

# CEOP Objective #1:

## GEWEX Objective #1

Produce consistent research quality data sets complete with error descriptions of the Earth's energy budget and water cycle and their variability and trends on interannual to decadal time scales, for use in climate system analysis and model development and evaluation.

### *Specific Technical Issues*

1. Developing an integrated hydroclimate data set that can be used to answer the CEOP main scientific questions.
2. Developing the capability to handle and disseminate a large amount of data from diverse sources
3. Analyzing and comparing with model simulations this diverse data to understand the underlying mechanisms and model deficiencies.



2011-2012: DELIVERABLE: A "state-of-the-art" suite of global energy and water cycle products complete with error bars for closing the global water and energy budgets for the period 1980 to 2010.


# CEOP Objective #2:

## GEWEX Objective #2

Enhance the understanding of and quantify how energy and water cycle processes contribute to climate feedbacks.

### Associated Science Questions

- i. What are the average hydroclimate conditions over various regions and seasons?
- ii. How does water and energy flow into and through individual regions as well as being redistributed within these regions by local mechanisms?
- iii. How do extremes occur and what is their role in the hydroclimate?
- iv. How do aerosols affect the hydroclimate?
- v. Does knowledge of water isotopes help us to understand the water cycle?



Understanding the contributions of water and their highly coupled non-linear interactions in regulating feedbacks to the climate system.

# CEOP Objective #3:

## GEWEX Objective #3


Improve the predictive capability for key water and energy cycle variables and feedbacks through improved parameterizations to better represent hydrometeorological processes, and determine the geographical and seasonal characteristics of their predictability over land areas.

### Associated Science Questions

- vi. Can we simulate and predict the hydroclimate cycle?

### Specific Technical Issues

4. Assimilating and integrating the data with newly developed models.



Provide a final review of the success of GEWEX in improving parameterization at operational Numerical Weather Prediction (NWP) and climate modeling centers and its impact on the predictive capabilities for key energy and water cycle variables, including hydrological prediction

# CEOP Objective #4:

## GEWEX Objective #4:

Undertake joint activities with operational hydrometeorological services, related Earth System Science Partnership Program (ESSP) projects like the Global Water System Project (GWSP), and hydrological research programs to demonstrate the value of GEWEX research, data sets and tools for assessing the consequences of climate predictions and global change for water resources.

### Associated Science Questions

- vii. What is the benefit of this increased knowledge about the hydroclimate for society?

### Specific Technical Issues

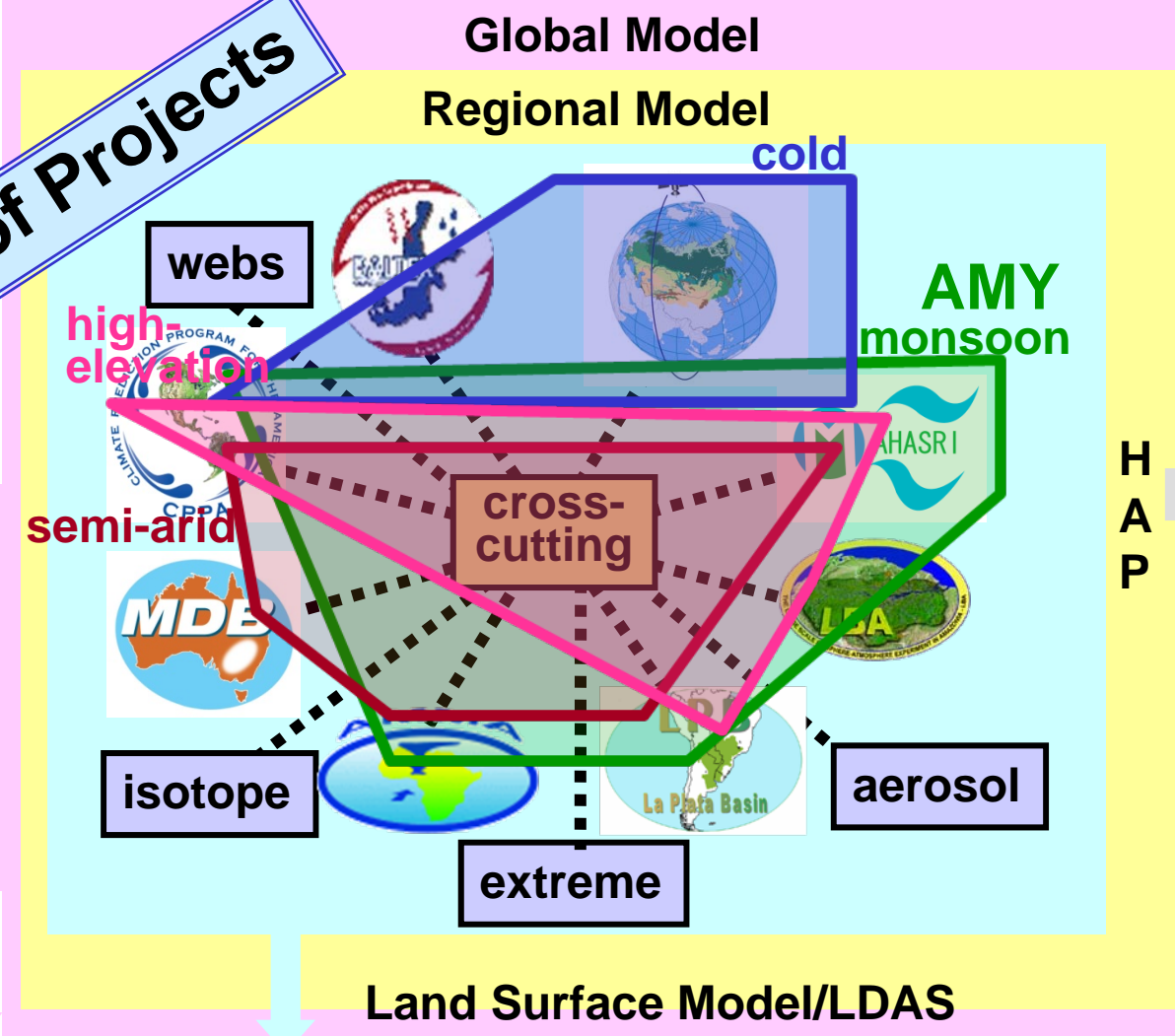
5. Transferring CEOP methodologies to other regions, sectors, and applications .



Demonstrate benefits of improved hydrometeorological predictions for water resources.

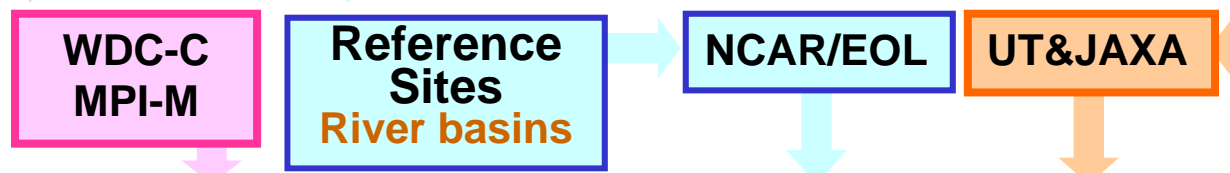
# A Project of Projects

- NWPCs/ACs**  
 NCEP, JMA  
 ECPC, BoM  
 UKMO, CMC  
 ECMWF  
 CPTEC  
 NCMWF  
 EPSON MET  
 GMAO GLDAS

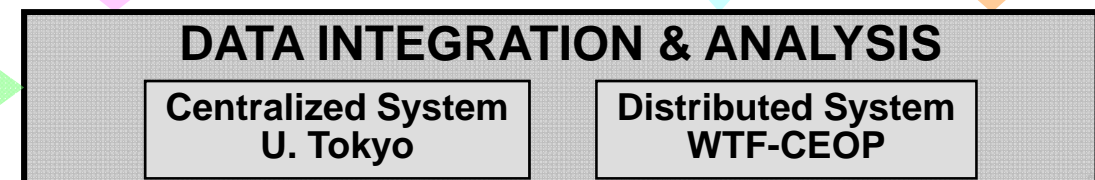


Societal Benefits

Global Dataset Projects



- Satellite data**  
**CEOS**  
 JAXA  
 NASA  
 ESA  
 NOAA  
 EUMETSAT  
 WGISS  
 WGCV

