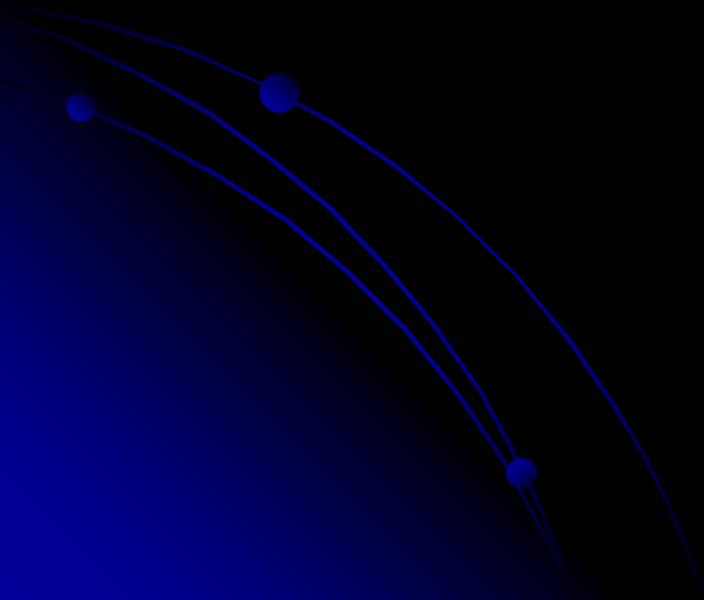


# POTENTIAL CONTRIBUTIONS OF NEESPI TO INTERNATIONAL WATER SCIENCE PROGRAMS

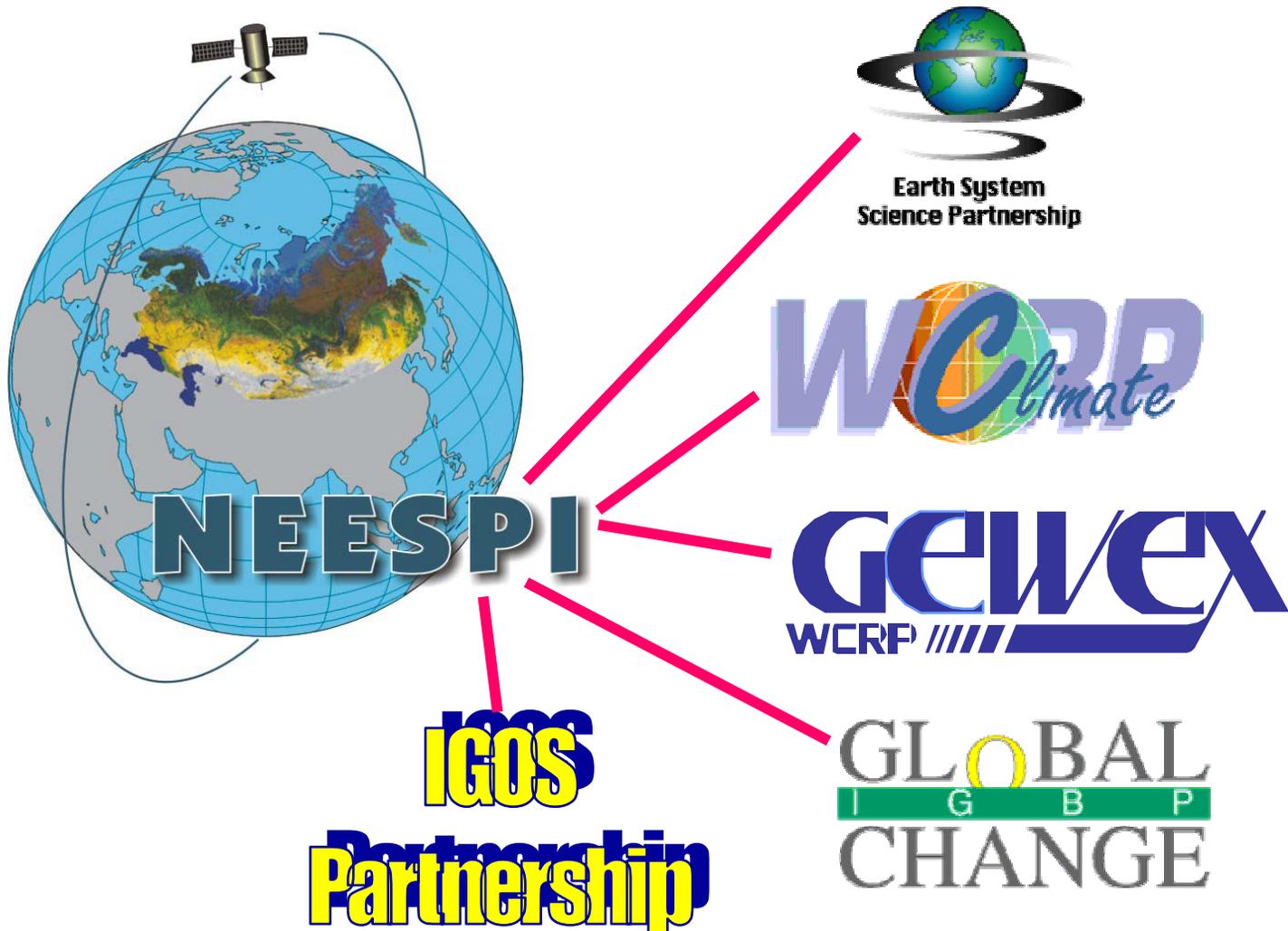
RICK LAWFORD  
DIRECTOR, IGPO  
DEC. 9, 2004



# **BENEFITS OF INTERNATIONAL SCIENCE PROGRAMS**

1. PROVIDE A BASIS FOR COLLABORATIVE RESEARCH BASED ON AGREED AGENDAS.
2. BUILD RESEARCH NETWORKS TO TACKLE FOCUSED SCIENTIFIC QUESTIONS THAT ARE BEYOND THE CAPABILITIES OF INDIVIDUALS/ NATIONAL CAPABILITIES.
3. PROMOTE STANDARDIZED METHODOLOGIES.
4. PROVIDE COORDINATION FOR COMPLEX, MULTINATIONAL FIELD CAMPAIGNS.
5. CAN PROVIDE SUPPORT FOR LONG-TERM FIELD OBSERVATIONS.
6. FACILITATE MODEL INTERCOMPARISONS AND COMPARISONS WITH DATA.
7. PROVIDE MORE VISIBILITY FOR RESEARCH EFFORTS AND A STRONGER CASE FOR SUPPORT.

