

1. UPDATED PROPOSAL

Cover Page

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- 2. Project Reference: CBA2008-12NMY-Ishida**
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- 3. Project Title**

“The **Global Earth Observation System of Systems Asian Water Cycle Initiative Observation Convergence and Data Integration** (GEOSS/AWCI/OCDI)” for water cycle research and water resources management under climate change in Asia will run from 2008-2010 and will require USD 35,000 per year for years 2008 and 2009. These funds are required to support travel and per diem expenses of research scientists, data engineering experts, and national governmental agency representatives from developing Asian countries, within the APN framework, to attend a series of data integration and analysis workshops to be held in Tokyo, Japan and possibly also in another of the APN member countries.

- 4. Project relevance to the APN Science & Policy Agendas**

The intended workshops and meetings will establish data handling, and exchange policies and an overall climate (water and energy cycle) data management strategy that will meet the goals of the Global Earth Observation System of Systems (GEOSS) within the context of GEOSS Work Plan for 2007 – 2009: (i) WA-06-07: Capacity Building Program for Water Resource Management, (ii) WA-07-01: global Water Quality Monitoring, and (iii) WA-07-02: Satellite Water Quantity Measurements and Integration with In-situ Data.

The Main Body of the Full Proposal

1. Project Title

The Global Earth Observation System of Systems Asian Water Cycle Initiative Observation Convergence and Data Integration (GEOSS/AWCI/OCDI)

2. Fully Detailed Proposal

Description of the proposed project

- Background

Water comprises the most basic and critical component of all aspects of human life and is an indispensable component of the global life support system. On the whole, the water environment is characterized by the hydrological cycle, including floods and droughts. The widespread scarcity, gradual destruction and aggravated pollution of water resources in many world regions have triggered a range of water crises. Nowadays, many water related problems, particularly drinking water pollution, are being reported in various Asian countries. Health damage due to arsenic polluted drinking water is one of such problems. There is an urgent need for international cooperation to overcome the problems and secure the safe and sustainable groundwater utilization. Additionally, global climate change and atmospheric pollution could also have an impact on water resources and their availability.

About 60 % of the World population lives in Asia, and their various social activities including agriculture depend on the bountiful Monsoon rain. At the same time, the vast water cycle variation in Asia can be the cause of droughts and floods, and consequently, may be responsible for an enormous amount of human and economic damage.

To establish a comprehensive, coordinated and sustained earth observation scheme, an agreement for a 10-Year Implementation Plan for a Global Earth Observation System of Systems, known as GEOSS, was reached at the Third Earth Observation Summit held in Brussels, in February 2005; on that occasion the Group on Earth Observation (GEO) was also formally established. "Improving water resource management through better understanding of the water cycle" has been agreed to as one of the targeted societal benefit areas of GEOSS.

- Objectives

Our goal is to better understand the mechanism of variability in the Asian water cycle and to improve its predictability, and furthermore to interpret the information applicable to various water environments in different countries in Asia, then to help to mitigate water-related disasters and promote the efficient use of water resources.

We develop an information system of systems for promoting the implementation of integrated water resources management (IWRM) through data integration and sharing and improvement of understanding and prediction of the water cycle variation as a basis for sound decision making of national water policies and management strategies.

The objectives for AWCI are defined as follows:

- to develop Integrated Water Resources Management (IWRM) approaches;
- to share timely, quality, long-term information on water quantity and quality, and their variation as a basis for sound national and regional decision making;
- to construct a comprehensive, coordinated and sustained observational system of systems, such as prediction systems and decision support capabilities, under the GEOSS;
- to develop capacity building for making maximum use of globally integrated data and information for local purposes as well as for observation and collecting data.

-Strategy

The GEOSS/AWCI/OCDI is a new type of an integrated scientific challenge in cooperation with meteorological and hydrological bureaus and space agencies. Its uniqueness is described as follows:

- Effective combination of the architecture and data and the capacity building;
- Advanced data infrastructure availability including a river basin meta-data registration system, a data quality control interface, and data-integration and downscaling methods;
- A clearly described data sharing policy agreed among the participating countries;

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(CBA2008-12NMY-Ishida)

- Strong linkage among science communities, space agencies, and decision makers;
- Well coordination between the research communities and operational sectors with clear strategy for shifting scientific achievements to operational use;
- Effective cooperation with international projects and cooperative frameworks.

Detailed Work Plan

(1) Kick-off Plenary Meeting (November, 2008)

- At a plenary session, the Project Leaders will introduce the background, objectives and final goals as well as benefits for national research and water management groups; a demonstration of existing systems such as those developed as part of CEOP will be provided by the host country (Japan); tools from other ongoing projects (observation, data management, data integration, information transformation) will also be demonstrated. Each country and regional organization will make a brief presentation focusing on survey of existing data sharing, exchange, and management, schemes.
- Establish the GEOSS/AWCI/OCDI Task Team (GAOTT) members - From the experts/scientists of the AWCI member countries, Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Japan, Korea, Lao, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Uzbekistan, Viet Nam, one focal point of each country will be nominated as a GAOTT member.
- Identification of the tasks - the GAOTT will have a breakout session and define a detail work plan including:
 - Metadata collection and input
 - Collection of observed data and model outputs both in global and local scales
 - Data quality checks and format unification
 - Distributed river runoff model development
 - Rainfall prediction system development
 - River runoff prediction including floods, droughts and water quality
 - Early warning and operation optimization

(2) The first GAOTT workshop (March, 2009)

- The GAOTT will have the first workshop to ensure work which has progressed on data collection and management.