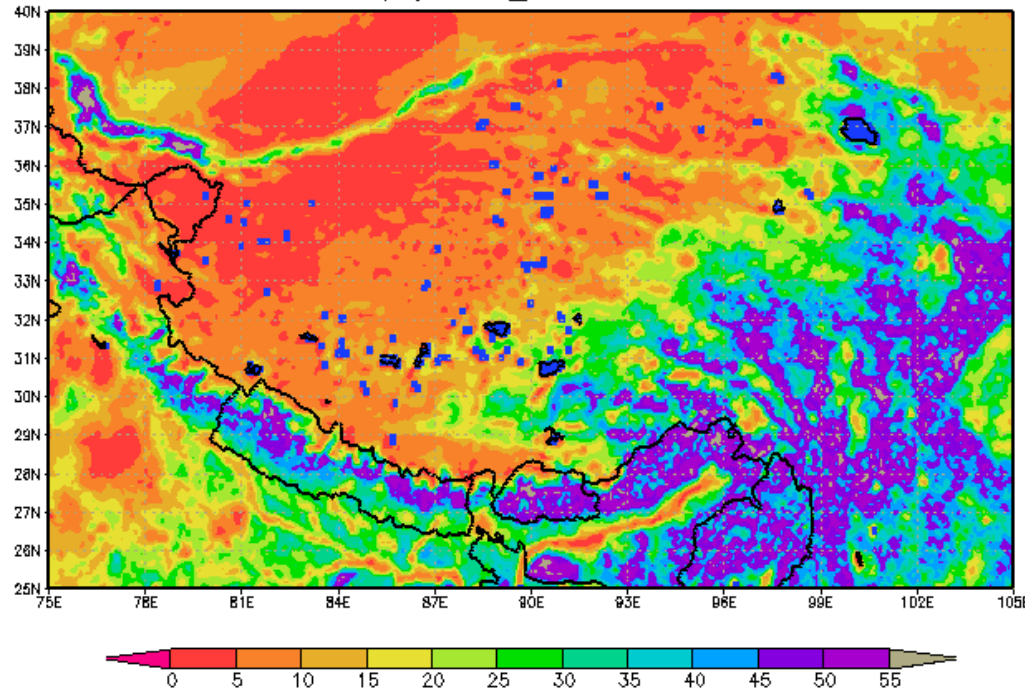


# Seasonal Variation of the Soil Moisture

## Tibetan Plateau

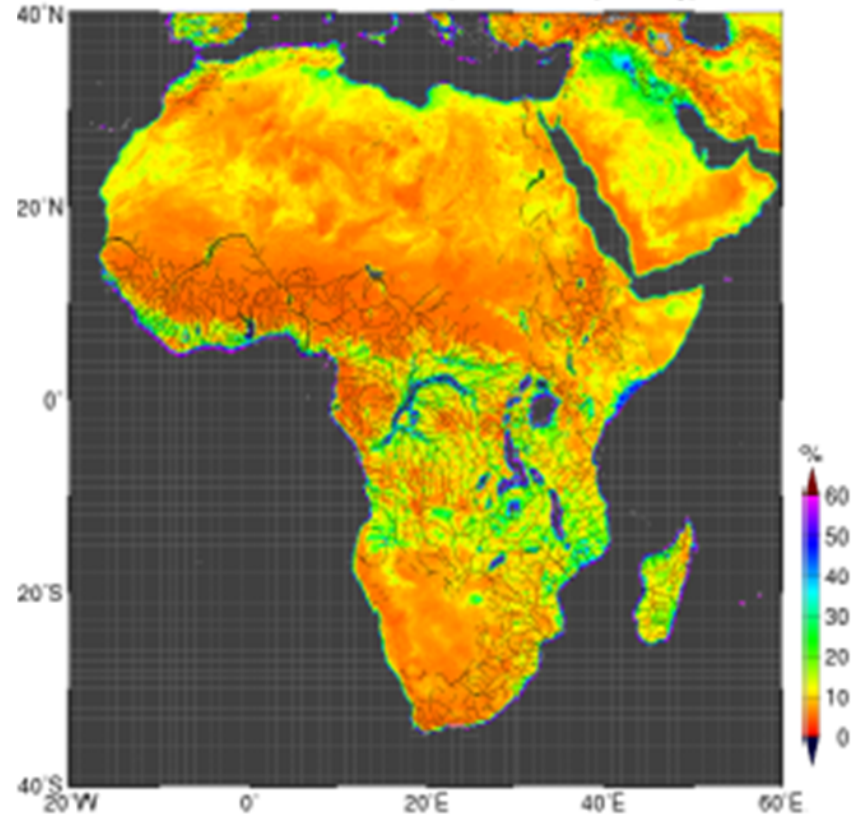
## Africa

6G Mv(%) tibet\_D 2003SEP-last



SM(AMSR-E)

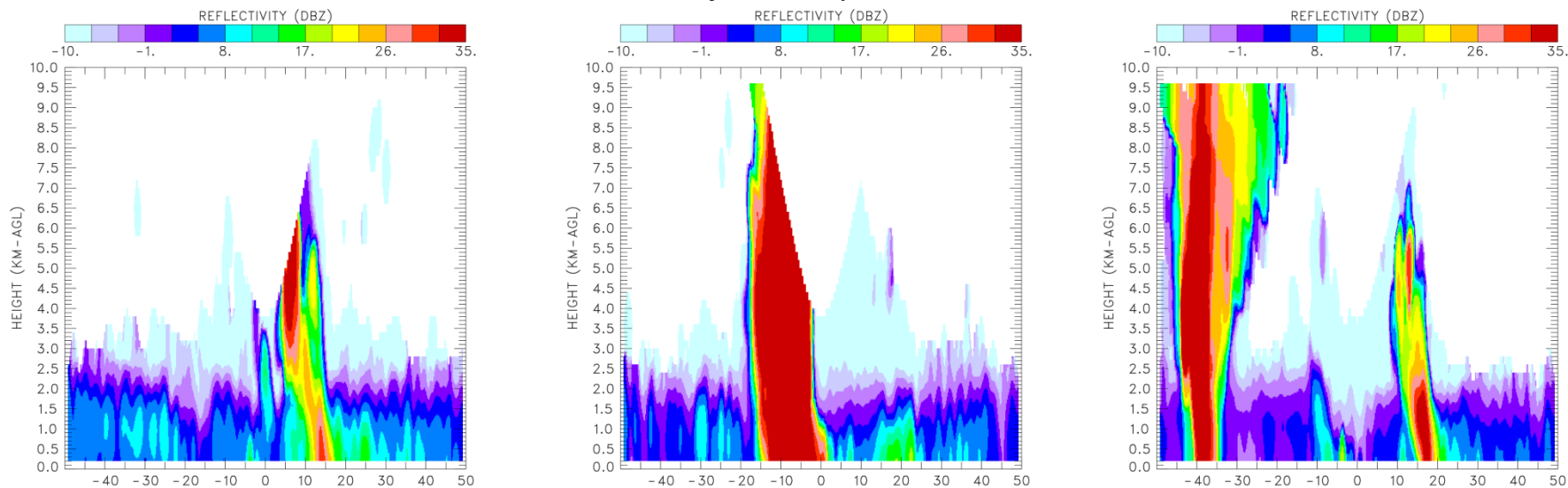
AQUA/AMSR-E SM Dec., 2003 DES (Monthly)



