

## **UPDATED PROPOSAL**

### **Cover Page**

**1. Project Leader: Dr. Toshio Koike, Professor** (University of Tokyo, Japan)  
**Dr. Chu Ishida** (CEOS/JAXA, Japan)

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**2. Project Reference: APN2006-07NMY**

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#### **3. Project Title**

The **International Integrated Water Data Access and Transfer in Asia (IIWaDATA) Project**, focusing on water cycle research and water resources management, will run from 2005-2008 and will require USD 50,000 per year for fiscal years 2006 and 2007, of which USD 43,000/year will be required from APN and USD 7,000/year secured from other sources. The funding will be used to support research and related activities that are essential for achieving the project goals including the bringing together of scientists, data engineering experts, and national governmental agency representatives from developing Asian countries to work on the project and the linking with other bodies in the international community.

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#### **4. Project relevance to the APN Science Agenda**

The Project will establish water data sharing and exchange policies and data management strategies in the Asian region that will enable (1) integrated data access and transfer among Asian national research groups and between these groups and international organizations such as WMO and UNESCO, and (2) effective transfer of observation information and scientific knowledge to water resources policy- and decision-making groups. In particular, the Project will examine existing technologies and develop new tools for (a) enhanced data collecting and sharing, (b) improved detection and prediction of variations in the Asian water cycle, and (c) science information fusion and transformation for application to water resources management issues at local to regional scales. These capabilities will aim toward building up national/regional capacity to conduct water cycle research in a more efficient, coordinated manner and to exploit research results for solving societal issues associated with the water cycle features in Asia. In this way the IIWaDATA effort will contribute to APN activities in support of the Global Earth Observation System of Systems (GEOSS) especially within the context of GEOSS Work Packet Two Year (2006-2007) Target #042.

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#### **5. Regional collaboration and leverage of support being sought**

(1) The University of Tokyo (UT) will contribute USD 80,000 to establish an IIWaDATA Task Team (ITT) and to hold an initial workshop (Nov 2005) to prepare work packages and reports for use at two working and demonstration sessions (FY 2006 and 2007) for which funds are being requested. (2) The World Climate Research Programme (WCRP), which is partially funded by ICSU, contributes USD 35,000/year for travel expenses of climate data experts from developing and developed countries around the globe to attend similar workshops and meetings. A number of such experts will be invited to attend the proposed working sessions and WCRP will contribute by providing support to experts from regions outside Asia. (3) Other support has been contributed by Japan (UT, JAXA, JMA) the USA (UCAR/NASA/NOAA) and Europe (ESA, MPI) in the range of a total of USD 300K/year to develop and maintain prototype integrated data systems of the type proposed for implementation in Asia through this proposal. These systems will be studied and their existence will provide leverage for the development of the proposed Asian scheme, through information, knowledge and data exchange that can be shared in-kind during and after the establishment of the IIWaDATA project system. In addition, the advanced data management software tools of the aforesaid existing systems will be also provided to facilitate development of the targeted scheme in the Asian region.

## **The Main Body of the Full Proposal**

### Description of the proposed project

#### *- Background*

In recognition of the need for accurate, timely, long-term, water cycle information as a basis for sound and effective water resources and risk management and with regards to the ongoing initiatives pursuing to meet this need, we are proposing the IIWaDATA project that aims to develop a sustainable scheme for water cycle data collecting, sharing, exchanging, and management at the regional level in Asia in cooperation with national governments, institutes and research communities and also international organizations that would be consistent with the global framework of the Global Earth Observation System of Systems (GEOSS), especially its Water theme component.

The GEOSS 10-year Implementation Plan has recognized benefits of integrated data systems for achieving one of its major goals: "Improving water resources management through better understanding of the water cycle" and identified the WCRP Coordinated Enhanced Observing Period (CEOP) project as a prototype of such an integrated global system. In addition to the advanced data collection, management, archiving, integration and dissemination functions, CEOP is also pursuing development of specific tools for information fusion and transfer in order to bridge the gap between science and water resources management communities and thus to make water cycle research achievements serviceable for solving societal issues.

In this context, the IIWaDATA project plans to utilize the achievements of CEOP and similar international projects as well as related existing capabilities developed by individual countries and regional research groups in Asia as a basis for developing an adequate scheme that will reflect specific aspects of the Asian region and will meet particular requirements of national and regional research and water management communities.

