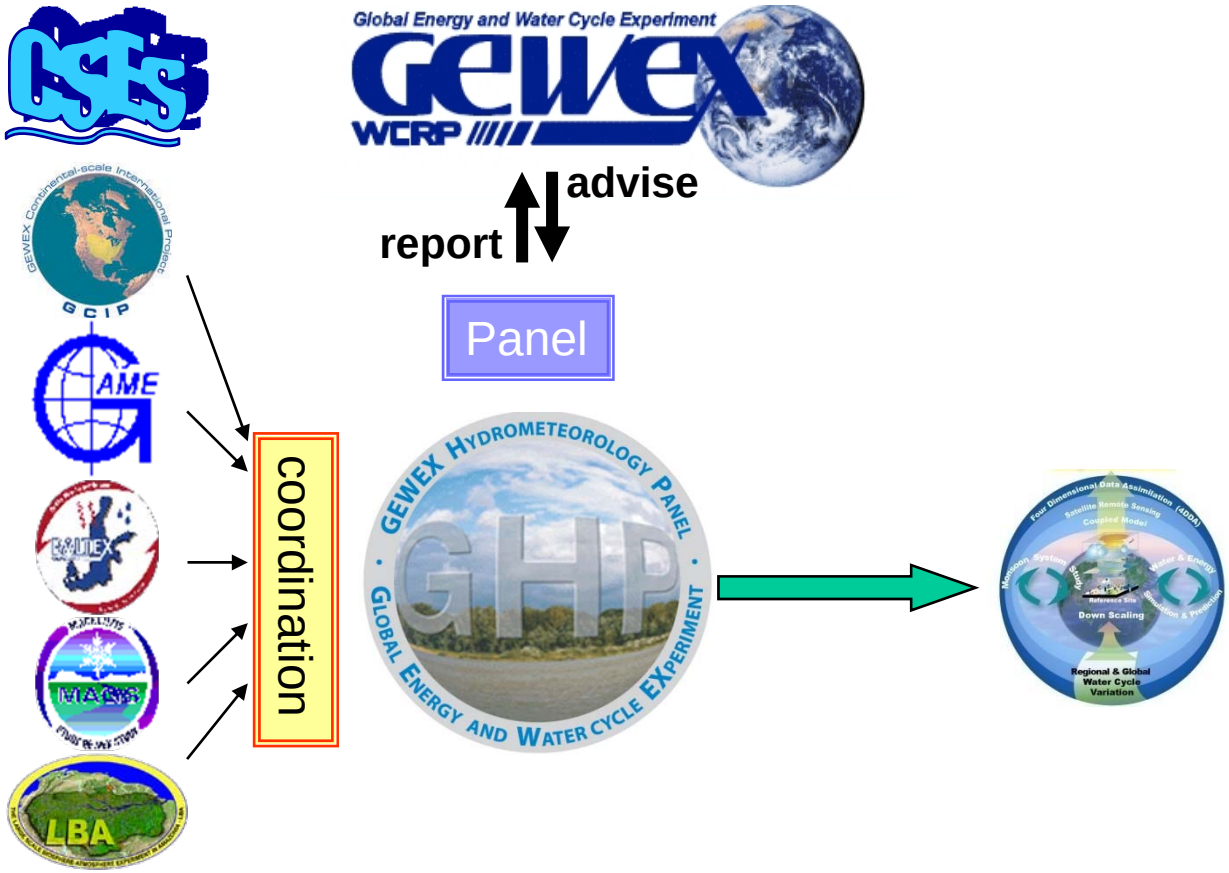
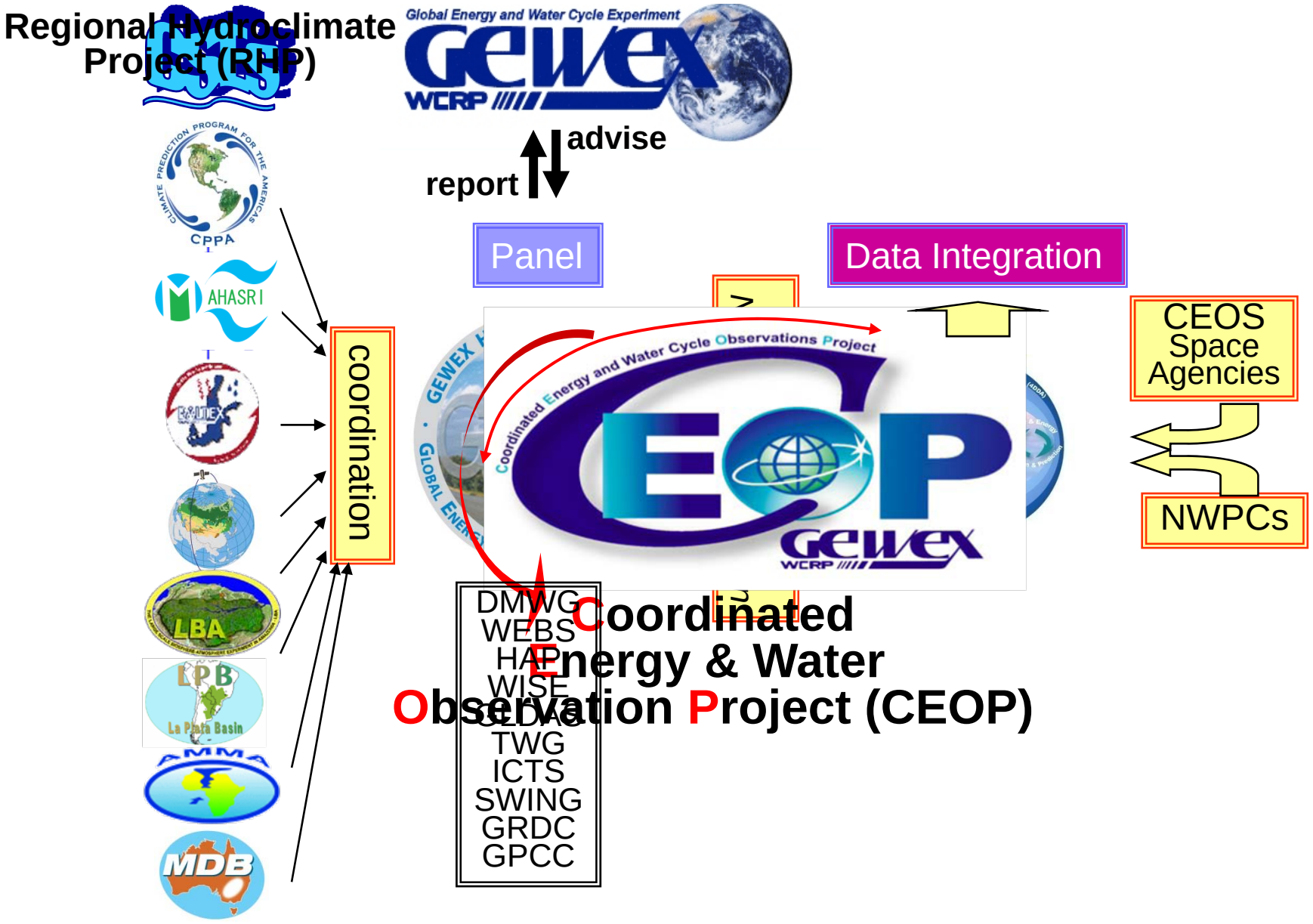
Dr. John Roads, Research Professor at the University of California, San Diego, Scripps Institute of Oceanography, Co-Chair of the GEWEX Coordinated Energy and Water Cycle Observations Project (CEOP), and former Chair of the GEWEX Hydrometeorology Panel (GHP), died on Saturday, 21 June, following a 2-year battle with leukemia.

John completed the merger of GHP and CEOP successfully, and made out a strategic implementation plan for CEOP by encouraging the members of the drafting team. His excellent vision and enthusiastic contribution led us up to this stage of the CEOP implementation. We are fortunate to have known John and will miss him deeply.

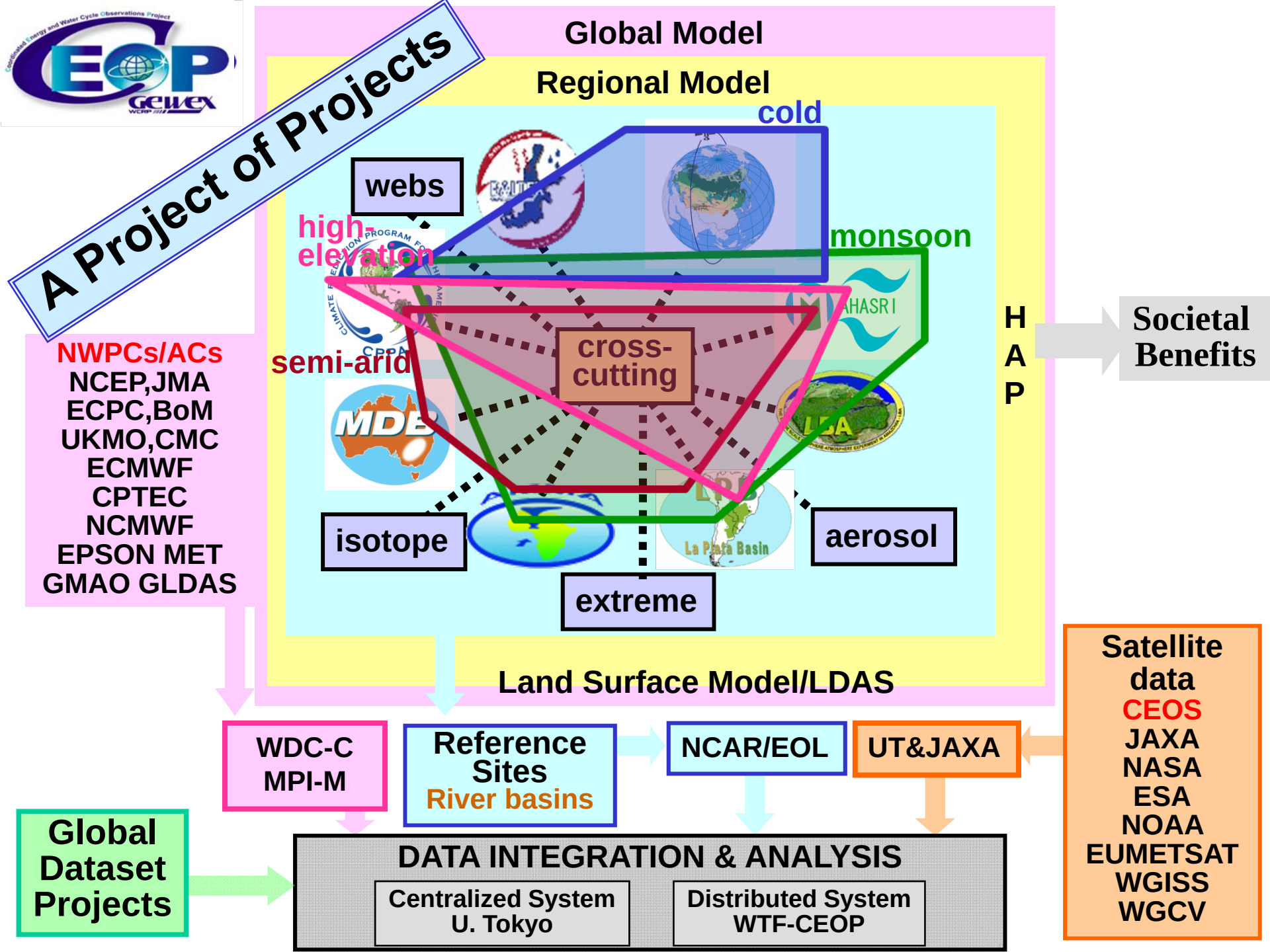
We would like to make a memorial web page of our friend and colleague John Roads to pay a tribute to his unique personality as well as to his numerous achievements in the science field and successful leadership of GHP and CEOP. We would very welcome and appreciate for your contribution to this web page by offering your personal memorial essays and photos of John.



History of CSEs/RHPs, GHP and CEOP



History of CSEs/RHPs, GHP and CEOP


A Project of Projects
Global Model
Regional Model
cold
webs
high-elevation
monsoon
semi-arid
cross-cutting
isotope
aerosol
extreme
MDB
LBA
La Plata Basin
AHASRI
CPPA
NWPCs/ACs
NCEP,JMA
ECPC,BoM
UKMO,CMC
ECMWF
CPTEC
NCMWF
EPSON MET
GMAO GLDAS
H
A
P
Societal Benefits
Land Surface Model/LDAS
WDC-C
MPI-M
Reference Sites
River basins
NCAR/EOL
UT&JAXA
Satellite data
CEOS
JAXA
NASA
ESA
NOAA
EUMETSAT
WGISS
WGCV
Global Dataset Projects
DATA INTEGRATION & ANALYSIS
Centralized System
U. Tokyo
Distributed System
WTF-CEOP

Strategic Implementation

Goals

To
understand and predict
continental to local-scale hydroclimates
with applications.

