, CAS, China

Dr. Xiaofeng Li, LASG, IAP, CAS, China

Dr. Fei Xie, LASG, IAP, CAS, China

Dr. Cheng Sun, LASG, IAP, CAS, China

Dr. Bian He, LASG, IAP, CAS, China

### **Secretariat:**

Ms. Nan Jin (Tracy), LASG, IAP, CAS, China

Ms. Zheng Lin (Jenny), IAP, CAS, China

Ms. Wenling Zhou, LASG, IAP, CAS, China

Mr. Jun Wang, LASG, IAP, CAS, China

Mr. Kangjun Chen, LASG, IAP, CAS, China

Ms. Xuan Wang, LASG, IAP, CAS, China

Ms. Chen Chen, LASG, IAP, CAS, China

Ms. Chuanyi Wang, LASG, IAP, CAS, China



## GENERAL INFORMATION

### Venue

Institute of Atmospheric Physics,  
Chinese Academy of Sciences  
**Add:** Bldg.40, Huayanli, Beichenxilu,  
Chaoyang District, Beijing, China  
100029  
**Website:** www.iap.cas.cn

A map of IAP and its neighborhood including location of hotels can be found at the back of this handbook

### Presentation Preparation

Presenters must upload presentations during coffee breaks before, preferably one day prior to the start of their session to ensure their presentations are loaded successfully

### Catering

#### Breakfast Buffet

0700-0930, 11-13 April, Yuefugong Restaurant (Lobby Level in the hotel)

#### Lunch & Dinner

Lunch and dinner coupons are inside the package given to you when you register. You should present your coupon in order to obtain lunch or dinner.

- Lunch box, 1230-1400, 11-12 April, Cafe Restaurant in IAP
- Dinner, 1800-2030, 10 April & 12 April, Yuefugong Restaurant

#### Morning and Afternoon Tea Breaks

Tea breaks during the workshop will be served in the Room 101, IAP Keyan Building

### Registration

The registration desk is located in the hotel lobby and will be opened at 1300-1800, Thursday 10 April 2014

### Internet-Wireless

All delegates have access to the IAP free wireless Internet service. To connect to this free service, choose the wireless network called "IAP-WIFI" and the password is "IAP@w1fi"

#### Welcome Banquet

1900, (Buses departure at 1815 from IAP square), Dazhaimen Restaurant, 11 April  
**(invitation card required)**

#### Nearby Cafes and Restaurants

There are numerous cafes and restaurants near IAP and Foreign Experts Building Beijing. There're two supermarkets (Darunfa Supermarket and Carrefour) nearby. Have fun with Chinese food and language!



## The 1<sup>st</sup> CCEC Workshop

11-12 April 2014, Beijing, China

*Institute of Atmospheric Physics, Chinese Academy of Sciences*

### AGENDA

10 April (Thursday)	
1300-1700	Registration (at the Foreign Experts Building Beijing)
Morning, 11 April (Friday)	
Chairs: Michael MacCracken & Guoxiong Wu    Rapporteur: Bian He	
0900-0920	<b>Tom Beer:</b> CCEC-Introduction, history
0920-0940	<b>Guoxiong Wu:</b> Brief introduction of ICSU and its activities and of Future Earth in China
0940-1000	<b>Makoto Taniguchi:</b> Water-energy-food nexus with climate change-Research for global sustainability
1000-1030	Discussion
1030-1100	Tea Break & Photo
1100-1120	<b>Pingfan Rao:</b> The IUFOST perspective on Future Earth, ICSU programmes and possibilities for interaction with IUGG
1120-1140	<b>Jun Chen:</b> Supporting Future Earth with global land cover information
1140-1200	<b>Serhat Sensoy:</b> The WMO and WCRP perspective on Future Earth
1200-1230	Discussion
1230-1400	Lunch
Afternoon, 11 April (Friday)	
Chairs: Jianping Li & Tetsuzo Yasunari    Rapporteur: Qing Bao	
1400-1420	<b>Tom Beer:</b> IUGG & Future Earth
1420-1440	<b>Dan Rosbjerg:</b> Panta Rhei
1440-1500	<b>Tom Beer:</b> WeatCLiFS: Weather, climate and food security
1500-1530	Discussion
1530-1600	Tea Break
1600-1620	<b>Frans Berkhout:</b> Future Earth: Objectives, structure and implementation
1620-1640	<b>Tetsuzo Yasunari:</b> Future Earth in Asia-Towards solving complex disaster-environment issues
1640-1700	<b>Keith Alverson:</b> UNEP's climate change adaptation priorities and portfolio
1700-1730	Discussion
1900	Welcome reception