#### *- Objectives*

The key guiding goals of the IIWaDATA efforts are:

- (1) To improve knowledge and enhance prediction of the Asian water cycle variation through integrated observation systems and advanced data management and processing capabilities that will assure an easy access to relevant data in the proper format and to the desired extent to research communities;
- (2) To make a contribution toward the sustainable human development in the region through development of methods and tools for effective transformation of global and regional observation information and scientific knowledge into information relevant for local water resources and risk management and facilitated transfer of such information to national policy- and decision-making groups.

To achieve its key goals IIWaDATA aims to meet the following objectives:

- (i) Establishment of a mutual consensus among the Asian countries that will define data sharing and exchanging policy and responsibilities for data processing, management and archiving;
- (ii) Establishment of an observation convergence strategy in the Asian region;
- (iii) Development of effective tools for enhanced data collecting and data management including: software for data processing, quality control and format conversion, sophisticated database systems, and other tools;
- (iv) Development of advanced technologies for data integration and data dissemination to research groups 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, etc.;
- (v) Development and implementation of specific tools and methods for facilitated transformation of observation data and scientific knowledge into water resources and risk management relevant information including: advanced downscaling methods to successfully introduce the impact of the global climate change on water cycle processes at the local scale, technologies for information fusion to link together various features of the water cycle and other aspects of the Earth system

and thus provide sound information for decision makers, visualization tools to help to translate the scientific information, etc.

#### *-Strategy*

The proposed project is conceived as a regional Asian water cycle initiative that is contributing to GEOSS and is fully compliant to the GEOSS framework. Accordingly, the implementation of the free data access and transfer policy will proceed within the context of the GEOSS 10-Implementation Plan and, in particular, following the strategy outlined in the GEO 2006 Workplan, Section 3.1.2 Architecture and Section 3.1.3 Data Management. The IIWaDATA project involves both GEO member countries and participating organizations, and countries that have not joined this group yet. The activities aiming at implementation of the free data access and transfer policy that will be undertaken as part of the proposed IIWaDATA project will, therefore, include: efforts to encourage further countries to join GEO and endorse the GEOSS 10-Implementation Plan, providing forum for dialogue and resolution of issues at regional level, advocate the adoption of a common data policy defined by GEOSS. The benefits of participation in the envisioned System that will be part of GEOSS will be demonstrated at meetings and workshops organized by the IIWaDATA project as well as at other suitable events such as conferences and meetings organized by organizations and projects that have agreed to participate in the IIWaDATA and/or GEOSS initiatives. For this purpose, demonstration projects have been nominated out of the projects presented at the Asian Water cycle Symposium (First Workshop of the IIWaDATA initiative) that include, for example, the Coordinated Enhanced Observing Period ([CEOP](#)) project, the Thailand Hydroinformatics Platform on Prototype Area project, Contributing Project to GEOSS Climate Information System for Agriculture in West Sumatera, and others.

The data system targeted by the proposed IIWaDATA initiative will be based on the Centralized and Distributed Data Integration Functions that have been developed as a part of the CEOP project in order to provide easy access to and enable basic analyses of data collected, managed and archived under the CEOP framework. These Systems, that were opened to public in 2005 and also demonstrated at the Asian Water Cycle Symposium, are available at: [http://jaxa.ceos.org/wtf\\_ceop/](http://jaxa.ceos.org/wtf_ceop/) and [http://monsoon.t.u-tokyo.ac.jp/ceop-dc/ceop-dc\\_top.htm](http://monsoon.t.u-tokyo.ac.jp/ceop-dc/ceop-dc_top.htm) for Distributed and Centralized Systems, respectively. The description of these two systems is provided in the CEOP Newsletter #9 that published in February 2006 and available through the CEOP Homepage (<http://www.ceop.net>).

The IIWaDATA project plans to expand the current CEOP systems by including other already existing on-line data servers and archives, and new archives that are intended to be developed following the CEOP data management and archiving scheme, which has been identified in the GEOSS 10-year Implementation Plan Reference Document as a prototype data integration system. The strategy to achieve such a System was proposed and agreed to at the Asian Water Cycle Symposium (First IIWaDATA Workshop). The first step is to make an inventory of available data archives and data integration systems. Further, a team of data management and IT experts, including those who have also been involved in development of the CEOP system, will work on bridging these archives and systems and the current CEOP system using such technologies that will assure all of the aspects of Interoperability as emphasized by GEOSS. Metadata design is one of the key aspects of the Interoperability. A group of experts has been approached to participate in the IIWaDATA project to deal with the development, homogenization and application of metadata schemes that will be compliant to the ISO standards and suitable for the collected data.