Strategic Implementation

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?

vi. Can we simulate and predict the hydroclimate?

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

Strategic Implementation

Specific Technical Issues

1. Developing an integrated hydroclimate data set that can be used to answer the main scientific questions noted above.
2. Developing the capability to handle and disseminate a large amount of amount of data from diverse sources
3. Analyzing and comparing with model simulations this diverse data to understand the underlying mechanisms and model deficiencies.
4. Assimilating and integrating the data with newly developed models.
5. Transferring CEOP methodologies to other regions, sectors, and applications .

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.

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

WDC-C
MPI-M

Reference Sites
River basins

NCAR/EOL

UT&JAXA

Satellite data
CEOS
JAXA
NASA
ESA
NOAA
EUMETSAT
WGISS
WGCV

Global Dataset Projects

DATA INTEGRATION & ANALYSIS

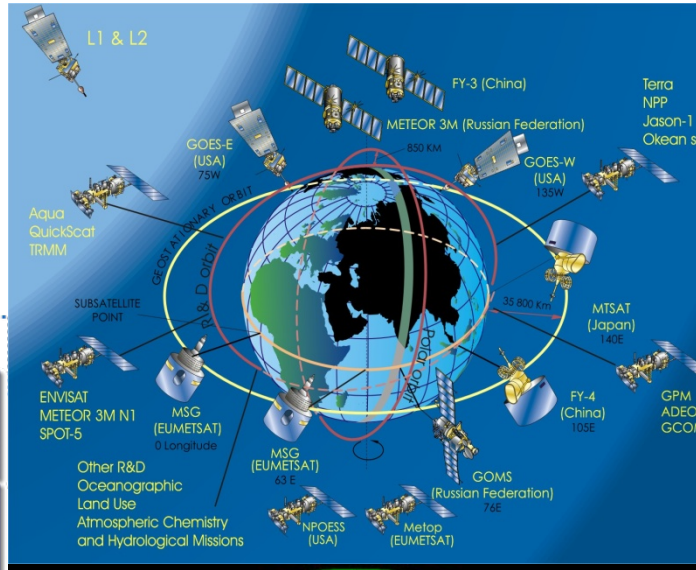
Centralized System
U. Tokyo

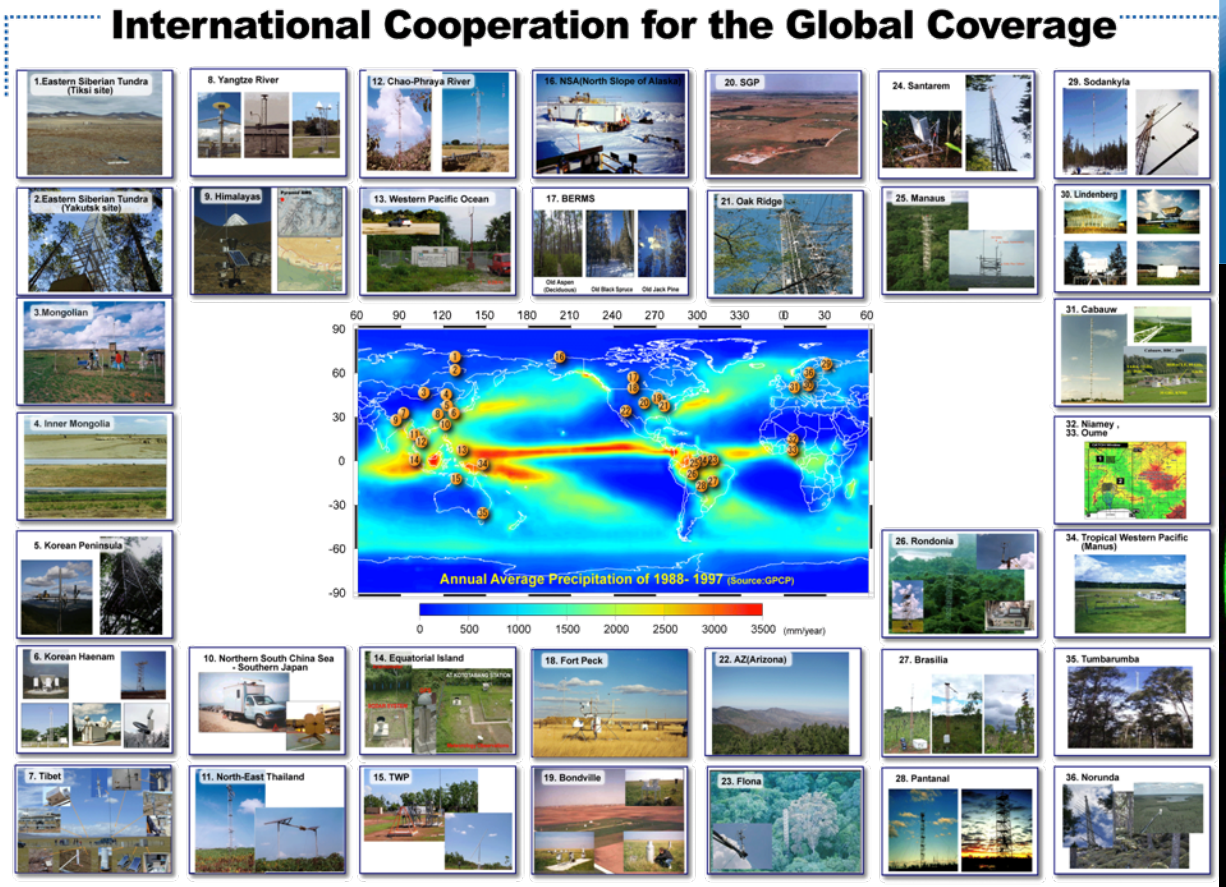
Distributed System
WTF-CEOP

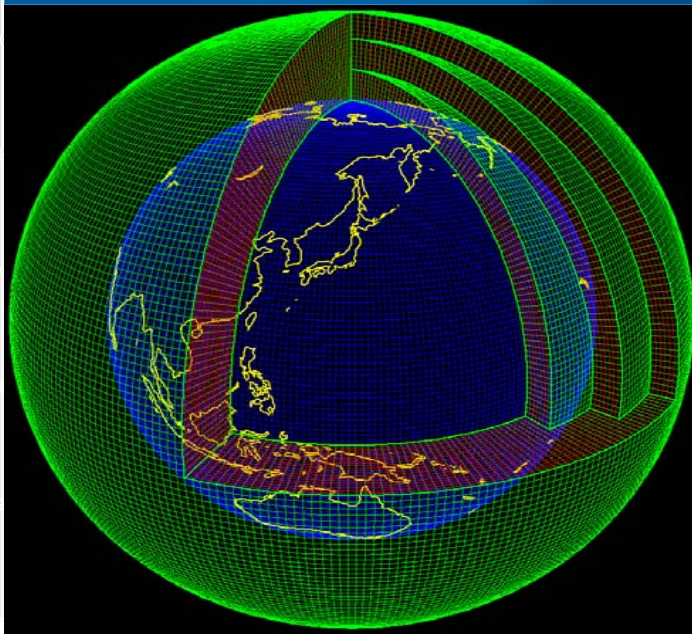
Coordinated Enhanced Observing Period
Three Unique Capabilities

Convergence of Observations

A Prototype of the Global Water Cycle Observation System of Systems



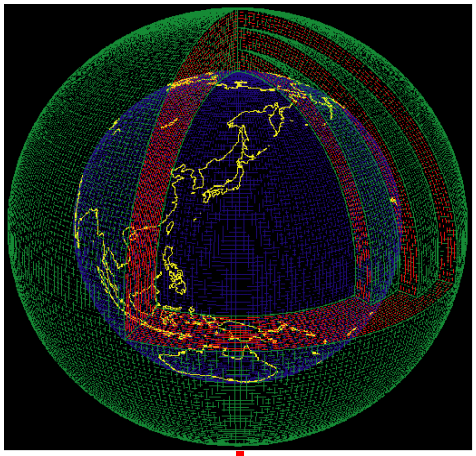


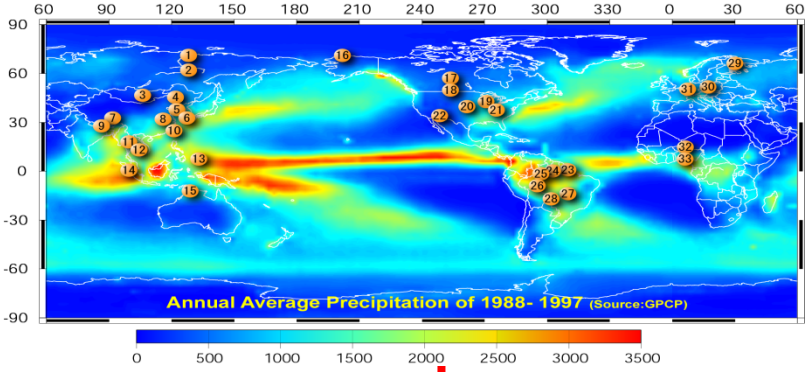


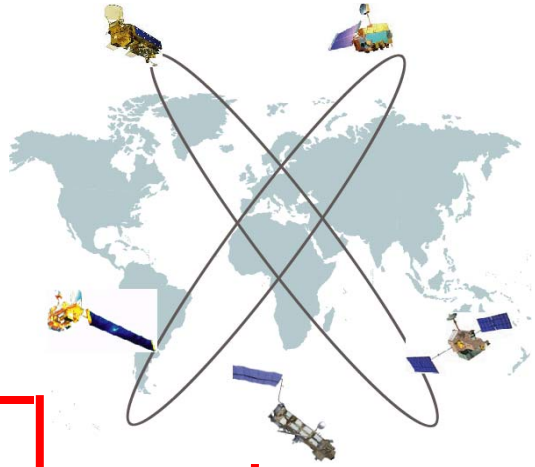
Coordinated Enhanced Observing Period
Three Unique Capabilities

Interoperability Arrangement

A well organized collecting, processing, storing, and disseminating shared data, metadata and products



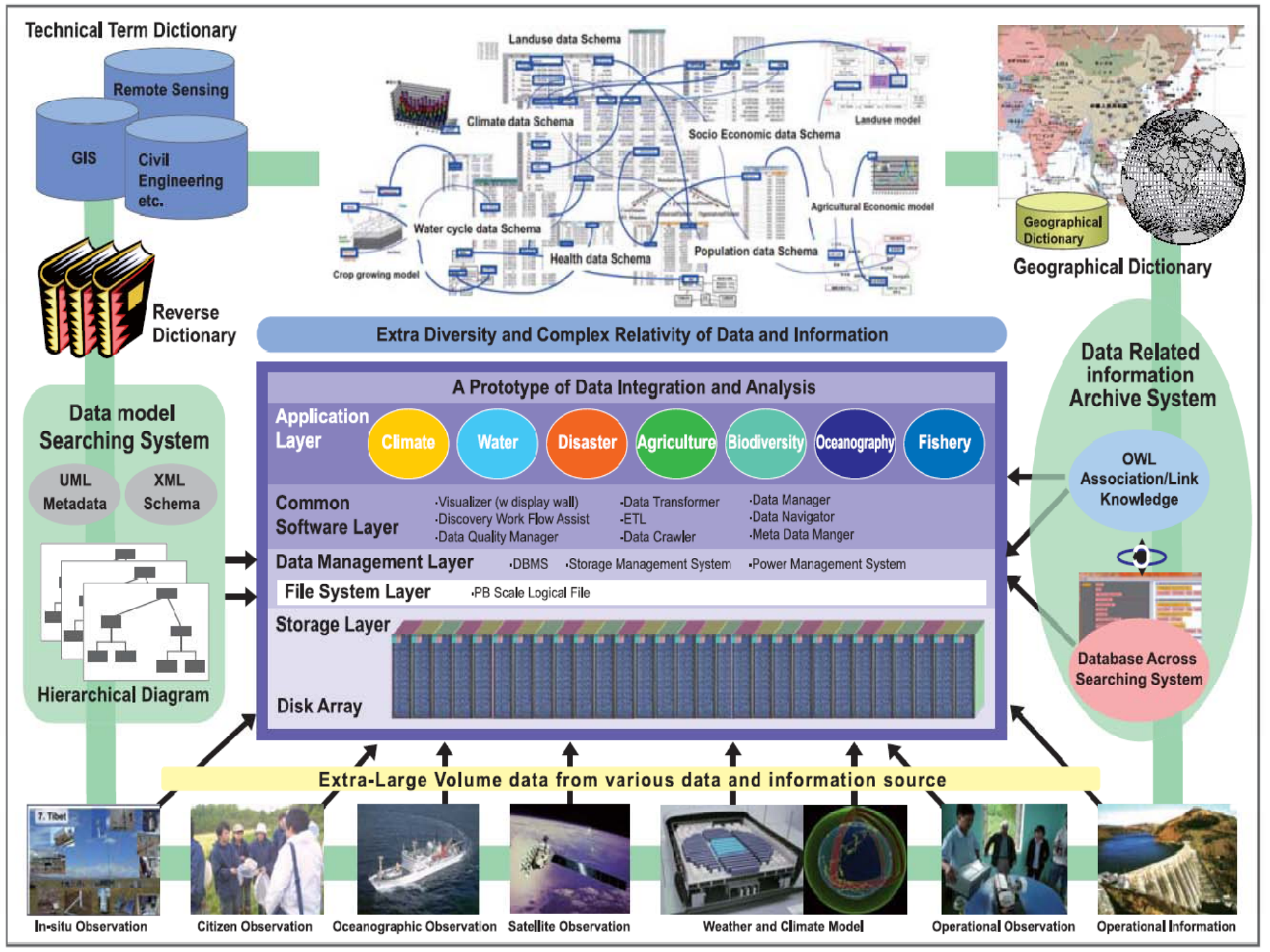




In-Situ Data Archiving Center at NCAR (National Center for Atmospheric Research) of USA

