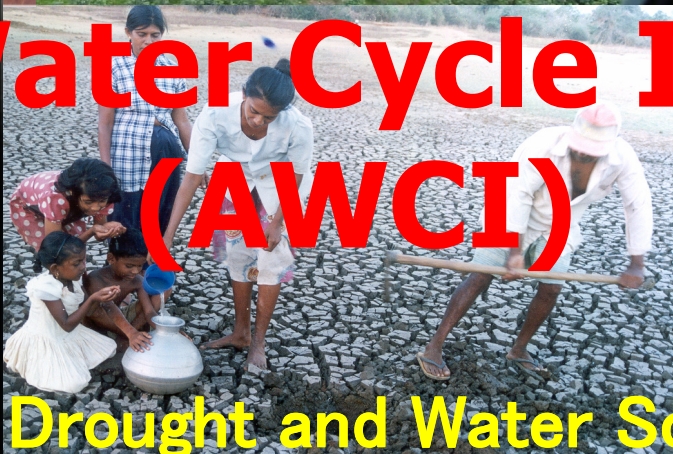


# Floods and Land Slides



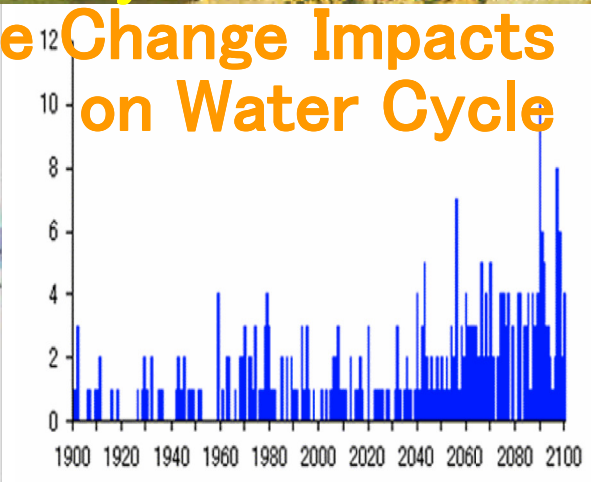
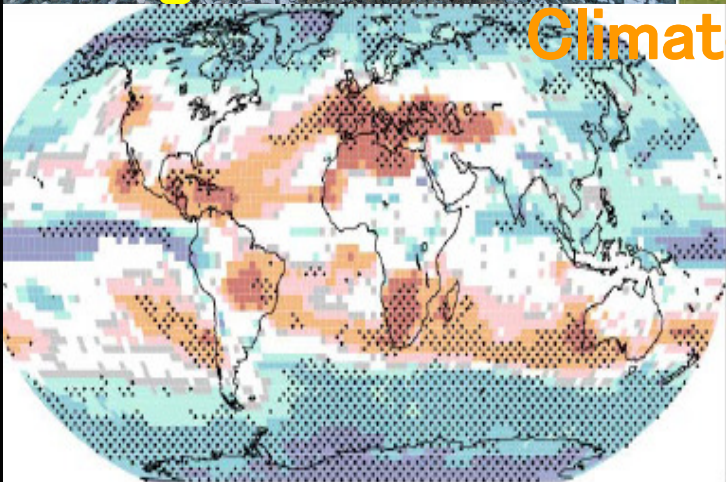
# Asian Water Cycle Initiative (AWCI)



# Drought and Water Scarcity



# Climate Change Impacts on Water Cycle







1<sup>st</sup> Asian Water Cycle Symposium, Tokyo, Nov. 2005



1<sup>st</sup> Task Team Meeting, Bangkok, Sep. 2006



1<sup>st</sup> Capacity Building Workshop, Sep. 2006



2<sup>nd</sup> Asian Water Cycle Symposium, Tokyo, Jan. 2007



1<sup>st</sup> GEOSS AP Symposium, Tokyo, Jan. 2007

## **GEOSS Asian Water Cycle Initiative (AWCI)**

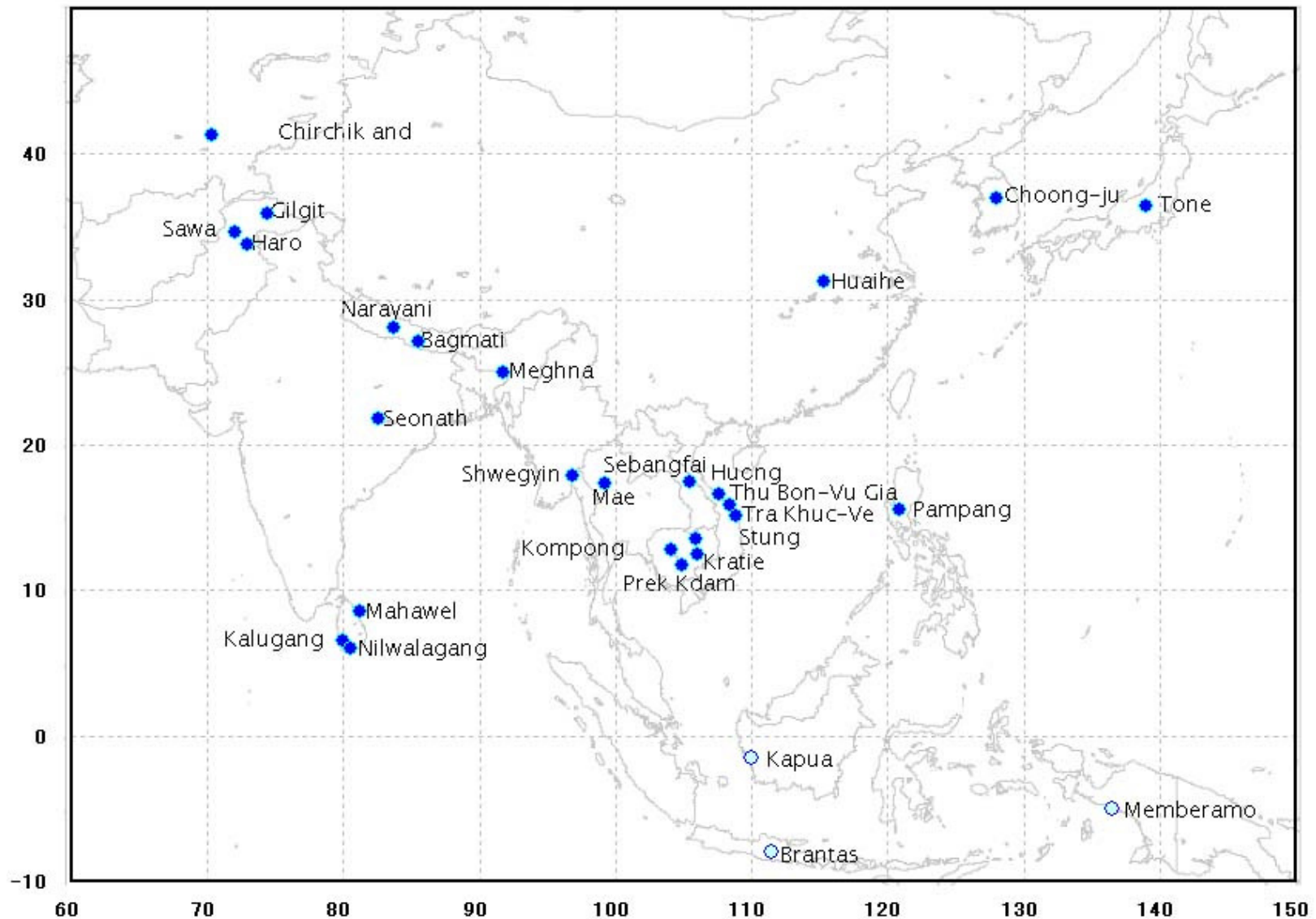
**To promote integrated water resources management by making usable information from GEOSS, for addressing the common water-related problems in Asia.**