Morning, 12 April (Saturday)	
Chairs: Keith Alverson & Athena Coustenis      Rapporteur: Bo Wu	
0900-0915	<b>Michael MacCracken:</b> IAMAS: The international association of meteorology and atmospheric sciences
0915-0930	<b>Makoto Taniguchi:</b> IAHS interactions with CCEC and Future Earth
0930-0945	<b>Eigil Friis-Christensen:</b> IAGA interactions with CCEC and Future Earth
0945-1000	<b>Ian Allison:</b> Cryospheric challenges in managing global environmental change and Earth sustainability
1000-1015	<b>Tonie Van Dam:</b> Geodetic contributions to observing environmental change
1015-1030	<b>Keith Alverson:</b> IAPSO interactions with CCEC and Future Earth
1030-1100	Tea Break
1100-1130	<b>Michael MacCracken:</b> Discussion-Ways to encourage co-ordination between associations
1130-1200	<b>Michael MacCracken:</b> Discussion-Advancing the science on key issues
1200-1230	<b>Michael MacCracken:</b> Discussion-Interaction with funding agencies and governments
1230-1400	Lunch
Afternoon, 12 April (Saturday)	
Chair: Tom Beer      Rapporteur: Ruiqiang Ding	
1400-1430	<b>Jianping Li:</b> ICCL and CCEC: Roles and linkages
1430-1500	<b>Athena Coustenis:</b> IUGG 2015 Session U1
1500-1530	Discussion
1530-1600	Tea Break
1600-1630	<b>Jianping Li:</b> Proposal for Review of Climatic and Environmental Change (RCEC)
1630-1700	Discussion
1700-1715	Closing remarks
1830	Dinner



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## **CCEC-Introduction, history**

Tom Beer<sup>1,2</sup>

*1. Chair, Climatic and Environmental Change (CCEC)*

*2. Centre for Australian Weather and Climate Research, CSIRO, Australia*

The Union Commission on Climatic and Environmental Change (CCEC) was established by the Executive Committee of IUGG in June 2012 in order to promote the advancement of scientific understanding of climatic and environmental change, to boost research in reducing uncertainties in climate and environmental models, to define criteria for collaborative trans-disciplinary research on climate and environmental change, to fulfill the objectives of IUGG and its associations, to provide an all-Union perspective on climatic and environmental change, and to make available the knowledge and insights developed through scientific research to the benefit of society and planet Earth, including consideration of the science of global change, related vulnerability and impacts, and potential responses.

CCEC provides a focus for IUGG scientific expertise in climate and environment related areas across the breadth of all IUGG disciplines and associations. CCEC enables the breadth of IUGG expertise to be brought to bear at the global level through collaborating with, and underpinning the work of ICSU and other international organizations. It also enables the geographic spread of IUGG expertise to be brought to bear at the local level through involvement with national bodies in the organization of meetings and other activities.

### Objectives

- To build scientific capacity for responsibly addressing the broad, multi-disciplinary issues involved in climatic and environmental change;
- To provide useful information, understanding, and support to the public and governmental organizations;
- To interact and cooperate with outside activities that would benefit from the capabilities and resources of the IUGG Associations; and
- To strengthen links across the Scientific Associations within IUGG, to build new external links to organizations outside IUGG, to strengthen existing links to external organizations and to promote IUGG's contribution to global change research.



## **Brief introduction of ICSU and its activities and of Future Earth in China**

Guoxiong Wu<sup>1,2</sup>

*1. International Association of Meteorology and Atmospheric Sciences (IAMAS)*

*2. State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics (LASG), Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China*

The primary goal of the International Council for Science (ICSU) is “Strengthening international science for the benefit of society”. This presentation will firstly provide a brief introduction on ICSU and its activities.

In 2010, the Ministry of Science and Technology (MOST) in China launched a “National Key Basic Research Program on Global Change” which covers five Program topics:

- The main drivers and mechanism of global change
- The influence of human activities on the global change
- Climate change: impacts and adaptation
- Earth system model development
- Synthetic observation, data integration and assimilation

The primary progress of the program in the past five years will be presented.

With the transition from global change study to Future Earth initiative over the world, Chinese Academy of Sciences (CAS) and China Association for Science and Technology (CAST) have been working on the studies of various aspects concerning ecological progress and urbanization so as to seek for a more proper way for sustainable development in China. The recent progress in the planning of the new initiative “Future Earth-in China” is also introduced. Finally the way of regional and international cooperation for implementing the Future Earth is also explored.