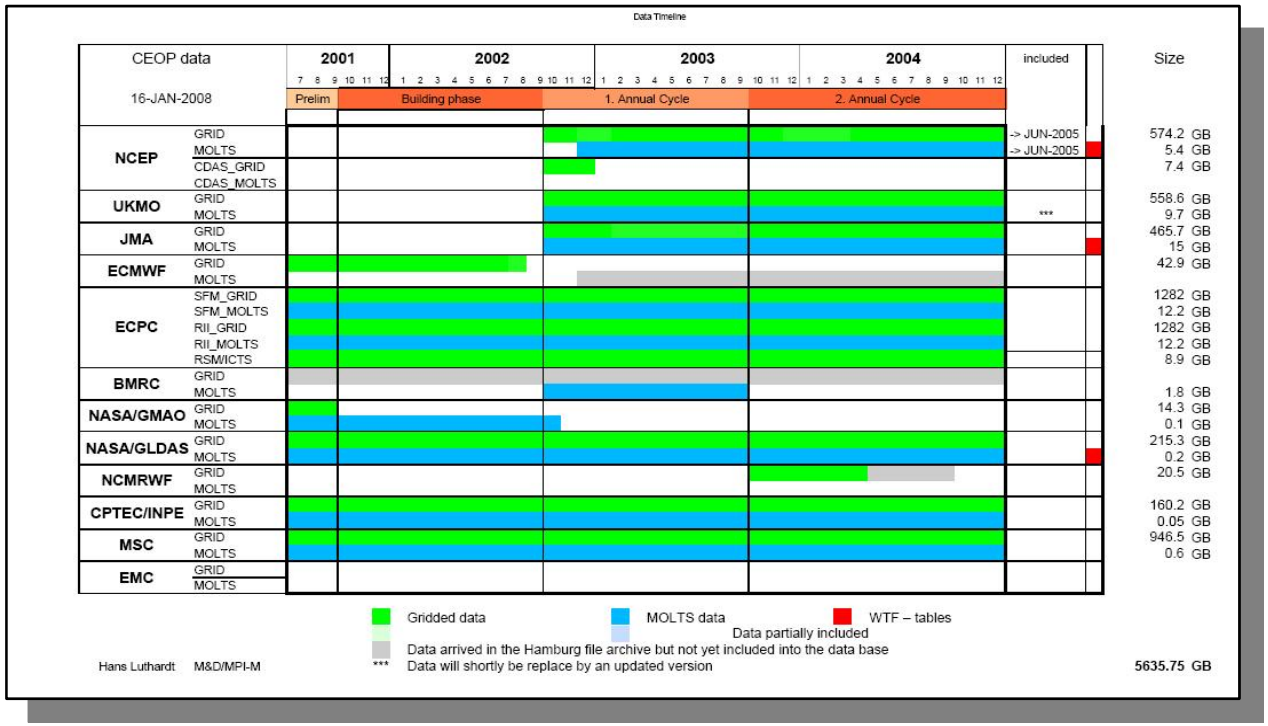
Model Output Data Archiving Center at the World Data Center for Climate, Max-Planck Institute for Meteorology of Germany

Data Integrating/Archiving Center at University of Tokyo and JAXA of Japan


Technical Term Dictionary
Remote Sensing
GIS
Civil Engineering etc.
Reverse Dictionary
Landuse data Schema
Climate data Schema
Socio Economic data Schema
Landuse model
Agricultural Economic model
Water cycle data Schema
Health data Schema
Population data Schema
Crop growing model
Geographical Dictionary
Geographical Dictionary
Extra Diversity and Complex Relativity of Data and Information
Data model Searching System
UML Metadata
XML Schema
Hierarchical Diagram
A Prototype of Data Integration and Analysis
Application Layer
Climate
Water
Disaster
Agriculture
Biodiversity
Oceanography
Fishery
Common Software Layer
·Visualizer (w display wall)
·Discovery Work Flow Assist
·Data Quality Manager
·Data Transformer
·ETL
·Data Crawler
·Data Manager
·Data Navigator
·Meta Data Manger
Data Management Layer
·DBMS
·Storage Management System
·Power Management System
File System Layer
·PB Scale Logical File
Storage Layer
Disk Array
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

Model Data Content

(as of 1 February 2008)



The most recent version of the data status (time line) can be found from:

http://www.mad.zmaw.de/wdc-for-climate/ceop/

2007 30th Formal Telecon (30 Jan)
2006 29th Formal Telecon (14 Nov)
28th Formal Telecon (12 Sept)
27th Formal Telecon (11 July)
26th Formal Telecon (16 May)
25th Formal Telecon (28 Mar)
24th Formal Telecon (17 Jan)
2005 23rd Formal Telecon (08 Nov)
22nd Formal Telecon (20 Sep)
21st Formal Telecon (19 Jul)
20th Formal Telecon (25 May)
19th Formal Telecon (31 Mar)
18th Formal Telecon (18 Jan)
2004 17th Formal Telecon (7 Dec)
16th Formal Telecon (5 Oct)
15th Formal Telecon (10 Aug)
14th Formal Telecon (15 Jun)
13th Formal Telecon (27 Apr)
12th Formal Telecon (25 Feb)
11th Formal Telecon (9 Jan)
2003 10th Formal Telecon (3 Dec)
9th Formal Telecon (28 Oct)
8th Formal Telecon (17 Sep)
7th Formal Telecon (30 Jul)
6th Formal Telecon (2 Jun)
5th Formal Telecon (28 Apr)
4th Formal Telecon(11 Mar)
3rd Formal Telecon (3 Feb)
2nd Formal Telecon (17 Dec)
2002 1st Formal Telecon (15 Nov)

CEOP SFC Data Status and Quality

The colors represent the CEOP Data Quality Flags (see definitions) as follows: green=G, yellow=D, red=B, black=I, gray=U. Note that the time period covered varies from station to station. If a station does not measure any FLX parameters it is not included in this table.

For the Soil Temperature and Moisture Data Status and Quality summary click here.
For the Meteorological Tower Data Status and Quality summary click here.
For the Flux Data Status and Quality summary click here.

RHP	Reference Site	Station	Station Pressure	Air Temp	Dew Point	Relative Humidity	Specific Humidity	Wind Speed	Wind Dir	U Wind	V Wind	Precip	Snow Depth	In Short	Out Short	In Long	Out Long	Net Rad	Skin Temp	In PAR	Out PAR
BALTEX	Cabauw	Cabauw											None							None	None
BALTEX	Lindenberg	Falkenberg																			
BALTEX	Lindenberg	Forest						None	None	None	None		None							None	None
BALTEX	Norunda	Norunda										None	None						None		
BALTEX	Sodankyla	Oberseratory Site A														None	None	None	None	None	None

RHP	Reference Site	Station	Station Pressure	Air Temp	Dew Point	Relative Humidity	Specific Humidity	Wind Speed	Wind Dir	U Wind	V Wind	Precip	Snow Depth	In Short	Out Short	In Long	Out Long	Net Rad	Skin Temp	In PAR	Out PAR
ClIC (MAGS)	BERMS		No data available yet.																		

RHP	Reference Site	Station	Station Pressure	Air Temp	Dew Point	Relative Humidity	Specific Humidity	Wind Speed	Wind Dir	U Wind	V Wind	Precip	Snow Depth	In Short	Out Short	In Long	Out Long	Net Rad	Skin Temp	In PAR	Out PAR
CPPA (GAPP)	Bondville	Bondville											None								
CPPA (GAPP)	Ft. Peck	Ft. Peck											None								
CPPA (GAPP)	Mt. Bigelow	Mt. Bigelow	No data available yet.																		
CPPA (GAPP)	Oak Ridge	Oak Ridge											None								

RHP	Reference Site	Station	Station Pressure	Air Temp	Dew Point	Relative Humidity	Specific Humidity	Wind Speed	Wind Dir	U Wind	V Wind	Precip	Snow Depth	In Short	Out Short	In Long	Out Long	Net Rad	Skin Temp	In PAR	Out PAR
CPPA (GAPP)	SGP (ARM)	C1 Lamont	None	None	None	None	None	None	None	None	None	None	None							None	None
CPPA (GAPP)	SGP (ARM)	E1 Lamed											None						None	None	None
CPPA (GAPP)	SGP (ARM)	E2 Hillsboro	None	None	None	None	None	None	None	None	None	None	None						None	None	None
CPPA (GAPP)	SGP (ARM)	E3 Le Roy											None						None	None	None
CPPA (GAPP)	SGP (ARM)	E4 Plevna											None						None	None	None
CPPA (GAPP)	SGP (ARM)	E5 Halstead											None						None	None	None
CPPA (GAPP)	SGP (ARM)	E6 Towanda											None						None	None	None
CPPA (GAPP)	SGP (ARM)	E7 Elk Falls											None						None	None	None

CEOP Reference Site Data Set Availability (as of 1 February 2008)

CSE	Reference Site	EOP-3	EOP-4
BALTEX	Cabauw		
	Lindenberg		
	Norunda		
	Sodankyla		
CAMP	Chao-Phraya River		
	Equatorial Island		
	Himalayas		
	K		
	K		
	Mongolia		
	Northeast Thailand		
	Northern South China Sea		
	Siberia Taiga		
	Siberia Tundra		
	Tibet		
	Tongyu		
	Western Pacific Ocean		
AMMA	Niamey	SF, Precip	SF, Precip
	Oueme	SF, Precip	SF, Precip

CSE	Reference Site	EOP-3	EOP-4
GAPP	Bondville		
	Ft. Peck		
	Mt. Bigelow		
	Oak Ridge		
	ARM SGP		
LBA	Brasilia		
	Caxiuana		
	Rondonia		
	Santarem		
MAGS	BERMS		
MDB	Murrumbidgee		
	Tumbarumba		
ARM	North Slope of Alaska		
	Tropical Western Pacific		

No magic, but just patient efforts!

