Hydrological Applications and Run–Off Network (HARON)

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AP Symposium Breakout Session on Water Mananagement

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GEO and GEOSS
The Tower of Babel Problem!

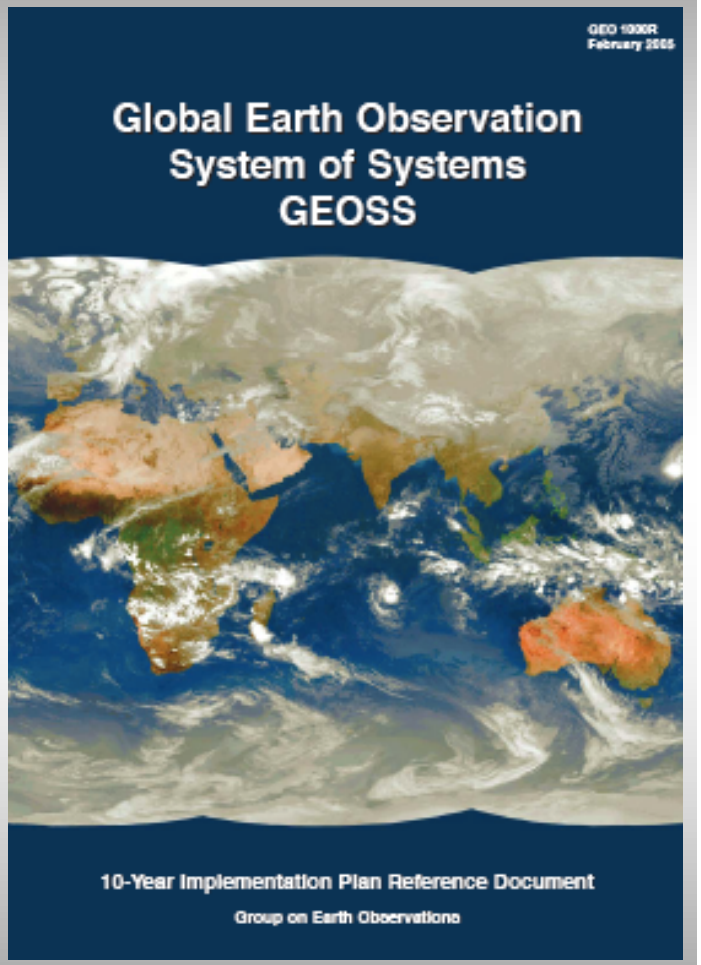
There is a Need for a System which Provides Access to all Earth Observation Data in Standard Interoperable Formats

Need for an EO System Of Systems

- For Access to all Earth Observation Data
- Based on Existing Portals, Systems and Networks
- Designed to Increase Quality and Accessibility of Information
- Providing Tools

GEO and GEOSS Status

- The Group on Earth Observations GEO as Intergovernmental Organization is formally established
- 10-Year Implementation Plan Endorsed
- GEO Secretariat established in Geneva
- The Group on Earth Observations is an Intergovernmental Organization with 76 Member Countries, the European Commission and 46 Participating Organizations
- One Objective: Establish a global, coordinated, comprehensive and sustained system of Earth observing systems, GEOSS



