Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

U07-01 Room:501 Time:May 1 09:00-09:30

Importance of Future Earth in Asia

YASUNARI, Tetsuzo[1*]

[1]Research Institute for Humanity and Nature

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) programmes. The GEC programmes have provided foci for several extensive international and multi-disciplinary networks of researchers investigating key human-environmental dynamics. Future Earth would develop a new generation network building on these. Future Earth proposes national and regional level committees, in addition to the regional nodes. 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.

This paper introduces a strategic science plan for FE in Asia, which should be a guideline for implementing the overall FE activity in the whole of Asia, including part of the Pacific/Australasia and the Indian Ocean basin region.

Keywords: Future Earth, Asia

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U07-02 Room:501 Time:May 1 09:30-09:55

Trade-offs in climate risks and societal risk decision

EMORI, Seita[1*]

[1]National Institute for Environmental Studies

The need to take mitigation measures in order to hold the increase in global average temperature below 2 degree C above pre-industrial levels are recognized in international negotiations of the United Nations Framework Convention on Climate Change (UNFCCC). According to the fifth assessment report by the Working Group I of Intergovernmental Panel on Climate Change (IPCC) which was published last September, attaining the temperature goal with a probability of 50% will require cumulative CO2 emissions from all anthropogenic sources to stay approximately 300 GtC from the present. If the current level of anthropogenic CO2 emission, 10 GtC yr-1, continues, the cumulative emissions will reach this upper limit in only 30 years. If we will seriously pursue the goal of temperature increase below 2 degree C, global CO2 emission should be turned to decline as soon as possible, and to be reduced at nearly zero by around the end of this century.

A great deal of research on climate change impacts and mitigation measures exist; however, large uncertainties remain in their overall pictures. So far, nobody can grasp clearly risks for human society and ecosystem associated with global warming exceeding "2 degree C", and risks for socioeconomics due to severe emission reductions of greenhouse gases. Furthermore, the risks will be realized in different ways by country, region, generation, and social attribution, and therefore, either if no specific response measures are conducted or if strong measures are conducted, a part of people in the world will have benefits and another part of people will make a loss. Climate change impact is not just an issue on benefits and losses of each person; but it relates to issues how we feel distress on risks for ecosystem, developing countries, and future generations. It relates to different value judgment among people. Deliberate work will be necessary in order to lead a decision-making which have both scientifically high rationality and socially high consensus, by connecting expert knowledge with social value judgment.

U07-03 Room:501 Time:May 1 09:55-10:20

Integrated MRV system using Monitoring-Sensing-Modeling in Tropical Peatland and Wet/lowland

OSAKI, Mitsuru[1*] ; HIROSE, Kazuyo[2]

[1]Research Faculty of Agriculture, Hokkaido University, [2]Earth Remote Sensing Division, Japan Space Systems

The Earth ' s remaining tropical forests are found mainly in the peatlands of the Amazon, Central Africa, and Southeast Asia, especially in regions of Kalimantan, Sumatra, and Papua New Guinea, where rich biodiversity can still be found and large amounts of carbon are stored in peat soils. Also, Wet/low-land where locate especially in South-East Asia is globally one of most important Bioproduction Ecosystem on food production, livelihood, mitigation and adaptation on climate change. This kind of Bioproduction Ecosystem have been supporting to feed large population, because of sustainability of soil fertility and nature friendly production system, calling as human-nature coexistence such as Satoyama in Japan. This human-nature coexistence Ecosystem (Satoyama Ecosystem) in wet/low-land is widely distributed in South-East Asia and South Asia, such as Cambodia, Thailand, Myanmar, Malaysia, Indonesia, Philippines and Bangladesh. Thus, peatland and wet/low-land Ecosystem has a role to stock large amount of Carbon, especially in peat and organic soils, and Mangrove soil. However, this human-nature coexistence Ecosystem (Satoyama Ecosystem) has been gradually or quality degrading and breaking down because of human-impact and climate change. Thus Sustainability of this human-nature coexistence Ecosystem (Satoyama Ecosystem) is one of key issue in not only regional, but also global. As SBSTA38 and Workshop of UNFCCC in 2013 have been focusing on ”Ecosystem of High Carbon Resorvoirs” such as peatland, costal ecosystem including Mangrove and Coral, and Permafrost, South-East Asia is key in this aspect.