Complete Partial

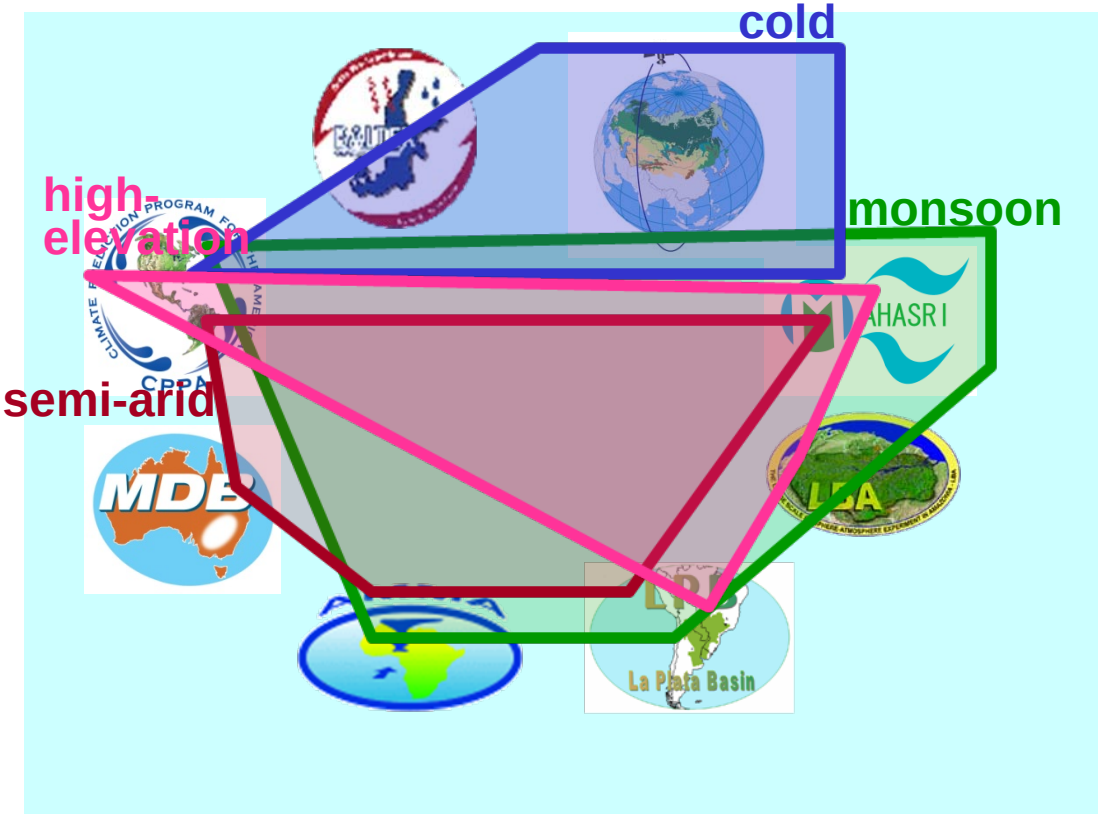
CEOP Objective #2:

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?


cold
high-
elevation
monsoon
semi-arid
MDB
LBA
La Plata Basin

CEOP Objective #2:

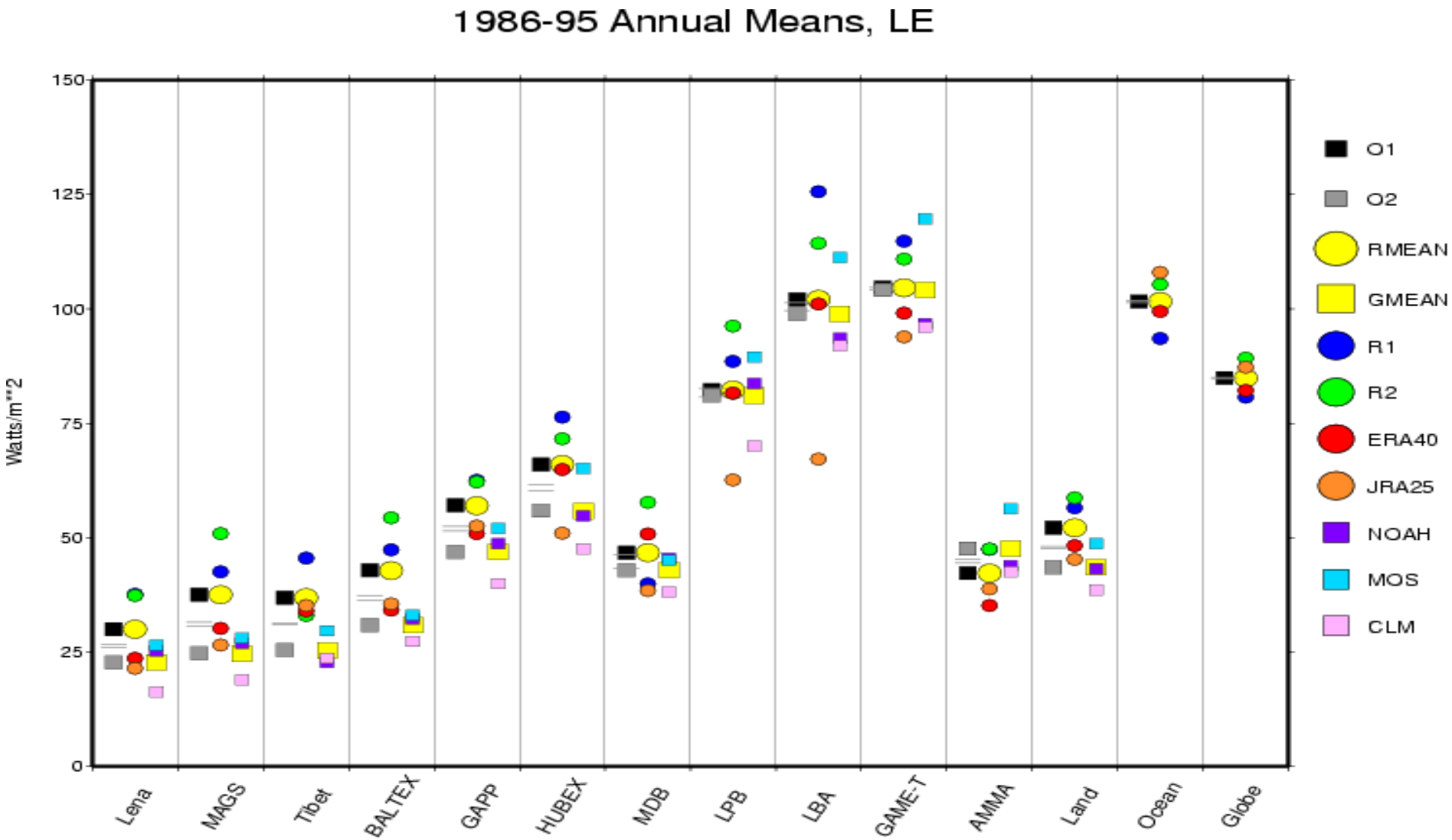
GEWEX Objective #2

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?

Average hydroclimate conditions



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GEWEX Objective #2

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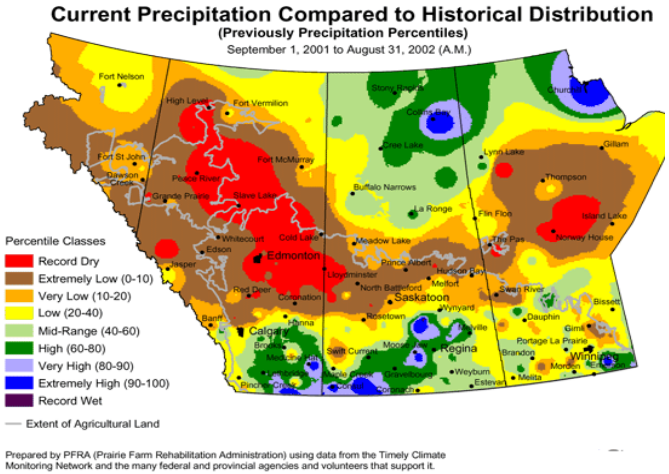
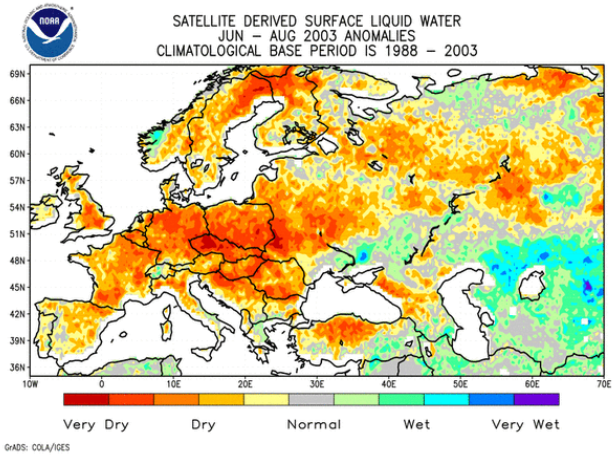
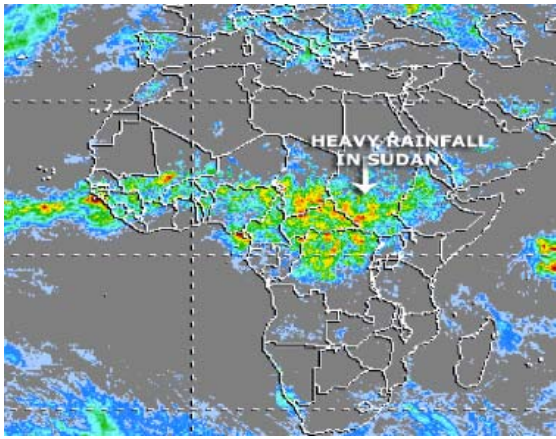
Extreme Events Impact Analysis Project