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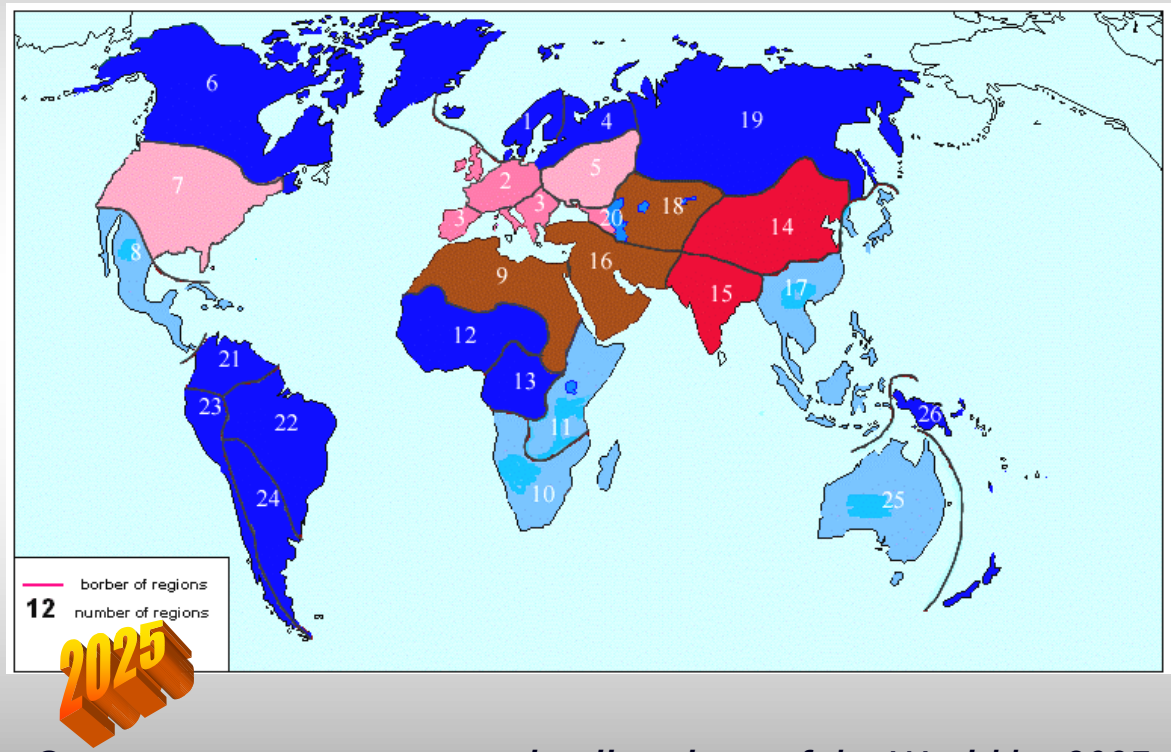
Key Issues Affecting State of the World's Water Resources [1]

- World's water resources, under pressure due to major population change and increased demand
- Growing variability of surface water availability
- Increasing levels of water pollution
- Water diversions

Disruption of social & economic development, and ecosystem health in many areas

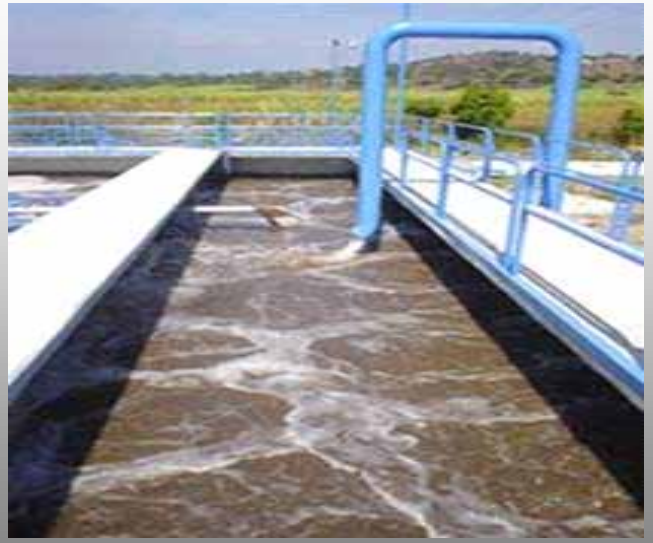


Stress on water resources in all regions of the World by 2025

[1] Key messages: "*The State of the Resource*", Chapter 4; prepared by UNESCO, WMO and IAEA; The UN World Water Development Report No.2, 2006

Key Issues (cont.)

Climate change - expected to have significant impact on weather patterns and hydrological cycle, affecting surface water availability, soil moisture, and groundwater recharge



Groundwater resources - tapped at unsustainable rates and/or affected by pollution

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Key Issues (cont.)

Floods - number one cause of disaster in terms of loss of human life /property

More than 5 million people die each year from *water-borne diseases* (malaria and cholera)

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Need for Hydrological Cycle Information

Improved monitoring and forecast information provide large benefits in terms of reduced human suffering, preservation of property, and improved economic productivity

The need for *water cycle data* monitoring systems was specifically recognized in international fora:

- 1992 - *Chapter 18 - Freshwater* of Agenda 21, Rio Declaration on Environment and Development, UNCED, Rio de Janeiro
- 2002 - *The Johannesburg Declaration on Sustainable Development,* WSSD, Johannesburg
- 2003 - *UN Millennium Declaration,* UN Development Goals (MDGs)

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Current Situation of Data Collection Systems

- inadequate / deteriorating systems for collecting and managing water-resources related information
- Little or no-quality assurance & control standards applied to instruments, data reduction methods and procedures
- Insufficient basic capabilities to access, interpret, and apply water cycle information available from satellite systems

Declining ability of the National Hydrological Services (NHSs) and related water agencies to provide information on the status and trend of water resources

International Efforts Initiated to Address these Issues

1993 - *World Hydrological Cycle Observing System* (WHYCOS) - WMO

2003 - GEO and its 10-Year *Implementation Plan for* GEOSS

- with water cycle observations and related research activities

2004 - Global Water Cycle Observations Theme (IGWCO) by IGOS – P

- develop & promote strategies for continuity of global water cycle observing systems

2004 - Global Terrestrial Network – Rivers (GTN-R) in GCOS *Implementation Plan*

- *development of baseline network in support of UNFCCC*

Detailed understanding of the components of the global water cycle not yet achieved

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HARON Project: Basic Rationale

- Prevention of water-induced disasters through global monitoring of runoff and lake storage as integral parts of water resources management.