### **Uniqueness**

- 29 River Basins in 18 Countries**
- Observation Convergence**
- Interoperability Arrangement**
- Data Integration**
- Open Data & Source Policies**
- Capacity Building**
- Early Achievements**

# GEOSS Asian Water Cycle Initiative (AWCI)

**29** River Basins in **18** Countries





# GEOS Asian Water Cycle Initiative (AWCI)

## Observation Convergence

### Convergence of Satellite Observations

The 1st Opportunity for Global and Comprehensive Data Sets and the Beginning of the 21C

New Generation Satellite

TRMM, TERRA, AQUA, ADEOS-II, ENVISAT, ALOS

Operational satellite

GOES, GMS, METEOSAT  
NOAA, DMSP, FY-1C

Atmospheric Heating

AIRS, HIRS,  
AMSU-A/B

Cloud micro physics

MODIS, GLI, CERES,  
AIRS, HIRS, AMSU-A/B, HSB

Diurnal Cycle

TRMM, TERRA/ADEOS-II + AQUA

Heat & Moisture Fluxes

Precipitation

PR, TMI, AMSR, AMSRE

AMSR, AMSRE  
MODIS, GLI

Snow

Dry

River discharge

Vegetation

TMI

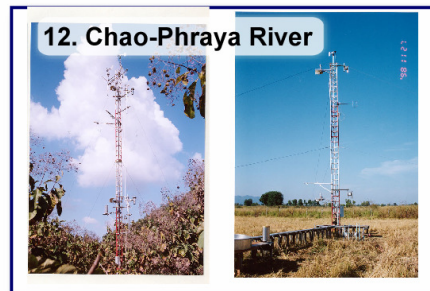
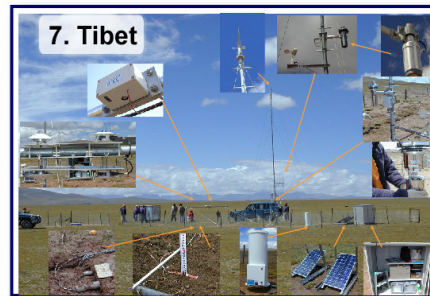
AMSR, AMSRE

MODIS, GLI, ETM, ASTER

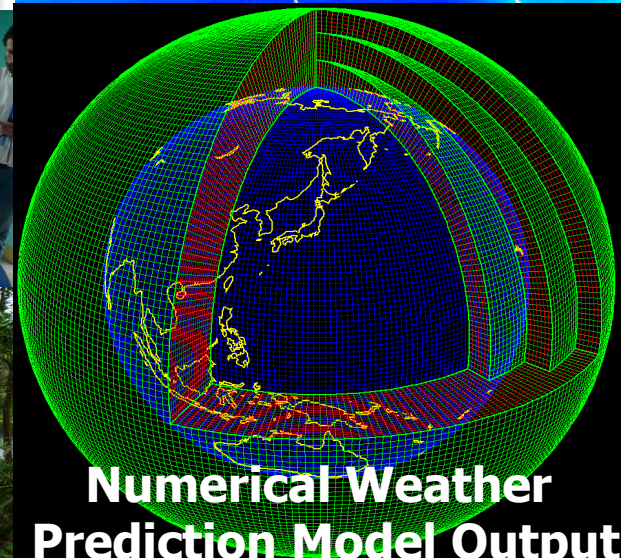
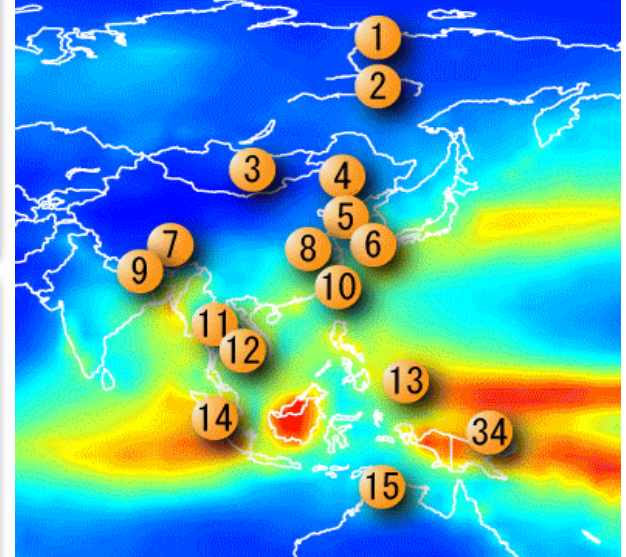
Sub-grid scale heterogeneity:

MODIS/GLI + ASTER/ETM

AMSR/AMSRE/TMI + ASAR/PALSAR



### In-situ Reference Sites

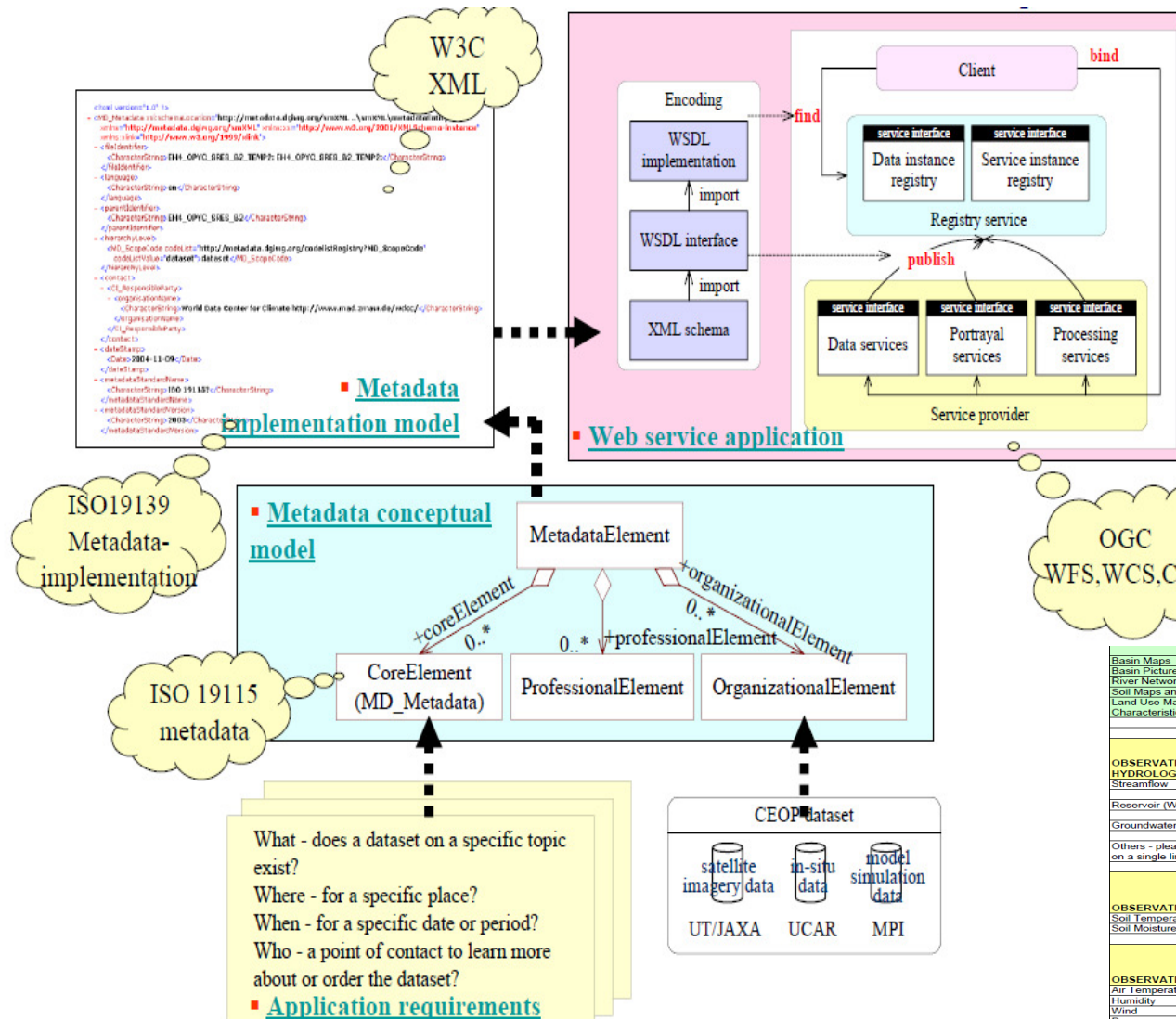


Operational River Observation

Numerical Weather Prediction Model Output

# GEOSS Asian Water Cycle Initiative (AWCI)

## Interoperability Arrangement



Completed by WCRP/CEOP  
 Meta Data for

- Satellite Data
- Reference Site Data
- Model Output

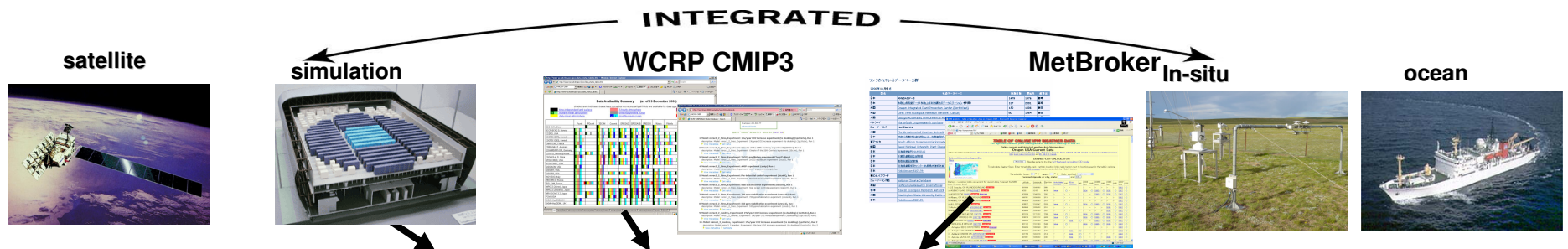
On-going  
 River Basin Meta Data

	digital form (D) or "paper" form(P) or not available (N)			
Basin Maps				
Basin Pictures				
River Network Maps				
Soil Maps and Soil Characteristics				
Land Use Maps and Vegetation Characteristics				
<b>OBSERVATION DATA - HYDROLOGICAL</b>	Available (A)/ Not available (N)	Number of observation stations in the basin	Duration of observation (since when)	Frequency of observation
Streamflow				
Reservoir (Water level, Outflow)				
Groundwater Table				
Others - please specify (each data type on a single line)				
<b>OBSERVATION DATA - SUB-SURFACE</b>	Available (A)/ Not available (N)	Number of observation stations in the basin	Duration of observation (since when)	Frequency of observation
Soil Temperature				
Soil Moisture				
<b>OBSERVATION DATA - SURFACE</b>	Available (A)/ Not available (N)	Number of observation stations in the basin	Duration of observation (since when)	Frequency of observation
Air Temperature				
Humidity				
Wind				
Pressure				
Precipitation				
Snow				
Skin Temperature				
Upward Shortwave Radiation				
Downward Shortwave Radiation				



# GEOSS Asian Water Cycle Initiative (AWCI)

## Data Integration



### A Prototype of Data Integration and Analysis

#### Application Layer

User Apps. User Apps. User Apps. User Apps. User Apps.

#### Common Software

- Visualizer(w display wall)
- Discovery Work Flow Assist
- Data Quality Manager
- Data Transformer
- Data Crawler
- ETL
- Data Manager
- Data Navigator
- Meta Data Manger