Drought in Canada in 2002

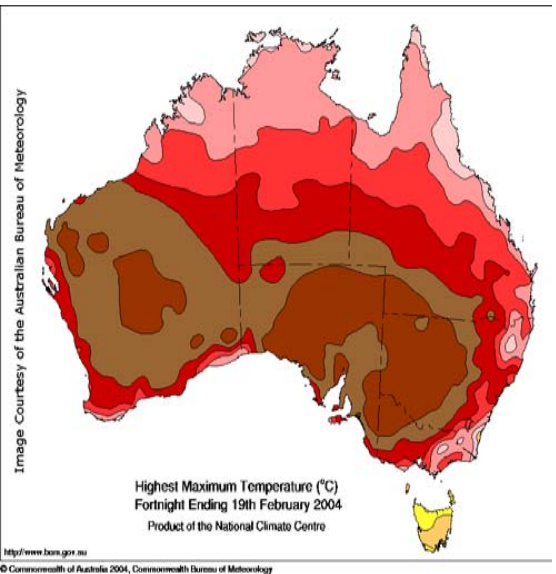
Heat Wave in Europe in 2003

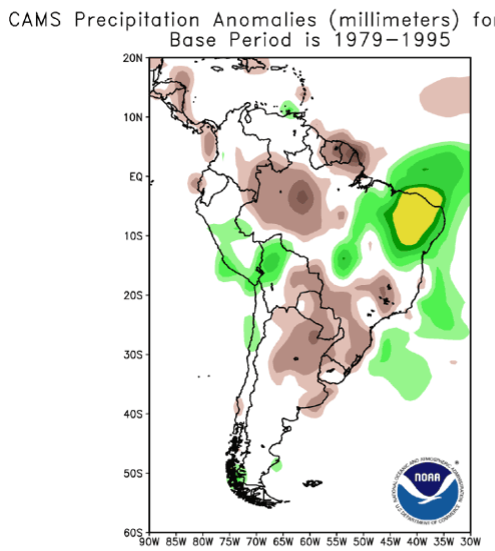
Flood in Africa in2003

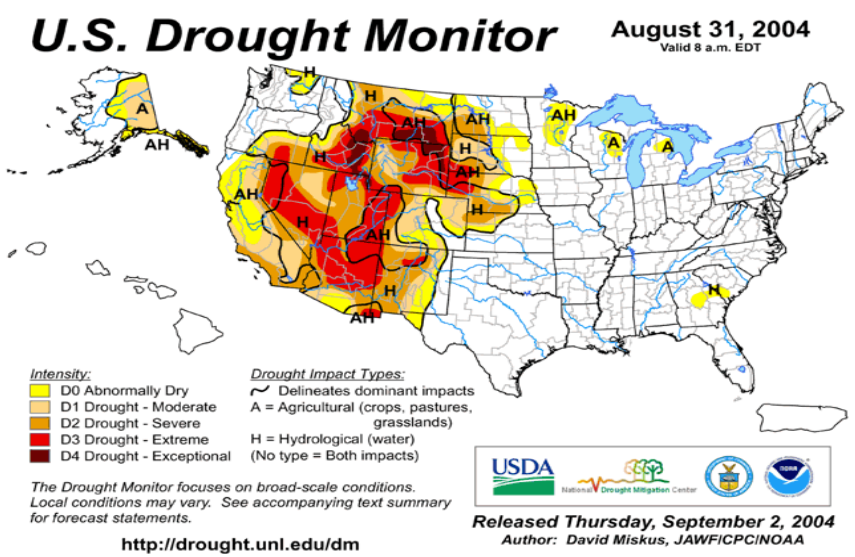
Drought in Australia in 2003

Drought and Flood in Brazil in 2003

Drought in USA in 2004







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?
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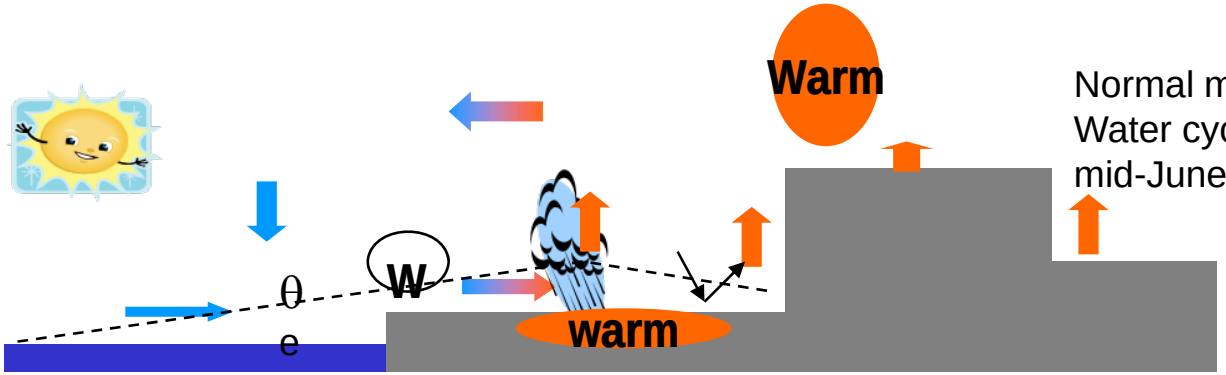
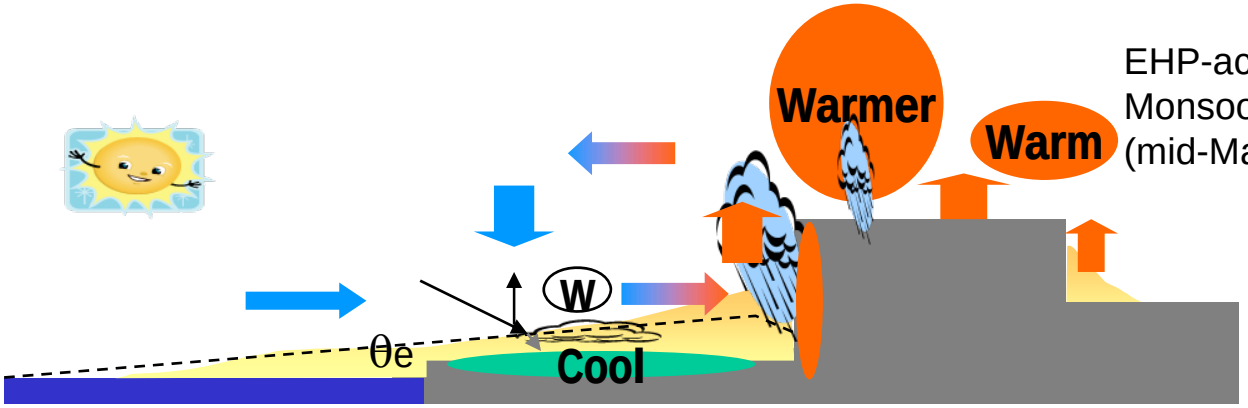
iv. How do aerosols affect the hydroclimate?

The Elevated Heat Pump (EHP) hypothesis

(Lau et al. 2006, Lau and Kim 2006)





EHP postulates:

a) warming and moistening of the upper troposphere over the Tibetan Plateau

b) an advance of the rainy season in northern India/Napal region in May-June

c) In June-July, the increased convection spreads from the foothills of the Himalayas to central India, resulting in an intensification of the Indian monsoon.

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?

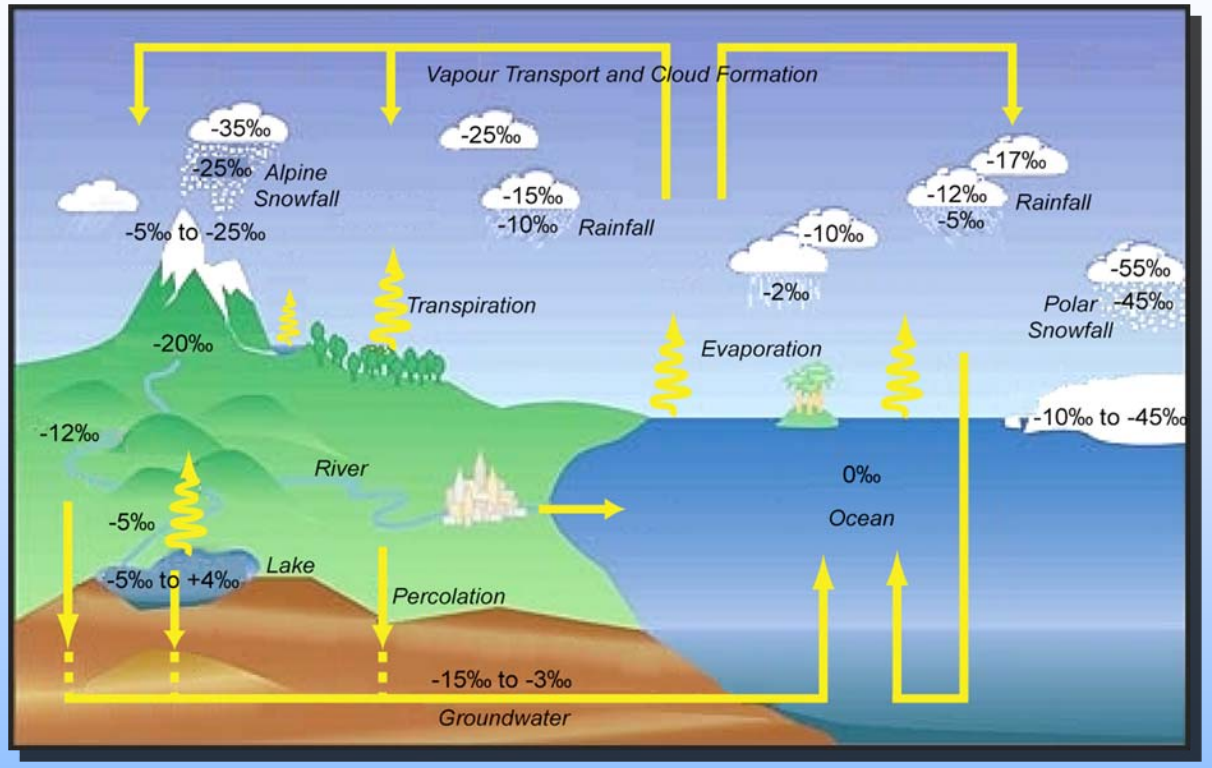
The Stable Water Isotope Inter-Comparison Group (SWING)

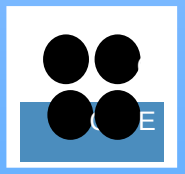
The isotope cross cut study (ICCS)

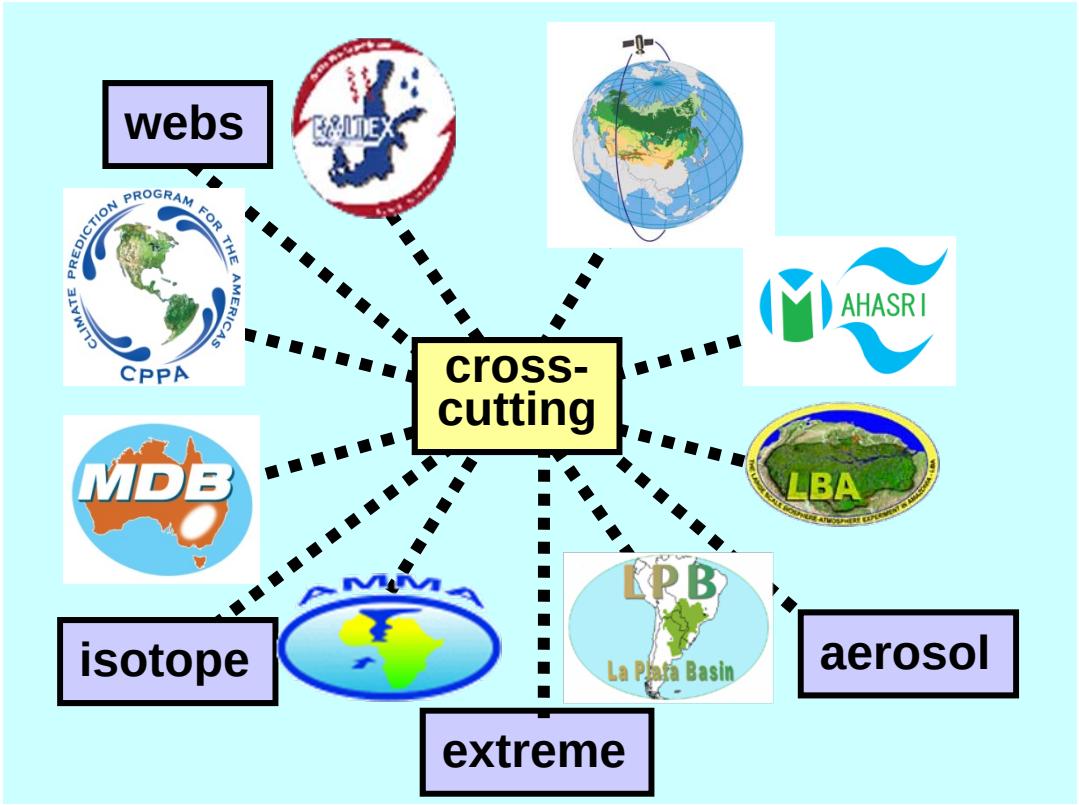
SWING Project Members
(alphabetical order):

Pradeep Aggarwal (IAEA)
Josephine Brown (U. Reading)
Laurence Gourcy (IAEA*)
Ann Henderson-Sellers (ANSTO)
Georg Hoffmann (LSCE)
Kimpei Ichiyanagi (FORSGC)
Maxwell Kelley (LSCE)
David Noone (U. Colorado)
John Roads (UCSD)
Gavin Schmidt (NASA-GISS)
Kristof Sturm (ANSTO)
Julia Tindall (U. Bristol)
Paul Valdes (U. Bristol)
Kei Yoshimura (U. Tokyo)
Martin Werner (MPI-BGC)
Vyacheslav Zakharov (Ural State U.)

(now at BRGM, France)*






webs
cross-cutting
isotope
extreme
aerosol
CPPA
AHASRI
MDB
LBA
AMMA
LPB
La Plata Basin

CEOP Objective #2:

GEWEX Objective #2

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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 para-meterizations to better represent hydrometeorological processes, and determine the geographical and seasonal characteristics of their predictability over land areas.

Associated Science Questions

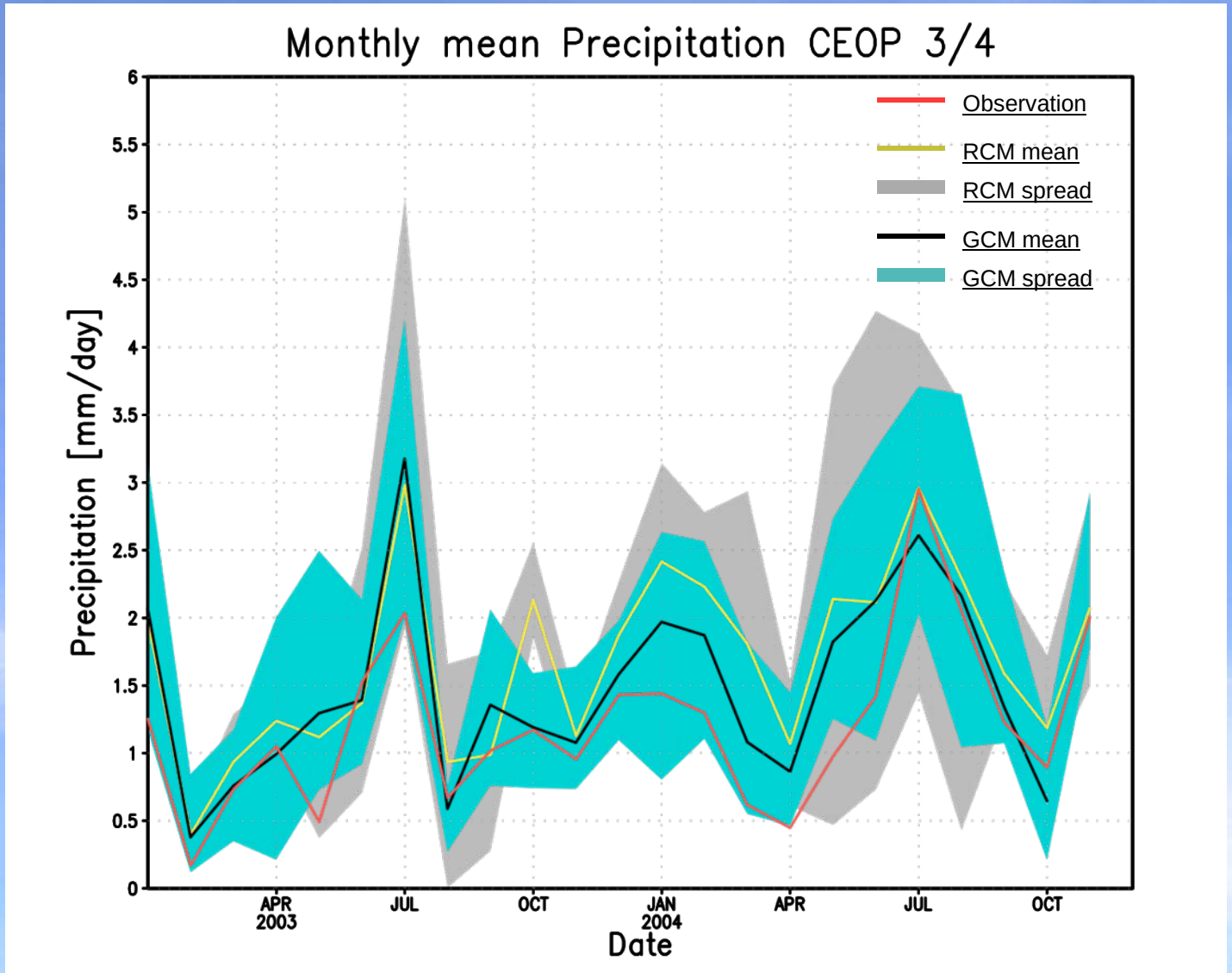
vi. Can we simulate and predict the hydroclimate cycle?