# The Northern Eurasia Earth Science Partnership Initiative (NEESPI) has many potential international links

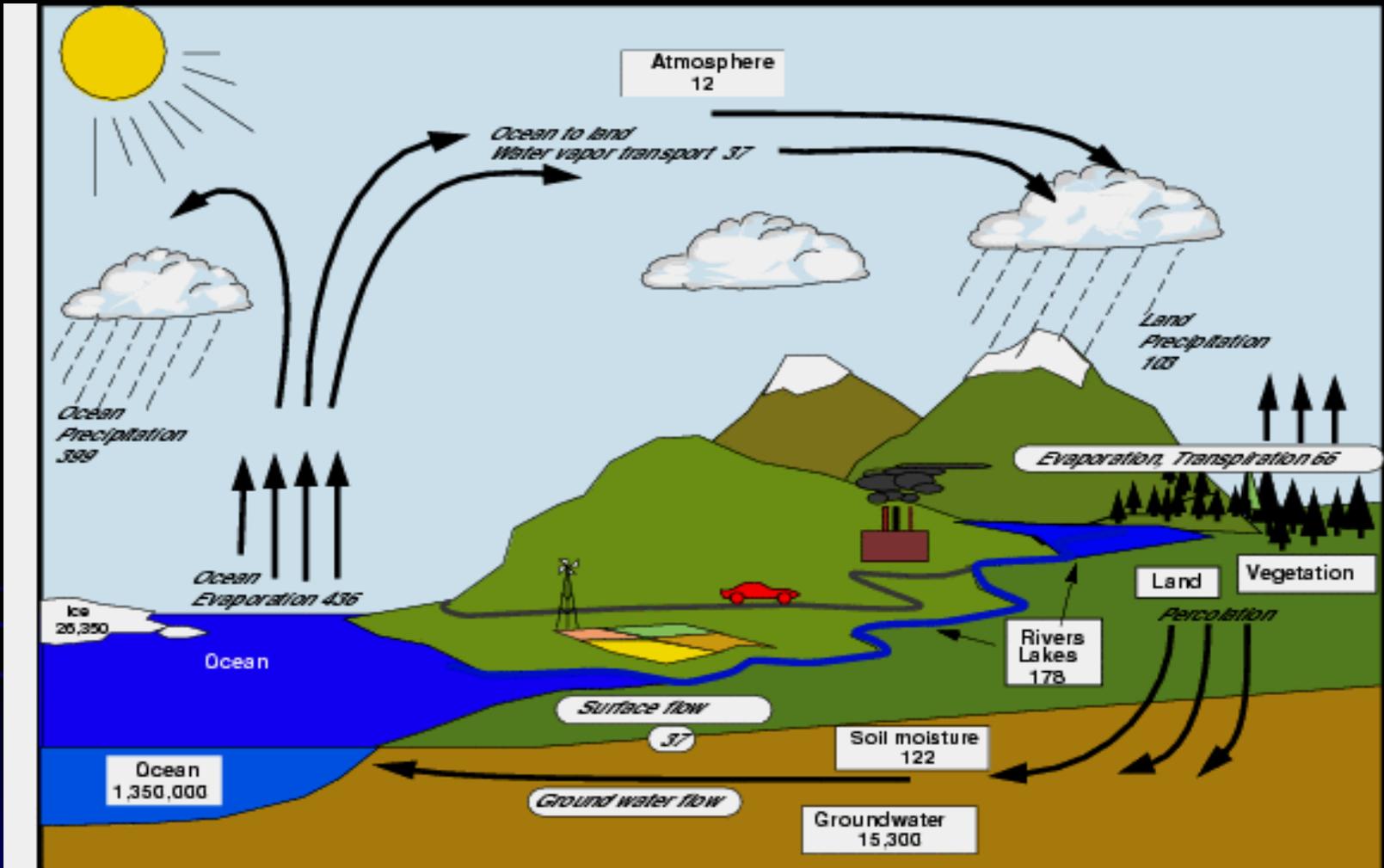


# WCRP Priorities for the next decade

(agreed at WCRP-Conference, Geneva, 1997)

- ◆ Assessing the **nature and predictability** of seasonal to interdecadal climate variations at **global and regional** scales
- ◆ Providing the scientific basis for **operational predictions**
- ◆ **Detecting** climate change and **attributing causes**
- ◆ **Projecting** the magnitude and rate of human-induced change (as input for IPCC, UNFCCC, ...)

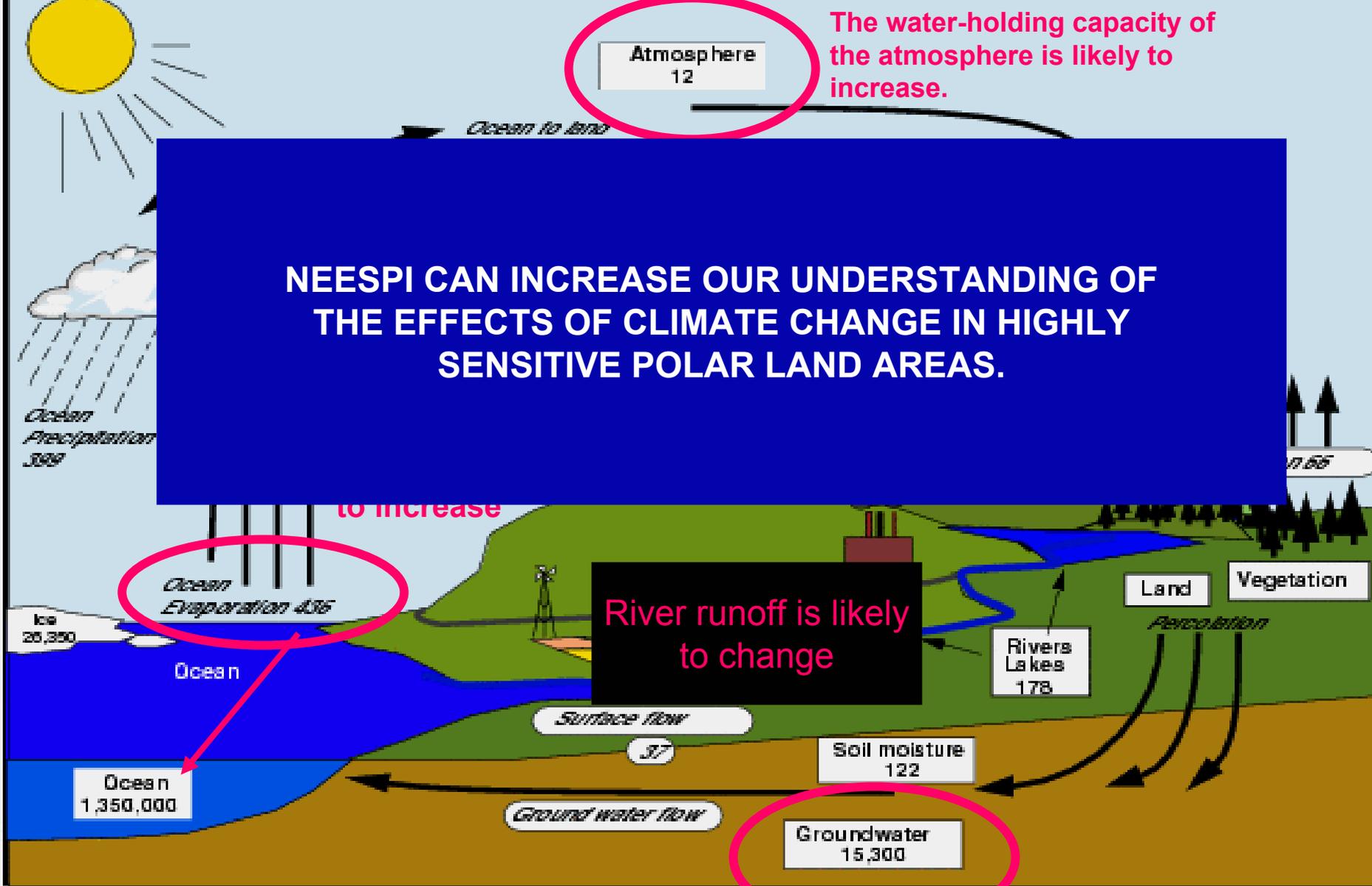
# A WCRP/GEWEX ? : “IS THE GLOBAL WATER CYCLE “ACCELERATING” OR INTENSIFYING DUE TO CLIMATE CHANGE?”