Focusing on carbon emission estimation related with the REDD (Reducing Emissions from Deforestation and Forest Degradation in Developing Countries) Mechanism, at COP15 in Copenhagen, MRV (Measurement, Reporting and Verification) focused on establishing reference emission levels, national monitoring systems. At COP15 of Copenhagen, it was declared that an MRV system that should be coupled with two components ? satellite sensing and grand truth- is urgently required. Presently, our JST-JICA Project (SATREPS) on ”Wild Fire and Carbon Management in Peat-Forest in Indonesia” is the only project in the world to propose all aspects of MRV in tropical peatlands, enabling it to contribute significantly to also in tropical wet/low-land. Actually, carbon stock mapping and carbon flux mapping in peatland were obtained. Therefore, this paper describes our MRV system as a sensing standard for REDD+, biodiversity, and LLULUCF in tropical peatland and Wet/low lands.

Keywords: Satoyama Ecosystem, MRV, REDD+, Tropical peatland, Wet/low lands, High Carbon Resorvoir Ecosystem

U07-04 Room:501 Time:May 1 10:20-10:45

Current state of international governance on conservation and sustainable use of marine ecosystem services

YAGI, Nobuyuki[1*]

[1]Graduate School of Agricultural and Life Sciences, The University of Tokyo

Conservation and sustainable use of marine ecosystem services has been discussed internationally. For instance, discussions on EBSA (Ecologically or Biologically Significant Areas) are ongoing at meeting under the CBD (Convention on Biological Diversity). Likewise, the issues of VME (vulnerable marine ecosystem) are also discussed at FAO (Food and Agriculture Organization of the United Nations). In addition, General Assembly Ad Hoc Open-ended Informal Working Group to study issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction has been held by the United Nations in order to discuss the need for creating an international instrument under UNCLOS to address the issue of the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction before the end of the 69th Session of the United Nations General Assembly (which is winter time in 2014).

The author has closely monitored the development of the discussions on the above meetings and found that their discussions were narrowly focused upon the control of fishing activities and they lacked considerations on the ecosystem services as a whole. This is most likely because stakeholder identifications, such as polluters and users of ecosystem services, are difficult and creating a legal framework is extremely hard. Under this situation, it can be argued that agreeing economical tools such as payment for ecosystem services would be more practical.

Keywords: Ecosystem services, UNCLOS, CBD, FAO, EBSA

U07-05 Room:501 Time:May 1 11:00-11:25

Global and regional platforms for integrated environmental and sustainability studies

TANIGUCHI, Makoto[1*]

[1]Research Institute for Humanity and Nature

Future Earth is a new 10 years initiative of international research program for global sustainability. The objectives of the Future Earth are to provide the knowledge required for societies in the world to face risks posed by global environmental change and to seize opportunities in a transition to global sustainability. Future earth was launched at 2013 by international academic, funding, organizations as alliances including ICSU, ISSC, IGFA, Belmont Forum, UNEP, UNESCO, and UNU. Future Earth focuses on co-design, co-production, and co-delivery, transdisplinarity, vertical (global-regional-local) and horizontal (multi issue with different sectors and stakeholders) integrations, and the involvement of young scientists. There are three themes, 1) Dynamic Planet, 2) Global Development, and 3) Transformation towards Sustainability. Researches on global environment and sustainability are urgent in Asia, because more than 50 percent of the world population lives in Asia, and drastic changes (both increase and decrease) of population, urbanization, material consumptions, environmental deteriorations, natural and social disasters, occurs in Asia, i.e. Asia is a hot spot area in terms of human and nature drives. Therefore core research hubs of the global environment and sustainability study such as Future Earth are needed in Asia, where is the hot spot area for global sustainability. Structures of the global and regional hubs for the Future Earth, core projects, and others are now under discussion during the interim period. Japan is expected to be Asian regional hub and a part of global hubs because many experiences and good practices on global environmental researches with stakeholders. Methodology, data, and knowledge for interdisciplinary and transdisciplinary researches, should be established in a platform and networking as regional hub of the Future Earth in Asia Pacific and others. Capacity building and education for global sustainability are also very important in Future Earth. Beyond the existing one-way capacity building and environmental education, knowledge transfers between different stakeholders may be a key for the next step of capacity building and education for global sustainability.