Specific Technical Issues

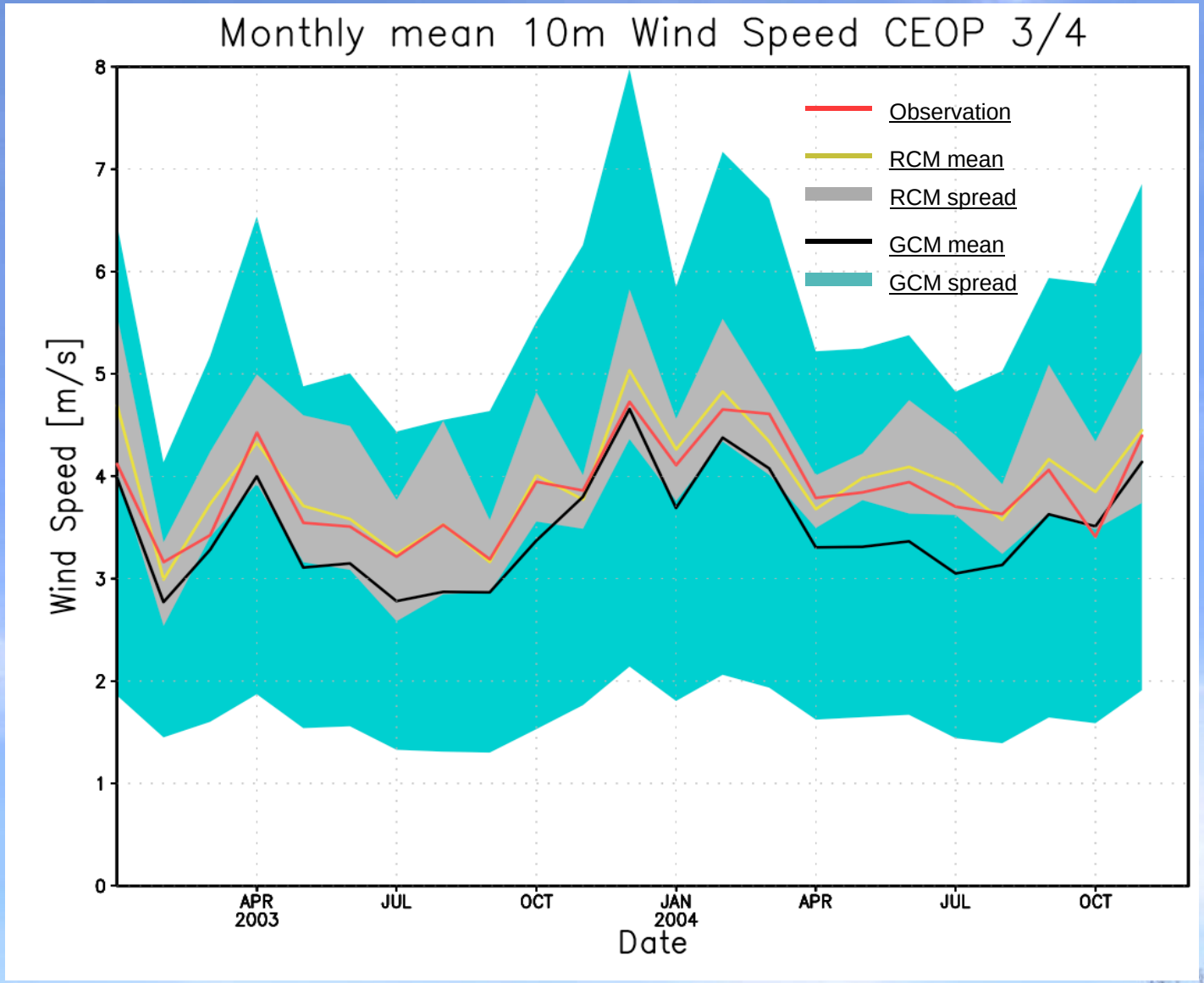
4. Assimilating and integrating the data with newly developed models.

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

Lindenberg (Precipitation)



Lindenberg (10m Wind)



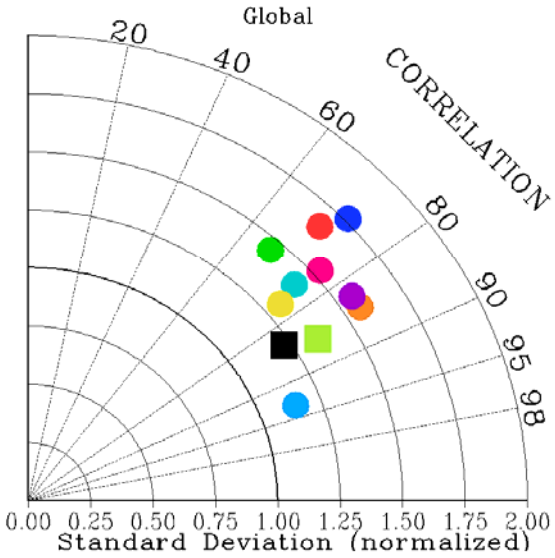
Multi-model Analysis for CEOP (MAC)

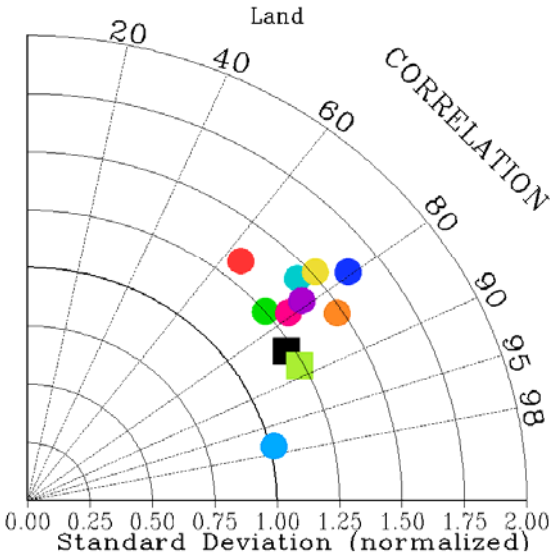
- Each of 8 systems provides 6 hourly analyses, largely the same input observations with different
  - Some important differences among members
- Output: Ensemble mean and variance
  - 1.25 degree global spatial resolution
  - Monthly, daily, and 6 hourly time series – For all 8 members, ensemble mean and std. dev.
  - Considering NetCDF format, CF compliant
- Issues in developing the Ensemble
  - Missing data, spatial resolution, temporal averaging, analysis vs. forecast, occasional bugs, P Surface intersecting the topography, variable names

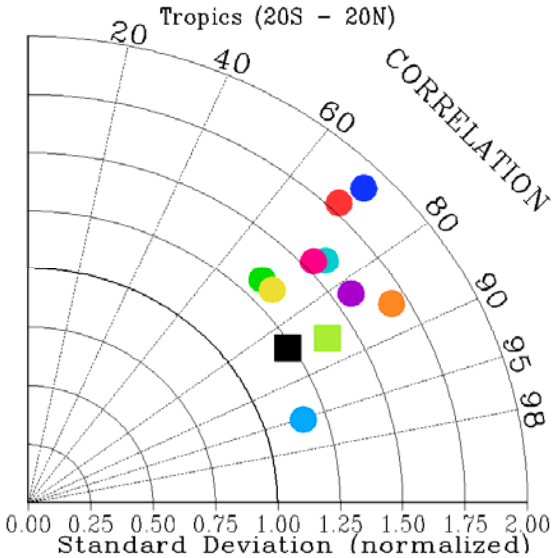
July 2004 Precipitation: Taylor Diagram

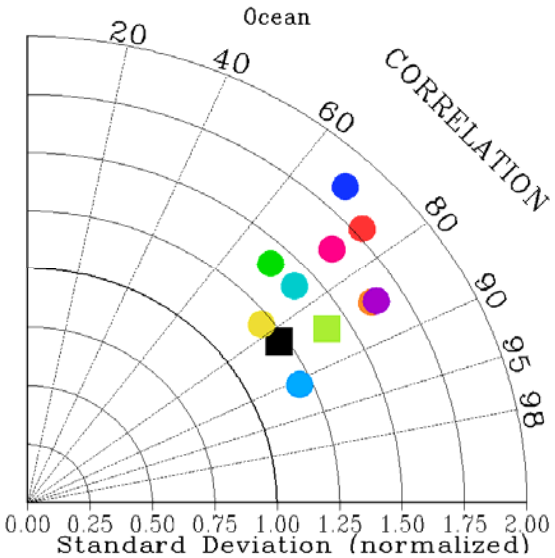
- GEOS5
- BMRC
- CPTEC
- ECPC−RII
- ECPC−SFM
- JMA
- MSC
- NCEP
- UKMO
- MAC
- CMAP

