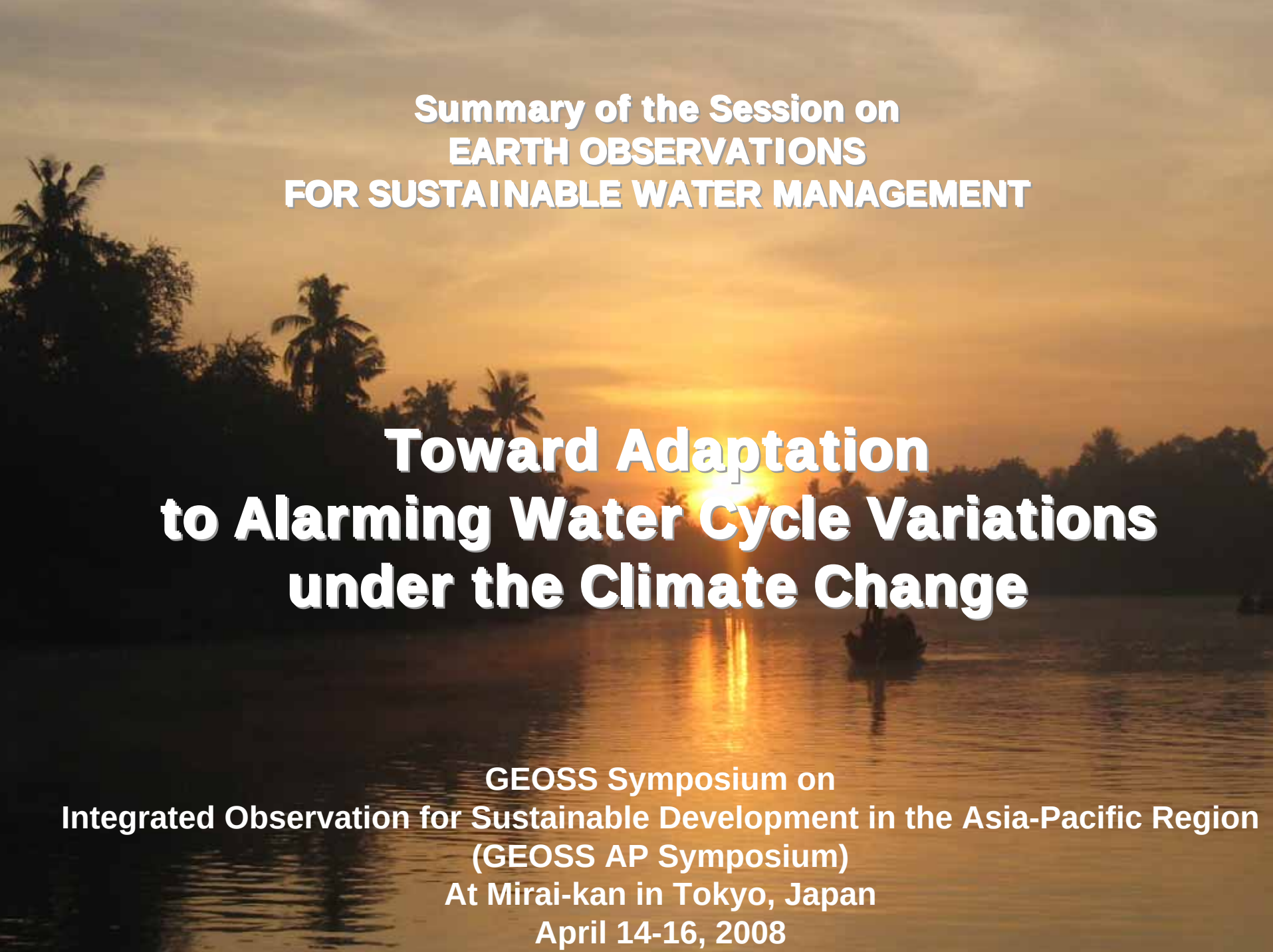
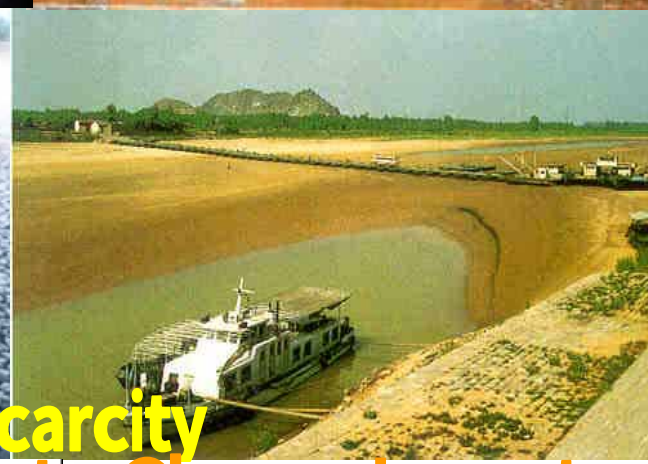


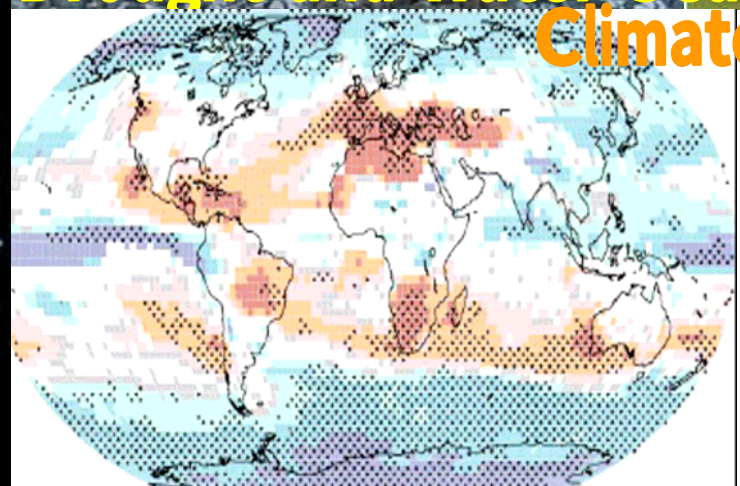
Summary of the Session on
EARTH OBSERVATIONS
FOR SUSTAINABLE WATER MANAGEMENT

Toward Adaptation to Alarming Water Cycle Variations under the Climate Change

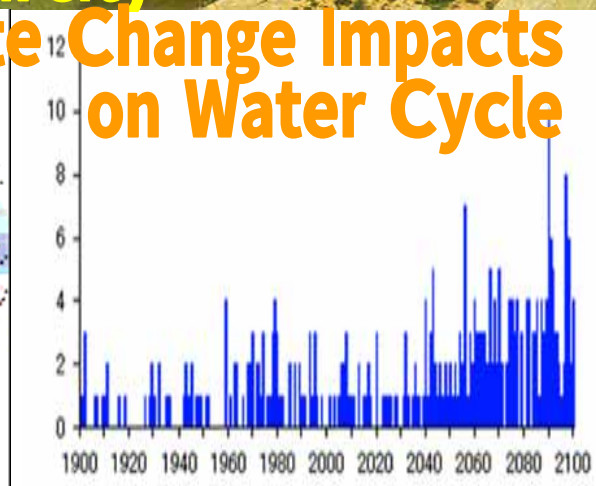
GEOSS Symposium on
Integrated Observation for Sustainable Development in the Asia-Pacific Region
(GEOSS AP Symposium)
At Mirai-kan in Tokyo, Japan
April 14-16, 2008