**Hydrological cycle.**

(Trenberth)

*Units are thousand cubic km for storage  
and thousand cubic km/year for exchanges*

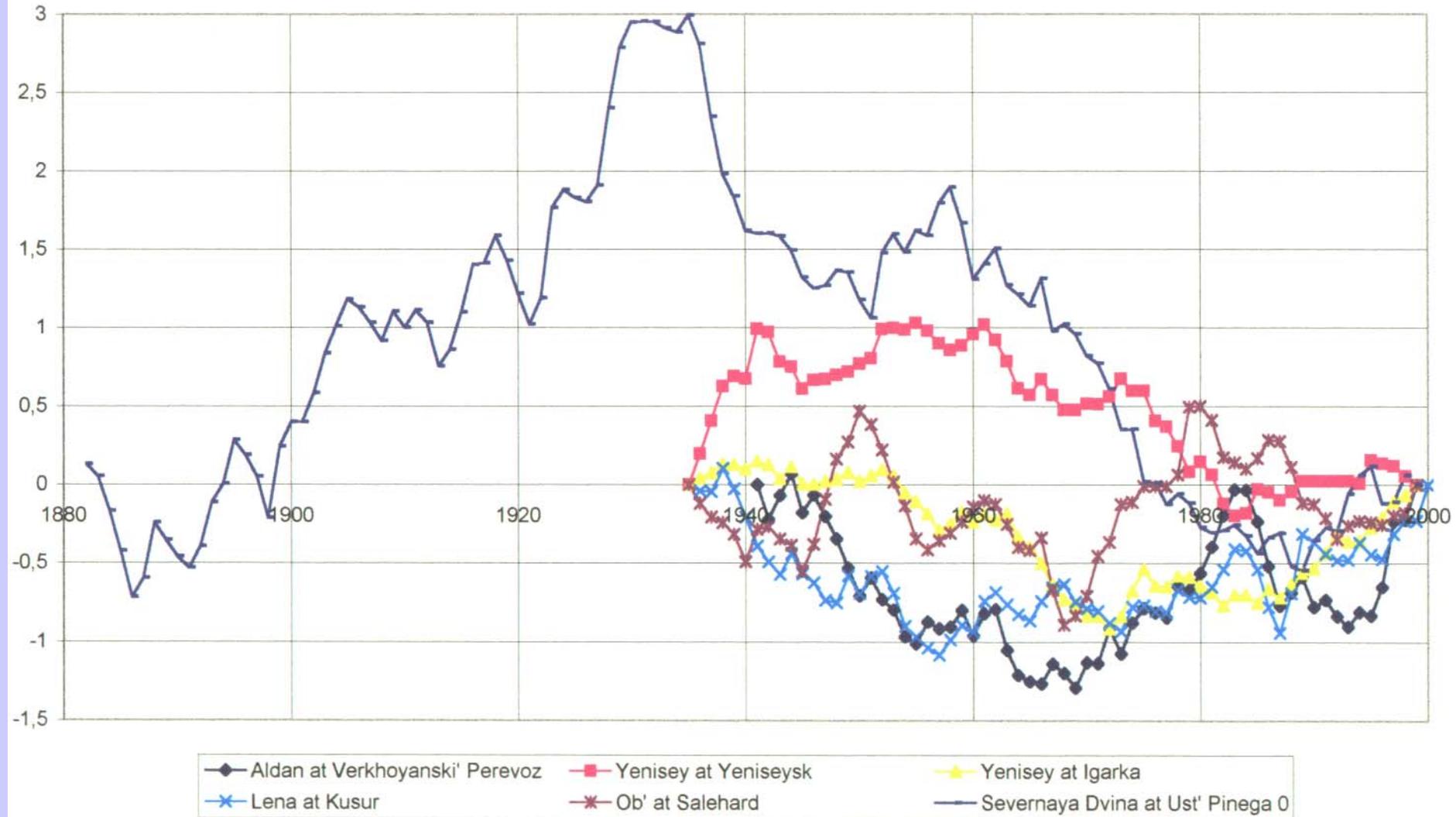


## Hydrological cycle.

*Units are thousand cubic km for storage and thousand cubic km/year for exchanges*

(Base map by Trenberth)

## Разностно-интегральные кривые



# WCRP COPES

## Coordinated Observation & Prediction of the Earth System

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### AIM

- ◆ To facilitate prediction of the climate/earth system variability and change for use in an increasing range of practical applications of direct relevance, benefit and value to society

### Goals

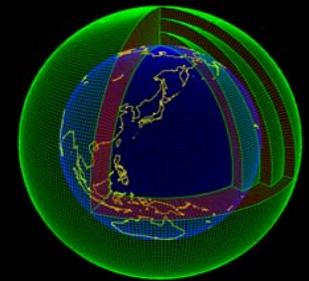
- ◆ Determine what aspects of the climate/earth system are and are not predictable, at weekly, seasonal, interannual and decadal through to century time-scales
- ◆ Utilise improving observing systems, data assimilation techniques and models of the climate/earth system  
(-> **IGBP, GCOS, NWP centres, ...**)