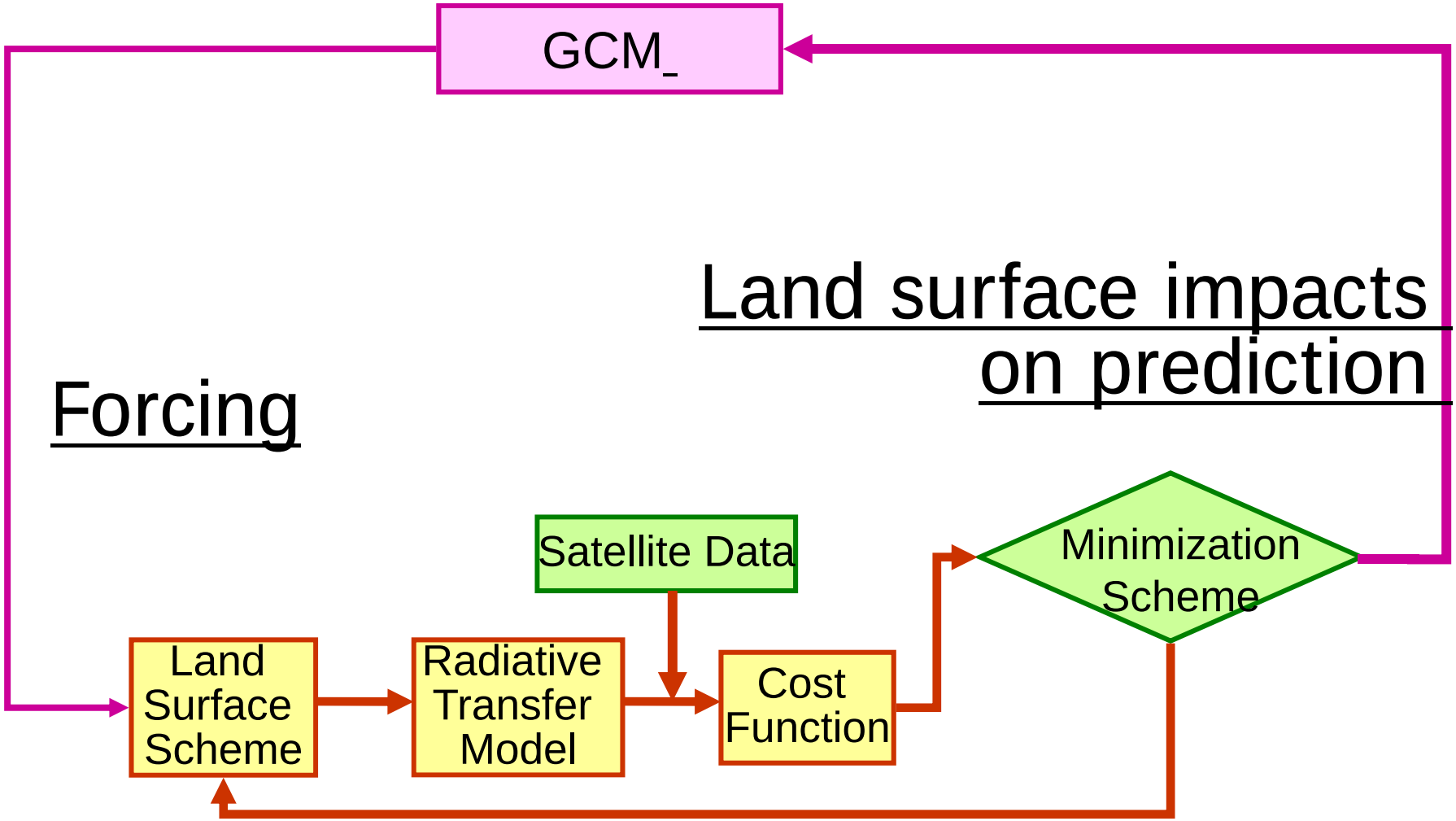
v. GPCP







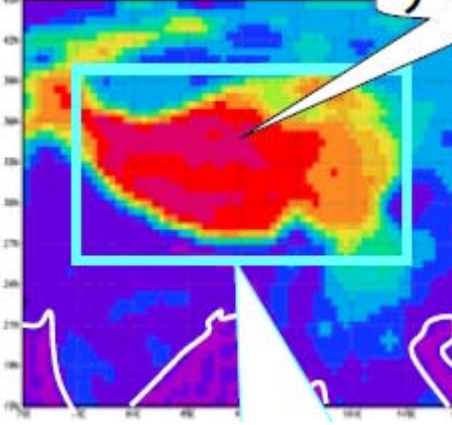



GCM
Land surface impacts on prediction
Forcing
Satellite Data
Minimization Scheme
Land Surface Scheme
Radiative Transfer Model
Cost Function

LDAS

Impacts of the Tibet surface initial conditions on the GCM prediction of the surface parameters

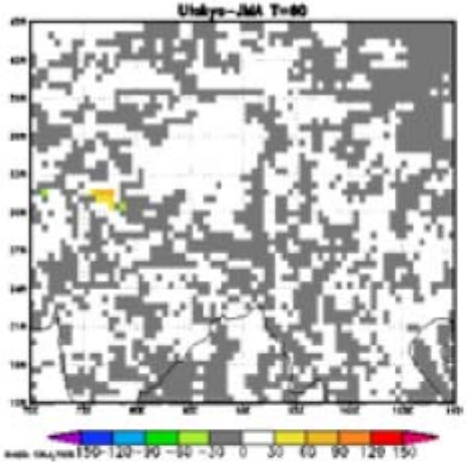
(*UT-JMA Cooperative Research*)

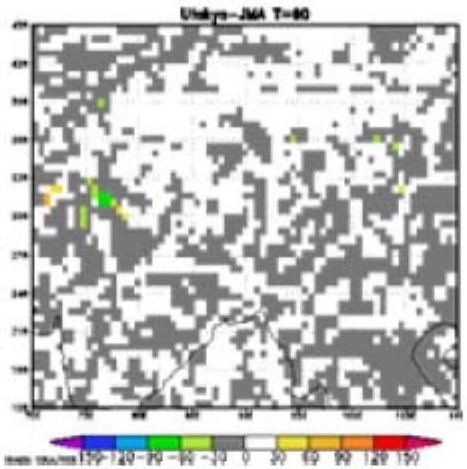


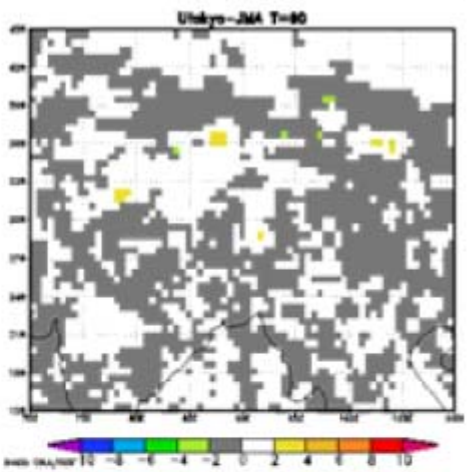
sensible heat flux

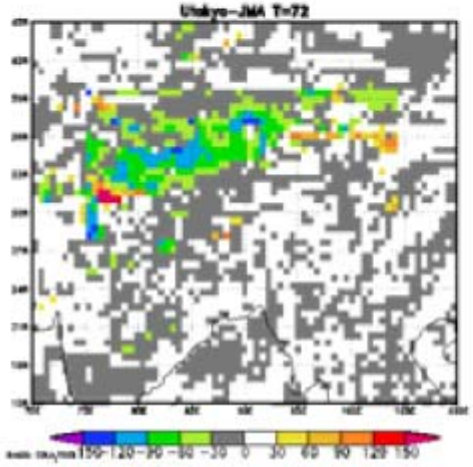
latent heat flux

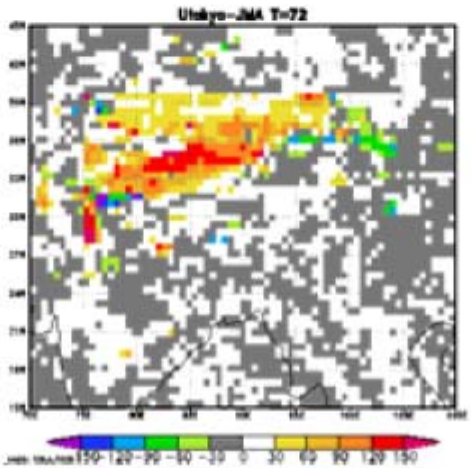
surface temperature

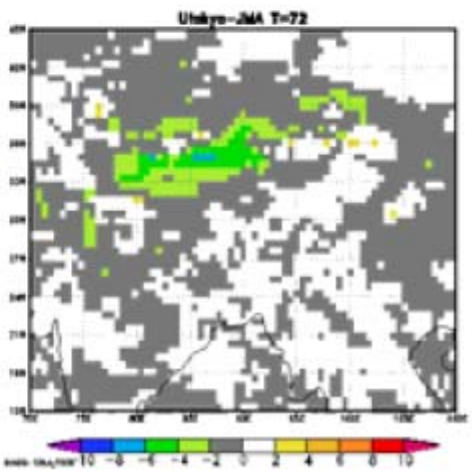












Use the assimilation product as the initial condition

Nighttime

3 Day Prediction

Daytime

Global Model

Regional Model

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

Land Surface Model/LDAS

WDC-C
MPI-M

Reference Sites
River basins

NCAR/EOL

UT&JAXA

Satellite data
CEOS
JAXA
NASA
ESA
NOAA
EUMETSAT
WGISS
WGCV

Global Dataset Projects

DATA INTEGRATION & ANALYSIS

Centralized System
U. Tokyo

Distributed System
WTF-CEOP

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

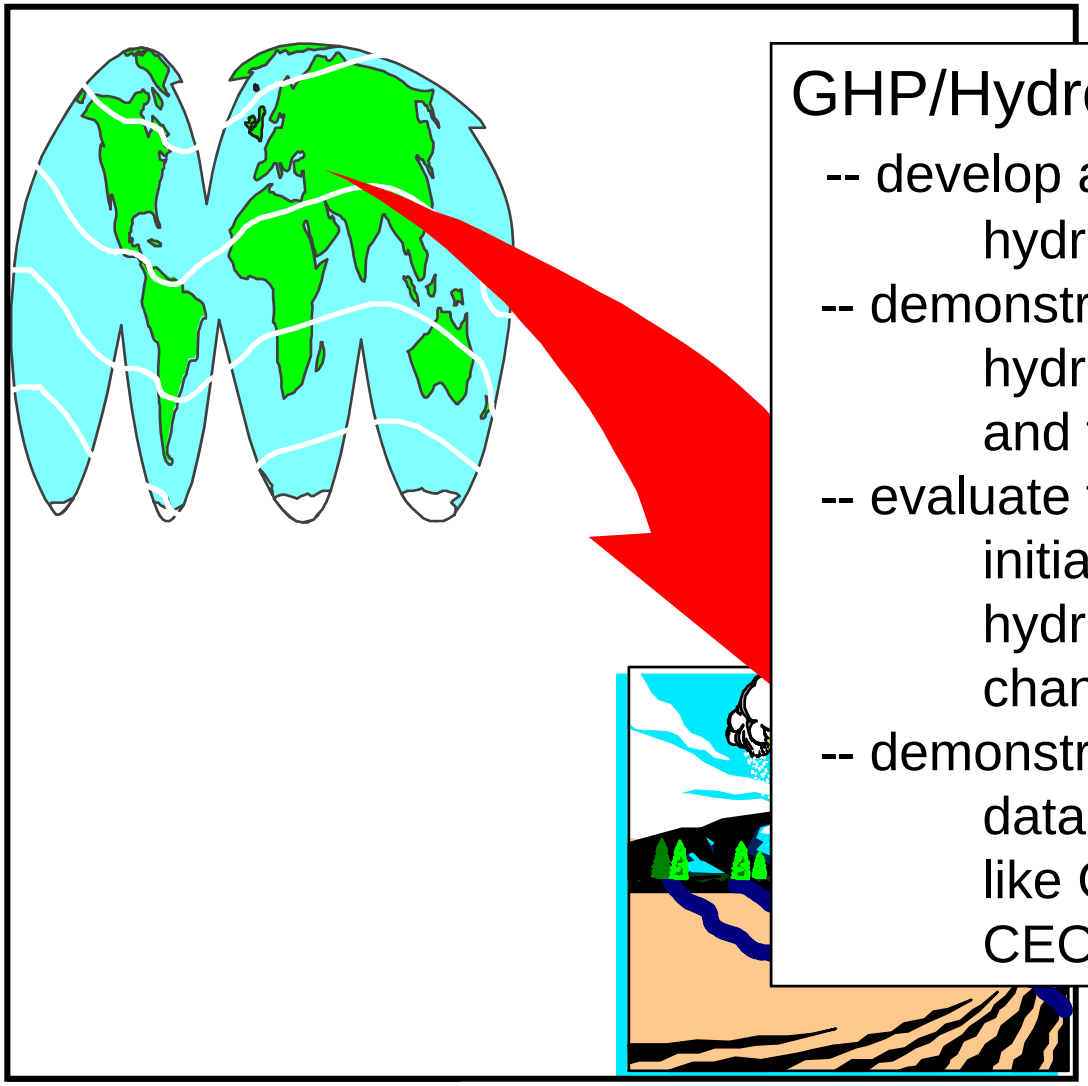
vii. What is the benefit of this increased knowledge about the hydroclimate for society?

Specific Technical Issues

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

Demonstrate benefits of improved hydrometeorological predictions for water resources.

Implementation Strategy



GHP/Hydrologic Application Project

-- develop and test probabilistic hydrologic forecasts procedures

-- demonstrate how to produce reliable hydrologic ensemble predictions and their use for water resources

-- evaluate the importance of hydrologic initial conditions and determine hydrologic sensitivity to climate change

-- demonstrate the usefulness of GEWEX data products for related activities like GWSP, HEPEX, IAHS/PUB, CEOP/WISE, (etc.)

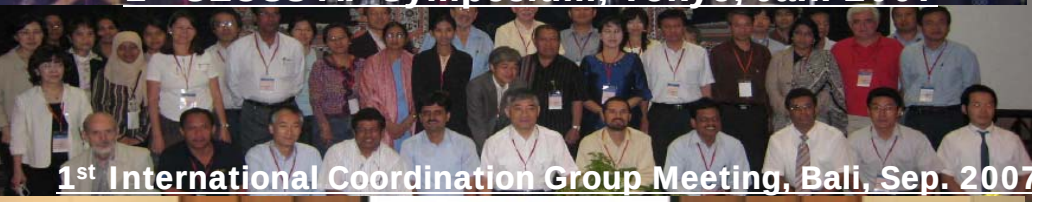

1st Asian Water Cycle Symposium, Tokyo, Nov. 2005


1st Task Team Meeting, Bangkok, Sep. 2006


1st Capacity Building Workshop, Sep. 2006


2nd Asian Water Cycle Symposium, Tokyo, Jan. 2007


1st GEOSS AP Symposium, Tokyo, Jan. 2007


1st International Coordination Group Meeting, Bali, Sep. 2007


3rd Asian Water Cycle Symposium, Beppu, Dec. 200

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.