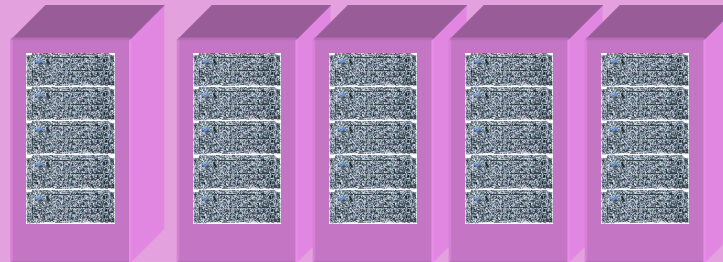
#### Data Management Layer •DBMS

#### File System Layer

- Storage Management System
- Power management System

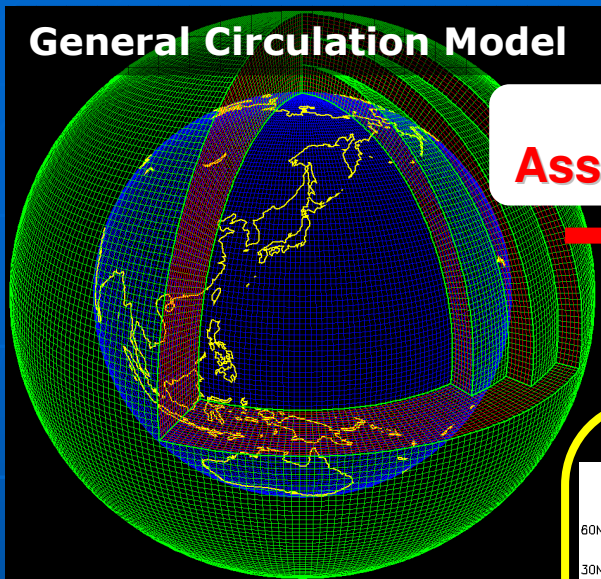
#### Storage Layer

Disk Array



# Global Data to Local Information

## General Circulation Model

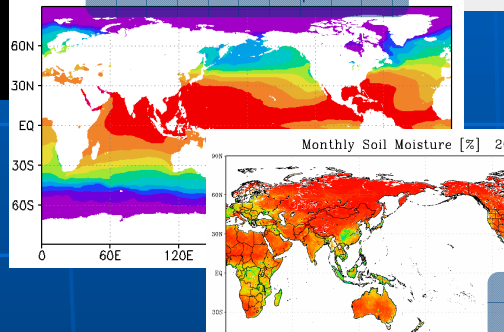


**Data Assimilation**

**Data Assimilation**

**Improved prediction**

**Satellite data**



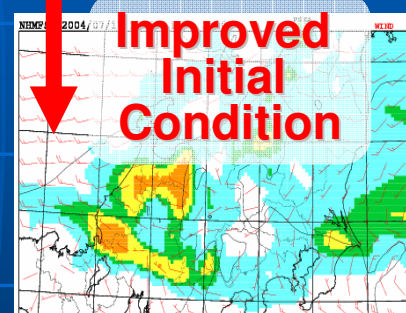
**In-situ data**



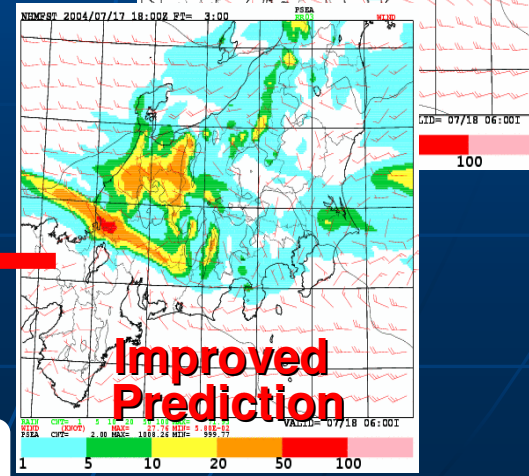
**Centralized Data System**

**Regional/Meso Model**

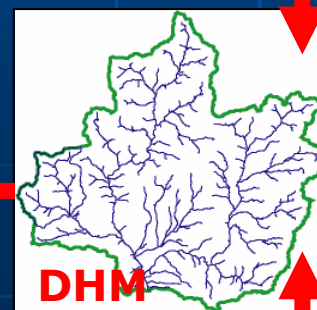
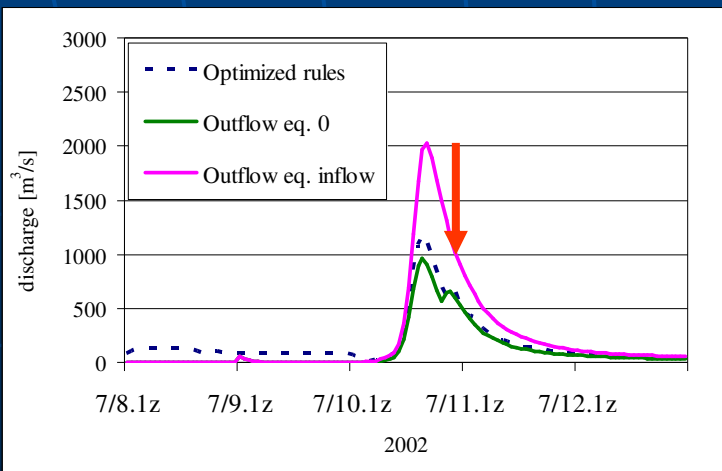
**Improved Initial Condition**



**Improved Prediction**

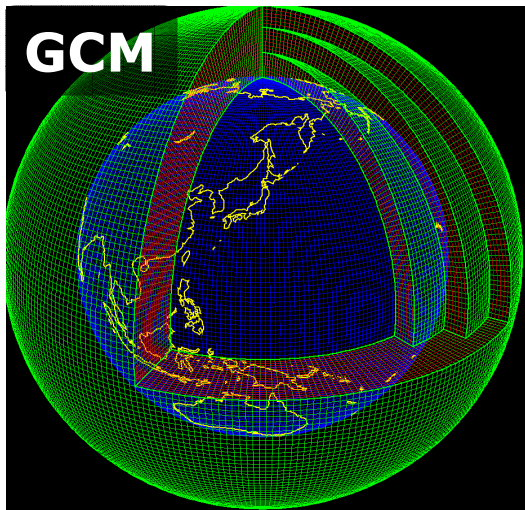


## Flood Peak Reduction



**Socio-Economic Data**

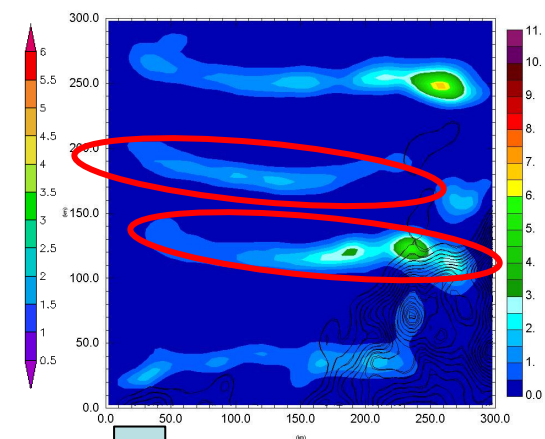
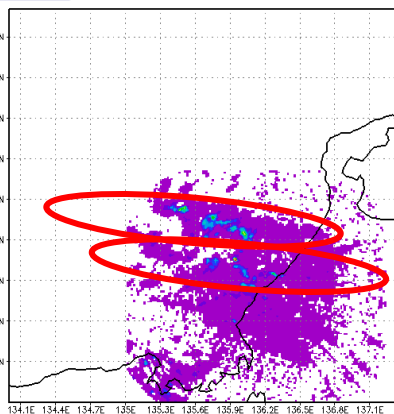




**GCM**

**Satellite-CMDAS**

3 hourly precipitation prediction over ocean

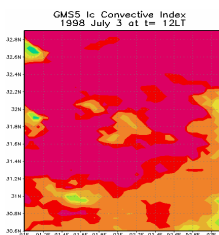


**Satellite-LDAS**

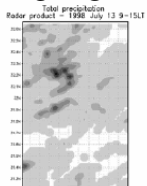
**NHM**

**Convection**

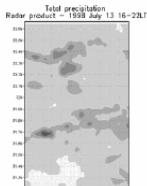
**Diurnal Cycle of Rainfall**



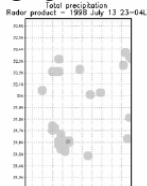
9-15



16-22

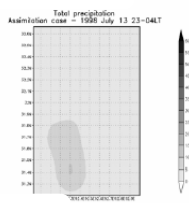
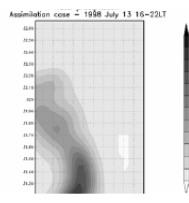
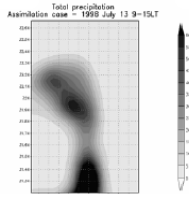
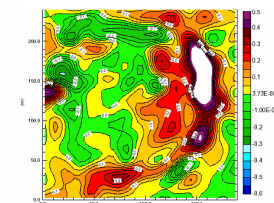