# Comparison LES - Observations

## Initiation and development of deep convection in the afternoon

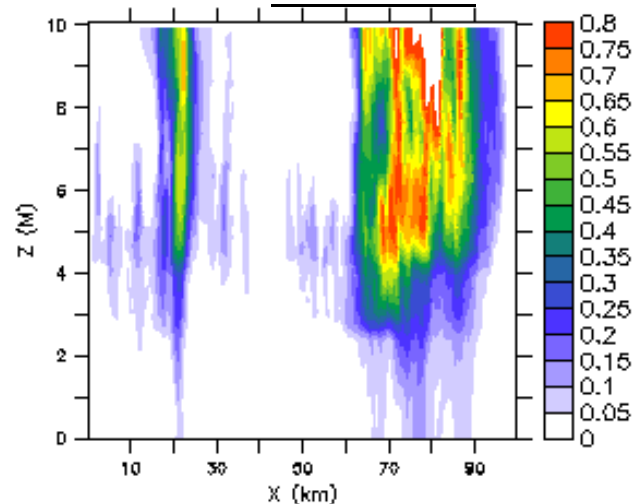
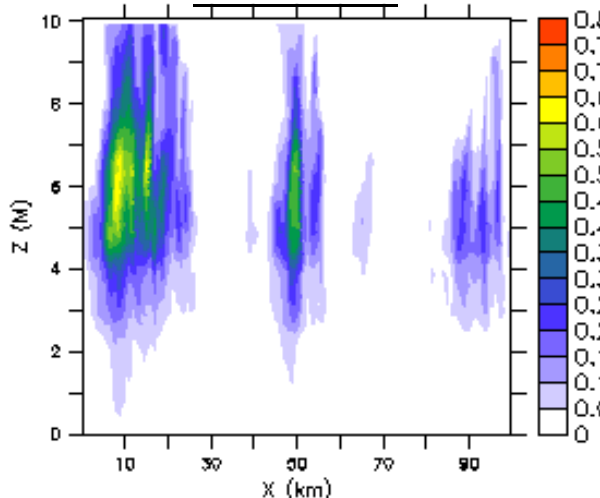
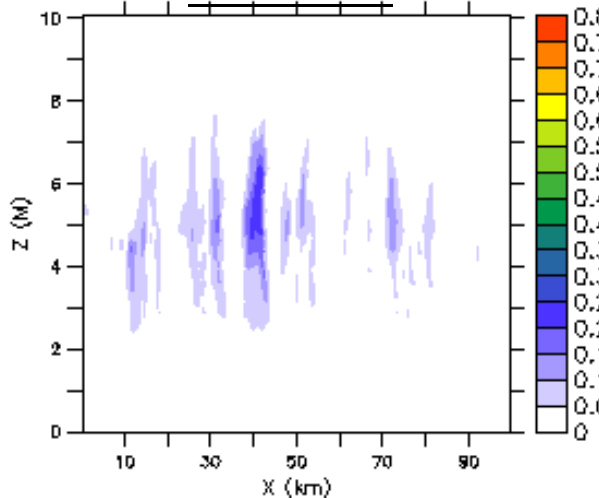
### MIT RADAR vertical cross-section reflectivity 5km to the north



16:00 LT

17:00 LT

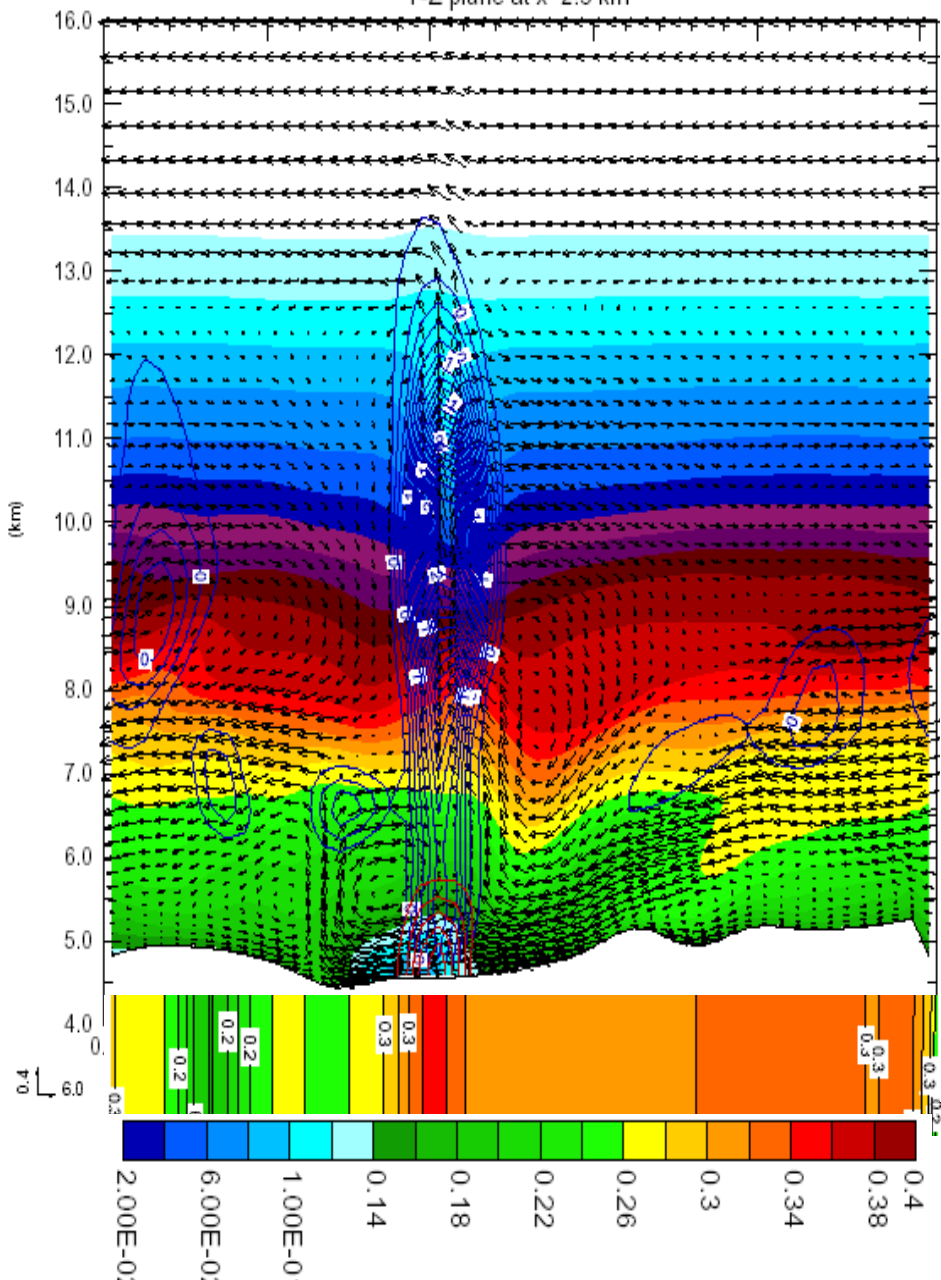
18:00 LT



### LES vertical cross-section of precipitating liquid and ice

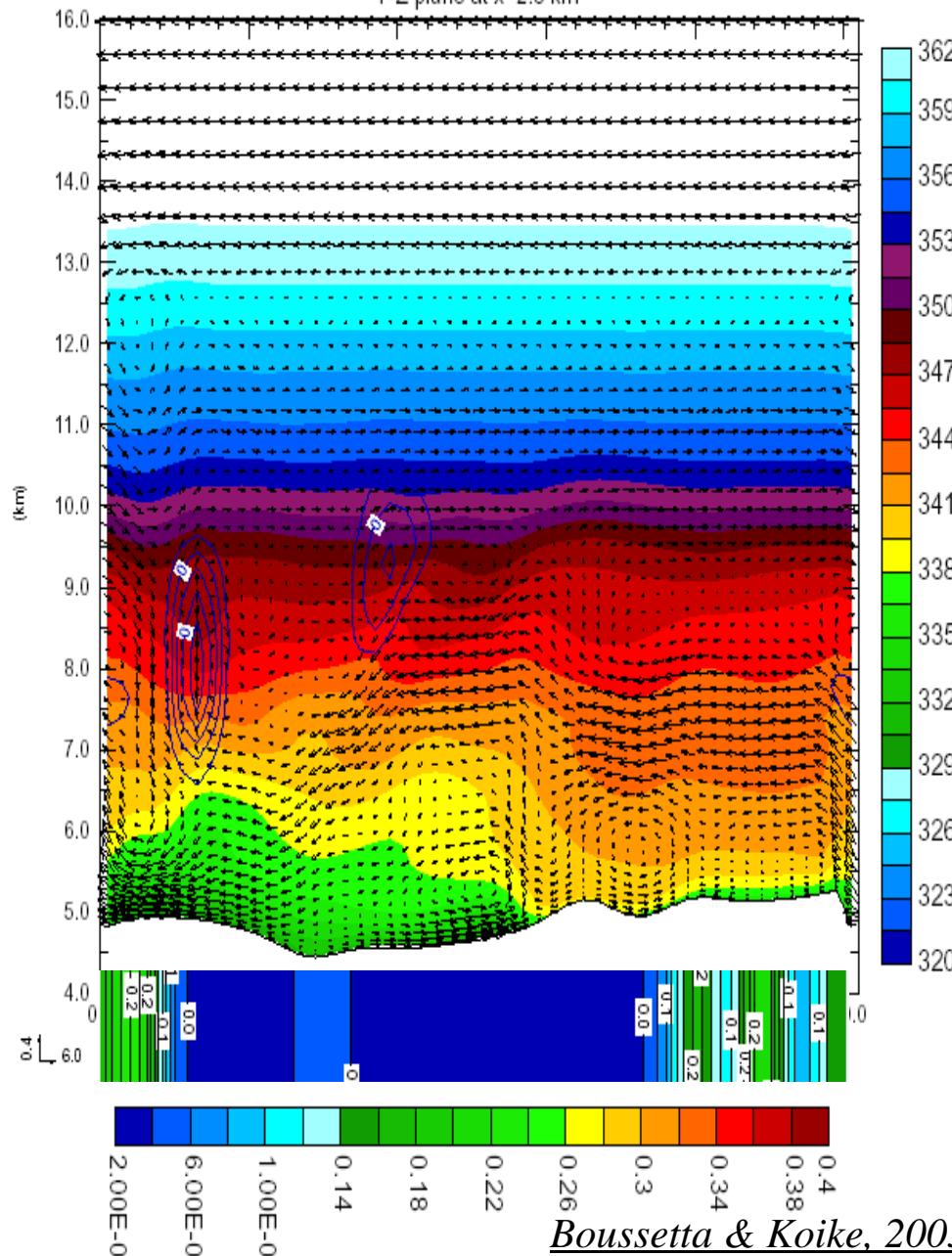
20:00LT Thu 9 Jul 1998 t=396000.0 s (\*\*:00:00)