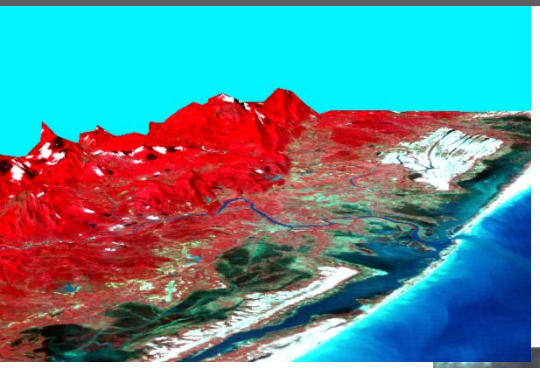
Uniqueness

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

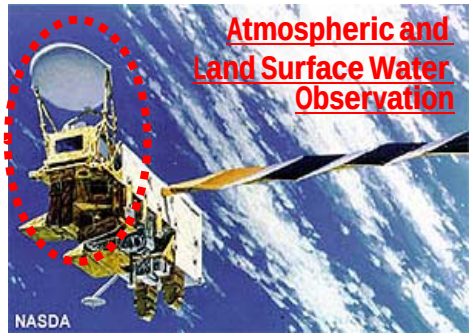
GEOSS Asian Water Cycle Initiative (AWCI)

18 River Basins for Initial Demonstration

GEOSS/AWCI Flood Evacuation Instruction System

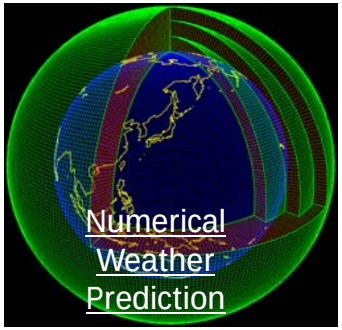


Topography and River Channel Network



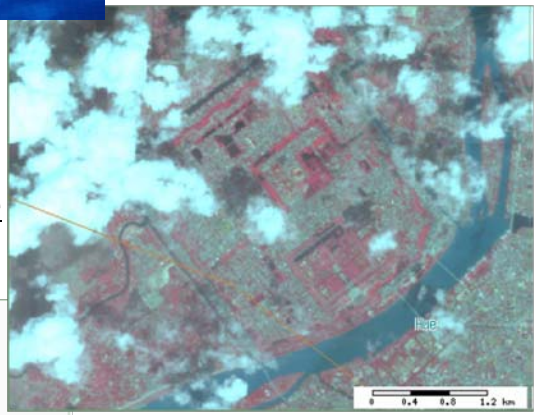
Atmospheric and Land Surface Water Observation

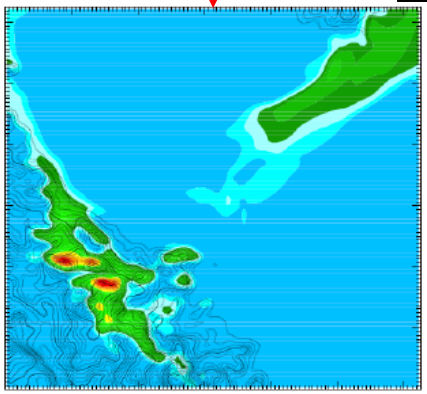
Heavy Rainfall Prediction Coupled with Satellite Data Assimilation



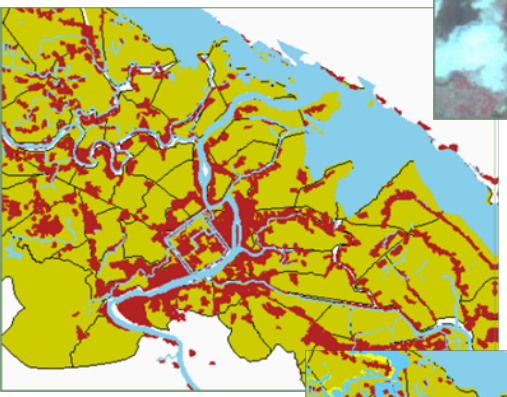
Numerical Weather Prediction

Land-use

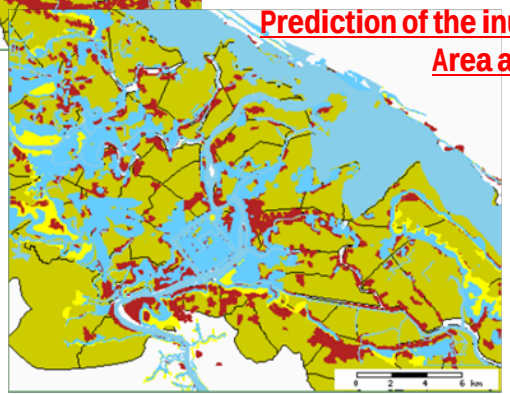




Heavy Rainfall Prediction



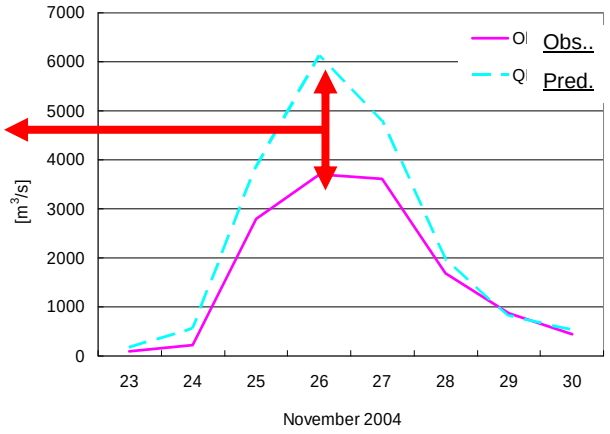
Socio-Economic Data



Prediction of the inundation Area and Depth

Operational Data

Flood Prediction



G8 Toyako Hokkaido Summit
7-9 July 2008
Declaration

To respond to the growing demand for Earth observation data, we will accelerate efforts within the Global Earth Observation System of Systems (GEOSS), which builds on the work of UN specialized agencies and programs,

in priority areas, climate change and water resources management,

by strengthening observation, prediction and data sharing.

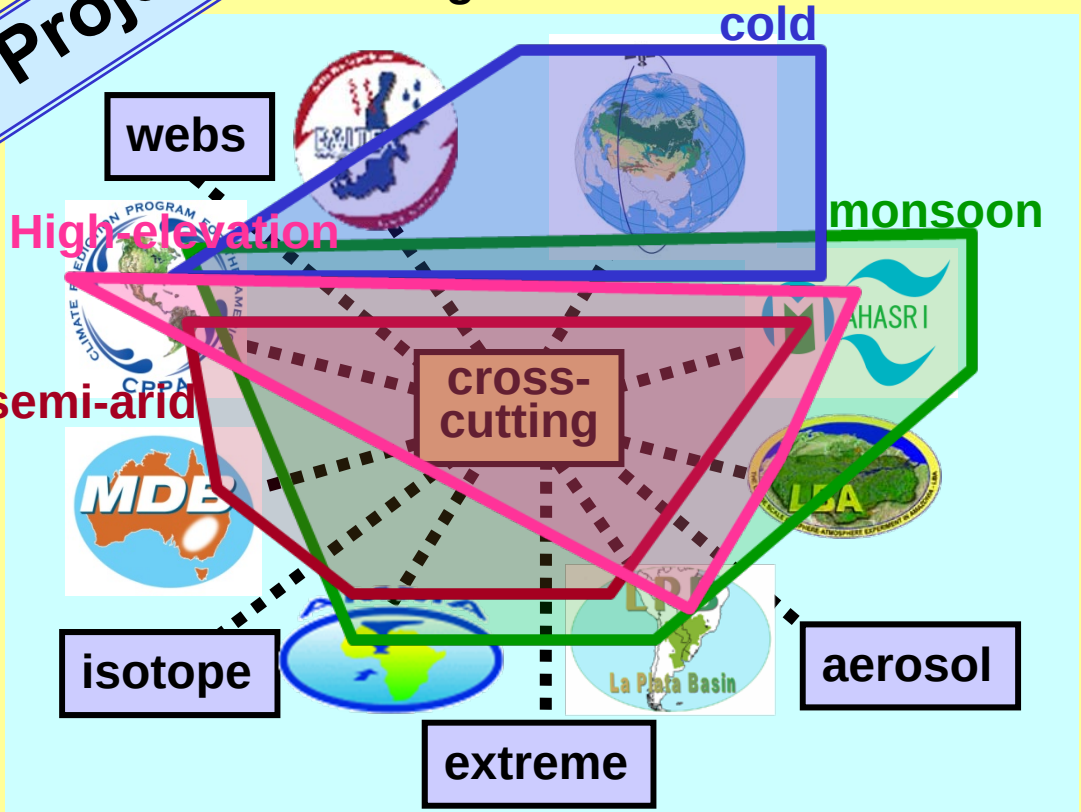
We also support capacity building for developing countries in earth observations and promote interoperability and linkage with other partners.

© GEO Secretariat

A Project of Projects

Global Model

Regional Model



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

H
A
P

Societal Benefits

Land Surface Model/LDAS

WDC-C
MPI-M

Reference Sites
River basins

NCAR/EOL

UT&JAXA

Satellite data
CEOS
JAXA
NASA
ESA
NOAA
EUMETSAT
WGISS
WGCV

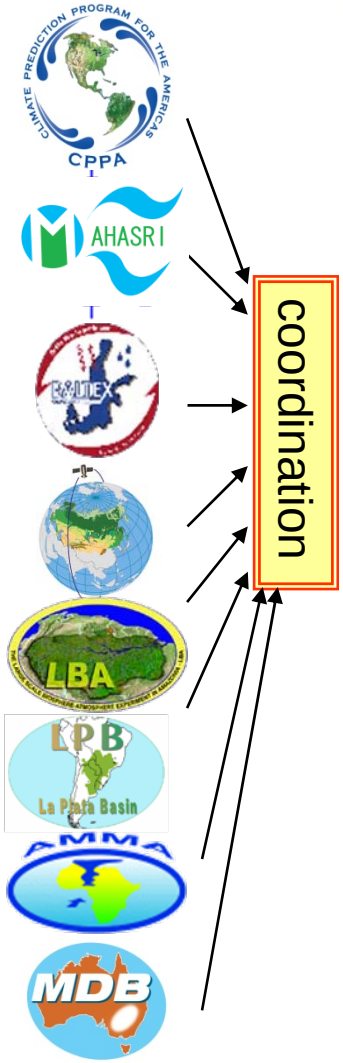
Global Dataset Projects

DATA INTEGRATION & ANALYSIS

Centralized System
U. Tokyo

Distributed System
WTF-CEOP

Regional Hydroclimate Projects (RHPs)



coordination

Global Energy and Water Cycle Experiment GEWEX WCRP

advise

report

Panel

Data Integration

Coordinated Energy and Water Cycle Observations Project CEOP GEWEX WCRP

CEOS Space Agencies

NWPCs

GEWEX/CEOP RHP CRITERIA

TECHNICAL CRITERIA

•Cooperation of an NWP center for provision of atmospheric and land surface data assimilation.
•Atmospheric-hydrologic models for studying transferability and climate variability.
•Mechanism for collecting and managing adequate hydrometeorological data sets.
•Participation in the open international exchange of scientific information and data.
•Interactions with hydrologic services and related groups
•Commitment of adequate resources and personnel.
•Evaluation of GEWEX global data products.
•Contributions to CEOP in situ, remote sensing, and model output databases.

SCIENTIFIC CRITERIA

•Observe, simulate, and predict diurnal, seasonal, annual and interannual variability.
•Determine climate system variability and critical feedbacks.
•Demonstrate improvements in predictions of water-related climate parameters.
•Demonstrate the applicability of techniques and models for other regions.
•Assess the human impact on hydroclimate variations, including vulnerability to climate change

“overlap”, “duplication”, “big eater”, , , ,

We should be modest to those criticisms.

BUT

do not hesitate to accept them.

They express a certain part of CEOP,

a science for knowledge integration.

By promoting communication, coordination and cooperation,

let’s change the criticisms to applauses,

and contribute to science and societal benefits.