## **Water-energy-food nexus with climate change-Research for global sustainability**

Makoto Taniguchi<sup>1,2</sup>

*1. International Association of Hydrological Sciences (IAHS)*

*2. Research Institute for Humanity and Nature (RIHN), Japan*

Increases in demand of water, energy, and food resources under the climate and social changes will cause increased levels of tradeoffs and conflicts among these resources and stakeholders. Policy development and resource management require careful consideration between nature and society, because these resources are inter-connected as nexus. Different type of bottle neck for the sustainable society may exist among water-energy-food nexus in the world with climate change. For instance in California, US, the water may be a bottle neck for the sustainable society among water-energy-food nexus, because more than 30 % of total energy consumption are used for water allocation. On the other hand in Japan, the energy may be a bottle neck for the sustainable society, because the self-production rate of the energy is less than 20 % although enough water exists in Asia monsoon hydro-meteorological condition. Therefore, there are different type of tradeoffs and conflicts exist within the water-energy-food nexus and various stakeholders in the Asia Pacific region under the climate change.

Future Earth, which is an International integrated research initiative and platform for global sustainability, has been launched as next 10 years program under ICSU, ISSC, IGFA, Belmont Forum, UNEP, UNESCO, and UNU. Future Earth focuses on co-design/co-production/co-delivery, and inter/trans-disciplinary. There are three themes in Future Earth; 1) Dynamic Planet, 2) Global Development, and 3) Transformation towards Sustainability. The theme of “water-energy-food nexus” are related to all three issues of Future Earth.

Inter and trans-disciplinary research project, “Human-environmental security in Asia-Pacific Ring of fire: Water-energy-food nexus” has been started from 2013 for 5 years in Research Institute for Humanity and Nature (RIHN). Themes for this study include conflicts and tradeoffs between geothermal power generation and the hot spring business (water-energy nexus), water uses on land vs. environmental flow from land to the ocean for coastal ecosystem (water-food (fishery resources) nexus), and resource development vs water use and contamination (water-energy nexus), and others. This study integrates interdisciplinary and transdisciplinary research with co-design / co-production / co-delivery and science in society. Horizontal integration with different issues and sectors, and vertical integration from local, national, regional to global scale



are also targeted. Project will suggest optimize policy options to maximize security of water-energy-food nexus under the climate change.



## **The IUFoST perspective on Future Earth, ICSU programmes and possibilities for interaction with IUGG**

Pingfan Rao<sup>1,2</sup>

*1. International Union of Food Science and Technology (IUFoST)*

*2. Fuzhou University, China*

The International Union of Food Science and Technology (IUFoST) one of ICSU's 31 scientific union members and the global voice of food science and technology representing 300,000 food scientists and technologists from 70 countries. IUFoST aims to strengthen food science and technology's role in helping secure the world's food supply and eliminate world hunger. It resonates well with Future Earth's goal to deliver solution-orientated research for sustainability, linking environmental change and development challenges to satisfy human needs for food, water, energy, health. IUFoST fully recognizes that Future Earth is providing a natural and great arena for the disciplines, its effective participation remains questionable. As the disciplines instructing what to be delivered into the body in the form of food, it is exactly the science that determines what human being will become of not in the future but immediately. Unfortunately, due to its relatively short history and the fact that it is masked by other food related disciplines, food science is commonly ignored by the society including decision makers, academia and general public. It is imperative that IUFoST proactively participates ICSU programmes to showcase what food science is about and work with other unions to raise the awareness of food science. Future Earth is a strategic opportunity for IUFoST, and we are committed to a close collaboration with IUGG and other unions.



## Supporting Future earth with global land cover information

Jun Chen<sup>1,2</sup> and Songnian Li<sup>1,3</sup>

1. *International Society of Photogrammetry and Remote Sensing (ISPRS)*

2. *National Geomatics Center of China, Beijing, China*

3. *Department of Civil Engineering, Ryerson University, Toronto, Ontario, Canada*

The new 10-year research initiative of *Future Earth*, launched by the International Council of Science (ICSU), aims to deliver, at global and regional scales, the knowledge that societies need to effectively address global change while meeting economic and social goals, by answering the most pressing questions in the context of securing human development in an era of rapidly escalating global environmental risks. The Future Earth related studies critically depend on reliable spatio-temporal data and information, including multi-scale land cover data, covering global, regional to urban areas.

Land cover and its changes reflect the characteristics of a variety of material types covering the surface of the earth. This is fundamental information for environmental change studies, land resource management, sustainable development, and many other societal benefit areas. Recently, we have completed an operational global land cover mapping project with the support from international communities and produced two global land cover data sets at 30-m resolution (called GlobalLand30) for two base line years, i.e., 2000 and 2010, respectively. GlobalLand30 contains ten major land cover classes, i.e., open water, wetland, artificial cover, agricultural land, forest, grassland, shrub, permanent snow and ice, tundra, and bare land. From these 30m GLC data products, most interactions between human activities and land systems on the earth can be observed, and most landscape heterogeneity can be differentiated.