Y-Z plane at x=2.5 km

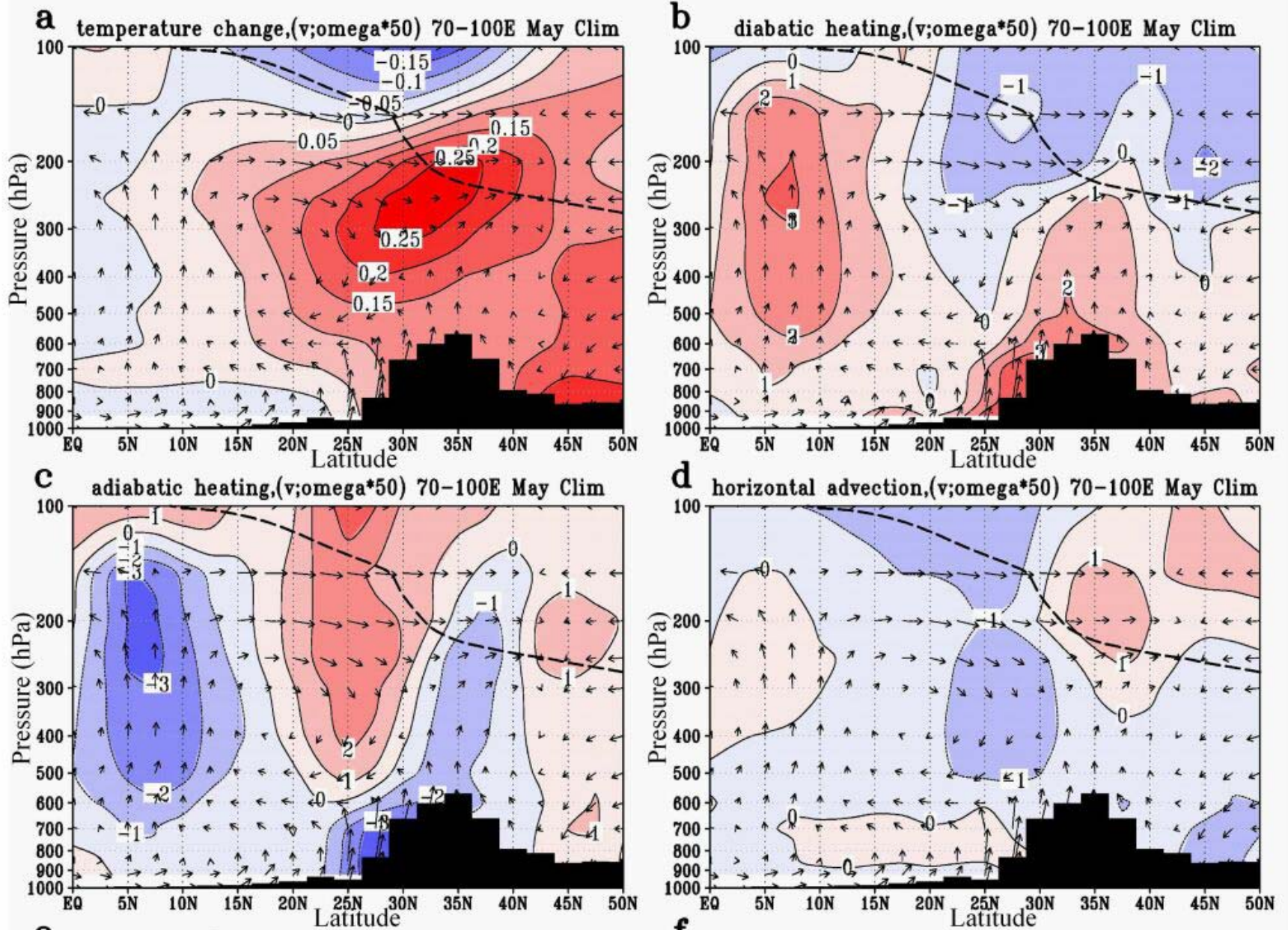


20:00LT Thu 9 Jul 1998 t=396000.0 s (\*\*:00:00)