(3) The 2nd Plenary Meeting (November 2009)

- A GAOTT report on the outcomes of the demonstration projects will be provided at the 2nd Plenary Meeting.

(4) The 2nd GAOTT workshop (March, 2010)

- The GAOTT will have the 2nd workshop to ensure work which has progressed on modelling and decision-making support information.

(5) The Final Plenary Meeting (September 2010)

- A final report on the outcomes of the demonstration projects will be provided at the final Plenary Meeting. All of the achievements of the demonstration projects will be reviewed, evaluated, and summarized.

(6) Follow-up telephone conference(December 2008 – September 2010)

- The GAOTT will hold regular teleconferences, to discuss partial results of the running survey of existing capabilities and to share progresses of GEOSS and related scientific and societal information for promoting the GEOSS/AWCI/OCDI demonstration projects.

APN Funds will provide mainly the basis for organizing the working and plenary sessions and periodical communication through the telephone conferences and for local data storage facilities.

Relationship to the APN's Second Strategic Plan

GEOSS/AWCI/OCDI will provide advanced technologies for data integration and data access and transfer among research groups in Asia and other international science communities including: data integration systems based on Internet technologies and capable of integrating data from various sources such as satellite, in-situ, and model output data; metadata schemes following ISO standards; distributed and centralized data archives based on accepted standard interfaces such as GrADS Data Server (GDS) and on separate super-

**2007 Annual Regional Call for Proposals (ARCP)
ARCP Full Proposal Template**

(CBA2008-12NMY-Ishida)

computer capabilities, with standardized access schemes; algorithms and data visualization and integration software for down-scaling data from global to regional and local scales; and output formats and products including model intercomparison results that can be easily interpreted and applied by all classes of users.

These specific deliverables will contribute directly to the mission, core strategies and vision identified in the APN's Second Strategic Plan. This claim is reflected in the fact the tools proposed by the GEOSS/AWCI/OCDI project are already being prototyped in broader International projects such as GEWEX and CEOP and require only specific integration to meet the special needs of water cycle research, applications and policy in Asia. The funding requested from APN will be used by GEOSS/AWCI/OCDI to identify, explain and predict changes in the Asian water cycle in the context of both natural and human components. The work will include an initial assessment of existing capabilities and will examine, by application of down-scaling methods, where the potential vulnerabilities to human and natural systems exist. Also, by entraining science, technical and governmental groups, GEOSS/AWCI/OCDI will reach out to policy makers to provide tools, which will enable policy options for appropriate responses to climate change that will also contribute to sustainable development.

Contribution to APN's Agenda's

Science Agenda - GEOSS/AWCI/OCDI will focus on specific science issues related to climate, atmosphere/land interactions, and impacts of water cycle variability on resources as a way of addressing capabilities for sustainable development. By using APN funding to invest in a survey of existing methods and the development of new tools and methodologies related to these scientific and societal issues, GEOSS/AWCI/OCDI will contribute to the improvement of the effectiveness of transfers of scientific knowledge to the decision-makers in the Asian region as a contribution to the APN's science agenda.

Policy Agenda - By cooperating with other institutions and bodies that address issues relating to science policy interactions such as WMO, ICSU, IOC, UNESCO, and others, GEOSS/AWCI/OCDI is embracing a specific APN strategy formulated under its Policy Agenda.

Institutional Agenda - By setting up a cooperative scheme of regular international teleconferences and working throughout each year between major working sessions GEOSS/AWCI/OCDI will be establishing a sustainable scheme for enhancing year-round communications between member countries, liaison functions, Project Leaders, relevant secretariats and the global change community at large, and thereby will be contributing directly to a main element of the APN Institutional Agenda.

3. Regional Collaboration

The GEOSS/AWCI/OCDI will contribute to improved regional collaboration, by involving many Asian countries including but not limited to: Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Japan, Korea, Lao, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Uzbekistan, Viet Nam. Drs Bilqis Hoque, Samarendra Karmakar, Shameem Bhuiyan from Bangladesh, Drs Ailikun and Dawen Yang from China, Dr Surinder Kaur from India, Dr Joesron Loebis from Indonesia, Drs Kazuhiko Fukami and Maiko Ikeda from Japan, Dr Deg-Hyo Bae from Korea, Dr Chanthachith Amphaychith from Lao PDR, Dr Azzaya Dolgosuren from Mongolia, Dr Shiv Kumar Sharma from Nepal, Dr Bashir Ahmad from Pakistan, Dr Flaviana Hilario from Philippines, Dr S.B. Weerakoon from Sri Lanka, Dr Thada Sukhapunaphan and Dr Hansa Vathananukij from Thailand, Dr Duong Van Khanh from Vietnam, Dr Steve Williams from USA, Dr Srikantha Herath from UNU whose CVs are listed below along with Drs Ishida and Koike are GEOSS/AWCI/OCDI collaborators that will apply knowledge gained in current international and regional efforts to assist GEOSS/AWCI/OCDI to specifically tailor some existing tools and strategies to meet the special needs of water and energy cycle research, applications and policy in Asia. These collaborators will be nominated as GAOTT members, provide GEOSS/AWCI/OCDI with knowledge and experience, and lead GEOSS/AWCI/OCDI to its goal in the most efficient manner possible.