Keywords: global environmental change studies, global sustainability, future earth, platform, capacity building

U07-06 Room:501 Time:May 1 11:25-11:50

On Sustainability Initiative for Marginal Seas in East Asia

YAMAGATA, Toshio[1*] ; CRUZ, Lourdes J.[2] ; HASAN, Nordin M.[3]

[1]Application Lab, JAMSTEC, [2]National Research Council, the Philippines, [3]ICSU, Regional Office for Asia and the Pacific

The marginal seas of East Asia (MSEA hereafter) along the western Pacific, geologically as the interface between the Pacific Ocean and the Asian land mass, have islands spread from the Bering Sea down to the Indonesian seas consisting mainly of the Japanese, Philippine, and Indonesian Archipelagos. The MSEA is very important to international commerce and global security as linkage of heavily populated megacities with active societal, economical and industrial activities.

The MSEA is also the region of the highest marine biodiversity in the world, and its coral reefs and waters around atolls and small islands serve as the spawning ground and nursery of many marine species including tuna and other pelagic species that serve as very important food commodities in the Pacific islands, the Asia mainland and North America. To conserve the health of the MSEA under the pressure from the global change is of our urgent need. The region also lies along the path of destructive typhoons that originate in the western North Pacific and affect the Philippines, Vietnam, Hong Kong, China, Korea, and Japan. It is known that the western North Pacific is one of the most active basins where about 26 typhoons are generated annually, majority of which enter the Philippine area. The latest typhoon, Haiyan, the strongest storm recorded at landfall and the deadliest Philippine typhoon causing storm surges ever recorded, impinged heavily on human life, food security, energy supply, health, wellbeing, and transportation and communication systems in addition to extreme destruction of property, the economy and the ecosystem of Central Philippines. The outpouring of support from the international community to help the Philippines rise out of the disaster is well appreciated particularly by the victims of typhoon Haiyan and its storm surges. Many lessons now learned can be shared to minimize the impact, improve the resiliency of communities and to ensure protection of people against the anticipated increase in the number of future disasters due to global climate change. The cold phase of the Interdecadal Pacific Oscillation which brought the apparent hiatus of the global warming will eventually change and we expect a dramatic climate regime shift as observed in 1976.

In the spirit of the Future Earth initiative of ICSU, we are proposing a collaboration mechanism to share knowledge and expertise for better well-being among ICSU members around the MSEA to work for solutions of relevant problems in the region. While focusing on the maritime region, the researchers will aim to contribute to the attainment of the goals of Future Earth, namely: 1) to develop the knowledge for responding effectively to the risks and opportunities of global environmental change, and 2) to support transformation towards global sustainability in the coming decades. The main region of the proposed study will be the Exclusive Economic Zone beyond the territorial limit (generally 12 nautical miles from shore) in MSEA as well as international waters relevant to the sustainable use of common areas. The collaboration will involve joint researches and capacity building particularly of young scientist in developing countries. We had the brainstorming pre-scoping workshop for SIMSEA in February in Yokohama, of which purposes are:

1) To exchange information and knowledge on the existing discipline-oriented research programs on the marginal seas in Asia and the western Pacific for integrative sustainability research program involving natural, social, economic, engineering and technological sciences.

2) To discuss and co-design a collaborative interdisciplinary research program on the marginal seas of Asia and the western Pacific that meets the criteria of research toward global sustainability under the framework of Future Earth.

We will summarize the outcome of the pre-scoping meeting and envisage the future of SIMSEA in accord with Future Earth.