GlobalLand30 can be used by researchers in various fields and decision-makers from different countries as reliable data and facts for addressing complex and urgent global and regional problems. The United Nations and the Member States can use this finer resolution GLC product to set the post-2015 development agenda for the implementation of the Sustainable Development Goals (SDGs). Specifically, GlobalLand30 is an important tool for eradicating poverty, improving agricultural systems and rural prosperity, achieving health and wellbeing at all ages, empowering inclusive/productive/resilient cities, curbing human-induced climate change, ensuring clean energy, and securing ecosystem services, biodiversity and good management of natural resources.

ISPRS recognizes the importance of GLC information and decided, at its 2012 Congress in Melbourne, to establish an inter-commission working group on Global Land Cover Mapping and Services involving three of its eight technical commissions



(TC II, IV and VIII). One of the main objectives of this working group is to coordinate and plan international efforts on further development of GLC data production, validation and web services. In the future, ISPRS will continue to support the Future Earth programme with GLC information by 1) exploring the potentials of GLC information in the three research themes of Future Earth, namely dynamic planet, global development and transformations towards sustainability; 2) identifying key gaps and major challenges in serving reliable GLC for Future Earth; and 3) developing a scientific vision towards future GLC at high spatio-temporal resolution and its ubiquitous services; 4) supporting young scientists and researchers from developing countries by exploring ways to help build their GLC capacity and to share knowledge required for a variety of applications. This will be implemented by a closer collaboration with ICSU Geo-unions and other international organisations.



## **The WMO and WCRP perspective on Future Earth**

Serhat Sensoy<sup>1,2</sup>

*1. World Meteorological Organization (WMO)*

*2. Turkish State Meteorological Service, Turkey*

The impacts of climate change pose an unprecedented and increasing global threat to life, livelihoods, and life-supporting systems. The World Meteorological Organization (WMO) is conducting climate related studies through World Climate Programme (WCP). WCP primarily aims at enhancing climate services with adequate focus on user interaction, to facilitate evermore useful applications of climate information to derive optimal socio-economic benefits and thereby underpins the Global Framework for Climate Services (GFCS) which is decided to establish at World Climate Conference-3 in 2009. The scope of WCP is to determine the physical basis of the climate system that would allow increasingly skilful climate predictions and projections, develop operational structures to provide climate services and to develop and maintain an essential global observing system fully capable of meeting the climate information needs. WCP has 4 components: World Climate Research Programme (WCRP), Global Climate Observing System (GCOS), World Climate Services Programme (WCSP) and Programme of Research on Climate Change Vulnerability, Impacts and Adaptation (PROVIA) respectively.

The mission of WCRP is to facilitate analysis and prediction of Earth system variability and change for use in an increasing range of practical applications of direct relevance, benefit and value to society. The overall objectives of the WCRP are to determine: To what extent climate can be predicted and the extent of human influence on climate. Study areas of WCRP are: Cryosphere and Climate, Water, Energy and Climate, Atmosphere, Oceans and Climate, Atmospheric Chemistry and Dynamics, Climate Projections: Past, Present and Future.

The GCOS is co-sponsored programme of WMO, the IOC of UNESCO, UNEP and ICSU. The GCOS is built on existing operational and scientific observing, data management and information distribution systems. It is based upon an improved World Weather Watch Global Observing System, the Global Ocean Observing System, the Global Terrestrial Observing System and the Global Atmosphere Watch.

The scope of WCSP spans across four inter-related areas: Climate data and analysis, Climate monitoring watch and prediction, Climate system operation and infrastructure and Climate adaptation and risk management; thereby serving as the Climate Services Information System (CSIS) and a part of the User Interface Platform components of the GFCS.

PROVIA became the fourth component of the WCP, by Resolution 4.3(2)/1 of EC-65. It is a global initiative which aims to provide direction and coherence at the





international level for research on vulnerability, impacts and adaptation (VIA).



## IUGG and Future Earth

Tom Beer<sup>1,2</sup>

*1. Chair, Climatic and Environmental Change (CCEC)*

*2. Centre for Australian Weather and Climate Research, CSIRO, Australia*

Future Earth is the new multi-and inter-disciplinary Earth System Science programme of ICSU that merges IGBP, Diversitas, IHDP and involves WCRP. It has a broad scope to examine the effects of global change on the whole earth system including the geosphere, biosphere, and anthroposphere.

The IUGG response to Future Earth indicates that **IACS**, **IAGA**, and **IAG** are all actively considering ways in which their existing programs can be coordinated in a way to assist Future Earth.

In the case of **IAMAS**, the International Association of Meteorology and Atmospheric Sciences these plans have advanced to a sufficient stage that IAMAS has passed a resolution: [http://www.iamas.org/Pdfs/IAMAS-Resolution\\_FutureEarth-2013.pdf](http://www.iamas.org/Pdfs/IAMAS-Resolution_FutureEarth-2013.pdf).