Drought and Water Scarcity



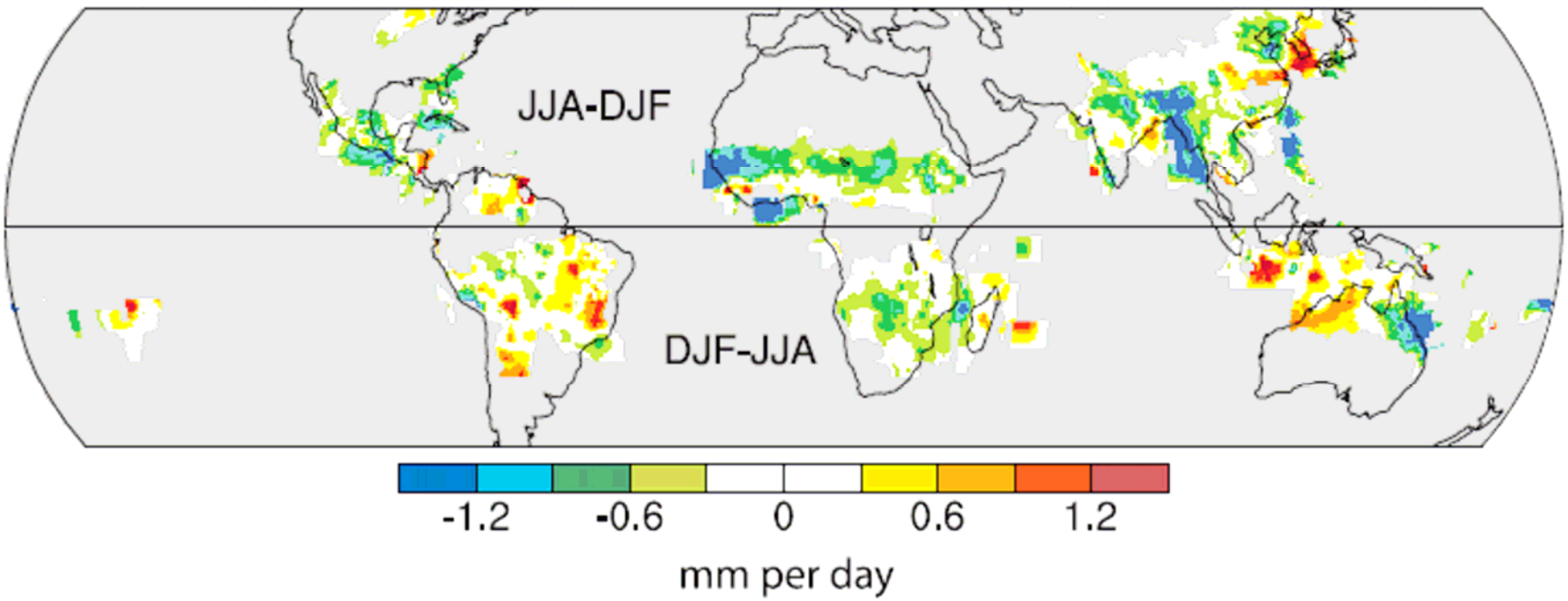
Climate Change Impacts on Water Cycle



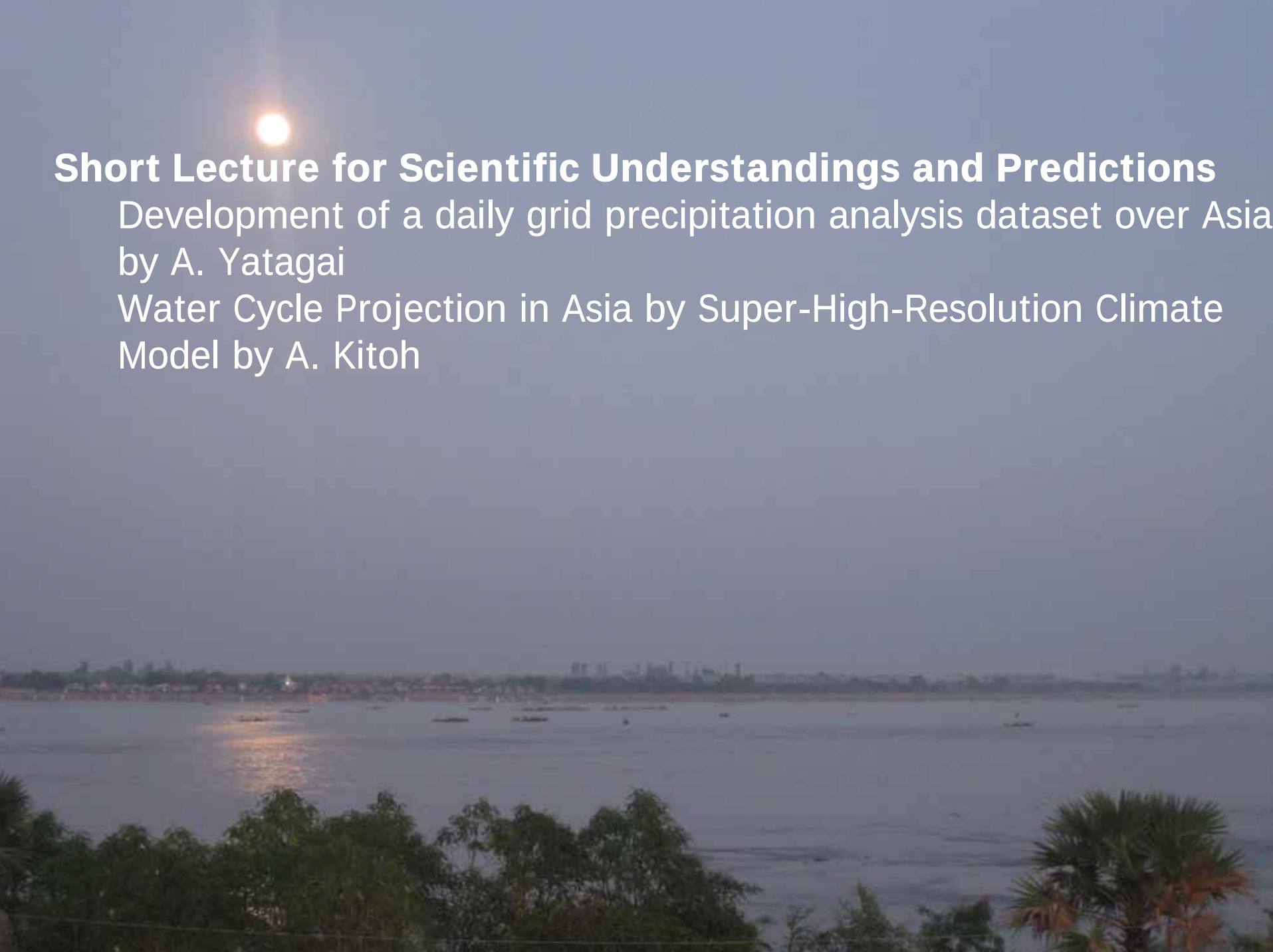
Extreme Weather Events
in late 20th century, human contribution, and future trend

Phenomenon[a] and direction of trend	Likelihood that trend occurred in late 20th century (typically post 1960)	Likelihood of a human contribution to observed trend [b]	Likelihood of future trends based on projections for 21st century using SRES scenarios
Warmer and fewer cold days and nights over most land areas	*Very likely* [c]	*Likely* [d]	*Virtually certain* [d]
Warmer and more frequent hot days and nights over most land areas	*Very likely* [e]	*Likely (nights)* [d]	*Virtually certain* [d]
Warm spells / heat waves. Frequency increases over most land areas	*Likely*	*More likely than not* [f]	*Very likely*
	Likely	*More likely than not* [f]	**> 90 %**
	Likely in many regions since 1970s	*More likely than not*	**> 66 %**
	Likely in some regions since 1970	*More likely than not* [f]	**> 66 %**
Increased incidence of extreme high sea level (excludes tsunamis) [g]	*Likely*	*More likely than not* [f, h]	*Likely* [i]

Monsoon Rainfall
increase or decrease ?



Change in the mean annual range of precipitation:
]1976 to 2003 minus 1948 to 1975 periods (mm per day).