Keywords: Future Earth, Marginal Seas, East Asia, Interdecadal Pacific Oscillation, Global Change, Climate Variations

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U07-07 Room:501 Time:May 1 11:50-12:15

Digital Earth as a communication platform for Future Earth

FUKUI, Hiromichi[1]*

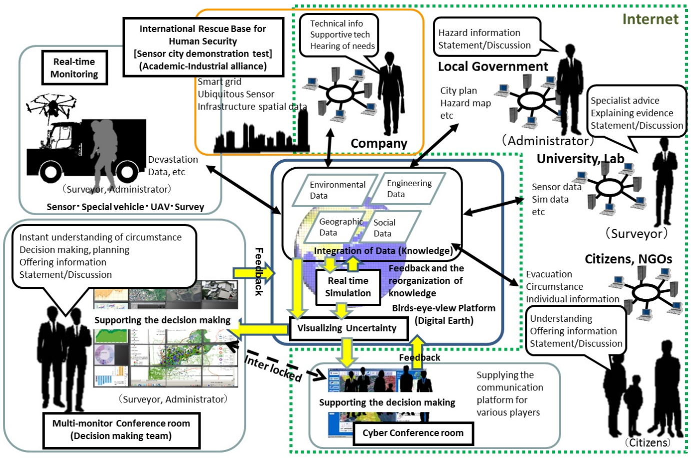
[1]International Digital Earth Applied Science Research Center, Chubu Univ.

As we can see in problematique, such as environmental issues and disasters, the various risks we face at both local and global scale are all interrelated to each other, and also tend to suddenly emerge at very local level. Conventional science has only been able to deal with parts of these problems. The first step to build a sustainable and disaster resilient society is to monitor, identify, store the data of phenomena on the earth, then process and interpret the raw data, turn them into understandable information to display, publish and distribute. We must share a common recognition of the issues. Therefore we need the Digital Earth (DE) that is a virtual representation of our planet on the internet, and enables a person to explore and interact with the vast amounts of natural, socio-economic and cultural information gathered about the earth. These infrastructures are using for the ESD (Education for Sustainable Development) that focus on systems thinking, critical thinking and holistic views. The Digital Earth can also facilitate collaborative, data-intensive studies for problematiques of Future Earth Project in the 21st century

It was reviewed Digital Earth concept, applications, and some of projects for promoting disaster resilient and sustainable society with information and communication technology in this paper.

We propose Digital Earth platform as the public information base which has cloud-based geospatial information system and services in cooperation with multi stakeholder as shown in Fig. These information systems should be autonomous, distributed and coordinated, interoperable as well. They work for ESD especially for the multi-risks, both mitigation and preparedness in ordinary time and emergency to reduce the vulnerability of our society. It would be a comprehensive facility and social system dedicated to disaster and environment management for sustainable future, with the capacity to supply the necessary staff and equipment such as sensor web supporting by a wide range of associated organizations.

Keywords: Digital Earth, Geographic Information System, Citizen Sciences, Data Journalism, Education for Sustainable Development, Future Earth



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U07-08 Room:501 Time:May 1 12:15-12:40

Future Earth and Sustainable Development Goals

KANIE, Norichika[1*]

[1]Tokyo Institute of Technology

One of the next major challenges for research and policy in the field of sustainable development is the agreement of the post-2015 development agenda. This challenge is a direct result from the 2012 United Nations Conference on Sustainable Development (Rio+20), as well as from the formal ending of the Millennium Development Goals (MDG) in 2015. Governments, supported by civil society, now need to agree on a series of new global sustainable development goals and on the related governance mechanisms. At the Rio+20 Conference, governments decided on a process to develop such novel Sustainable Development Goals (SDG), to be integrated into the post-2015 global development agenda. Differently from the MDGs that target developing countries, the new Sustainable Development Goals are meant to apply to both developing and developed countries.

The research community that works in this field is faced with essentially two research tasks:
? First, we need to analyze the goal setting and implementation processes (governance questions);
? Second, we need to analyze and identify the goals and indicators themselves.

The first task entails an inquiry into who will be involved in setting these goals (Agency, Accountability), by which decision making mechanisms (Architecture, Adaptiveness), what these goals will be (Allocation and Access), and how to arrive at the framework for formulating the goals as well as an inquiry into how these goals will be translated into outcomes. The second task includes the question on how to elaborate the global development goals to facilitate achieving human well-being for all within resource constraints and environmental boundaries set by the earth system. A related question is the conceptual framework for the goals, and what goals, targets and indicators need to be developed. This in turn poses questions on enabling institutions and governance processes. We have witnessed in the past years that the development model that underpinned the post-1945 decades appears to be unable to handle the crises that many societies and institutions are struggling with (financial, demographic, environmental, etc.).