23-04

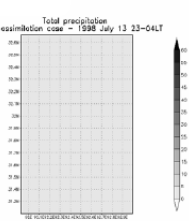
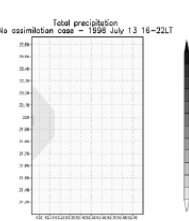
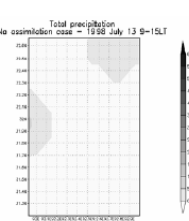
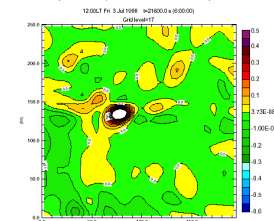


**Satellite IR**

**Ground-based Radar**



**Assimilation Yes ↑ No ↓**



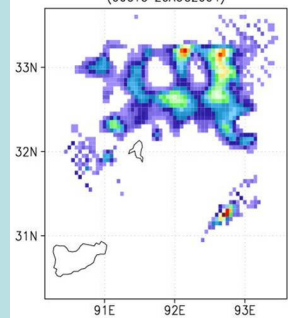
**Satellite-CMDAS**

**NHM**

**Satellite-LDAS**

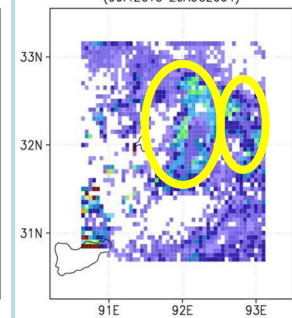
**Satellite-CMDAS  
Coupled with  
Satellite-LDAS**

ARPS Integrated Cloud Liquid Water  
(06UTC 20AUG2004)



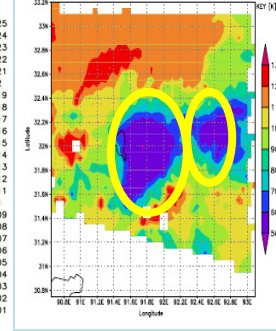
**Only LDAS**

Assimilated Integrated Cloud Liquid Water  
(06:42UTC 20AUG2004)



**Coupled**

MOBS Cloud Top Temperature  
(06:00 UTC 20AUG2004)

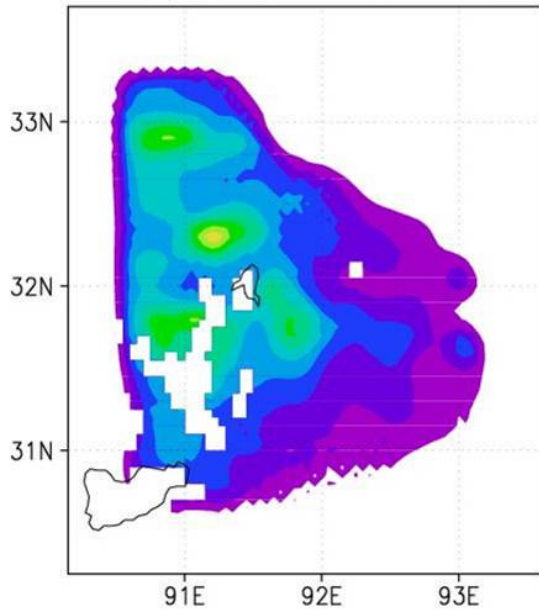


**IR**



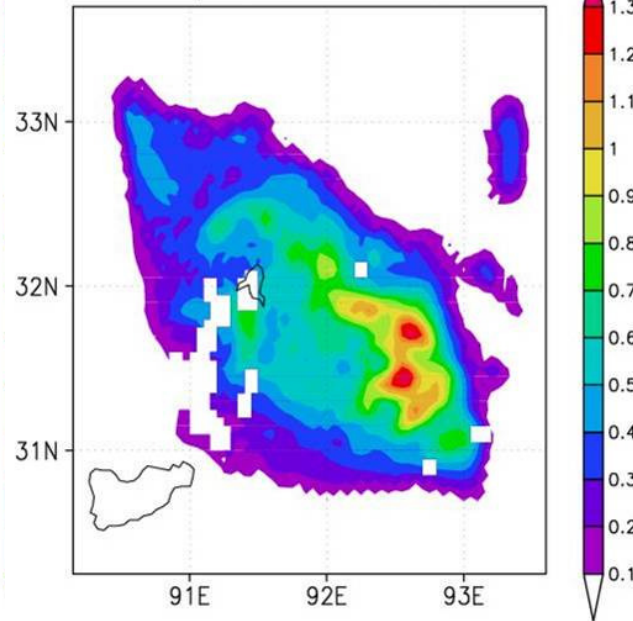
# 24 hour Prediction of Rainfall over the Tibetan Plateau