**IAHS**, the International Association of Hydrological Sciences, has established a new programme of research called **Panta Rhei** and this is envisaged to be the main IAHS contribution to Future Earth. Information about Panta Rhei can be found at their web site: <http://www.iahs.info/pantarhei/>

The IUGG Union Commission for Climate and Environmental Change (CCEC), in conjunction with the International Union of Food Science and Technology (IUFoST) and the International Union of Nutrition Sciences (IUNS) during 2013 ran a scoping activity concerning research activity in relation to **Weather, Climate and Food Security**.

It is to be hoped that the Scientific Committee of Future Earth (FE-SC) sees some or all of these IUGG initiatives as falling within their remit and adopt them as part of the Future Earth science program (with IUGG as the implementing agency). If this occurs, then a possible means of maintaining liaison between IUGG and Future Earth would be through CCEC.



## **Panta Rhei**

Dan Rosbjerg<sup>1,2</sup>

*1. International Association of Hydrological Sciences (IAHS)*

*2. Dept. of Environmental Engineering, Technical University of Denmark, Denmark*

The new Scientific Decade 2013-2022 of IAHS, entitled “Panta Rhei-Everything Flows”, is dedicated to research activities on change and society. The purpose of Panta Rhei is to reach an improved interpretation of the processes governing the water cycle by focusing on their changing dynamics in connection with rapidly changing human systems. The practical aim is to make predictions of water resources dynamics to support sustainable societal development in a changing environment. The concept implies focusing on hydrological systems as a changing interface between environment and society, whose dynamics are essential to determine water security, human safety and development, and to set priorities for environmental management. The Scientific Decade 2013-2022 will devise innovative scientific blueprints for the representation of processes including change and will focus on advanced monitoring and data analysis techniques. Interdisciplinarity will be sought by increased efforts to connect with the socio-economic sciences and geo sciences in general.



## **WeatCliFS: Weather, climate and food security**

Tom Beer<sup>1,2</sup> and Albert McGill<sup>3</sup>

1. *Chair, Climatic and Environmental Change (CCEC)*
2. *Centre for Australian Weather and Climate Research, CSIRO, Australia*
3. *International Union of Food Science and Technology*

To climatologists food security is dominated by the impacts of weather and climate on food systems. But the link between the atmosphere and food security is more complex. Extreme weather events such as tropical cyclones, landslides, volcanoes, floods, earthquakes and tsunamis may impact directly on agriculture, but they may also impact on the logistical distribution of food and can thus disrupt the food supply chain, especially in urban areas.

At the other end of the temporal spectrum, drought affects human life and health as well as impacting dramatically on the sustainable development of society and the impact is disproportionate within the developing world. Drought, especially when it results in famine, can change the life and economic development of developing nations and stifle their development for decades. *A holistic approach is required to understand the phenomena, to forecast catastrophic events such as drought and famine and to predict their societal consequences.*

In the Food Security recommendations of the Rio+20 Forum on Science, Technology and Innovation for Sustainable Development it states that it is important “To understand fully how to measure, assess and reduce the impacts of production on the natural environment including climate change, recognizing that different measures of impact (e.g. water, land, biodiversity, carbon and other greenhouse gases, etc) may trade-off against each other...”

IUGG and IUFoST lead the WeatCliFS consortium of international scientific unions to examine weather, climate and food security as well as to look at the interaction of food security and geophysical phenomena. The following fundamental question underpins WeatCliFS: *What technologies and methodologies are required to assess the vulnerability of people and places to hazards [such as famine]—and how might these be used at a variety of spatial and temporal scales?*



## **Future Earth: Objectives, structure and implementation**

Frans Berkhout<sup>1,2</sup>

*1. Future Earth Programme*

*2. King's College London, UK*

Future Earth is a 10-year international research programme that will provide critical knowledge required for societies to face the challenges posed by global environmental change and to identify opportunities for transformations to sustainability. The programme was announced at the Rio+20 Conference in 2012, in response to the United Nations Secretary General's Global Sustainability Panel report's call for a major global scientific initiative to strengthen the interface between policy and science.

Future Earth is an initiative of the Science and Technology Alliance for Global Sustainability, a collaboration of the International Council for Science (ICSU), the International Social Science Council (ISSC), UNESCO, UNEP, the United Nations University, the International Group of Funding Agencies (IGFA) and the Belmont Forum of principals, and the World Meteorological Organisation (WMO). It creates a unified global platform for science and innovation on global environmental change and sustainability, integrating existing global change programmes and projects across the natural and social sciences.

Future Earth has two main objectives: to enable more integrated science on global change and sustainable development internationally; and to promote the co-production of knowledge with partners in society. Implementation of the programme began in July 2013 when the interim secretariat started its work, based at ICSU in Paris. This presentation will report on the objectives, structure and progress in implementing Future Earth.