Y-Z plane at x=2.5 km





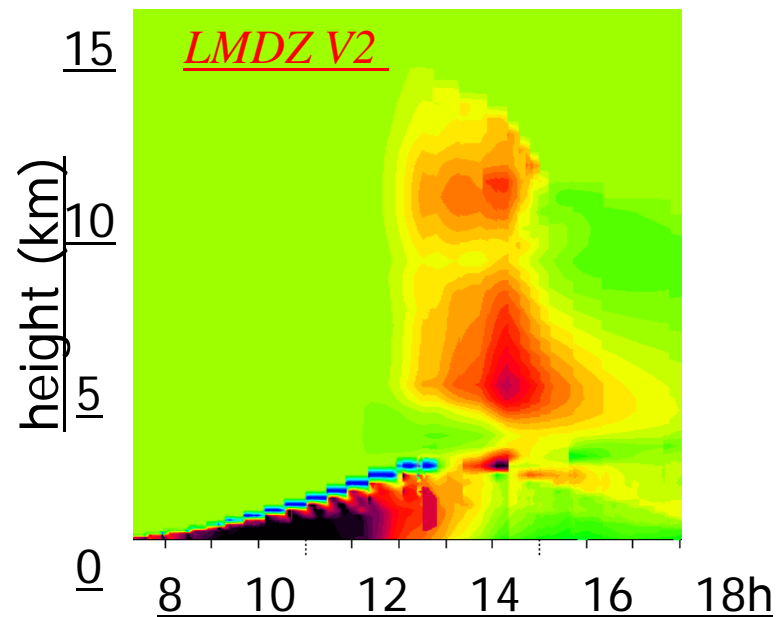
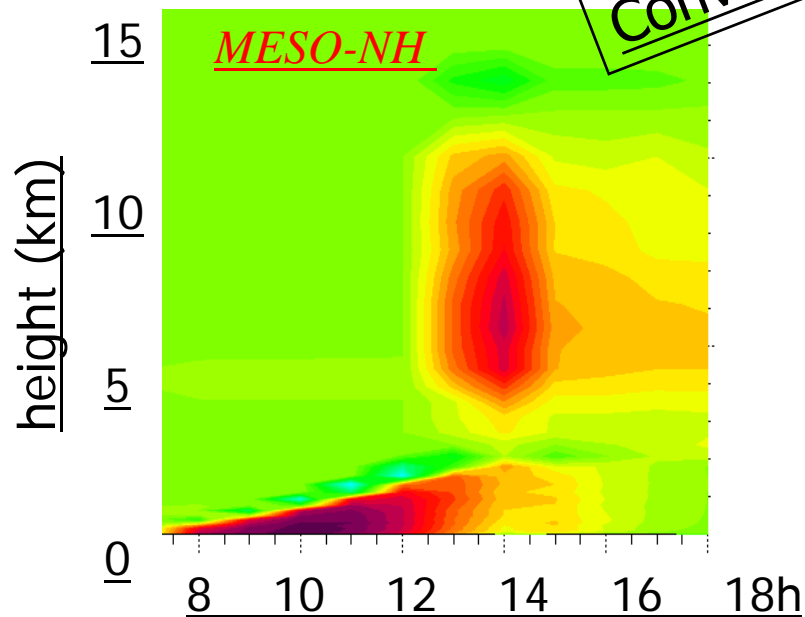
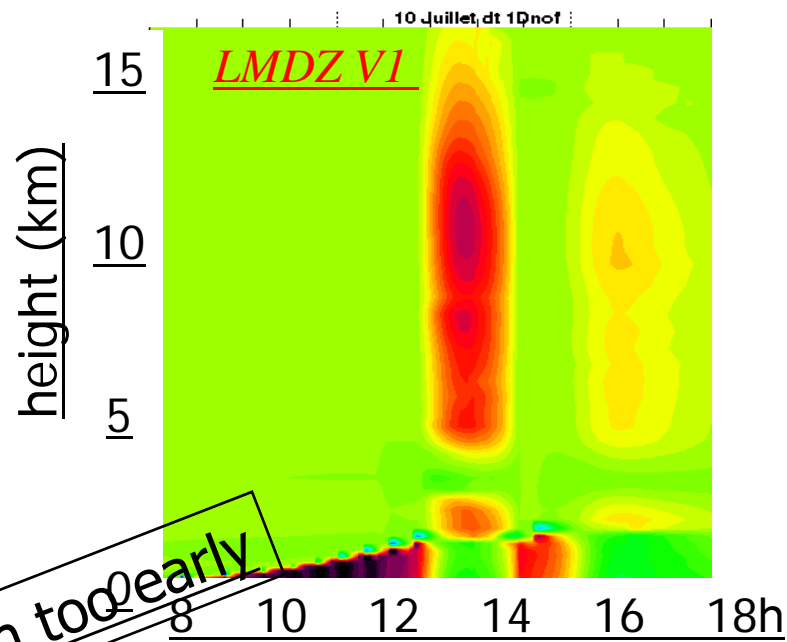
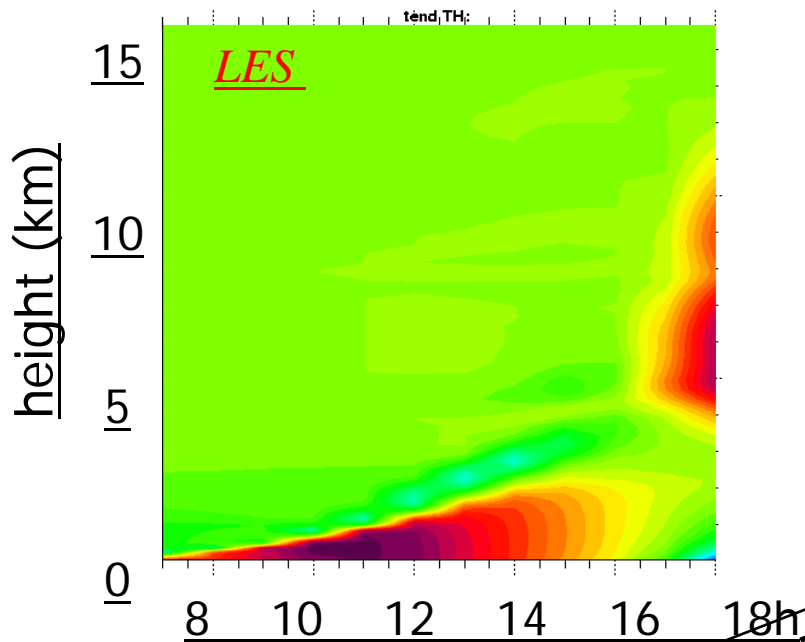


## Heat Budget in the Atmosphere over the Tibetan Plateau

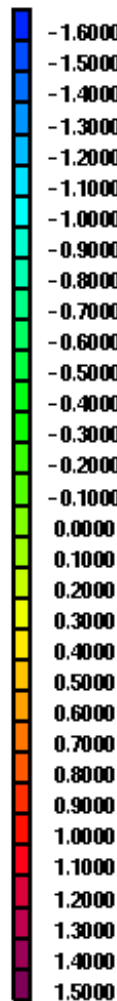
based on the NCEP/NCAR RA climatology.

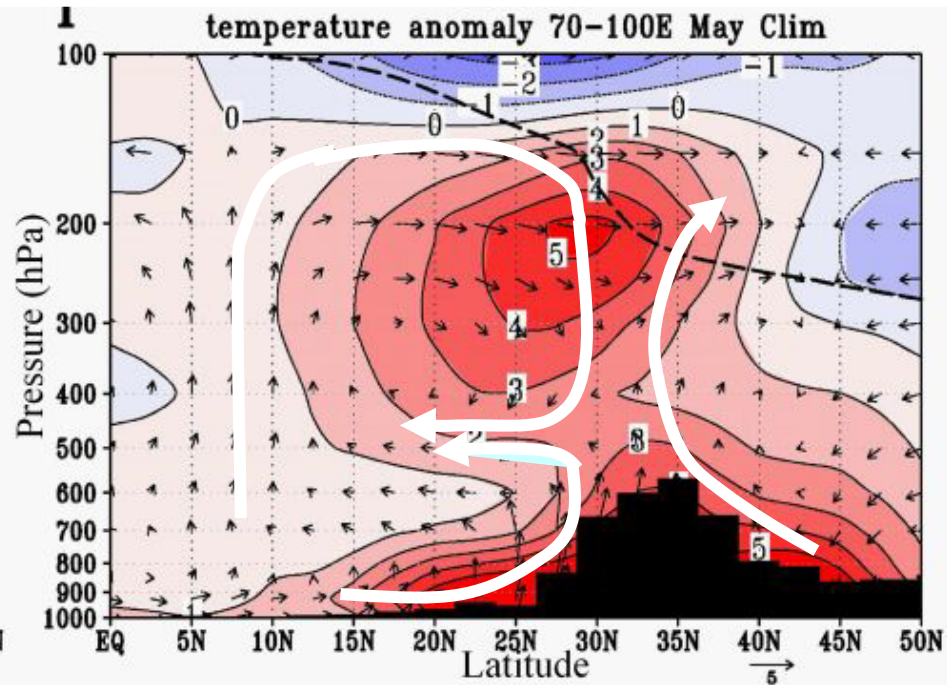
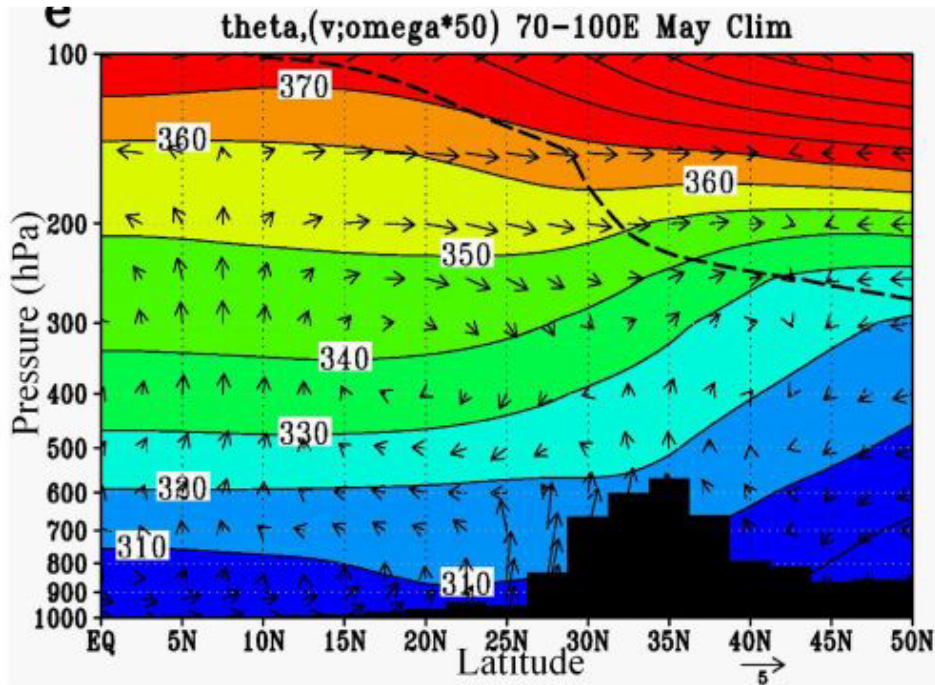
# 1D simulations