**GEWEX WILL PLAY A CRITICAL ROLE IN THIS NEW WCRP STRATEGY. ARE THERE OPPORTUNITIES FOR A FOCUS IN EUROASIA?**

**GEWEX (GLOBAL ENERGY AND WATER CYCLE  
EXPERIMENT) DIRECTS ITS EFFORTS TO  
“THE DEVELOPMENT AND APPLICATION OF  
PLANETARY WATER SCIENCE (AND OBSERVATIONS) TO THE  
PROBLEMS OF CLIMATE AND WATER RESOURCES”**



**GEWEX**  
WCRP



**THE PROGRAM ENTAILS:**

- GLOBAL DATA SETS DERIVED FROM SATELLITE DATA, *IN SITU* DATA AND DATA ASSIMILATION CAPABILTIES,
- MODEL DEVELOPMENT AND PREDICTABILITY STUDIES
- APPLICATIONS
- FIELD STUDIES AND PROCESS UNDERSTANDING



**GEWEX**



Mackenzie GEWEX Study (MAGS)



Baltic Sea Experiment (BALTEX)



GEWEX Americas Prediction Project (GAPP)

NEESPI?



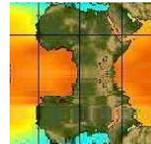
GEWEX Asian Monsoon Experiment GAME

AMMA

Large Scale Biosphere-Atmosphere Experiment in Amazonia (LBA)



Coupling of the Tropical Atmosphere and Hydrological Cycle (CATCH)



La Plata (LPB)

Murray-Darling Basin Water Budget Project (MDB)

Data Management

Water and Energy Budget Studies

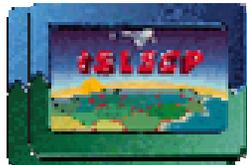
Sources and Cycling of Water

Extremes

Transferability

Predictability

Water Resource Applications Project



# Coordinated Enhanced Observing Period (CEOP)

CEOP HP : <http://www.ceop.net>

## CEOP Objectives:

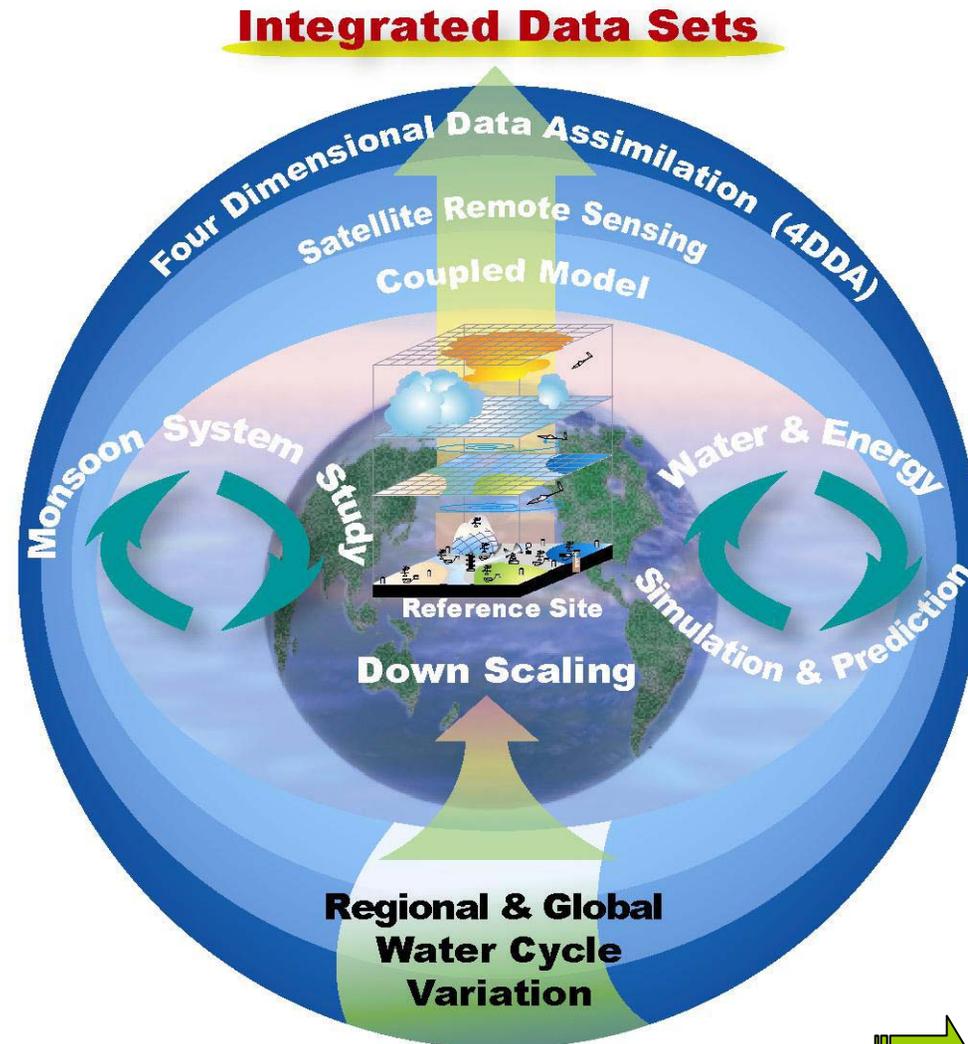
1. Water and Energy-Cycle Simulation and Prediction
2. Monsoon System Studies