4. Capacity Building for Global Change Research

The goal of the capacity development program of the AWCI is to facilitate and develop sustainable mechanisms for the countries in Asia Pacific to use advanced earth observations systems, associated data and tools for water cycle research and water resources management under GEOSS framework.

(CBA2008-12NMY-Ishida)

The initial focus areas of the program have been selected as floods, water quality and droughts. The program will be developed and be used concurrently in support of applications in 19 Asian Basins proposed to be studied within the Asian Water Cycle Initiative for clarification of basin water cycle and the development of appropriate water management practices. The training and capacity development program consist of elements such as short term training/long term training, online training materials, examples or modules, research opportunities, technical advise on existing projects, access to data and access to software. It will emphasize on sustainability and the need to customize technologies to suit local conditions by carefully setting up teams in each country made up of leading educational and research institutes and responsible government organizations that would function as core teams to ensure the future development and enhancement of the methodologies and incorporation of them to national programs.

5. Scientific Contribution of each Participating Country

All participating countries will provide information about their water cycle observation systems, data management strategies and data sharing policies as well as about relevant research activities. Representatives will participate in negotiations about the data sharing policy, and will concur on agreements for sustaining the system following the end of the project. Experts from different countries as specified in the detailed work plan will work on surveys of existing capabilities, write reports, and work on development of new tools including rainfall and river run-off prediction models, data integration and analyses, and operation optimization.

6. Policy-relevancy and Sustainable Development Issues

GEOSS/AWCI/OCD, which is directly relevant to one of the nine GEOSS Societal Benefit Area, "Improving water resource management through better understanding of the water cycle", can contribute to the water issue of the United Nation Millennium Development Goals (MDGs) and the paragraph 25 and 27 of the World Summit of Sustainable Development (WSSD) Plan of Implementation.

The proposed scheme contains tools that will facilitate translation of observation information and scientific knowledge for policy and decision makers in the arena of water resources. These tools include functions such as data integration, information fusion, and visualization tools based on Internet technologies and capable of integrating data from various sources such as satellite, in-situ, and model output data; metadata schemes following ISO standards. These tools will be able to provide output formats and products including model intercomparison results that can be easily interpreted and applied by all classes of users including but not limited to policy setting groups interested in sustainable development issues and disaster prevention.

7. Relationship between Global Change Research Programmes and Networks

An integrated water cycle observation system as envisioned in this proposal will bring together the capabilities of as many Asian countries as possible and will align the work in these countries with efforts being undertaken by a number of international projects such as those that are part of WCRP, which is also supported by WMO, IOC and ICSU. IIDATA can, therefore, be seen as a unique opportunity for the development of a unified Asian approach to the improvement of the scientific foundation needed to achieve documentation of its water cycle and to the meeting of goals for understanding and predicting variations in that cycle, as both a contribution to and coordination among International bodies who are activity in the Asian region.

8. Related Research Work

Space agencies are making efforts to fulfil the requirements of science and applications related to water cycle and water resource management by various satellite missions. Among satellite missions cited in the GEOSS 10 Year Implementation Plan, SMOS and GPM are making steady progress toward their launches, ie 2008 for SMOS and 2013 for GPM. As for water quality monitoring, a GEOSS workshop on inland and coastal water quality monitoring was held in 2007. NASA's GRACE mission demonstrated its potential for locating large-scale water distribution in the air, on land and underground. Integrated precipitation products with multi-satellite data have been realized by NASA's TRMM 3B42 multi-satellite product. Space agencies are supporting the CEOS Precipitation Constellation which could further expand the original GPM concept, by incorporating new missions and instruments.

2. UPDATED TIMELINE

Timeline for Year 1 (October2008-September2009)

MONTH	2008			2009								
	10	11	12	1	2	3	4	5	6	7	8	9
Kick-off Plenary meeting in November 2008		●										
Data Collection and coordination Conference calls for regional coordination	←—————→											
Follow up conference calls	←—————→											
The first GAOTT workshop						●						
Draft Year 1 report											●	
Year 1 Report												●
APN Reporting												●
Date/Venue												
Event												
Estimated No. of Participants												
3-6 November 2008, Beijing, China												
Kick-off Plenary Meeting												
100												
12-15 March 2009 Vietnam												
The 1 st GAOTT workshop												
45												