## **Future Earth in Asia-Towards solving complex disaster-environment issues**

Tetsuzo Yasunari<sup>1,2,3</sup>

- 1. Council Member, Science Council of Japan*
- 2. Member, Future Earth Science Committee*
- 3. Research Institute for Humanity and Nature (RIHN)*

Future Earth (FE) has been launched as an international initiative to promote research for global sustainability by the international science and technology alliance with partnership of the International Council for Science (ICSU), the International Social Science Council (ISSC), the Belmont Forum of funding agencies, the United Nations Educational, Scientific, and Cultural Organization (UNESCO), the United Nations Environment Programme (UNEP), the United Nations University (UNU), and the World Meteorological Organization (WMO) as an observer (Future Earth, 2013). Future Earth will provide a single overarching structure for researchers, funders, service providers, and users, and integrates the existing Global Environmental Change (GEC) projects. Future Earth would develop a new generation network building on these projects. The most essential issue for the overall FE activity towards global sustainability will be how to integrate efforts and activity of solving environmental problems and achieving sustainability for local to regional scales.

Asia is characterized by diverse climate, eco-system, and social-historical conditions. It contains more than 60% of the global population, accounts for one-third of global GDP, consumes more than 60% of global materials, is a growing emitter of greenhouse gases, and is undergoing rapid demographic change and economic growth. Urbanization and industrialization have increased resource extraction, processing, transport, and consumption and waste generation, transforming local and regional environments at a pace and scale that is unprecedented in modern history [Yasunari et al., COSUST, 2013]. In addition, Asia must improve its capacity for risk management of both natural and human-caused disasters, since the region exhibits high human vulnerability to extreme hydro-climatological and tectonic events (e.g. typhoons, heavy rains, floods and droughts, landslides, earthquakes, and tsunamis). Disasters expose different dimensions of social-ecological vulnerability and therefore disaster risk reduction is an important field of sustainability research and action. In the event of disaster, it is crucial to address immediate recovery needs while also developing learning systems that will improve social-ecological resilience to potential future disasters and build sustainability in the long term.



We, therefore, emphasize the importance and urgency of Future Earth in Asia, which should promote an integrated research & actions for coping with complex environment-disaster problems in this region.



## **UNEP's climate change adaptation priorities and portfolio**

Keith Alverson<sup>1,2</sup>

*1. Secretary-Treasurer, Climatic and Environmental Change (CCEC)*

*2. Climate Change Adaptation and Terrestrial Ecosystems Branch, Division of Environmental Policy Implementation, United Nations Environment Program, Nairobi, Kenya*

This presentation will provide an overview of climate change adaptation priorities and portfolio of the United Nations Environment Program. It will begin with a brief explanation of the Ecosystem based Approach to adaptation and how and why it is effective, followed by an overview of our portfolio of ecosystem based adaptation projects in various ecosystems and countries around the world. The talk will then introduce the Global Adaptation Network and its regional and thematic subnetworks as adaptation knowledge sharing mechanisms and some of the activities carried out within these networks. Finally, I will provide an overview of UNEP's work assisting countries to access adaptation finance through various mechanisms including the GEF special climate change fund, least developed countries fund, the Adaptation Fund-including both as implementing agency and our program of support for national accreditation and direct access-and our new Green Climate Fund Readiness program.





## **IAMAS: The international association of meteorology and atmospheric sciences**

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The International Association of Meteorology and Atmospheric Sciences (IAMAS) is composed of ten commissions and one supporting committee (see table). These groups organize activities, symposia, and special meetings covering research advances in particular areas of meteorology and atmospheric sciences, time scales from hours to centuries, spatial scales from local/regional (e.g., the polar regions) to global (and even planetary), processes from aerosols to dynamics, and issues from air pollution and stratospheric ozone to global climate change. With the atmosphere being the medium through which many aspects of the Earth system are felt by humans and the environment, the interests represented by the IAMAS commissions provide important bridges and conduits for enhancing cooperative scientific activities both with international scientific programmes going on outside IUGG (and a number of activities are already underway) and across and among the IUGG associations.

Table: IAMAS International Commissions

International Commission on Atmospheric Chemistry and Global Pollution (ICACGP)
International Commission on Atmospheric Electricity (ICAE)
International Commission on Climate (ICCL)
International Commission on Clouds and Precipitation (ICCP), including the Committee on Nucleation & Atmospheric Aerosols (CNAA)
International Commission on Dynamical Meteorology (ICDM)
International Commission on the Middle Atmosphere (ICMA)
International Commission the International Ozone Commission (IOC)
International Commission on Planetary Atmospheres and their Evolution (ICPAE)
International Commission on Polar Meteorology (ICPM)
International Commission the International Radiation Commission (IRC)

While the commissions each have a reasonably focused scope, there are a number of scientific issues that reach across the commissions, often leading to joint sponsorship



of symposia. Examples include issues relating to the effects of aerosols and air quality on clouds and climate, the behavior of the monsoons, extreme events, etc.