Heating rate K/h



Convection too early

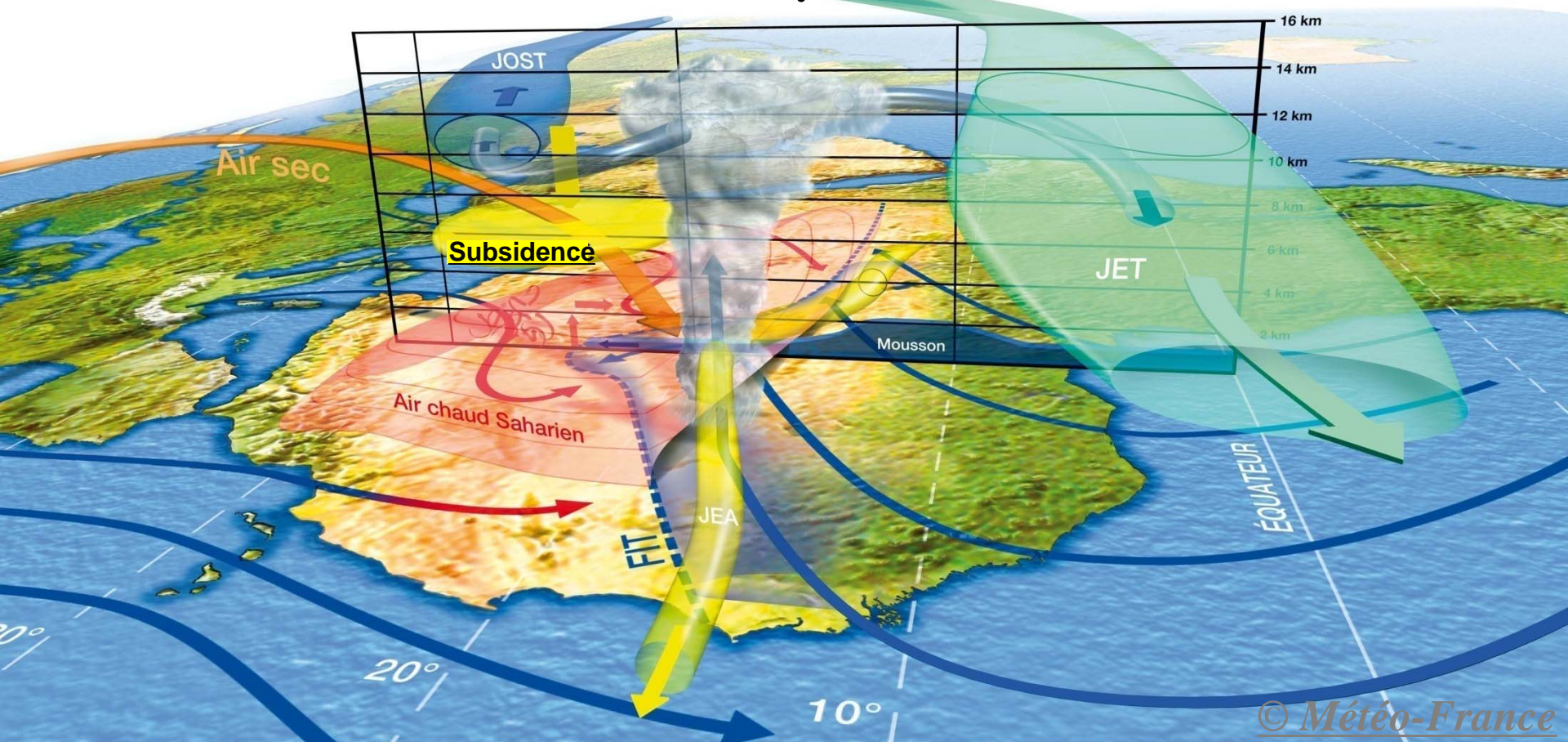




## Wind and Air Temperature Fields over the Tibetan Plateau

based on the NCEP/NCAR RA climatology.

# WAM Conceptual model



1. **Saharan Heat Low (HL)**  $\Rightarrow$  2 convergent fluxes  
 Northerly wind (Harmattan)  $\Rightarrow$  ITD  $\leftarrow$  Monsoon Flux
2. Baroclinicity  $\rightarrow$  **African Easterly Jet** 600-700 hPa  $\rightarrow$  AEWs (instable)
3. Convection: favorable conditions  $\sim$ AEJ: CAPE+Shear+Dry Air
4. Upper Trop: Anticyclonic Divergent Flux  $\rightarrow$  acceleration TEJ+SubT Jet
5. **Dry intrusions** from midlatitudes + **Subsidence** above the HL