## CEOP Strategy:

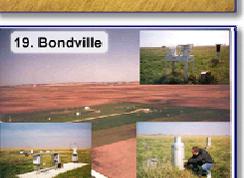
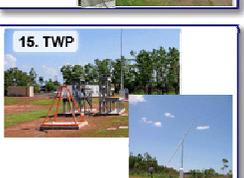
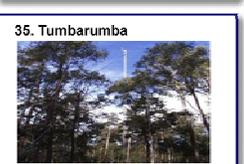
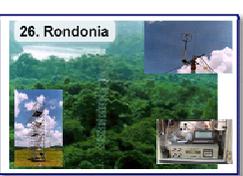
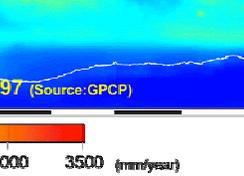
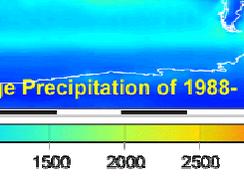
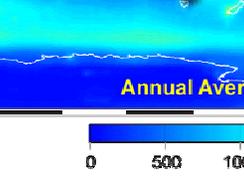
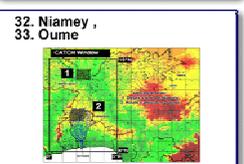
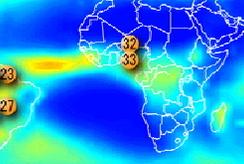
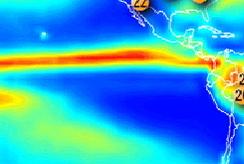
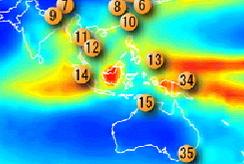
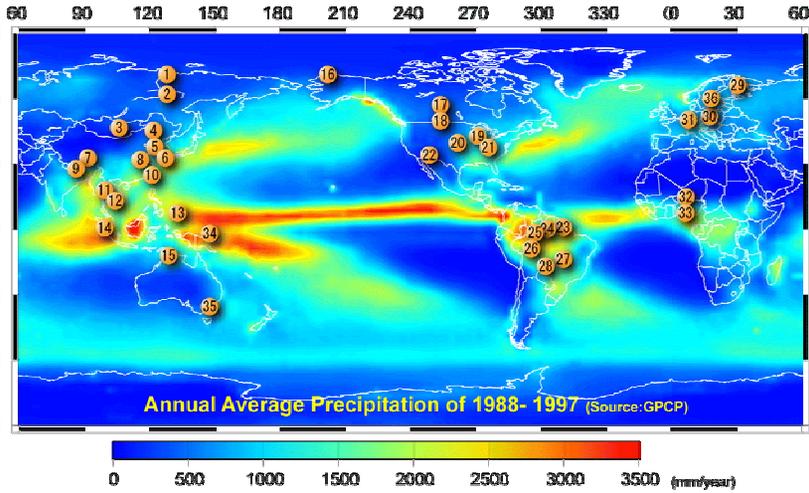
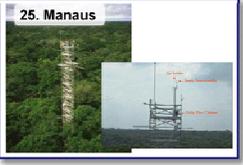
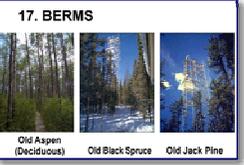
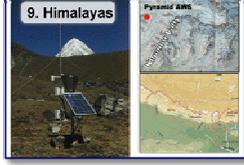
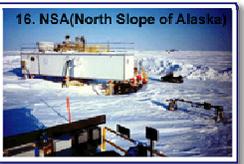
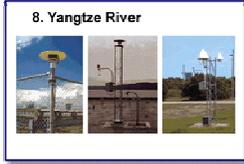
1. The first global integrated data sets of the water cycle with spatial consistency and climate variability, through
  - ( i ) the ground-based observations from the 36 CEOP reference sites
  - ( ii ) the satellite observations of the entire water cycle
  - ( iii ) the simulations of numerical models with physical consistency
2. Challenges to inter-connection of regional water cycles and Down-scaling applications to water resources

## CEOP Schedule:

	2001	2002	2003	2004
The Preliminary Data period	1 July — 30 Sep	<b>EOP-1</b>		
The Buildup phase		1 Oct — 30 Sep	<b>EOP-2</b>	
The First Annual Cycle period			1 Oct — 30 Sep	<b>EOP-3</b>
The Second Annual Cycle period			1 Oct — 31 Dec	<b>EOP-4</b>



# International Cooperation for the Global Coverage



# CEOP-II 6year Implementation Plan

- Part-I(2005-2006)

- 1) CEOP-I Science Goal (WESP and CIMS) To be accomplished by Using CEOP-I Data Sets
- 2) Building a Integrated Observation System for the Global Water Cycle toward GEOSS

- Part-II(2007-2010)

- 1) Implementation of the CEOP-II Integrated Observation System for the Global Water Cycle
- 2) CIMS Extension to WCRP Pan Monsoon Study
- 3) Cold Region Study in Cooperation with CliC
- 4) Cold season processes
- 5) Aerosols and the water cycle
- 6) Down-scaling Study

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# **NEESPI Surface Energy & Water Cycles can support GHP WEBS studies**

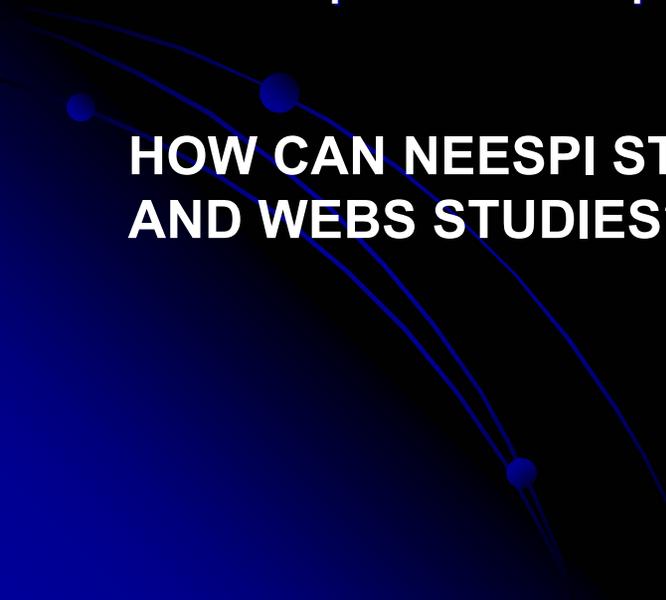
## **NEESPI QUESTION:**

**How can we account for major surface energy and water cycle dynamics in Northern Eurasia that affect regional and global climate, environment, and economy?**

## **CEOP WEBS OBJECTIVE:**

**To use enhanced observations to better document and simulate water and energy fluxes and reservoirs over land on diurnal to annual scales and to better predict these up to seasonal for water resource applications**