Therefore, questions related to the Post-2015 development agenda are not solely about SDGs, but are rather fundamental questions on how to achieve sustainability in the 21st century. To do so requires knowledge innovation, and it is possible through transdisciplinary research, one of the purposes of Future Earth, including co-design, co-production and co-design. This is a theme that should be explored in the year to come.

Keywords: Future Earth, Sustainable Development, Sustainable Development Goals, Post 2015 Development Agenda, Governance

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U07-09 Room:501 Time:May 1 14:15-14:45

How will Humanity Survive and Flourish on Future Planet Earth?

DE MULDER, Eduardo[1*]

[1]Earth Science Matters Foundation

In the past half century the world has changed in an unprecedented way. For the first time ever humans observed their planet from outer space. Our species also has become a geologic factor while beginning to interfere with natural forces in the Earth to a scale which can no longer be ignored. These caused geographic modifications at the Earth' surface and geographic maps begin to show more and more distinct human imprints. Simultaneously, our knowledge about the Earth has increased to a level that the Earth crust's anatomy and composition is increasingly known and that we begin to understand how our planet works. Knowing the basic principles of the Earth processes paves the way to forward modelling and more and more accurately predicting the impacts of human interaction with planet Earth. That, in turn, provides tools to anticipate on both assets and threats for an increasingly large and complex human population. As long as we remain dependent on our home planet societies should benefit more from such rapidly increasing knowledge to balance development with the Earth' bearing capacity. Here, we describe recent progress in our knowledge of the Earth and some trends in human development. In combination, these may point to knowledge-based options on how human societies may cope with potentials and limitations posed by planet Earth in view with the ambitions expressed by the Future Earth science initiative.

Planet Earth by itself is not in danger and humans will never threaten its existence for another 5 billion years. But human activities will continue and possibly aggravate impacting the biosphere, the hydrosphere, and to a lesser degree, also the geosphere. Dimensions of such changes will be determined by physical factors in the first place but ability of human societies to cope with such changes also depends on cultural diversity.

Five global trends in human development are discussed: population, urbanisation, living standard, environmental awareness and science & technology. Together these trends point to a growing need for physical space to accommodate future human ambitions. Science and technology trends demonstrate accelerating potential abilities of human society to address such needs. As we proceed in the Anthropocene the need to integrate humanity issues and the geosciences will further increase while reconfirming the growing relevance of the discipline of the Human Geosciences.

So far, the Earth sciences play a modest role in the Future Earth initiative. That is in sharp contrast with global ambitions to arrive at a Green Economy, as expressed in Rio+20, to be developed in balance with the Earth' bearing capacities. Recent progress in geoscientific and technological research demonstrate the potential of such development. This has been widely exposed during the International Year of Planet Earth (IYPE, 2007-2009). This global initiative was proclaimed by the UN and was particularly successful in its outreach programme. In turn, the IYPE served as a model for developing the International Year of Global Understanding, spearheaded by the IGU, and for the UN Year of the Soil (2015).

Human ingenuity spurred discovery of larger natural resources than ever before to drive our economies to unprecedented heights. Future Earth might mobilize the brain powers accumulated in the heads of 400,000 Earth scientists around the world towards a sustainable economy.

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U07-10 Room:501 Time:May 1 14:45-15:10

Scientific Knowledge Creation Supported by Data Integration and Information Fusion

KOIKE, Toshio[1*]

[1]School of Engineering, The University of Tokyo

What is scientific knowledge? We create some hypothesis based on theories, develop models, and implement experimental observation for validation of the hypothesis. This approach is called deductive inference. Based on the accumulation of factual knowledge, we can form the hypothesis. This approach is called inductive inference. Scientific knowledge is called formal knowledge which can be transferred and shared among wide scientific communities. By publishing paper and promoting communication, we exchange the factual knowledge. Such widely shared factual knowledge is defined as scientific knowledge. We are doing science in this way. During past one hundred years, this scientific knowledge has been increasing explosively. Differentiation and systematization have proceeded, and then a large number of disciplines have been established.