# 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


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




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



1<sup>st</sup> International Coordination Group Meeting, Bali, Sep. 2007



3<sup>rd</sup> Asian Water Cycle Symposium, Beppu, Dec. 2007

# GEOSS Asian Water Cycle Initiative (AWCI)

19 Member Countries

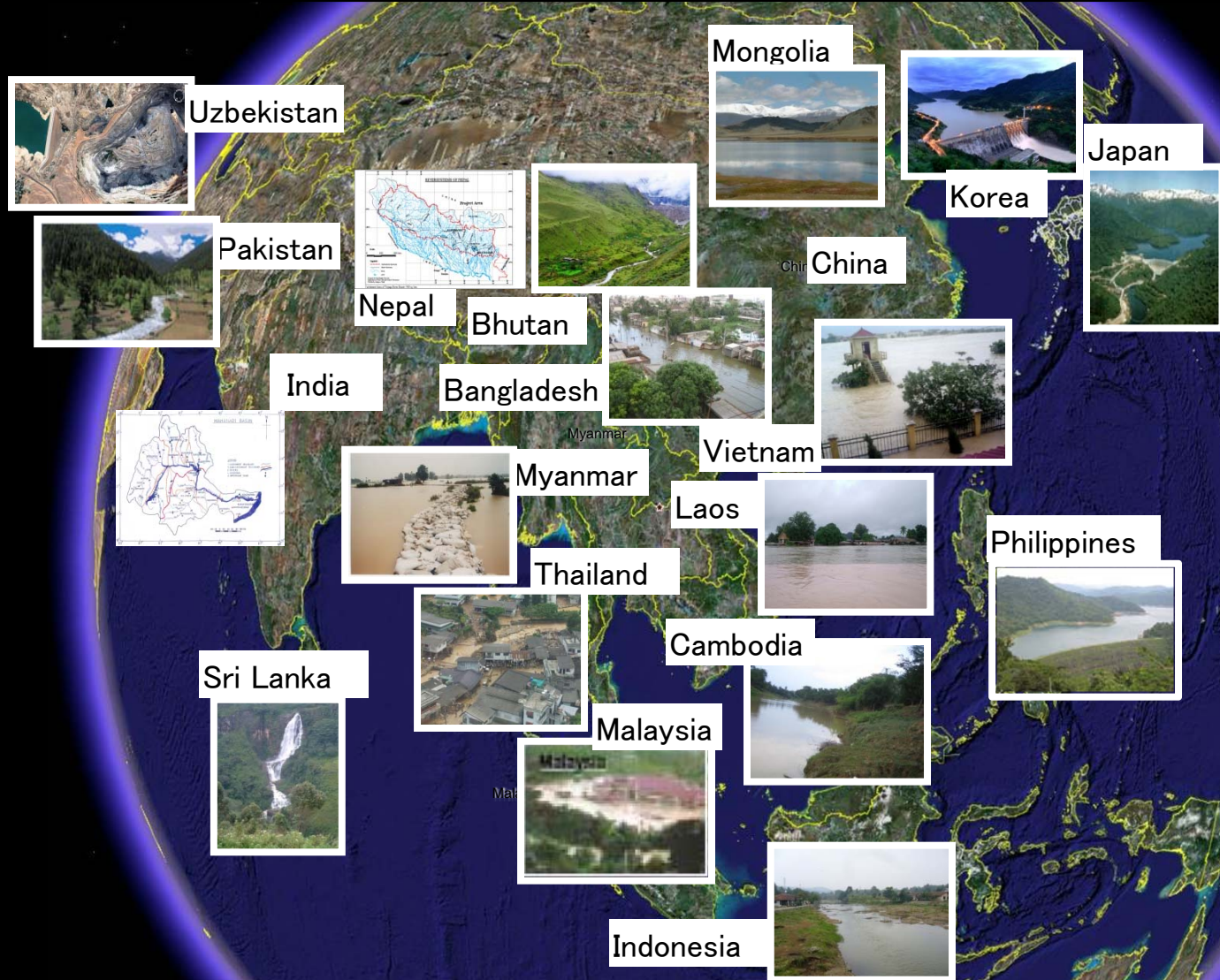




# GEOSS Asian Water Cycle Initiative (AWCI)

19 Member Countries

18 River Basins for Initial Demonstration





# Data status as of 2009/04/10

	Country	Basin Name	Basic Info.	Raw DataUpload		Quality Control		Metadata Initial Registration		Metadata Update	Remarks
			Complete	Ready	Complete	Ready	Complete	Ready	Complete	Complete	
1	Bangladesh	Meghna	09/01/20	09/01/20 09/04/02							Number of Station were changed (09/04/02)
2	Bhutan	Punatsangchhu	09/01/20	09/01/22	09/02/03	09/02/05	△	09/02/05			
3	Cambodia	Sangker	08/10/30	09/02/06	△			08/11/04			
4	India	Seonath	08/07/22	08/08/22	○						
5	Indonesia	Mamberamo	09/01/20	09/01/20	○						
6	Japan	Tone	08/10/30	08/12/26	08/12/26	09/01/18	△	08/12/26			
7	Korea	Upper Chungju-dam	08/08/05	08/08/05	08/10/02	08/11/02		08/11/04			
8	Lao PDR	Sebangfai									
9	Malaysia	Langat	09/02/06	09/02/06 09/02/11							Station location changed (09/02/11)
10	Mongolia	Selbe	08/07/22	08/08/22							
11	Myanmar	Shwegyin	09/01/22	09/01/22	09/03/05						
12	Nepal	Bagmati	08/11/10	08/11/12	09/01/17						
13	Pakistan	Swat	08/07/22 09/04/01	08/08/22 09/04/02							Basin Name/ location was changed (09/04/02)
14	Philippines	Pampanga	08/08/05	08/08/22	○						
15	Sri Lanka	Kalu Ganga	08/08/05	08/08/22	09/01/20						
16	Thailand	Mae Wang	08/08/05	08/09/01	09/01/31						
17	Uzbekistan	Chirchik-Okhangaran	08/08/05	08/09/01 09/04/02	○						Number of Station were changed (09/04/02)
18	Vietnam	Huong	08/07/22	08/09/04	○						

YY/MM/DD : Handling Date

○ : Full Data provided by offline

△ : Partial Data provided by offline

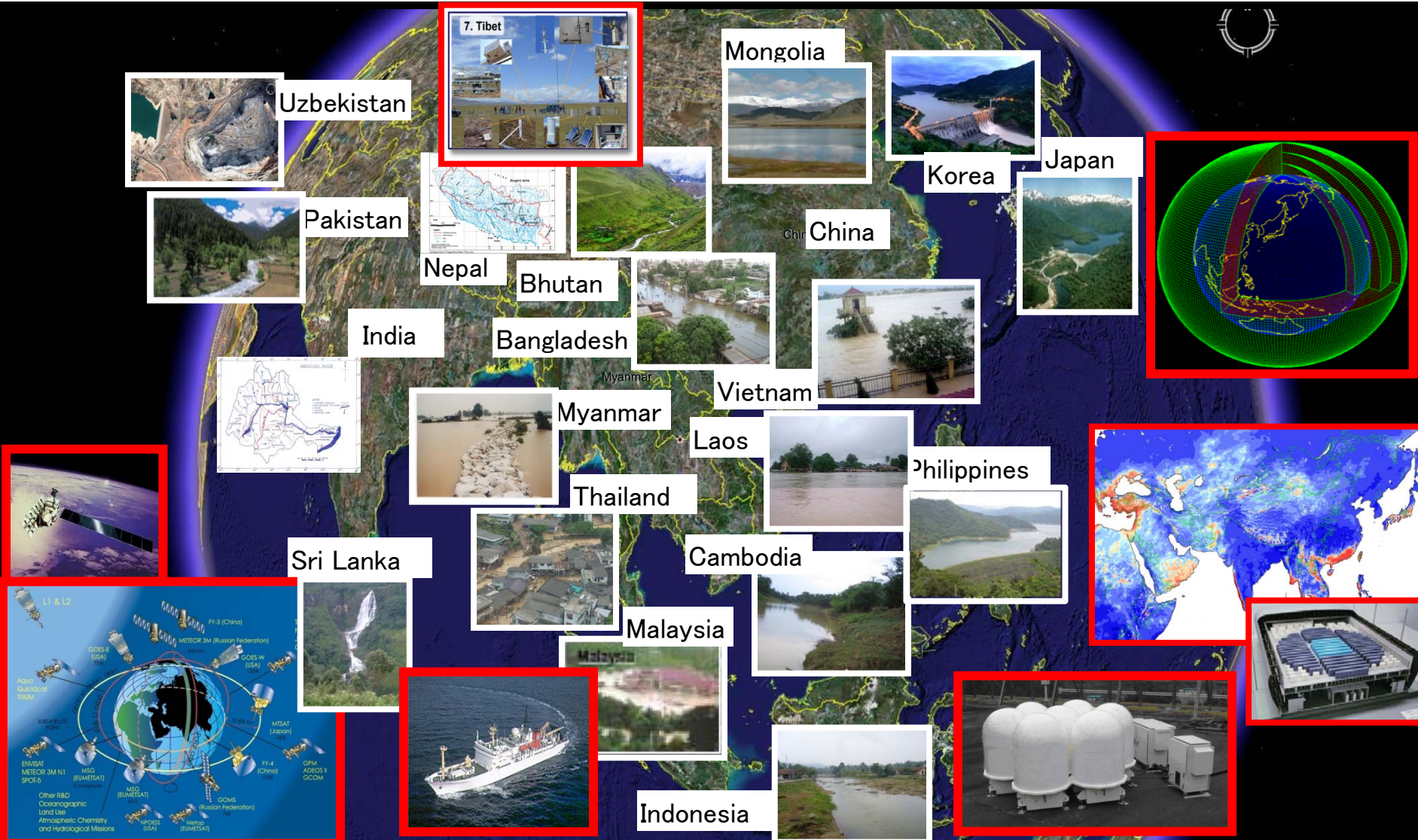
Completely Finished

Partially Finished

# GEOSS Asian Water Cycle Initiative (AWCI)

19 Member Countries

18 River Basins for Initial Demonstration



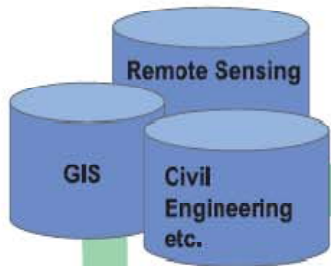
# GEOSS Asian Water Cycle Initiative (AWCI)

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18 River Basins for Initial Demonstration