In addition, effort will be made to link existing schemes focusing on observation and scientific information fusion and transformation into the information relevant for the water managers to the overall System and to develop new tools of such functions based on the needs identified through discussions at the workshops and System users' requirements provided to the developers.

#### Detailed Work Plan

(1) Establish the pool of potential IIWaDATA Task Team (ITT) members - Experts from Thailand, Japan, China, India, Mongolia, Pakistan, Viet Nam, Bangladesh, Indonesia, Philippines, and possibly other countries joined the initial workshop (Tokyo, Japan, 2-4 Nov 2005). Each country was asked to send up to two multi-disciplinary scientist/technical representatives as well as an intergovernmental/agency representative. A number of regional

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water resources representatives and a corresponding set of international representatives were also invited. The total number of participants exceeded 160 persons, including 60 international and more than 100 domestic (Japanese) participants.

(2) Initial meeting – At a plenary session, the Project Leaders introduced 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 were provided by the host country (Japan); tools from other ongoing projects (observation, data management, data integration, information transformation) were also demonstrated. Each country and regional organization made a brief presentation focusing on survey of existing data sharing, exchange, and management, schemes.

(3) Set the ITT membership – One representative of each country was nominated to participate in follow-up coordination meetings and teleconferences as well as in report drafting and related tasks. The outcome is an ITT core group of 15 persons that are a cross-section of the national/international/disciplinary range of the entire attending group.

(4) Follow-up to the initial meeting – From 11/2005 to 9/2006, confirmation of the ITT membership and preparation for the kick-off Teleconference among Project Leaders and the ITT that will be held in June/July 2006. The kick-off event will be followed by regular teleconferences to discuss partial results of the running survey of existing capabilities and variety of data policies.

(5) The ad-hoc ITT workshop will be held in Bangkok, Thailand, 25 September 2006, at the occasion of the International Workshop for Earth Observation in Water Management Services (Bangkok, Thailand, 26 – 28 September 2006), which is part of the capacity building activities framework of the Integrated Global Water Cycle Observations theme (IGWCO) of IGOS-P organized by the IGWCO and Japan Aerospace Exploration Agency (JAXA). The ITT members will clarify the IIWaDATA structure and strategy.

(6) Follow-up to the ITT workshop – From 9/2006 to 1/2007, the ITT members will prepare the inventories of available data and tools relevant to the IIWaDATA initiative, draft overview of data policies in the region as well as the Implementation Plan of the initiative. The series of regular teleconferences will continue

(7) The First IIWaDATA working session (venue: Tokyo, Japan, 15-17 January/2007) – APN funds will be used to support further development of the main IIWaDATA elements and to ensure work has progressed on research-quality datasets and data management tools and methods, as planned during the period following the initial workshop. This support will provide the basis for organizing the first working session, at which the elements of the sustainable set of IIWaDATA data sharing and exchange techniques (IIWaDATA-SET) for Asia will be proposed.

(8) Follow-up to the first working session – A report on the outcomes of the first working session and first draft of the IIWaDATA-SET document will be provided by the end of March 2007 (Project Leaders and ITT). APN Funds will be expended in support of focused actions, initiated during the period from 1/2007 to 1/2008, and leading to the final drafting of the IIWaDATA-SET document and related national and international agreements for sustaining the primary elements of the International Integrated Data Access and Transfer in Asia scheme.

(9) The Second working session (venue: TBD, 1/2008) – The same organizing approach as used for the first working session will be applied. At this session, nominated ITT members will introduce the developed IIWaDATA scheme to national representatives. Breakout sessions will be organized to finalize any remaining issues. A final plenary will be held to endorse the IIWaDATA-SET document and to formally close the IIWaDATA project.

(10) Follow-up to the second working session – A report on the outcome of the second working session will be drafted and the IIWaDATA-SET document published and distributed.

#### Relationship to the APN's Second Strategic Plan

IIWaDATA 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-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 IIWaDATA 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 IIWaDATA 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, IIWaDATA 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* - IIWaDATA 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, IIWaDATA 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, IIWaDATA 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 IIWaDATA 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.