However, it is very difficult to reflect accumulated sub-system knowledge to holistic knowledge. Knowledge on a whole system can be rarely introduced to a targeted subsystem. In many cases, knowledge in one discipline is inapplicable to others. We are far from solution of issues across disciplines. It is critically important to establish inter-disciplinarity and create scientific knowledge crossing disciplines. To realize the benefits of scientific knowledge in society, we need to combine scientific knowledge in the natural world, the socio-economic world and the recognition world and to develop trans-disciplinarity as well as inter-disciplinarity.

How can we develop inter-disciplinarity and trans-disciplinarity? We need to share the data and information and develop inter-linkage of our knowledge by developing models and exchanging tools. Based on this kind of scientific activities, we can corporate between science community and society by making effective use of opportunities.

Data Integration and Analysis System (DIAS) coordinates the cutting-edge information science and technology and the various research fields addressing the earth environment, constructs data infrastructure that can integrate earth observation data, numerical model outputs, and socio-economic data effectively, creates knowledge enabling us to solve the earth environment problems, and generates socio-economic benefits, aiming to create knowledge to be shared among different disciplines, to create knowledge to be shared throughout the world, and to disseminate data and information that brings awareness.

Keywords: Data Integration, inter-disciplinarity, trans-disciplinarity

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U07-11 Room:501 Time:May 1 15:10-15:35

Geospatial data and Future Earth: a case of digital elevation models

OGUCHI, Takashi[1*]

[1]CSIS, Univ. Tokyo

Future Earth is related to the concept of Digital Earth, proposed by US Vice-President Al Gore in 1998. Digital Earth aimed to compile global geospatial data with various resolutions and make them open to public worldwide for efficient solution of environmental problems. Although some related projects were launched, such activities in the 21st century have been relatively limited, partly because Gore lost in the 2000 presidential election. However, some of the elements of Digital Earth have been realized in the form of Internet virtual globes such as Google Earth and Bing Maps. These services allow us to browse maps, satellite images and airphotos with various resolutions. Although Digital Earth planned to provide more varied geospatial data related to science and culture, compilation and broad distribution of such data have been more delayed. It is important to understand the current state of available geospatial data and utilize them for activities associated with Future Earth. This presentation deals with digital elevation models (DEMs), one of the most basic geospatial data. It introduces currently available DEMs and application examples related to Future Earth.

Keywords: Future Earth, geospatial data, digital elevation model, Digital Earth

U07-12 Room:501 Time:May 1 15:35-16:00

Promoting Studies under Future Earth supported by Super-High Resolution Simulations on the Global Environment

OKI, Taikan[1]*

[1]Institute of Industrial Science, The University of Tokyo

The new terminology "Anthropocene", the geological era when anthropogenic activities substantially altering global environmental systems in which human beings are also a part of it, has been a popular word, but how the Anthropocene evolved? Population growth, economic development, and urbanization are inducing the climate change, the depletion of non-renewable resources, and the degradation of ecosystem services through the enhancement of the waste of resources, the emission of greenhouse gases, and the land use-land cover changes. Consequently, economic equity and the stable accesses to food, water, and energy are threatened, the potential risks to natural disaster are increased, and the minimum standards of wholesome and cultured living are in danger. How socio-ecological systems are changing and interacting with global and local environment?

In order to answer to these questions, it is necessary to understand the inter-linkages among factors of the socio-ecological systems through earth observations, field studies, data archive of social statistics and historical information on local and global changes, and the synthesis of them with integrated analysis and mapping. The study should have a scope with multi-spatial scale including Japan, Asia, and the globe, and with the target period of drastic changes for human beings in 300 years from the 150 years from the industrial revolution till now, and the 150 years from now on.

A research project of "Super-High Resolution Simulations on the Global Environment" is proposed in order to promote various studies under Future Earth. Cycles and budgets of energy, water, and materials such as carbon, will be eventually simulated by 1km (30 arc second) over global continent for past 150 and future 150 years considering social and climatic changes. Past and projected changes will prevail the historic transition and future anticipations in sustainable energy, renewable resources such as food and water, impacts and transition of health and ecosystem services with super-high resolution.

Research components to enable the study are mostly ready to start feasibility studies. Motivated researchers are welcome to join.