ARPS 48HR Forecast (01UTC 21AUG2004)  
Precip. Rate without Assimilation



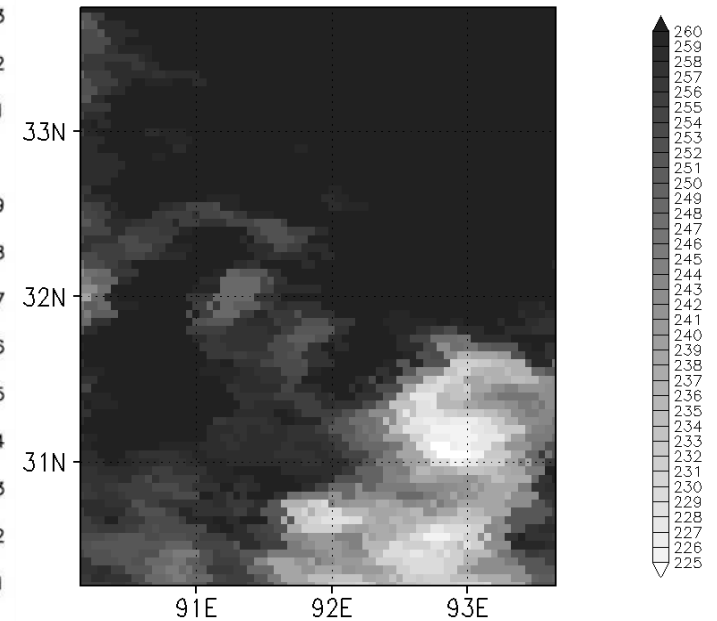
Only Nesting

ARPS 48HR Forecast (01UTC 21AUG2004)  
Precip. Rate with Assimilation



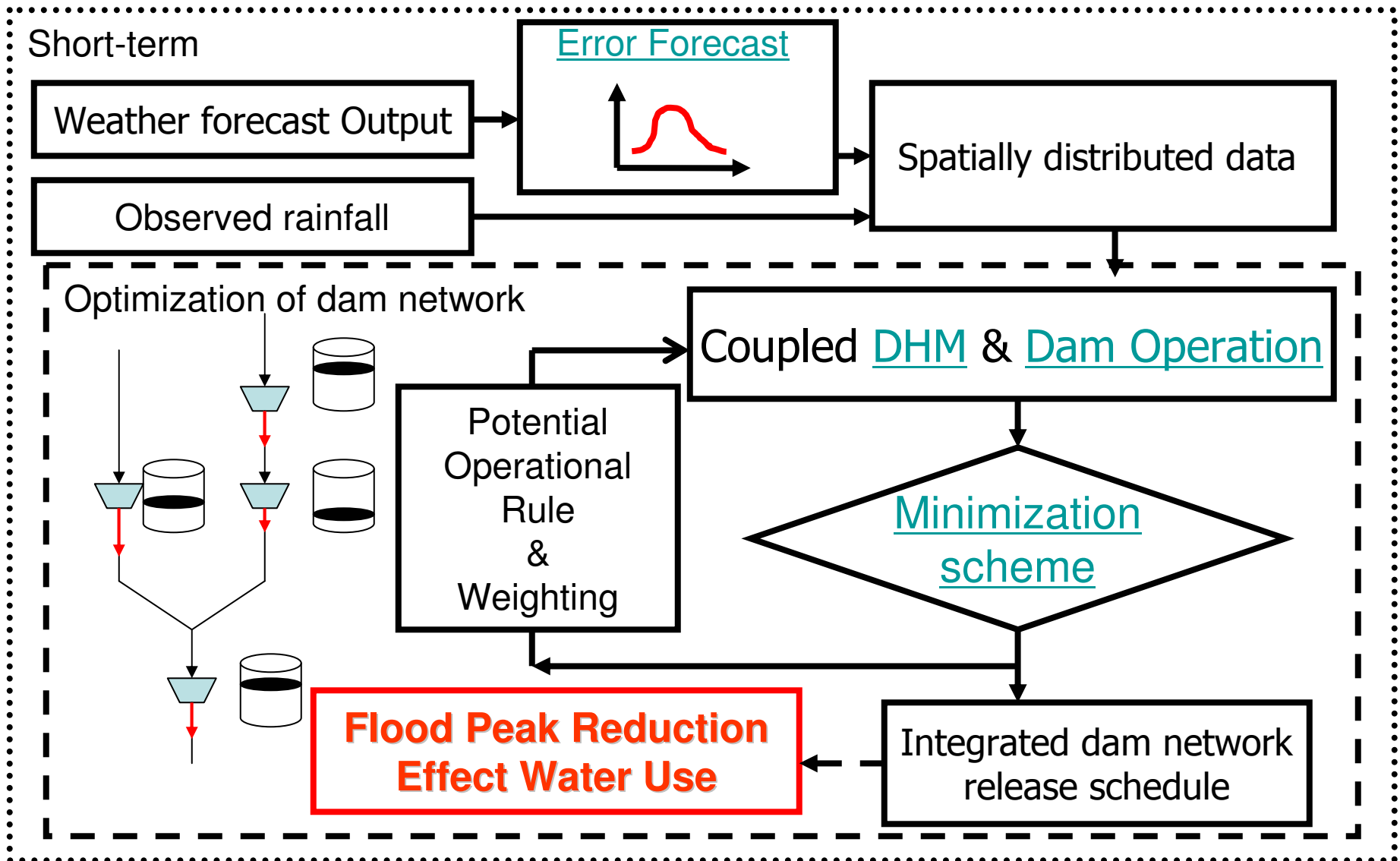
Prediction by Using  
the Initial Condition  
from the A-L Coupled  
Data Assimilation System