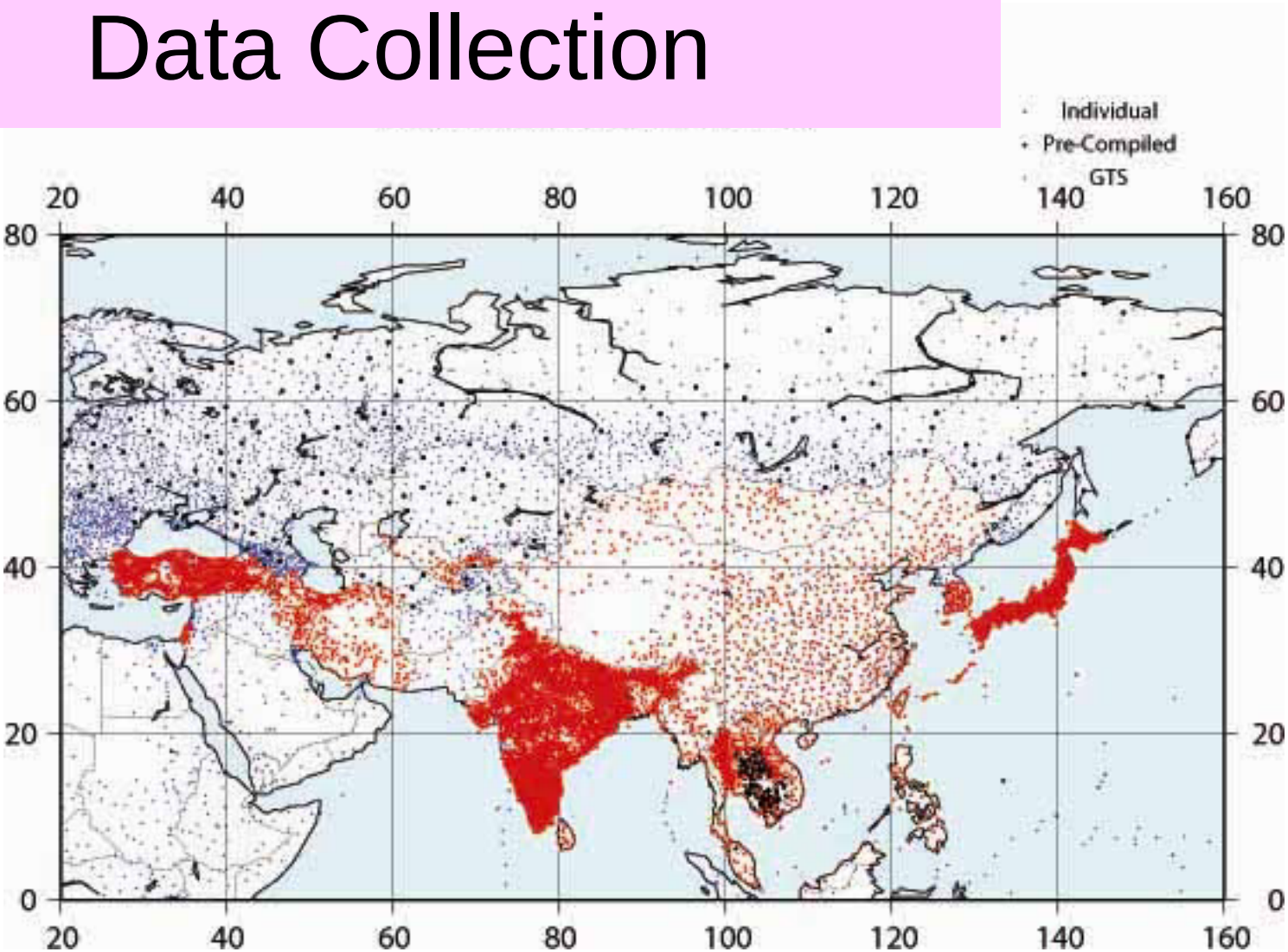


Short Lecture for Scientific Understandings and Predictions

Development of a daily grid precipitation analysis dataset over Asia by A. Yatagai

Water Cycle Projection in Asia by Super-High-Resolution Climate Model by A. Kitoh