Keywords: future earth, offline simulation, super-high resolution, anthropocene

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U07-13 Room:501 Time:May 1 16:15-16:35

Asian Economic Development and Global Environmental Sustainability

SUGIHARA, Kaoru[1*]

[1]National Graduate Institute for Policy Studies

During the last twenty years or so, growth economies of Asia collectively became the largest importer of resources (particularly of energy resources) in the world, as not only resource-poor countries like Japan but counties like Indonesia and China, which used to be resource exporters, turned to net importers. Meanwhile, East Asia historically pursued a path of economic development, different from that of capital- and resource-intensive industrialization developed in the West, by fostering relatively labour-intensive and resource-saving technology. The energy intensity (energy consumption per GDP) has been kept low in many Asian countries, and Japan's energy-saving technology still leads the world in a number of respects. Thus, growth economies of Asia (now including most of South and Southeast Asia) are major players in the global market of resources, influencing both demand and supply.

Needless to say, monsoon Asia creates the world's largest circulation of water and heat energy around the Himalayas (and the Tibetan Plateau), and about a half of world population live in this environment. It has formed a uniquely coherent civilization and economy, such as densely populated society based on rice farming, transcending the geospheric and biospheric boundaries between the tropics and temperate zones. Today, this region is going through comprehensive industrialization and urbanization, and the resource and energy use there is beginning to affect the health of the entire world economy.

In what ways has Asian economic development been affecting global environmental sustainability? If Asia has long fostered a path of economic development under the unique environmental outfit of monsoon Asia, how would it influence the region's ability to address global environmental issues? This presentation offers a review of recent history literature on these questions, with comments on its utility for the understanding of the future of global sustainability.

I am currently serving for the Future Earth Committee at the Science Council of Japan, to promote humanities and social science research for this global initiative. I hope to have an opportunity to exchange ideas with members of this Union, and to explore possibilities of interdisciplinary research, specifically designed for the activities of Future Earth.

Keywords: Asia, economic development, global environmental sustainability, path dependency

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International Earth Science Olympiad from the viewpoint of Future Earth

TAKIGAMI, Yutaka[1*] ; HISADA, Ken-ichiro[2]

[1]Kanto Gakuen University, [2]Graduate School of Life and Environmental Sciences, University of Tsukuba

When considering the Future Earth-sustainable Earth, it is important to know the whole Earth and the international cooperation. As the study of the whole Earth is Earth Science, we consider International Earth Science Olympiad (IESO) which is the international competition for high school students from the viewpoint of Future Earth.

IESO was hold on 2007 (Korea), 2008(Philippine), 2009(Taiwan), 2010(Indonesia), 2011(Italia), 2012(Argentina) and 2013(India). In 2016, we will have IESO at Mie.

1) International Team Field Investigation (ITFI)

ITFI is the typical event which is not existed on other science Olympiads. This event is the presentation event after high school students from other countries investigated some subjects with international cooperation. At this event, communication language is English and sometimes subjects of this investigation include the regional social life. This experience will guide the consideration of Future earth to students in future.

2) Increase of participating countries

Participating countries were increased from about 6 (2007,2008) to over 20 (2011-). One of the reason might be due to the understanding the importance of Earth Science for Future Earth.

3) Examination questions at IESO

At present, questions are consisting from three disciplines; Geology and Solid Earth, Metrology and Oceanology, Astronomy. However, members of IESO want to include multidisciplinary questions which are important for considering Future Earth. At 2016 IESO at Mie, we want include these examination questions aggressively.

4) Japan Earth Science Olympiad (JESO)

The half of students for participating the JESO will enter the universities of art divisions and 30% of students are girls. This fact is good for consideration of Future Earth because many peoples, not scientist, have basic earth science knowledge. However, it is regret that more high school students study another science curriculum than earth science.

I think that it is very important for Future earth to learn Earth Science and to join the Earth Science Olympiad.