### **1. Regional Collaboration**

The IIWaDATA Project will contribute to improved regional collaboration, by involving as many Asian countries as possible in a large opening workshop and two other large working meetings including but not limited to: Japan, China, Thailand, Mongolia, Pakistan, India, Vietnam, Bangladesh, Indonesia, Philippines. Dr Yaoming Ma from China, Dr Gombo Davaa from Mongolia, and Dr Tien Sribimawati from Indonesia whose CVs are listed below along with Drs Koike and Ishida are IIWaDATA collaborators that will apply knowledge gained in current international and regional efforts to assist IIWaDATA to specifically tailor some existing tools and strategies to meet the special needs of water and energy cycle research, applications and policy in Asia. Once the effective links functioning as desirable for achieving the targets of the IIWaDATA project have been established, the efforts will be made to entrain further participants, focusing on the key water sources of Asia, e.g. Himalayan region.

### **2. Relationship to the Human Dimensions of Global Change**

By providing better information as a contribution to water resources management the IIWaDATA Project will help to prevent and mitigate water-related events and their impacts on human and economic components of the region. Data systems, products and tools will also be provided that can benefit efforts toward sustainable water resources within the region.

### **3. Capacity Building for Global Change Research**

In keeping with the APN guiding goals, the proposed integrated data scheme and the tools for information transformation, will contribute to the development of a unique database, easily accessible by national and international research groups that will allow for advanced

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research devoted to the Asian water cycle and its variability under the changing global climate. The developed tools, enabling to conduct various studies, will be available for researchers.

**4. 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.

**5. Links to Policy and Sustainable Development Issues**

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.

**6. 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. IIWaDATA 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.

**7. Related Research Work**

IIWaDATA is an attempt to position the Asian region to contribute to related international research projects such as GEWEX and CEOP and ultimately to the GEOSS water cycle scientific thrust. It understood that IIWaDATA needs APN support to accomplish this goal in a manner that is synergistic with and complementary to the APN's own GEOSS initiative that is being built largely around the need for capacity building. It is envisaged that the IIWaDATA GEOSS connection and the APN GEOSS initiative should, therefore, enable the Asian region to be a major GEOSS contributor across both the scientific and capacity building arenas. In this context the relevant reference documents are: The GEOSS 10-year Implementation Plan and Implementation Plan Reference Document; GEOSS Work Packet Two Year (2006-2007) Target #042; The Coordinated Enhanced Observing Period - an initial step for integrated global water cycle observation, WMO Bulletin 53 No. 2, pp.3-9, 2004, by T. Koike and the CEOP Implementation Plan.

**3. UPDATED TIMELINE**

**IIWaDATA Project Year 1 Timeline (April 2006 – March 2007)**

	2006										2007		
MONTH	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Initial Meeting (Nov 2005) Report; Existing Capabilities Survey;	→					●	<b>ITT Workshop, Bangkok</b>						
International Task Team Workshop													
Data Collection and Coordination	→												
Integrated Data Scheme formulated and tested							←	→					
First Working Meeting Tools demo event										●			
Tool Development, coordination/ Demo/Documentation IIWaDATA-SET formulation										←	→		
Draft Year 1 Report												●	
Year 1 Report												●	
<b>Date/Venue</b>													
<b>Event</b>													
<b>Estimated No. of Participants</b>													
25 September 2006 Ramagarden Hotel, Bangkok, Thailand													
International Task Team Workshop; associated with the International Workshop for Earth Observation in Water Management Services (26 – 28 Sep 2006)													
20													
15 – 17 January University of Tokyo, Tokyo, Japan													
First Working Meeting; Tools demo event													
60													

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**IIWaDATA Project Year 2 Tentative Timeline (April 2007 – March 2008)**

	2007										2008		
MONTH	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
International Task Team Workshop						●							
ITT Workshop, TBD Location in Asia													
Tool Development/ Demo/Documentation IIWaDATA – SET imple- mentation initiation	→												
Final Techniques tested								←					
First Working Meeting Tools demo event; IIWaDATA – SET data policy agreement										●			
Final Techniques Document Delivered										●			
Draft Final Report										●			
Final Report											●		
APN Reporting												●	
<b>Date/Venue</b>													
<b>Event</b>													
<b>Estimated No. of Participants</b>													
September/October 2007 TBD Location in Asia													
International Task Team Workshop;													
20													
January 2008 TBD Location in Asia													
Second Working Meeting; Tools demo event													
60													