GOES-9 IR1 TB 01UTC 21AUG2004



GOES IR

# Dam Operation Optimization System by Using Rainfall Forecasting

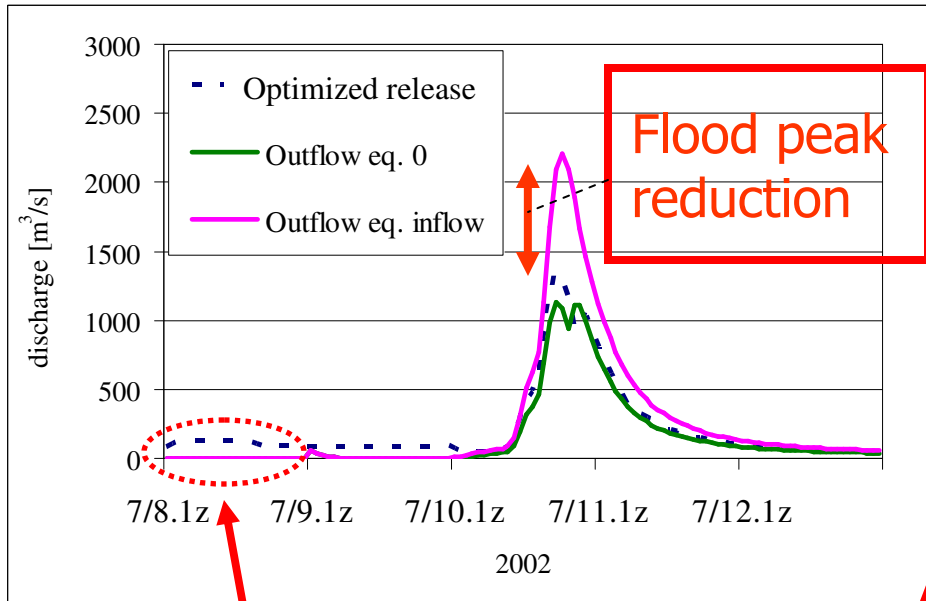




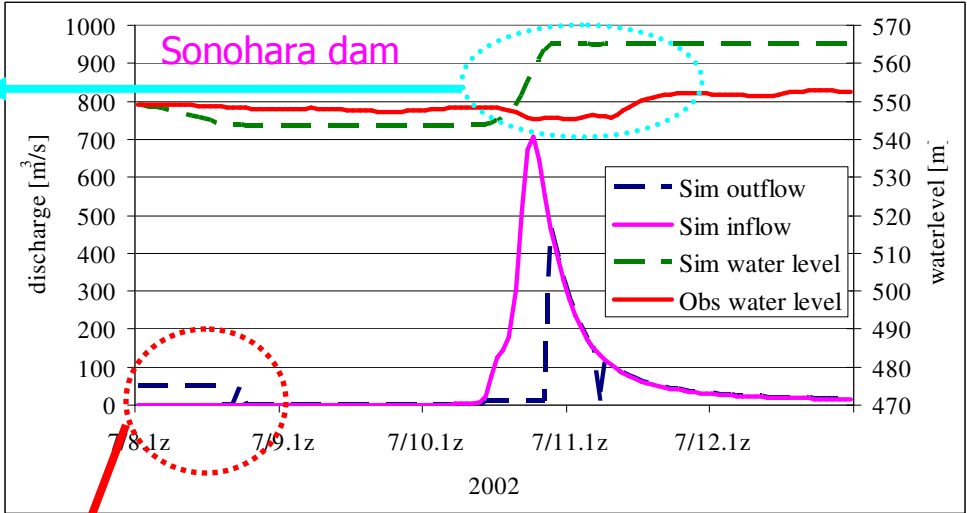
# Flood reduction with GPV 7~12

Water is stored until max capacity is reached

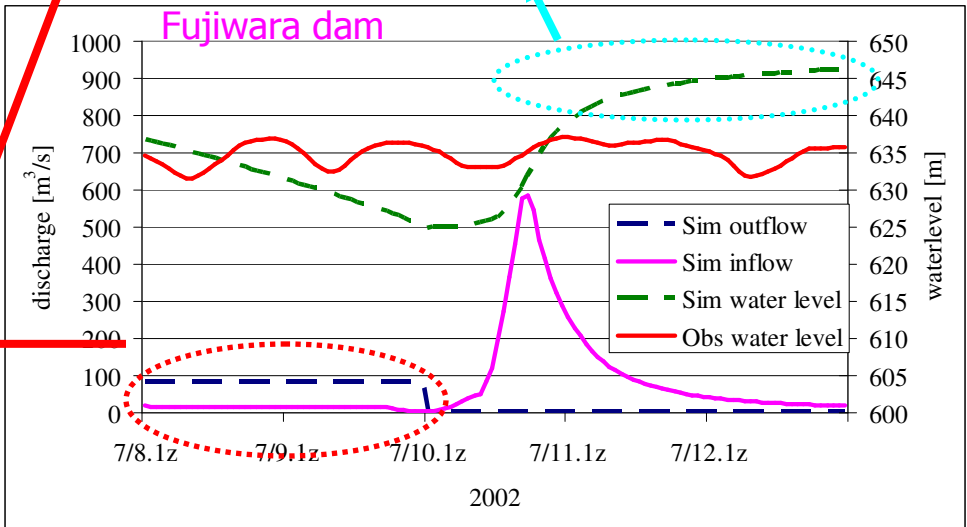
Iwamoto gauge



Peak created due to water release from dams



Water level increase due to storage



# **GEOSS Asian Water Cycle Initiative (AWCI)**

## **Open Data & Source Policies**

- 1) Release of Data in Compliance with WMO Resolution 40 (CG-XII) and WMO Resolution 25 (CG-XIII)**
- 2) No Commercial Use or Exploitation**
- 3) No Data Transfer to Third Parties**
- 4) Timing for Release of AWCI River Basin Data from the CDA Archive**
  - category 1 - standard data - data release after 6 months
  - category 2 - special data - data release after 15 months
    - *Streamflow data - (i) operational - category 1 data; (ii) research site maintained by university, through a project - category 2 data; also remote sites need to be included in category 2 data*
    - *Suggestion: to have 3 categories of data - the third category - real time or near-real time data (radiosonde data from operational sites)*
- 5) Acknowledgement and Citation**
- 6) Co-operation between AWCI Data Users and AWCI River Basin Principal Investigators (PIs)**
- 7) Co-Authorship for AWCI River Basin Principal Investigators (PIs)**
- 8) AWCI Publication Library**



# GEOSS Asian Water Cycle Initiative (AWCI)

## Capacity Building

### Targets

#### 1. Professional/Practitioners:

Introducing new methods, tools, standards

#### 2. Administrative/Local Governors:

Over view of technology and science

#### 3. Researchers/Scientists:

Customizing existing knowledge to suit local conditions supported by global experiences



Caravan training class scene in Sri Lanka, December 2005



A Scene from Mini-Project Fieldwork in Philippines, 2005



Discussion and Suggestion at AIT, 2005  
Mini-Project Final Presentation

# GEOS Asian Water Cycle Initiative (AWCI)

## Capacity Building

Legend: 3: being applied 2: applicable 1: potentially applicable 0: not applicable		Bangladesh		Bhutan	Cambodia	China	Indonesia	Lao PDR	Mongolia	Myanmar	Phillipines		Sri Lanka	Thailand		Vietnam										
		RS date	On-site monitoring	Software	Training	Information dissemination sys	Flood forecasting and EWS	Flood forecasting and warning	Flood and drought forecasting	Flood and drought risk map	Flood	Drought	Flash flood forecast radar and sat data use train	Access to GCM output	in-situ and sat data integratio	Flood hazard map	Climate change scenario	Capacity building	Data assimilation	Climate model for long range forecast	Radar interpretation	Meteorological EWS	Flood forecasting	Water quality	Drought forecasting	
CEOP	data integration service	2	2	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	QC service	2	2	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
GWSP	Global DB(Digital Atlas, Dam)	1	0	0	0	0	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	
	training & research workshop	0	0	0	1	0	1	1	1	1	1	0	0	1	1	0	1	0	0	0	0	0	1	1	1	
	University curricula	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
	Web-based teaching package	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
UNU	flood inundation modelling	0	0	1	1	0	2	2	2	2	2	1	2	0	0	2	0	1	0	0	0	0	2	0	1	
	loss estimation	0	0	0	1	0	1	1	1	1	1	1	1	0	0	0	1	0	1	0	0	0	1	0	1	
	rainfall downscaling and forecast	0	0	0	1	0	2	2	2	2	2	1	2	0	0	0	2	0	1	0	0	0	2	0	1	
ICHARM	Global Flood Alert System	2	0	0	0	0	2	2	2	2	2	0	2	0	0	0	2	0	0	0	0	0	2	0	0	
	flood hazard map training	0	0	0	2	0	1	1	1	1	1	0	1	0	0	0	1	0	2	0	0	0	1	0	0	
	river and dam engineering training	0	0	0	2	0	1	1	1	1	1	0	1	0	0	0	1	0	2	0	0	0	0	1	0	0
	Master course on flood mitigation	0	0	0	2	0	1	1	1	1	1	0	1	0	0	0	1	0	2	0	0	0	0	1	0	0
MRC	river basin management training	0	0	0	2	0	1	1	1	1	1	0	1	0	0	0	1	0	2	0	0	0	0	1	1	0
	water quality analysis training	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0
	flood hazard mapping training	0	0	0	2	0	2	2	2	2	2	0	2	0	0	0	2	0	2	0	0	0	2	0	0	0
	flood emergency management training	0	0	0	2	0	2	2	2	2	2	0	2	0	0	0	2	0	2	0	0	0	2	0	0	0
	mathematical modelling training	0	0	0	2	0	1	1	1	1	1	0	1	0	0	0	1	0	2	0	0	0	0	1	0	1
	satellite rain estimation training	0	0	0	2	0	1	1	1	1	1	0	1	0	0	0	1	0	2	0	0	0	0	1	0	1
China	flood and drought management system	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	1	0	1
	training	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
	data&product access	1	1	0	2	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
PUB	WGs and projects	0	0	0	1	0	1	1	1	1	1	1	0	0	0	1	0	1	1	1	0	0	1	0	0	0
JAXA/AIT	Mini-projects	2	2	1	2	0	2	2	2	2	2	1	2	0	0	2	2	0	2	0	0	0	0	2	0	0
	Sentinel Asia	1	0	0	2	2	2	2	2	2	0	2	0	0	2	2	0	2	0	0	0	0	2	0	0	0
MAIRS	Enhanced observation	1	1	0	1	1	1	1	1	1	1	1	0	0	1	1	0	1	0	0	0	0	1	0	0	0
	regional model development	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0





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## Asia-Pacific Network for Global Change Research

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APN Secretariat

IHD Centre Building, 5F, 1-5-1 Wakinohama Kaigan Dori, Chuo-Ku, Kobe 651-0073 Japan

Phone: 078-230-8017 Fax: 078-230-8018 Email : [info@apn-gcr.org](mailto:info@apn-gcr.org) <http://apn-gcr.org>

As you may already know, the APN has been conducting various activities related to GEOSS, including two "Scoping Workshops on Global Earth Observations and Capacity Building Needs in the Region – Focus: Climate". Also in the past several months, Dr. Andrew Matthews, the new Co-chair of the Scientific Planning Group and the former Chair of the Steering Committee of APN, has been communicating with you. Based on the communication and the encouraging suggestion by MEXT including at the GEOSS Symposium in Tokyo, the IGM recognized that such collaboration would be extremely valuable and agreed to deepen the discussions between AWCI and the APN.