Data Collection

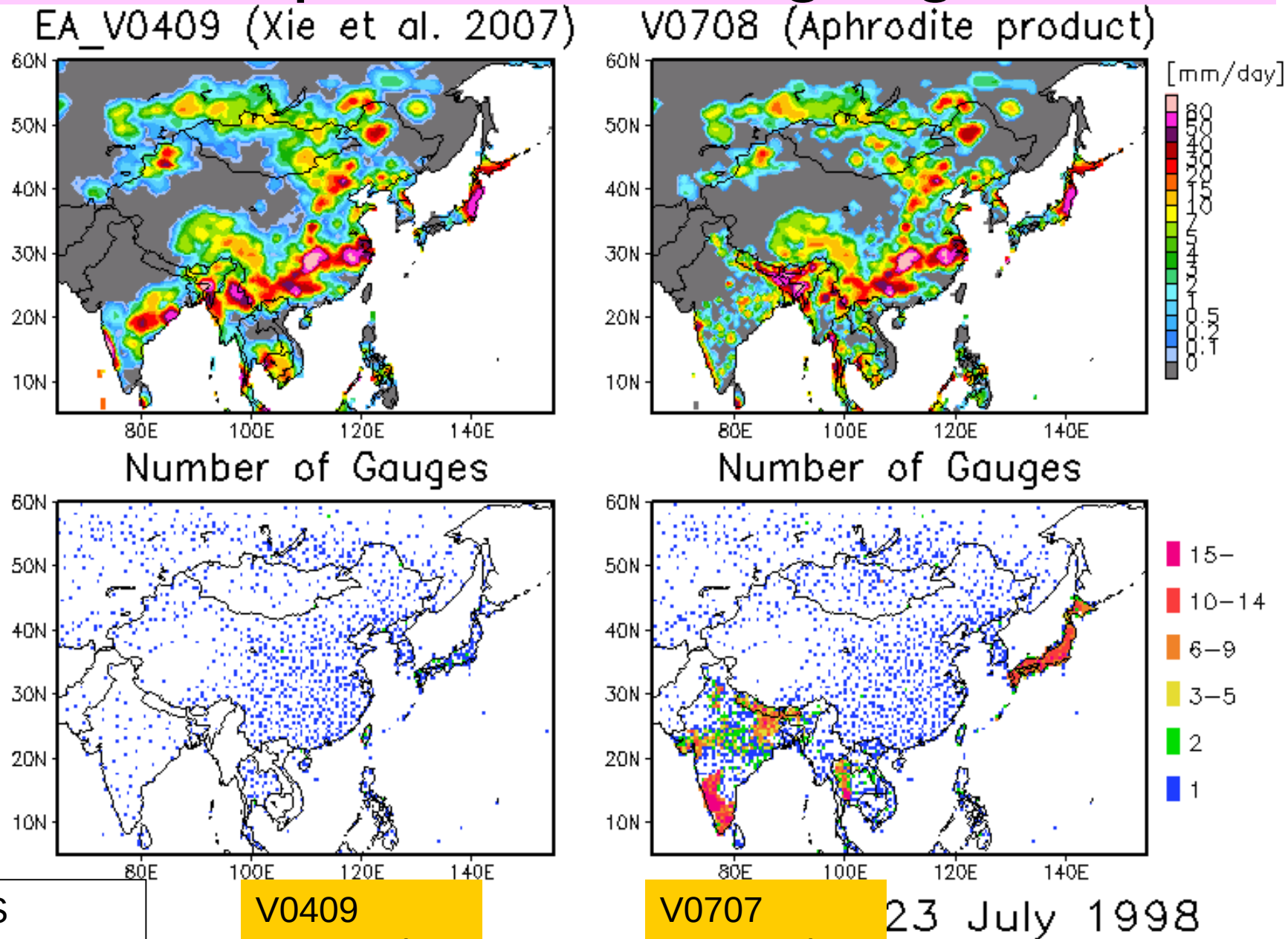


Blue：GTS

Black：Pre-compiled dataset

Red：Individual collection

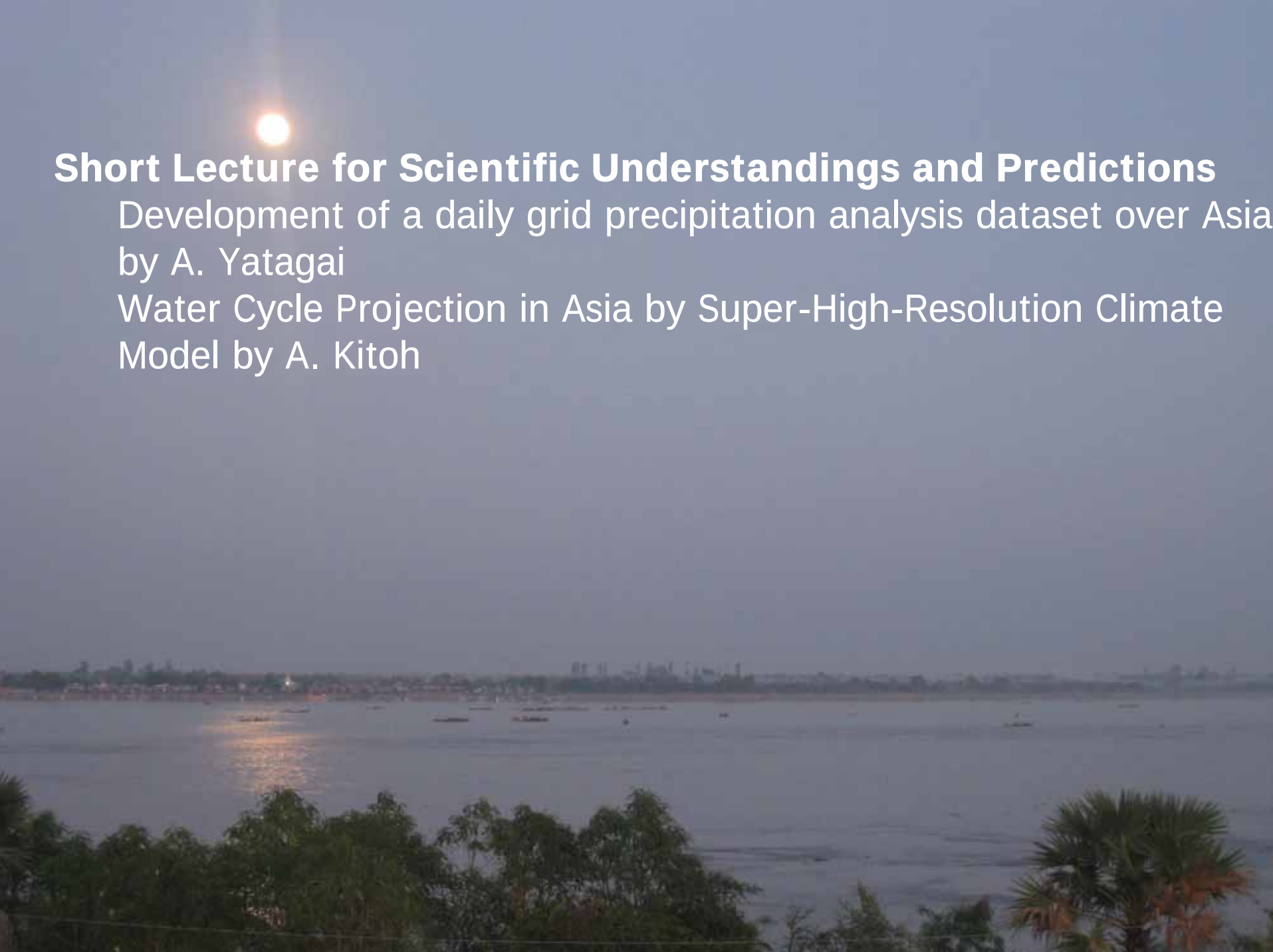
Input more rain gauges



GTS
920 station

V0409
1400 stations

V0707
6030 stations



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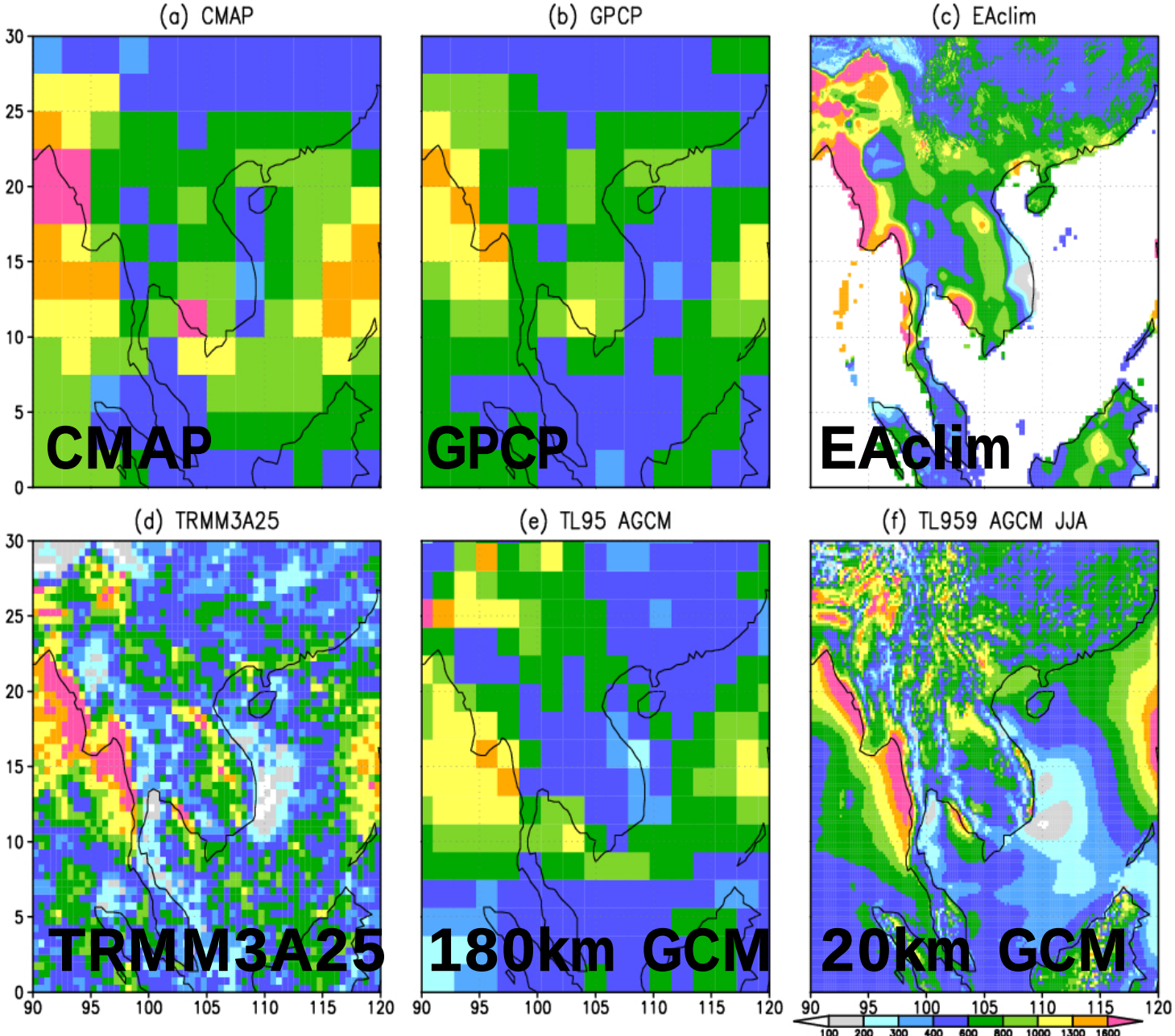
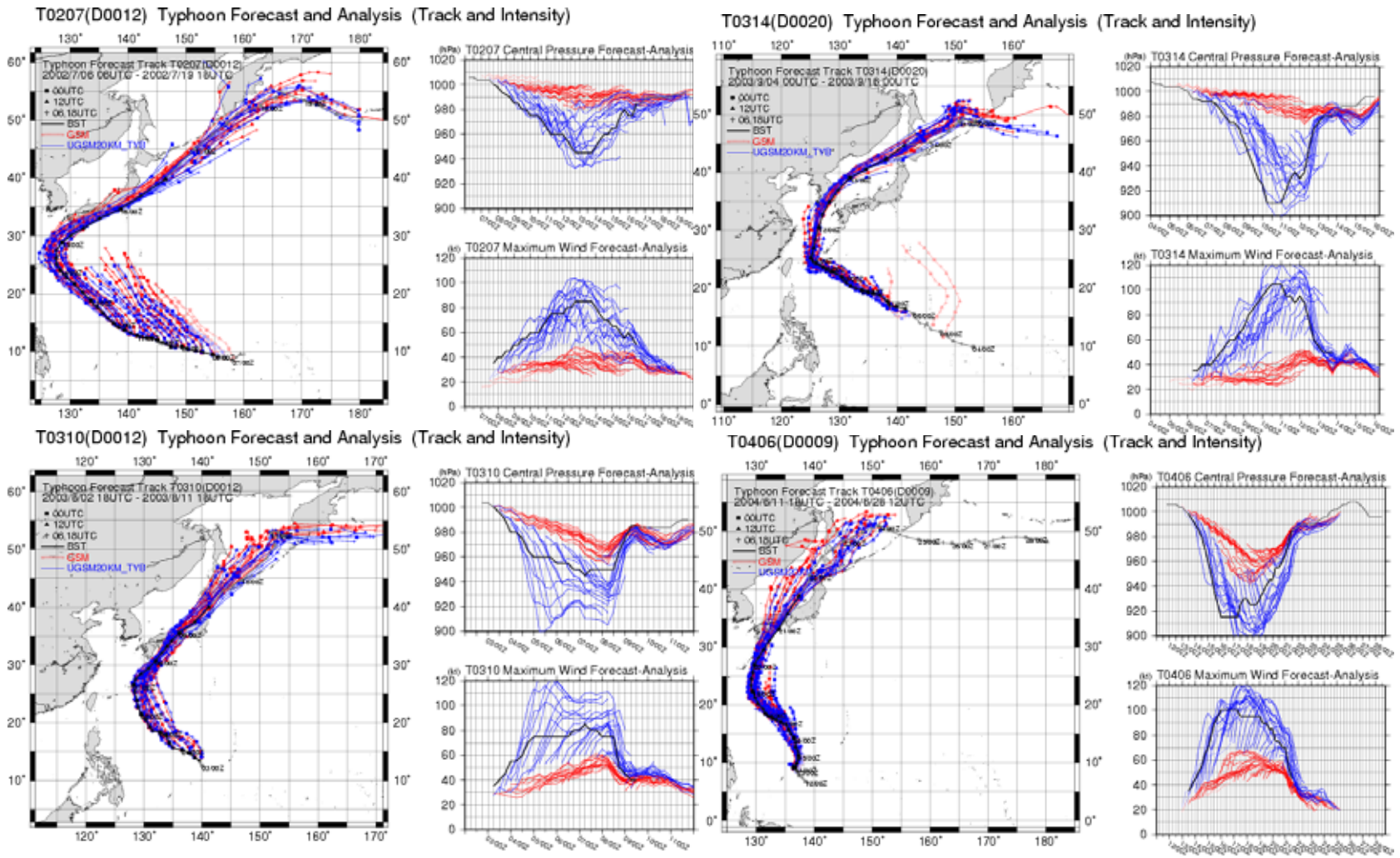
JJA precipitation climatology