**HOW CAN NEESPI STUDIES IN THIS AREA FEED INTO WESP  
AND WEBS STUDIES?**

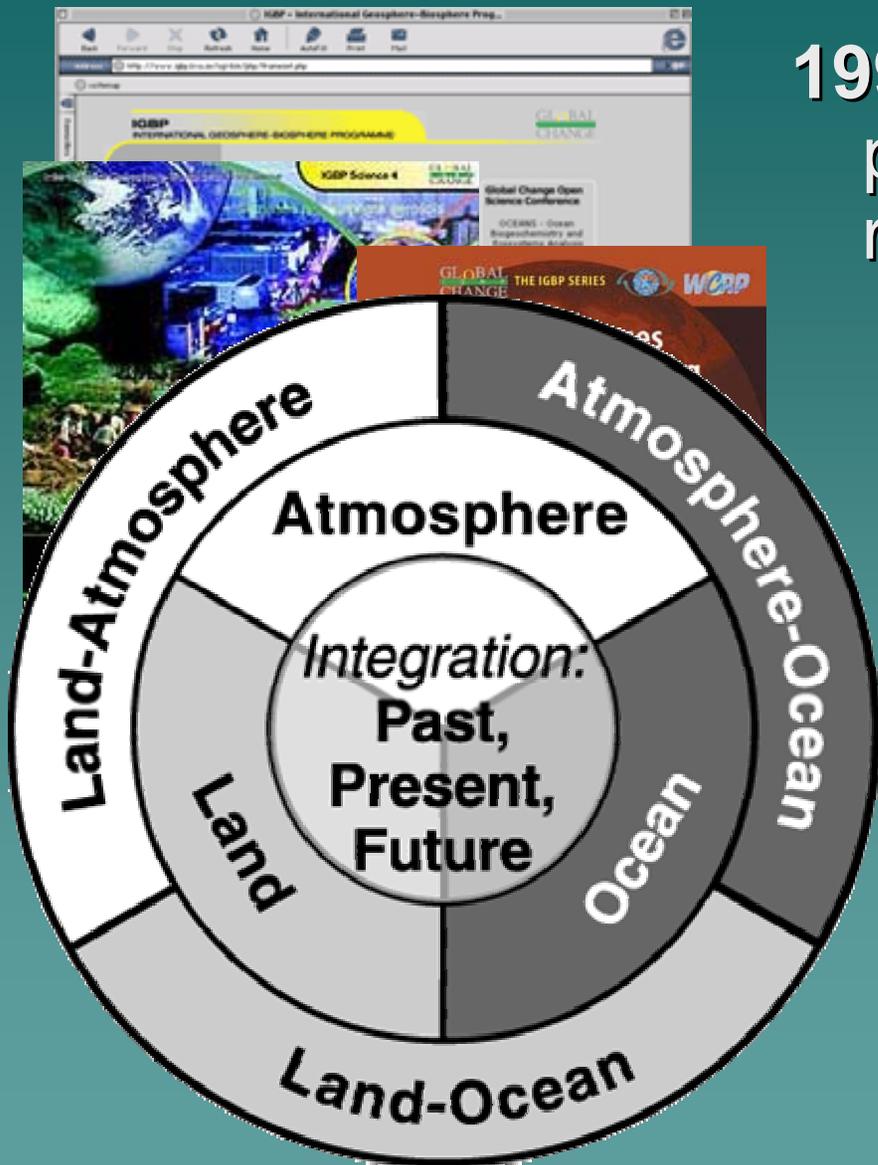


# Towards IGBP II

1999-2003: synthesis projects, transition and restructure

**IGBP II:** new questions, new structure, with focus on:

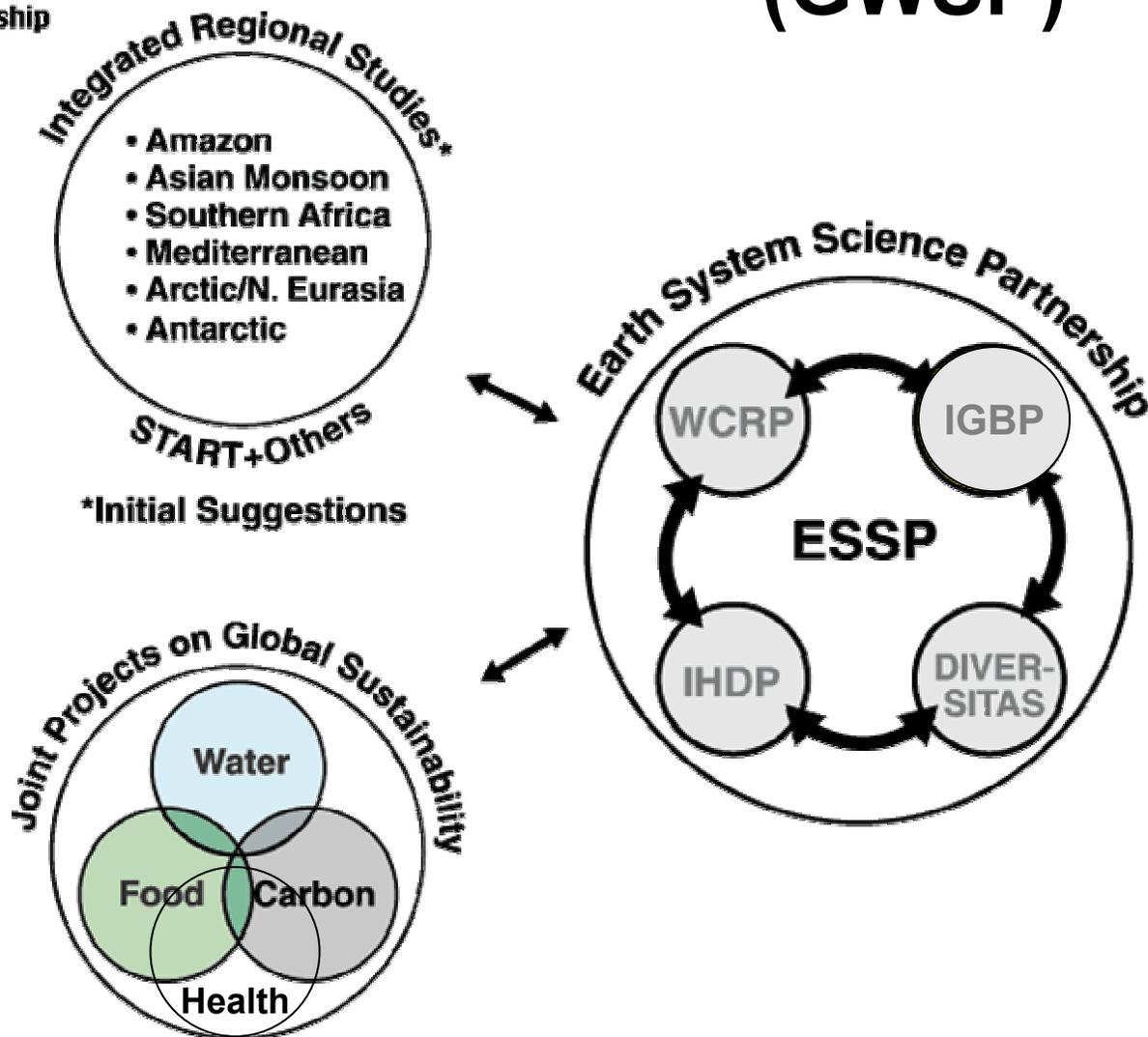
- biogeochemical sciences with relevance to issues of societal concern
- interdisciplinarity & Earth System science
- regional scale integrated research





Earth System  
Science Partnership

# Global Water System Project (GWSP)



# Theme I: What are the magnitudes of anthropogenic and environmental changes in the global water system and what are the key mechanisms by which they are induced?