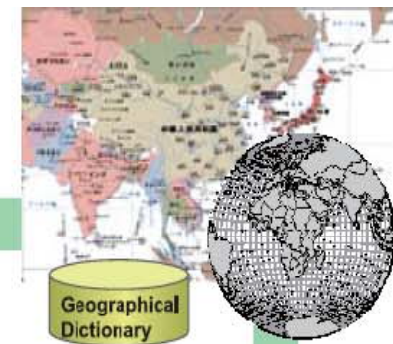
# Technical Term Dictionary



Reverse Dictionary

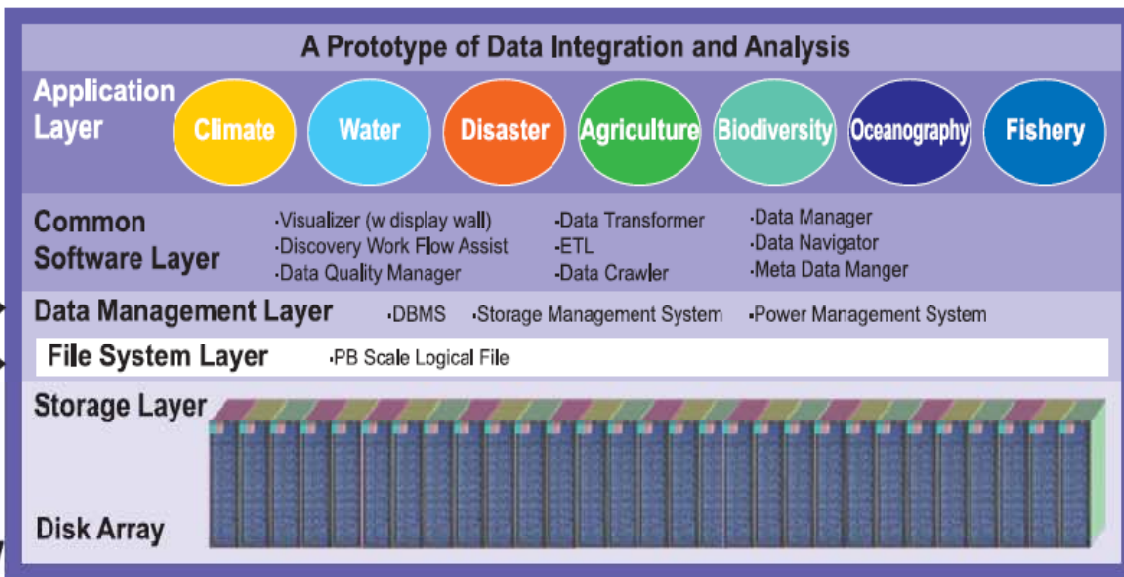
# DIAS

## Data Integration & Analysis System



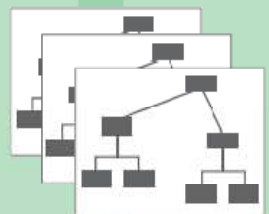
Geographical Dictionary

Extra Diversity and Complex Relativity of Data and Information



### Data model Searching System

UML Metadata  
XML Schema



Hierarchical Diagram

### Data Related information Archive System

OWL Association/Link Knowledge

Database Across Searching System

Extra-Large Volume data from various data and information source



In-situ Observation



Citizen Observation



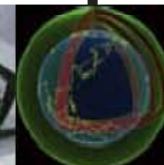
Oceanographic Observation



Satellite Observation



Weather and Climate Model



Operational Observation



Operational Information

# GEOSS African Water Cycle Symposium Tunis, 6-8, Jun., 2009



**109** participants from  
**16** countries  
**4** UN Agencies  
**2** Space Agencies  
**2** GEO Secretary

**12** from Africa  
**2** from Europe  
**1** form North America  
**1** from Asia

## Maroc ●

- Data & information system for river management

## Senegal ●

- GIS and urban flood management

## Cote d'Ivoire ●

- Lagoon environment

## Ghana ●

- Volta-regional project

## Benin ●

- PROJET OUEME2025
- Met service
- Realism of Water resources prediction

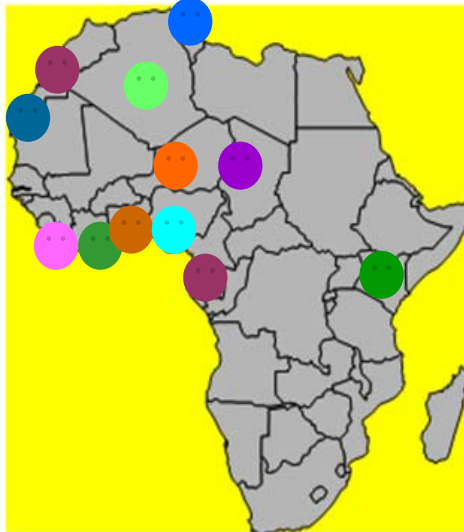
## Nigeria ●

- Climate change & Moisture Availability

# Reports from 12 African Countries

## Algeria ●

- Data acquisition, planning, protection



## Niger ●

- ACMAD, AGRHYMET

## Tchad ●

- Lake Chad variability

## Cameroun ●

- Climate Modification

## Tunisia ●

- Water for agriculture
- Met service
- Data & Information system for water Res.
- Drought analysis
- Water pollution
- Sustainable water management
- Ground water & its salinization
- Water diversion management system
- Water balance

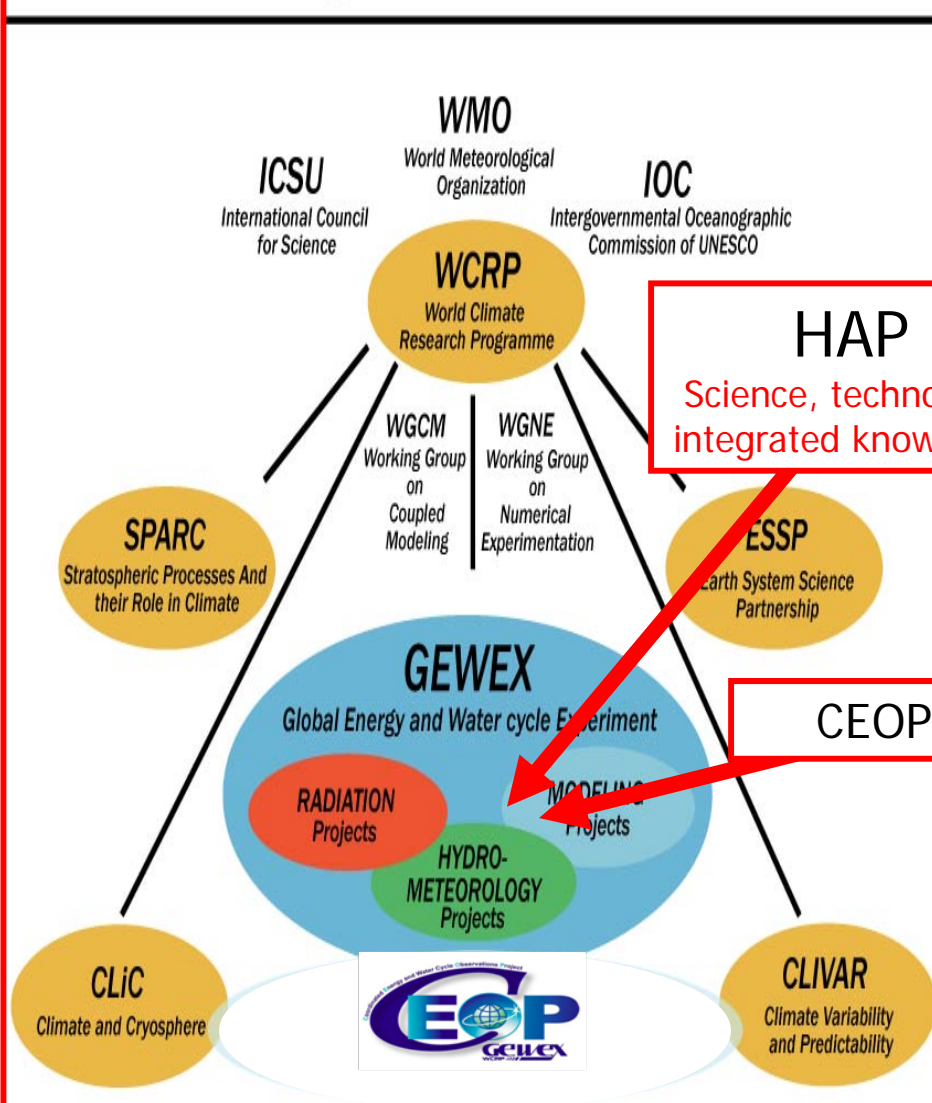
## Kenya ●

- Downscaling of climate/Met info. for river management
- Flood management & mitigation

# Societal Benefits!

Countries, Operational Sectors.  
Data and People

## GEWEX Organization Within WCRP



Reports from 12 African Countries	
<b>Maroc</b>	• Data & information system for river management
<b>Senegal</b>	• GIS and urban flood management
<b>Cote d'Ivoire</b>	• Lagoon environment
<b>Ghana</b>	• Volta-regional project
<b>Benin</b>	• PROJET OUEME2025
<b>Niger</b>	• Met service
<b>Nigeria</b>	• Climate change & Moisture Availability
<b>Tchad</b>	• Lake Chad variability
<b>Kenya</b>	• Downscaling of climate/Met. info. for river management
<b>Tunisia</b>	• Met service
<b>Algeria</b>	• Data acquisition, planning, protection
<b>Tunisia</b>	• Data & Information system for water Res.
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<b>Cameroun</b>	• Climate Modification

**HAP**  
Science, technology, integrated knowledge

**CEOP Data**