JMA

Typhoon track and intensity: 60km vs 20km

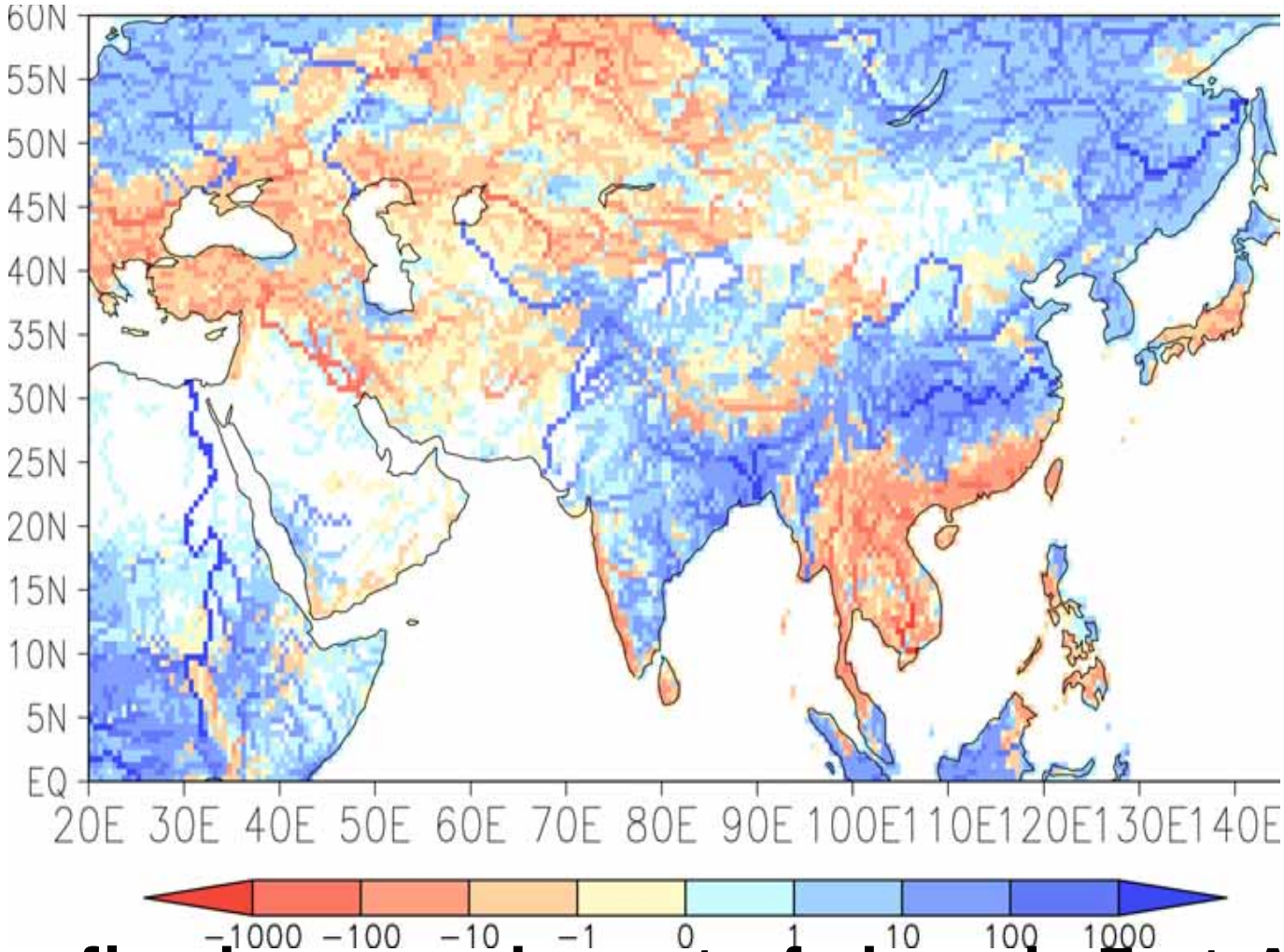


60-km model forecasts shallower central pressures and weaker maximum winds. 20-km model represents typhoon development closer to the observations.

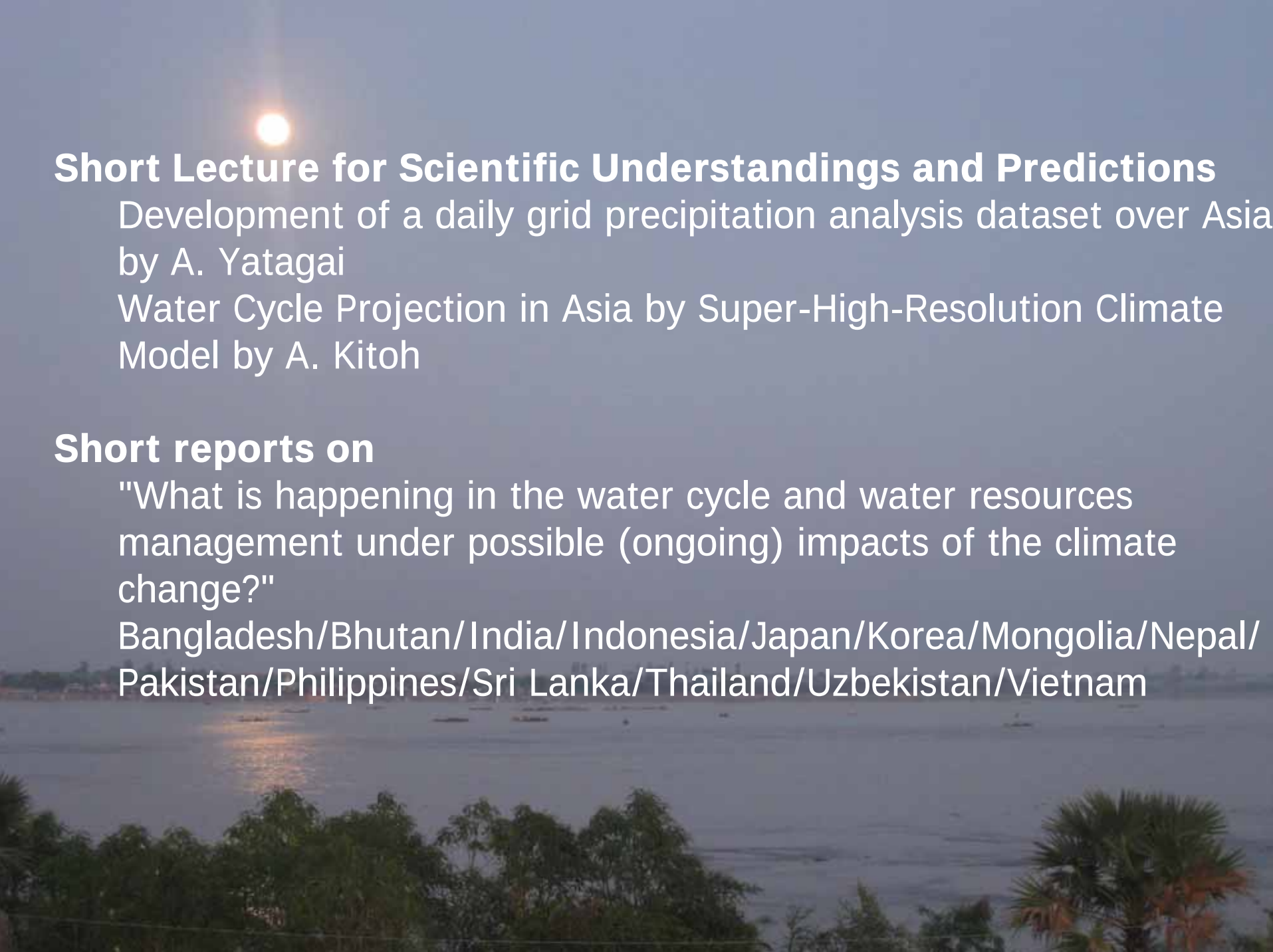
60km mesh model

20km mesh model

Changes in annual streamflow



Streamflow increases in most of rivers in East Asia and South Asia, but decreases in Southeast Asia, western Asia and the Mediteranean region



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Short reports on

"What is happening in the water cycle and water resources management under possible (ongoing) impacts of the climate change?"