## **Factors leading to change:**

Hydroclimatological Changes

Biogeochemical Changes

Hydrobiological/Ecological Changes

Changes in Water Quantity and Stress

Ecological Changes

Governance Changes

## **State of Knowledge:**

Climate Change

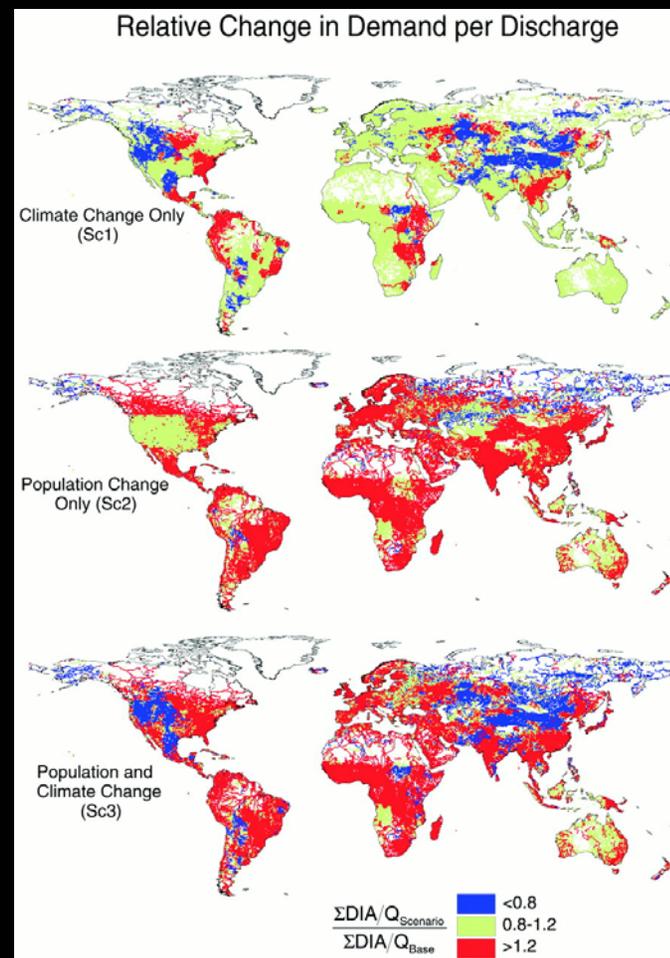
River Regulation

Land Use Change

Biodiversity Change

Changes in Water Supply/Use

Indicators of Change



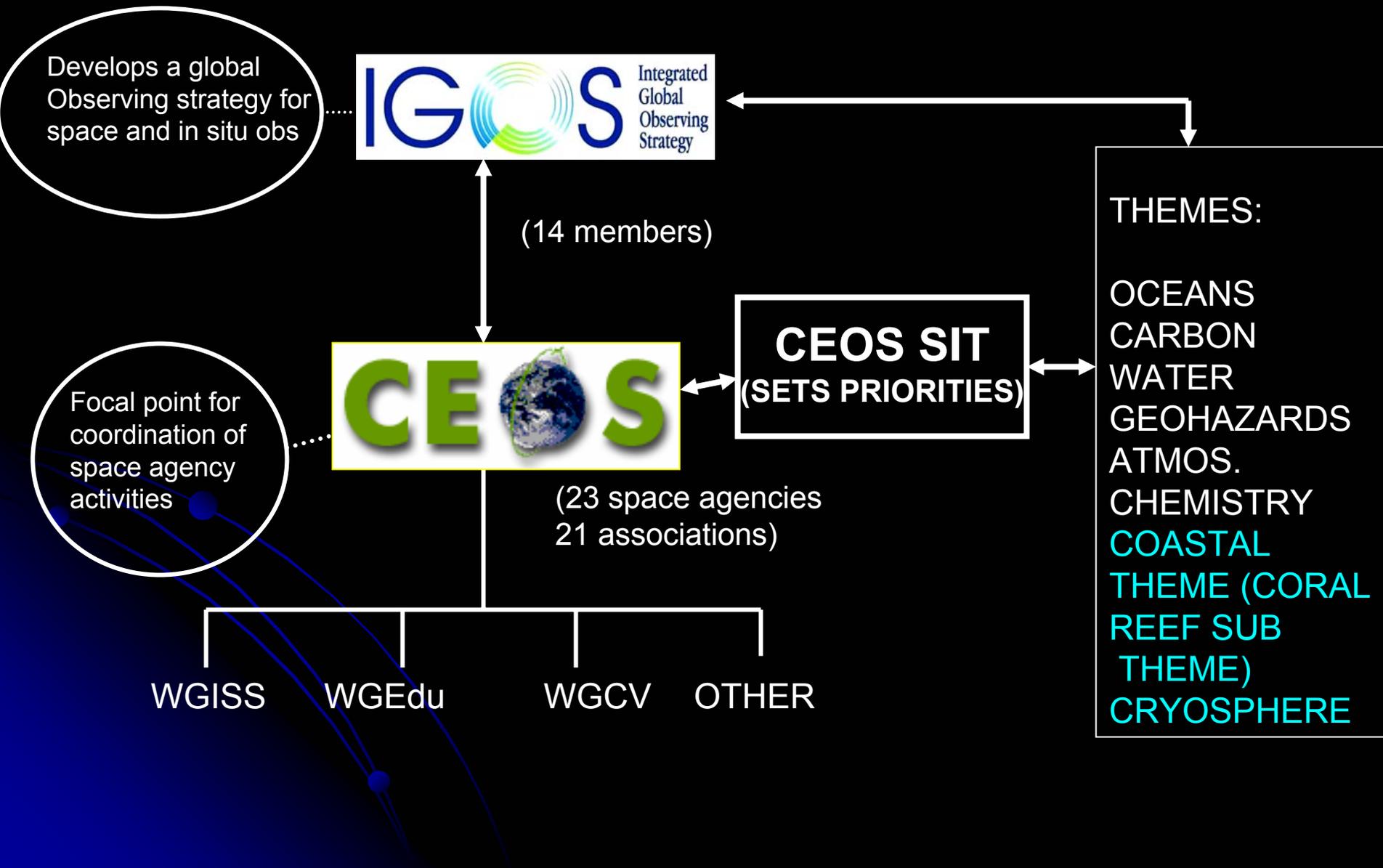
**Activity Q1.1:** Land Cover/Water Use/Climate Interactions.