In order to proceed, Dr Andrew Matthews will act as the contact point with you for the APN. We look forward to being in contact with you in the near future.

I am sure that this collaborative work between us will assist with the development of global change research in the Asia-Pacific region. I thank you again for your thoughtful suggestions.

# **GEOSS Asian Water Cycle Initiative (AWCI)**

## **Interactions & Supports**

**ADB Water Financing Program 2006-2010**

**Helping to Introduce IWRM in 25 River Basins  
in the Asia-Pacific Region**



**What is IWRM?** Integrated water resources management (IWRM) is now recognized across the world as the process to promote the coordinated development and management of water, land and related resources in river basins, to maximize the economic benefits and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

**ADB has announced in March 2006 that its Water Financing Program 2006-2010 will help its member countries introduce IWRM in 25 river basins in the Asia-Pacific region.**



# GEOSS Asian Water Cycle Initiative (AWCI)

## Interactions & Supports



### LINKING STRENGTHS FOR SUSTAINABLE EARTH OBSERVATIONS

#### 1<sup>st</sup> GEO – Donor Capacity Building Symposium

Seville. September 10 & 11, 2007

#### Sunday, September 9

16.00/19.00 REGISTRATION



#### Monday, September 10

08.00/09.00 REGISTRATION

09.00/09.30 **OPENING SESSION**

*Senior representatives of the Spanish- Ministry of Environment, Andalucía Territorial Government and GEO*

09.30/09.40 BREAK

09.40/10.20 **PLENARY 1: THE BENEFITS OF COORDINATED EARTH OBSERVATION**

# **GEOSS Asian Water Cycle Initiative (AWCI)**

## **Interactions & Supports**

*GEO Ministerial Summit*

*Earth Observations for Sustainable Growth and Development*

**Draft GEO Report on Progress**

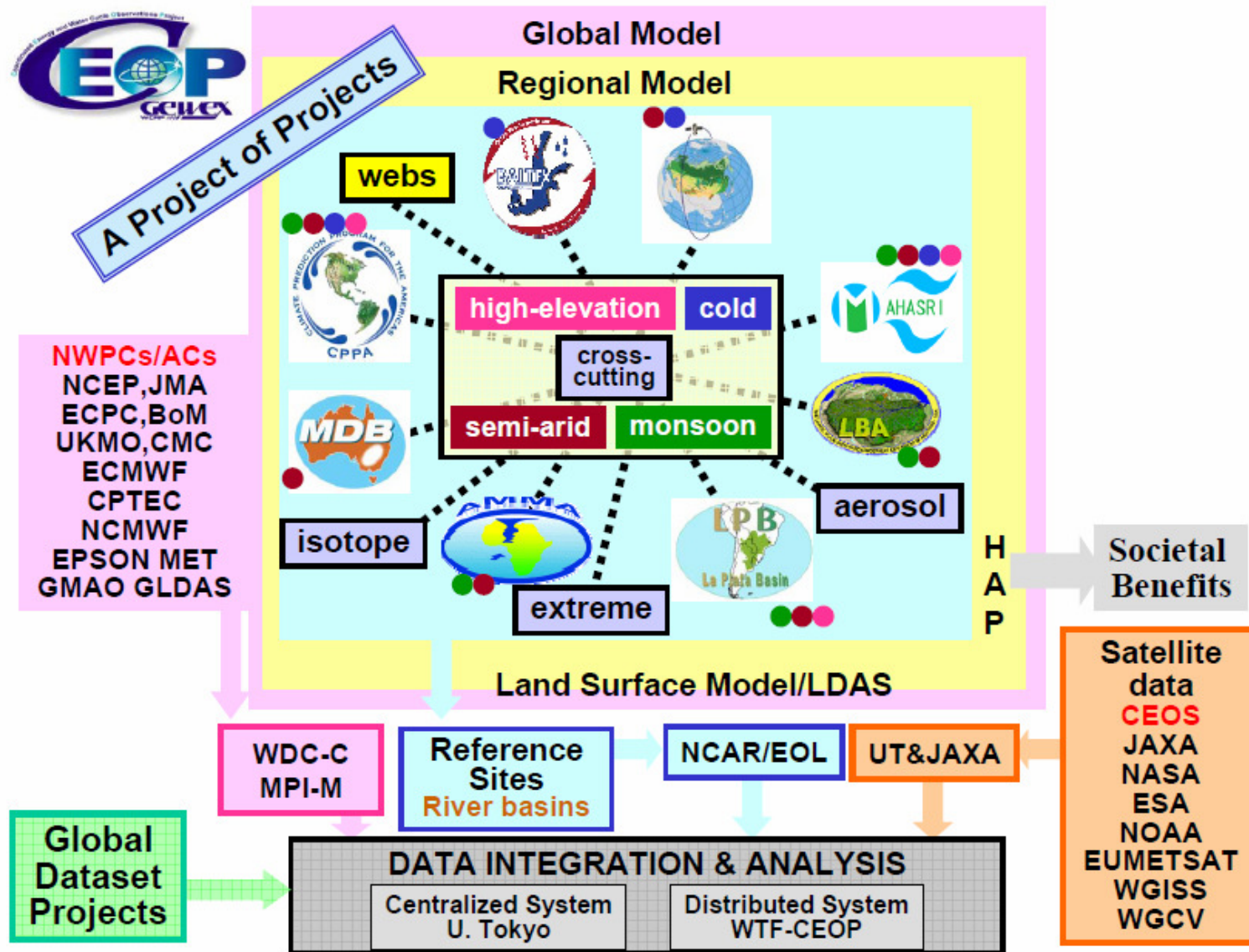
*Key Initiatives for Societal Benefits*

challenges, implementation of an African Meningitis warning system, expanding a drought monitoring program in North America, improving water resource monitoring and management in Asia, and the developing a visualization, monitoring, and forecasting system



# GEOSS Asian Water Cycle Initiative (AWCI)

## Interactions & Supports





1<sup>st</sup> Asian Water Cycle Symposium, Tokyo, Nov. 2005



1<sup>st</sup> Task Team Meeting, Bangkok, Sep. 2006



1<sup>st</sup> Capacity Building Workshop, Sep. 2006



2<sup>nd</sup> Asian Water Cycle Symposium, Tokyo, Jan. 2007



1<sup>st</sup> GEOSS AP Symposium, Tokyo, Jan. 2007

## **GEOSS Asian Water Cycle Initiative (AWCI)**

**To promote integrated water resources management by making usable information from GEOSS, for addressing the common water-related problems in Asia.**

### **Uniqueness**

- 29 River Basins in 18 Countries**
- Observation Convergence**
- Interoperability Arrangement**
- Data Integration**
- Open Data & Source Policies**
- Capacity Building**
- Early Achievements**