Bangladesh/Bhutan/India/Indonesia/Japan/Korea/Mongolia/Nepal/Pakistan/Philippines/Sri Lanka/Thailand/Uzbekistan/Vietnam

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Short reports on

"What is on-going and/or planned?

IGWCO/APN/UNU/ICHARM/Pacific Region Drought Initiative/Sentinel Asia /HARIMAU/AWCI

•documenting the variations

Local → To integrate local -global data sets and information and analyze

MRI/GCM20, K-GEO/27km RCM

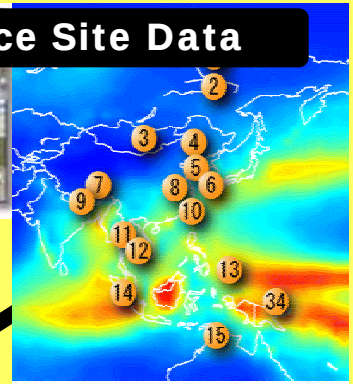
•documenting the societal issues

•summarizing the on-going and planed adaptations

•realizing end-to-end approaches

•providing usable information for effective adaptations

•building capacity



Support of data interoperability

Ontology of Geographic information

Ontology of dictionary

A Prototype of Data Integration and Analysis

Application Layer
User Apps. User Apps. User Apps. User Apps.

Common Software Layer
•Visualizer (w display wall) •Data Quality Manager •ETL •Data Manager
•Discovery Work Flow Assist •Data Transformer •Data Crawler •Meta Data Manger •Data Navigator

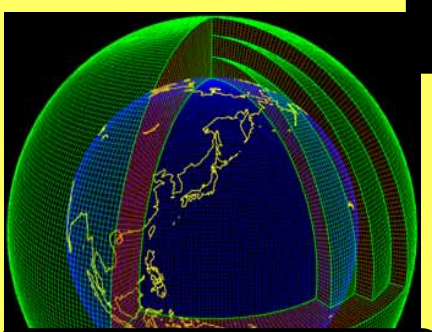
Data Management Layer •DBMS

File System Layer •PB Scale Logical File

•Storage Management System
•Power Management System

Storage Layer

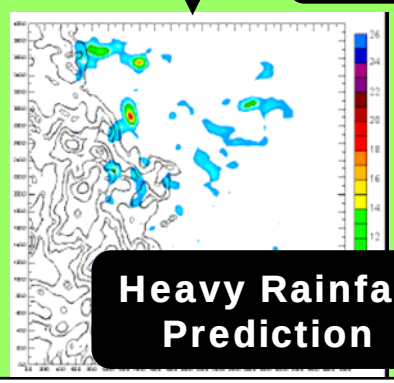
Disk Array

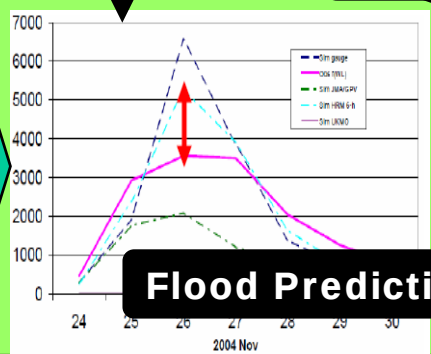


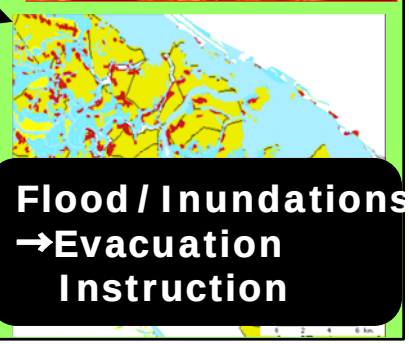
Satellite Data Assimilation

Distributed Hydrological Model

Operation Optimization







- documenting the variations

Local → To integrate local -global data sets and information and analyze

Monsoonal Region→ To compile nation's reports and datasets and analyze

- documenting the societal issues

Daily Rain Gauge → Grid Products

- summarizing the on-going and planed adaptations

- realizing end-to-end approaches

- providing usable information for effective adaptations

- building capacity

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To compile nation's reports

To compare and identify of common and unique issues

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To promote to exchange ideas, experiences and knowledge

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GEOSS Asian Water Cycle Initiative (AWCI)

17 River Basins for Initial Demonstration

- documenting the variations

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To collaborate with GEO Tasks and international organizations and projects..

- providing usable information for effective adaptations

- building capacity

GEO TASKS WHERE IGWCO TAKES THE LEAD

WA-06-02: Forecast Models for Drought and Water Resource Management

WA-07-06: Capacity Building Program for Water Resources Management

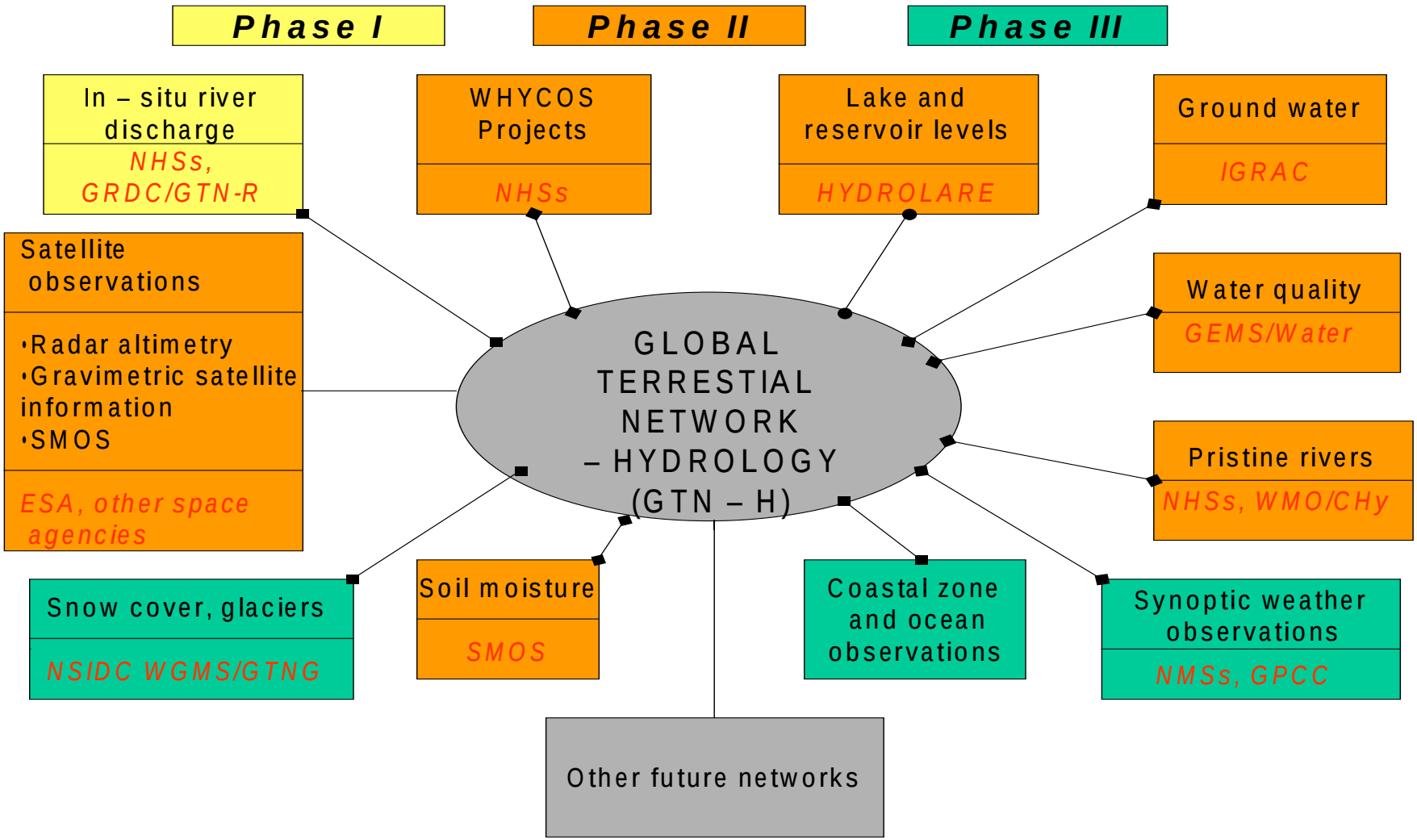
WA-07-01: Global Water Quality Monitoring