Keywords: Earth Science Olympiad

U07-15 Room:501 Time:May 1 16:55-17:15

The education for sustainable earth - The International Geography Olympiad

IDA, Yoshiyasu[1*]

[1]Univershity of Tsukuba

The International Geography Olympiad (iGeo) is a competition for the best 16 to 19 year old geography students from all over the world. Four students represent each country in a series of Geography tests in (generally) a four-five day program. An adult Team leader and International Board Member accompany each national team. The official language of the iGeo is English.(from iGeo home page)

There are three aims of iGeo. First is to stimulate active interest in geographical and environmental studies among young people, second to contribute positively to debate about the importance of geography as a senior secondary school subject by drawing attention to the quality of geographical knowledge, skills and interests among young people, third to facilitate social contacts between young people from different countries and in doing so, contribute to the understanding between nations.

The test questions in iGeo are presented from each country and are made. The international standard test is aimed by these questions. These questions are divided into three types that are multimedia, description, and fieldwork. The aim of each type test is to make students develop the ability to look the future society and earth on underlying knowledge, skills and view points of the geography. Particularly, in the fieldwork test, students can learn not only the present understanding but also the future by observing local natural phenomenon and the life of people, directly. Regarding geography education of our country, though present understandings more importance, a point of view to inquire the relation between nature and human in the future is not enough. In factually, the Japanese team in iGeo really tends that the point of the fieldwork test is low. As for this, the main factor would be that thinking the future is not educated in geography education in Japan. In addition, students have few chances to experience the fieldwork in geography class of our country.

In the geography education of Japan, it is necessary for the learning content including the consideration for the future based on geographical knowledge, skill and inquires.

Keywords: sustainable earth, future earth, geography education, international geography olympiad, fieldwork

Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

U07-16 Room:501 Time:May 1 17:15-17:35

Sustainable Future of Coastal and Marine Ecosystems in the Indo-Pacific Ocean

UEMATSU, Mitsuo[1*]

[1]Atmosphere and Ocean Research Institute, The University of Tokyo

The Indo-Pacific Ocean Region encompasses diverse coastal ecosystems, as represented by coral reefs, mangrove forests, seagrass beds, and even deep basin over 4000 m deep. These diverse environments harbor the unique and extremely high biodiversity of the region, known as the major biodiversity hotspot in the world. However, the region is also under serious threat of environmental decline from various human impacts due, for example, to loads of pollutants from land and habitat destruction associated with resort development and fisheries. There are also concerns about negative impacts of global climate change associated with ocean acidification.

As one of Future Earth initiatives, we should establish future perspectives and needs for strengthening sustainable ocean environment and development. A project aims at further expanding the network of the scientific and socio-economic studies and education on the Indo-Pacific Ocean Region, through (1) research collaboration applying new approaches and methodologies such as satellite remote sensing, molecular genetic analyses, and high-precision analyses of biogeochemical parameters, (2) integrative, inter-disciplinary ecosystem researches, and (3) establishment of core of coastal marine science and socio-economy in each country and multilateral network. Through these activities the project aims at enhancing education of researchers who will play major roles not only in domestic but also in international activities on global issues.

As a practical matter that impeded harmonized implementation of the program, there will be a large gap among the member countries in their funding capabilities, resulting in the shortage of funding in some countries. This may be partly due to the differences in political priorities for basic environmental and/or socio-economic research among countries. There are also problems that the importance and practical application of basic research to urgent environmental issues have not effectively been reflected in the response of funding organizations, policy makers, and/or popular audience, despite our efforts to demonstrate and disseminate these issues in various occasions.

Keywords: Indo-Pacific Ocean region, marine ecosystem, coastal region, biodiversity, inter-disciplinary research, impacts of global climate change

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Geoscientific Perspective for Sustainable Future Earth

HIMIYAMA, Yukio[1*]

[1]Hokkaido University of Education

The world global environmental studies are being re-organized under the flag of Future Earth led by ICSU, ISSC etc. Geoscience, which specializes in the dynamic nature and phenomena of the earth's surface, including lithosphere, hydrosphere, atmosphere, biosphere and human-geosphere, assumes unique responsibility in contributing to Future Earth. It was highly relevant for JpGU to establish Human Geoscience Section as one of its five academic sections when it was born in 2005 in response to the restructuring of the Science Council of Japan. The paper discusses the roles and the roadmaps of the geoscience community in general and those of the human geoscience in particular in implementing Future Earth.

Keywords: geoscience, Future Earth, global environmental problem, human geoscience, sustainability