**Activity Q1.2:** Detecting the Impact of Climate Change on Water Supply.

**Activity Q1.3:** The Scope and Impact of Water Diversions on River Systems.

**Activity Q1.4:** Changes in Nutrient and Sediment Transport and Their Impacts.

# SOME ELEMENTS OF THE IGOS-PARTNERSHIP



# IGWCO OBJECTIVES

“HELPING TO SOLVE THE WORLD’S WATER PROBLEMS WITH INTEGRATED WATER CYCLE OBSERVATIONS AND INFORMATION”



**IGOS**  
Integrated Global Observing Strategy



1. Provide a framework for guiding decisions on priorities and strategies regarding water cycle observations for:
  - Monitoring climate variability and change,
  - Effective water management and sustainable development of the world’s water resources,
  - Societal applications for resource development and environmental management,
  - Specification of initial conditions for weather and climate forecasts,
  - Research directed at priority water cycle questions
2. Promote strategies that facilitate the processing, archiving and distribution of water cycle data products

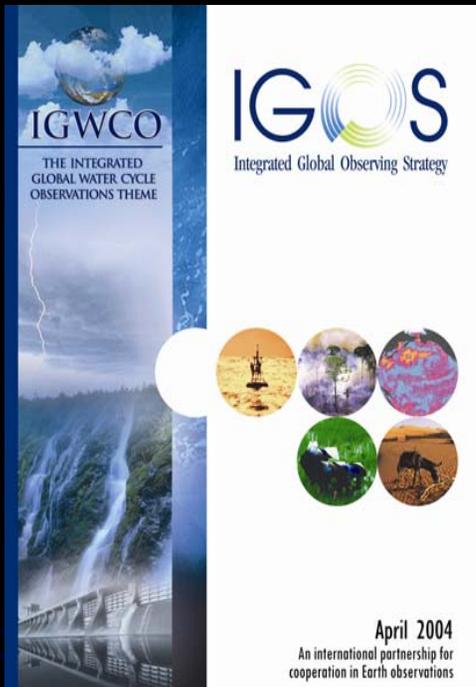
April 2004

An international partnership for cooperation in Earth observations

	GOALS	LEADERS	ACTIONS	COMM TO DEADLINES	FUNDING SOURCE
CEOP II	DRAFT	Toshio Koike Sam Benedict	SOME	YES	JAXA, MEXT
INT. PRECIP	DRAFT	Phil Arkin	Discussions	NO	NO
GWSP	DRAFT	Charles Vorosmarty	SOME	Driven by GWSP Agenda	NASA seed money
ISMWG	YES	Tom Jackson	Coordination Ongoing	YES	NASA
INDICATOR	DRAFT	Pilar Cornejo	Draft Workshop Proposal	NO	Opportunity Area
REG WKSH	P. DRAFT	Michael Hales	Draft Workshops proposal	NO	NOAA, ???

# WATER CYCLE MEASUREMENTS WILL HAVE GLOBAL BENEFITS IF DEVELOPING COUNTRIES GAIN THE CAPABILITY OF USING THESE DATA

(Capacity Building – Technology, Education/Training and Field Applications)



+



- Developing nations should be provided with the hardware and software to access all IGWCO data products and forecasts.
- Training materials should be developed and sessions carried out in developing countries.

=

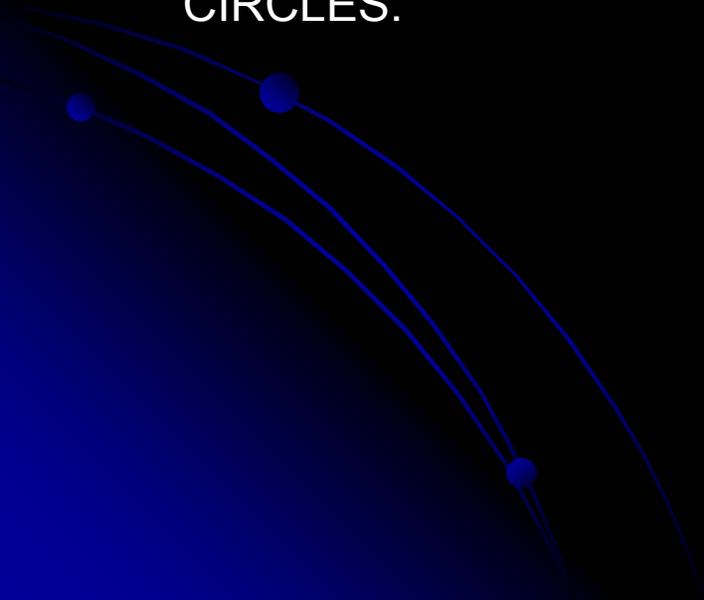


IGWCO WILL WORK ACTIVELY TO SUPPORT THE TRANSFER OF ADVANCED TECHNOLOGIES TO THE DEVELOPING WORLD. IGWCO ENVISIONS WORKING CLOSELY WITH UNESCO AND SPACE AGENCIES (CEOS) TO ACHIEVE THIS GOAL.

# SUPPORT INTERNATIONAL PROJECTS CAN BRING TO NEESPI

THEY:

- CAN BROADEN THE BASE OF EXPERTS WHO WILL USE NEESPI DATA SETS AND MODELS.
- CAN AID IN PROVIDING A HIGHER PROFILE FOR THE PROJECT WITH SOME FUNDING AGENCIES.
- CAN PROVIDE EXPOSURE FOR THE PROJECT IN WIDER SCIENTIFIC CIRCLES.



# WHAT NEESPI CAN PROVIDE TO AN INTERNATIONAL PROJECT LIKE GEWEX

- UNIQUE DATA SETS.
  - A TESTBED FOR SATELLITE PRODUCTS, MESOSCALE COUPLED LAND ATMOSPHERE MODELS AND MACROSCALE HYDROLOGICAL MODELS.
  - A PLACE TO CARRY OUT INTERNATIONAL FIELD CAMPAIGNS.
  - AN AREA WITH SOME UNIQUE GEOGRAPHICAL FEATURES THAT INFLUENCE THE WAY IN WHICH THE REGION INTERACTS WITH THE GLOBAL CIRCULATION AND CLIMATE SYSTEM.
  - EARLY SIGNALS OF CLIMATE CHANGE DUE TO THE AREA'S SENSITIVITY (AND VULNERABILITY) TO GREENHOUSE WARMING.
- 