IAMAS commission interests also lead to many interactions with the interests and scopes of other associations, including, for example, linkages of the atmosphere and oceans, cryosphere, hydrology, volcanology, etc. Obvious examples include atmospheric effects on mountain glaciers and ice sheets and the effects of volcanic eruptions on climate.

Quite a number of the commission efforts also coordinate with international research programmes beyond IUGG, including activities sponsored by the WMO, the World Climate Research Programme (and its ground challenges) and IGBP. In addition to their scientific merit, the activities and interests of the IAMAS commissions relate to many issues affecting society and the environment at present and into the future. For example, research relating to air quality, the monsoons, extreme weather, warming in the polar regions, stratospheric ozone, and more would seem to be especially relevant. There thus appears to be significant potential for identifying areas for joint study and collaboration that would be supportive of Future Earth objectives to more fully integrate the social sciences community in the overall set of research activities, and IAMAS passed a resolution at its 2013 biennial assembly in Davos expressing its interest in such coordinated efforts.



## **IAHS interaction with CCEC and Future Earth**

Makoto Taniguchi<sup>1,2</sup>

*1. International Association of Hydrological Sciences (IAHS)*

*2. Research Institute for Humanity and Nature (RIHN), Japan*

International Association of Hydrological Sciences (IAHS) is one of the eight constituent associations of International Union of Geodesy and Geophysics (IUGG). IAHS promotes hydrological sciences as discipline oriented studies. There are 10 commissions, such as surface water, groundwater, snow/ice hydrology and others, because the water circulates seamlessly on the earth with phase transformation. There are four cross cutting working groups including Panta Rhei which is launched recently for a new 10 years trans-disciplinary studies in hydrology. On the other hand, Committee of Climate and Environmental Changes (CCEC) is an inter-discipline research group among IUGG for studies under the two big drivers of climate change and social change, which cause global environmental change. Discipline oriented basic researches are very important for innovated science, as well as inter-discipline and trans-discipline research in terms of integration of the studies and social involvement for problems oriented studies.

Water is connected and transported beyond the natural boundaries such as coastal line between land and ocean, and land surface between atmosphere and the ground. Therefore inter-disciplinary studies are necessary with hydrology and oceanographer, hydrology and atmospheric sciences and so on. In addition to these interdisciplinary natural sciences, water issues are related to social sciences such as management, economy, and culture. Moreover, problem oriented studies such as “water security” issue need not only scientists but also other stakeholders involvement such as governments, policy/science interface, business, media, citizen and others. Therefore hydrology (IAHS) can cover not only discipline oriented research but also inter-and trans-discipline studies.

During the last decade, each discipline oriented research for global environmental change including geosciences have achieved excellent results, however, many global environmental problems have not been solved yet. In order to take a step forward, ICSU/ISSC/UNU/IGFA/Belmont Forum/UNEP/UNESCO have launched a new 10 years program “Future Earth” which focus on co-design/co-production/co-delivery, trans-discipline, vertical integration (multi scale of global-regional-local) and horizontal integration (multi issue with different sectors/stakeholders), and the involvement of young scientists. Water issues which are widely connected in natural and social ways, can be one of the most important issues of Future Earth, because water acts not only as planet dynamics, but also as global development and transformation to the sustainability.



## **IAGA interaction with CCEC and Future Earth**

Eigil Friis-Christense<sup>1,2</sup>

*1. International Association of Geomagnetism and Aeronomy (IAGA)*

*2. DTU Space, Technical University of Denmark, Denmark*

Understanding climate change is one of the greatest challenges in our society. Although the expressed political needs regarding science results primarily relate to the impact of anthropogenic greenhouse gasses, a good understanding of the climate system cannot be reached without a dedicated effort to understand the contribution to climate change from natural climate processes.

For the climate system, as for any system, intelligent control or mitigation must firmly rest on an ability to predict. In spite of the dedicated effort during more than two decades coordinated by the International Panel on Climate Change, current climate models still have difficulties explaining the observed changes in past climate, probably because natural climate variations have been underestimated in the models.

This calls for a coherent international effort, where scientists in all the associations of IUGG have specific competencies. The geological history very clearly documents a strong climate forcing associated with solar variability, although the exact mechanism has not been identified. Such possible contributions to natural climate change are well within the scope of IAGA science including the effect on our atmosphere of different spectral bands of solar radiation and particles of different energies originating from Space.

This presentation will briefly review some of the most promising mechanisms for solar activity controlled contributions to natural climate variations.