WA-08-P1: Integration of In-situ and Satellite Data for Water Cycle Monitoring

OTHERS WHERE IGWCO CAN/DOES INPUT:
DI-07-01: Risk Management for Floods
CL-06-01: Sustained Reprocessing and Reanalysis Efforts
US-06-02: Pilot Communities of Practice
DA-07-03: Virtual Constellations
DA-07-06: Data Integration and Analysis System
HE-07-02: Environment and Health Monitoring and Modelling
AG-07-03: Operational Agricultural Monitoring System

Group on Earth Observations

Phased Linkage of Networks with HARON



IGWCO ACTIVITY	CLIMATE IMPACT	EXISTING
PRECIPITATION	YES – FOR EXTREMES AND PATTERN SHIFTS	INTEGRATED PRODUCT DEVELOPMENT
SOIL MOSITURE	YES – SHIFTS OF PATTERNS AND SEASONALITY	NETWORK DESIGN CONSIDERATION
RUNOFF	YES – SEASONALITY AND PEAK FLOWS CHANGES	MONITOR CHANGES IN AMOUNT & SEASONALITY
GROUNDWATER	YES – RECHARGE ISSUES	MEASURE RESPONSES TO MEANS AND EXTREMES
WATER QUALITY	YES – LOW FLOWS ARE A CRITICAL ISSUE	PROJECT OPPORTUNITY FOR LOW FLOWS
INDICATORS	COMMUNICATION OF THE ISSUE	ASSESSMENT IN E2E ACTIVITY (DROUGHT)
CEOP	BETTER UNDERSTANDING AND PREDICTIONS	CEOP BRINGS DATA FOR MODEL DEVELOPMENT
CAPACITY BUILDING	MANAGEMENT AND ADAPTATION OPPORTUNITIES	CB EFFORTS FOCUS ON ABILITY TO ACCESS/ USE DATA

- documenting the variations

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To establish and activate data provider-user cooperation

- providing usable information for effective adaptations

To establish and activate data provider-user cooperation

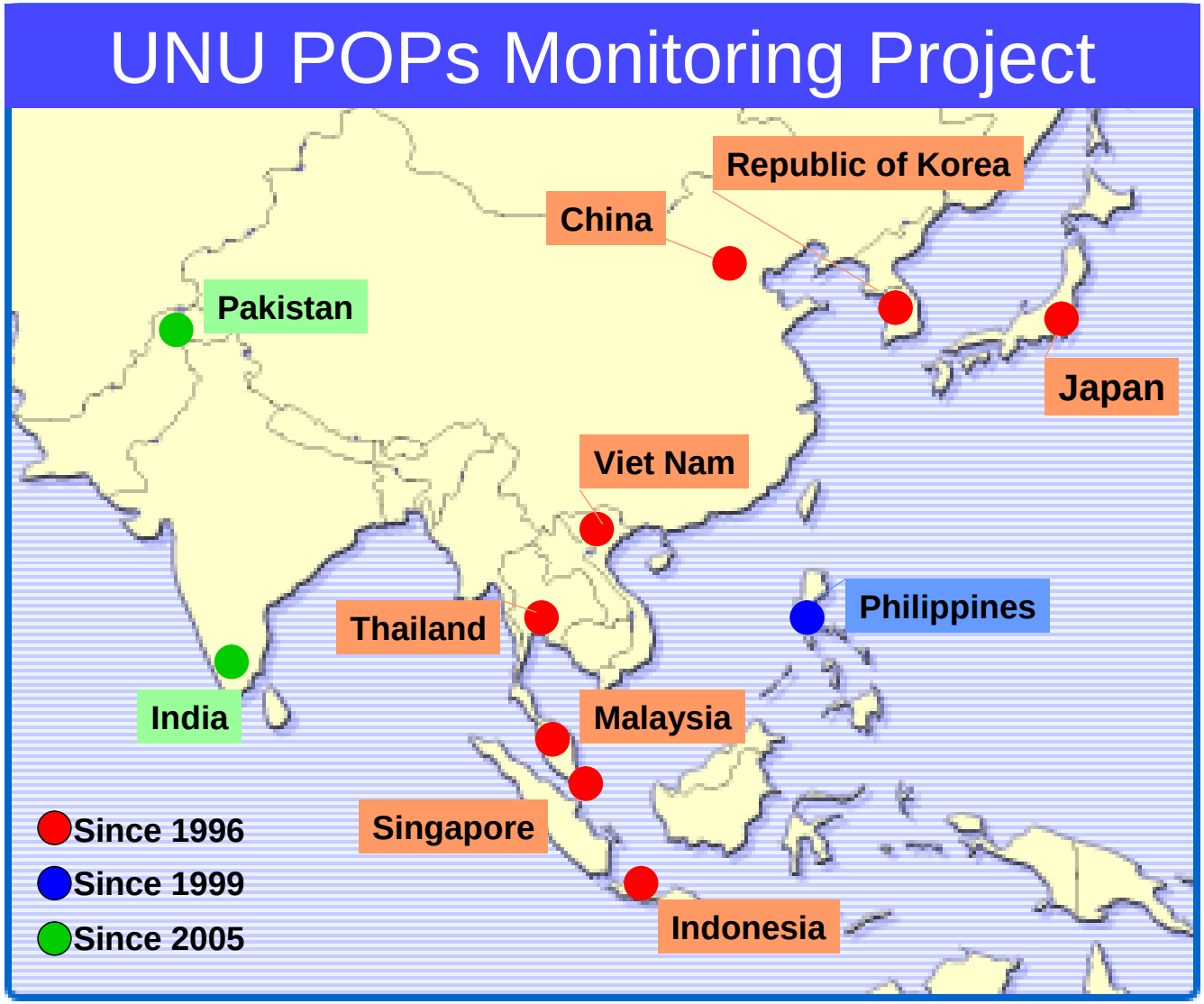
- building capacity

APN Member Countries

- Australia
- Bangladesh
- Cambodia
- China
- Fiji
- India
- Indonesia
- Japan
- Lao PDR
- Malaysia
- Mongolia
- Nepal
- New Zealand
- Pakistan
- Philippines
- Republic of Korea
- Russian Federation
- Sri Lanka
- Thailand
- United States of America
- Viet Nam

Pacific Island Countries and Singapore are approved countries whose scientists are eligible to receive funding under APN awards.

UNU POPs Analytical Capacity Development Project



ICHARM

International Centre for Water Hazard and Risk Management

under the auspices of UNESCO

hosted by PWRI, Tsukuba

United Nations Educational, Scientific and Cultural Organization

Drought Side Meeting • 29-Nov-2007

Introduction
- *Mark Myers, Director, USGS*

North American Drought Monitor and NIDIS
- *Jay Lawrimore, NOAA/NCDC*

FEWS NET
- *Tamuka Magadzire, FEWS NET Regional Scientist for Southern Africa*

Drought Management Center for Southeastern Europe
-*Silvo Zlebir, Director, Environmental Agency of the Republic of Slovenia*

SERVIR
- *Carrie Stokes, USAID*

~40 people from 19 countries

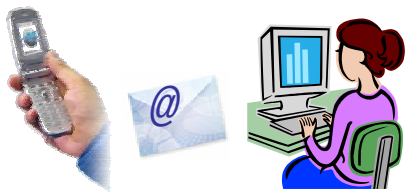
- Argentina
- Australia
- Austria
- Belgium
- Botswana
- Canada
- France
- Germany
- Honduras
- Japan
- Kenya
- Korea
- Netherlands
- Norway
- Panama
- Slovenia
- South Africa
- United Kingdom
- USA

Concept of Sentinel Asia STEP2

Observation

Value-added Information

Transmission



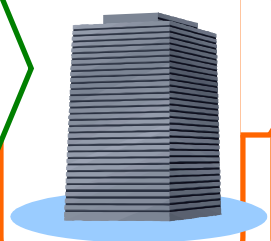
Sharing (Web)

Utilization

User Expansion

Disaster Management Organization

Governmental Organization (ADRC members)