## **IAGA interaction with CCEC and Future Earth**

Ian Allison<sup>1,2</sup>

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The cryosphere (snow and ice) is an interactive part of the Earth System, both responding to environmental change, and also controlling important feedback processes in the physical environment over much of the Earth's surface. These include impact on albedo and other components of the surface energy budget; on the water cycle; on surface gas exchange (including modification of the carbon budget through release of methane from thawing permafrost); on global ocean circulation; and on global sea level. These physical processes impact biological and social systems such as marine ecosystems and ocean primary productivity, water resources, navigation and ocean exploration in ice-covered waters, tourism, and societal infrastructure (through both sea level rise and changes in frozen ground). Monitoring cryospheric change and understanding cryospheric processes are hence necessary to answer the fundamental questions of the Future Earth initiative: how and why the global environment is changing, what are likely future changes, what are the implications for humans and other species, and what opportunities reduce risks and vulnerabilities, enhance resilience, and create prosperous and equitable futures. This presentation will review cryospheric processes, feedbacks and change, with an emphasis on those uncertainties that need to be addressed to support objectives of global sustainability. It will also consider present relevant research in projects such as WCRP Climate and Cryosphere (CliC), and avenues for collaboration between the International Association of Cryospheric Sciences (IACS) and other IUGG Associations through CCEC.



## **Geodetic contribution to observing environmental change**

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*1. International Association of Geodesy (IAG)*

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Geodetic techniques allow us to observe all components of the Earth System at local, regional, to global scales. These data have allowed for tremendous insight into the present day changes in the ocean, ice sheet, continental water, and glacier mass redistributions. Improved understanding of these changes allows us to better understand the relationships and feedback mechanisms of the Earth system components in response to global warming. These observations contribute directly to the Future Earth Initiative. This presentation will provide a brief overview of the types of observations that are possible today and that will be possible in the future using geodetic science.



## **IAPSO interaction with CCEC and Future Earth**

Keith Alverson<sup>1,2</sup>

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For this 15 min slot, the author will not give a presentation. He will instead open and lead a substantive discussion on the role of oceans in CCEC and future earth with reference to IAPSO.



## **ICCL and CCEC: Roles and linkages**

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*2. State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics (LASG), Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China*

International Commission on Climate (ICCL) was established by the International Association for Meteorology and Atmospheric Physics (IAMAP) (now the International Association for Meteorology and Atmospheric Science, IAMAS) at its plenary session in Seattle on 22 August 1977. The commission was established in response to the increasing research activities into the physical basis of climate and its variability. It was intended that the work of the ICCL should complement the work of the other commissions and that it should also include related areas such as ocean dynamics and paleoclimate variation and variability. The current ICCL president is Assoc. Prof. Neil Holbrook (Australia) and the Executive Secretary is Prof. Jianping Li (China).

ICCL organized a series of activities to promote climate science activities and its connection with other commissions of IAMAS and other associations of IUGG, in particular, IAPSO. ICCL members had been working closely with IAMAS bureau on preparing a proposal for the IUGG Union Commission on Climatic and Environmental Change (CCEC). ICCL will provide the core climate science for CCEC, whereas CCEC provides the inter-disciplinary linkages to operationalise the ICCL science. Both of them are planning for the IUGG General Assembly 2015 and fully support the Future Earth-research for global sustainability.





## **IUGG 2015 Session U1**

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The discussion session has three aims:

- Informing people about the Prague meeting and that session U1 will be the main CCEC activity.
- Letting people know what has been decided up to now in relation to U1-names of convenors, title and abstract.
- Seek agreement on the format of the session, its length, and seek suggestions for invited speakers.



## **Proposal for Review of Climatic and Environmental Change (RCEC)**

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This presentation aims at proposing a CCEC Journal of Review of Climatic and Environmental Change (RCEC) which will be sponsored by IUGG Union-Commission on Climatic and Environmental Change (CCEC/IUGG). The proposal aims to involve the efforts from all 8 associations to concentrate on a broad theme of climatic and environmental change and achieve a higher Impact Factor among peer-reviewed journals.

The proposal first states the aim and scope of the RCEC, followed by the description of significance and necessity of launching this journal. It presents the rationale for why it is worth doing for the CCEC. It analyzes the characteristics of two most influential journals in the field of geosciences and geophysics, and puts forward the uniqueness of the RCEC. Meanwhile, a work-plan for launching the journal is introduced. Finally, foreseeable difficulties and funding supports are also realized in the proposal.

It's planned that 8 associations take turns to invite experts within their discipline to write a review paper on the climatic and environmental change. Contributions will evaluate overall progress in their respective fields. Each association also has many disciplines so there are many resources we can distil. The authors, upon invitation, will have one year to write the review paper, which is supposed to be 40-60 pages. Every year, we intend to publish 2 issues and each issue contains 8-10 high quality reviewed papers.



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