Local Governmental Organization

End User

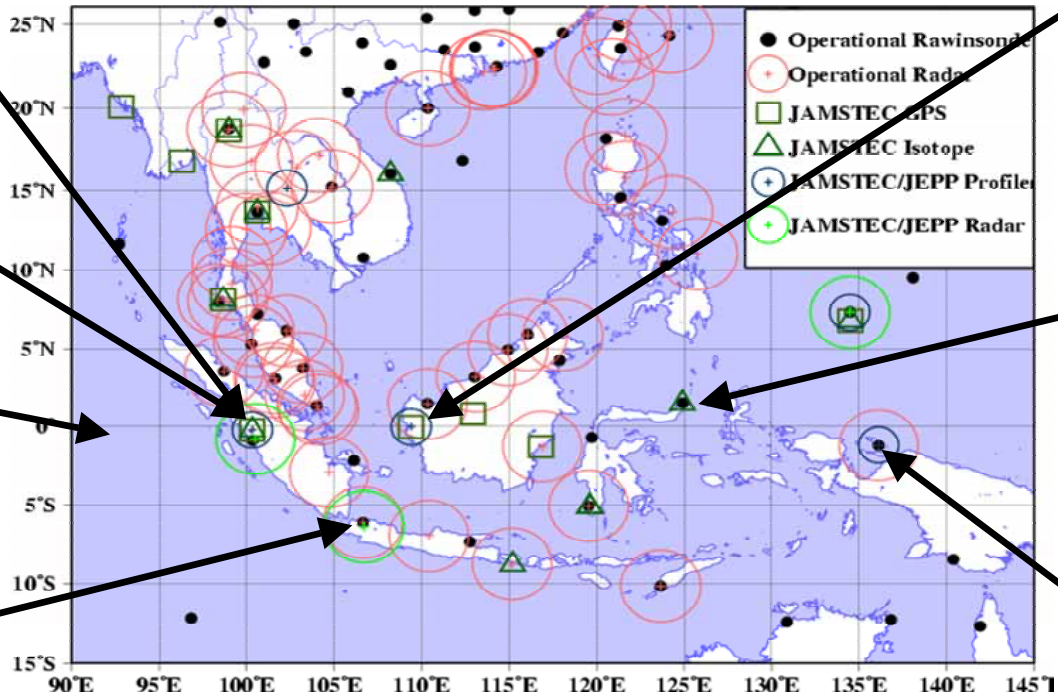
Human Network

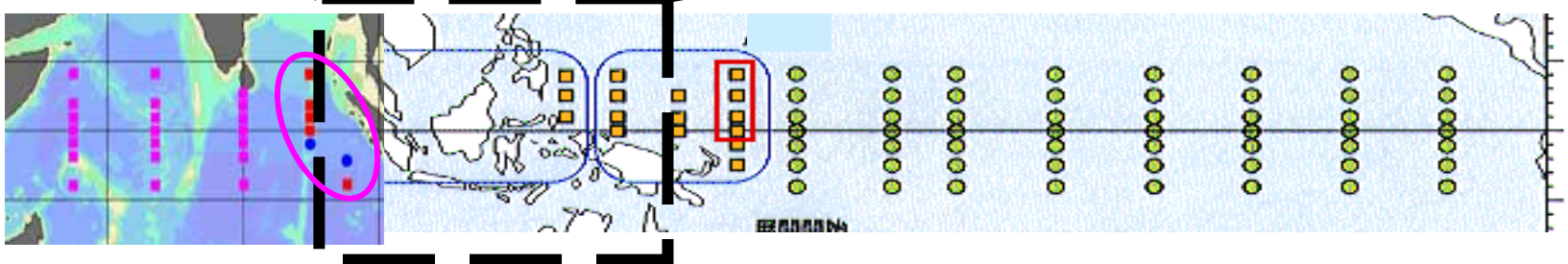
Capacity Building・Outreach

Japan EOS Promotion Program (JEPP) + Indonesian Research/Technology Grant

Hydrometeorological Array for ISV-Monsoon Automonitoring (HARIMAU)

http://www.jamstec.go.jp/iorgc/harimau/HARIMAU.html
mdy@jamstec.go.jp






1st Asian Water Cycle Symposium, Tokyo, Nov. 2005


1st Task Team Meeting, Bangkok, Sep. 2006


1st Capacity Building Workshop, Sep. 2006


2nd Asian Water Cycle Symposium, Tokyo, Jan. 2007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3rd Asian Water Cycle Symposium, Beppu, Dec. 2007

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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

- A River Basin of Each Country
- Observation Convergence
- Interoperability Arrangement
- Data Integration
- Open Data & Source Policies
- Capacity Building
- Early Achievements

- documenting the variations

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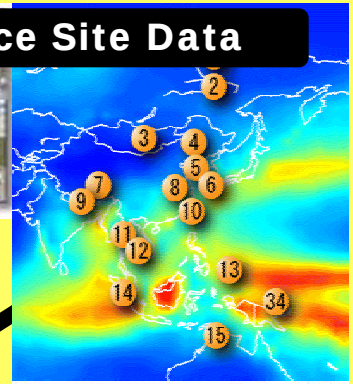
Group on Earth Observations

A Global Earth Observation System of Systems

GEOSS



Support of data interoperability

Ontology of Geographic information

Ontology of dictionary

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

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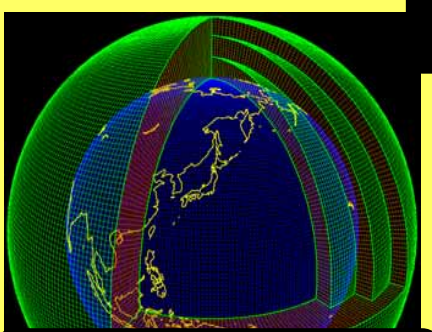
File System Layer •PB Scale Logical File

•Storage Management System
•Power Management System

Storage Layer

Disk Array



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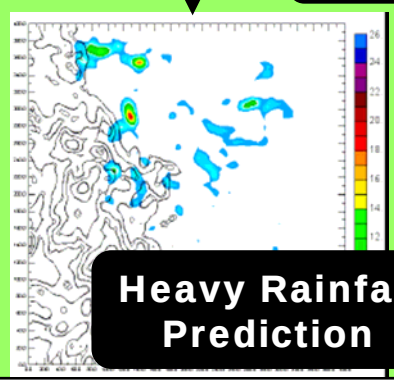

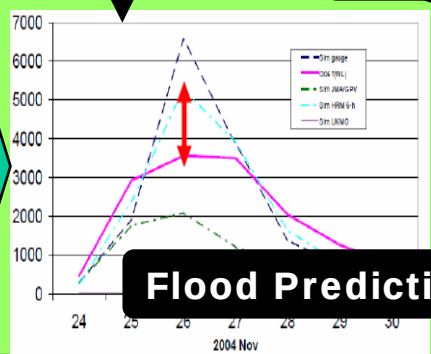

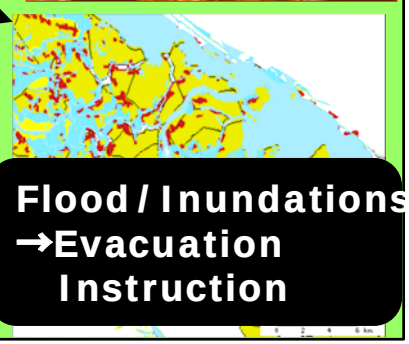

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- providing usable information for effective adaptations

To establish and activate data provider-user cooperation
To make maximum use of capability of data Integration and analysis system

- building capacity

For observation and data set generation including meta data preparation and QC.

For data analysis especially for climate model outputs and satellite products


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- Early Achievements

APN's Main Activities

- **Annual Regional Call for Proposals**
  - One of the scientific pillars of APN to support global change research in the Asia-Pacific region
  - Competitive process launched in 1998 to select projects for funding under the Science Agenda of the APN
- **Capacity Development Programme (CAPaBLE)**
  - The second pillar of APN supporting capacity development projects and activities
  - Registered as WSSD Type II Partnership Initiative
- **Science-Policy Linkages**
  - APN's Policy Agenda: "strengthening appropriate interactions among scientists and policy-makers, and providing scientific input to policy- and decision-making and scientific knowledge to the public

B. Parallel Session:
Earth Observations for Sustainable Water Management

Comprehensive knowledge of the water cycle and effective management of water resources are paramount to every nation's well-being. Especially, it is critically important to improve the predictions of extreme weather events that often result in flood and drought, in order to take mitigating actions.

Asia-Pacific nations need to coordinate space-based and *in-situ* water cycle observation networks under the framework of GEOSS for developing a global observational network. In addition, they are encouraged to pursue international cooperation for achieving integrated water resource management and adapting to potential impacts of climate change by using observations, analyses and predictions. Promoting capacity building is also important.

GEO is expected to strengthen the following GEOSS Tasks.
- Forecast Models for Drought and Water Resource Management
- Global Water Quality Monitoring
- Integration of In-Situ and Satellite Data for Water Cycle Monitoring
- Capacity Building Program for Water Resource Management


Toward Adaptation
to Alarming Water Cycle Variations
under the Climate Change
WE HAVE
SCIENCE AND TECHNOLOGY,
COOPERATION FRAMEWORK,
AND
PEOPLE.
STEP FORWARD!