- Provision of near real-time monitoring data and products of large scale rivers and lakes from:
  - *in-situ* gauge observations, and
  - satellite observations (based on developing altimetry technology)

- Comprehensive monitoring of Hydrological Cycle in context of climate change.

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Goals & Objectives

Main Goals

- Support water resources management while contributing in a cross-cutting fashion to all societal benefit areas of GEO
- Improve & support the closure of the global water budget, in line with requirements of GCOS and the Global Water Cycle Experiment (GEWEX)

Main Objective

Integrate, in a phased approach, dedicated river gauging networks of existing hydrological stations into a global runoff observation network

Implementation Phases

PHASE I – Upgrade & sustained maintenance of major global run-off stations, monitoring continental freshwater fluxes into the world's oceans

PHASE II – Integration of hydro-meteorological and related *in-situ* components with satellite observations

PHASE III – Consolidation of integrated hydrological observation network development and application of user-oriented information products made available by HARON

Production of an implementation plan for a broad global water cycle data integration system, combining water cycle *in-situ*, satellite, and model output data

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Main Elements

Rehabilitation of the in-situ observational infrastructure

• Technical upgrade, as required, of the major run-off stations which monitor continental freshwater fluxes into the world's oceans of the GTN – R network

Linkage with relevant research and development activities

• Use of satellite altimeters to measure inland water heights for major rivers - relevant research issue to supplement *in-situ* observations for the derivation of discharge data

• Continuous follow-up on results of national and regional initiatives for application during project implementation

Main Elements (cont.)

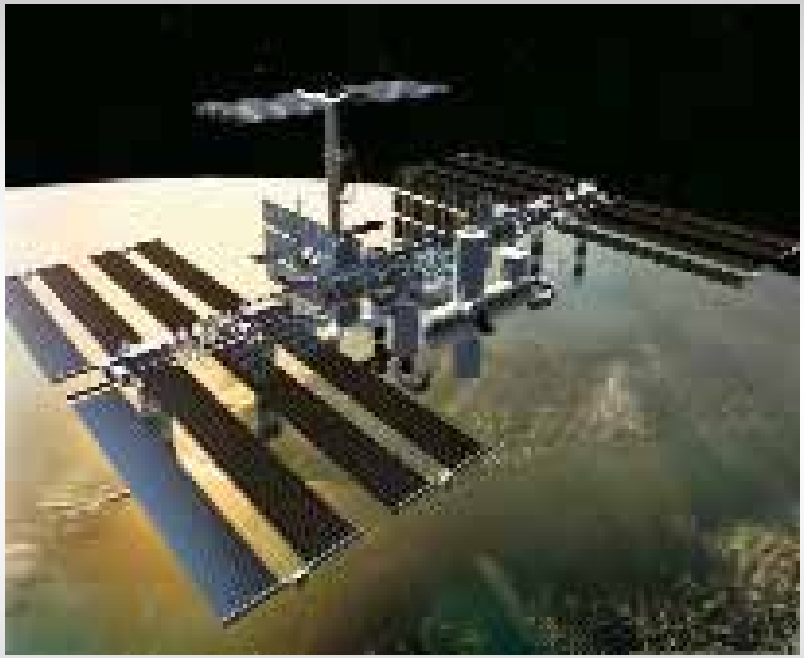
Training and capacity building

- Geared to participating (developing) countries to improve national water management practices
- Based on arrangements with existing local, national, regional, and global initiatives
- Provision of:
  - *Workshops and training courses covering relevant aspects of project implementation*
  - *Hardware & software for*
    - *receiving / processing satellite data*
    - *acquisition / processing of in situ data*
    - *integration with satellite and other space-borne data*
  - *Training modules*

Building Components

- ESA's "Rivers and Lakes" Project utilizing ENVISAT Radar Altimetry

- Input by scientific partners for research & provision of space data to convert surface water radar echoes into variations of river and lake levels



- Reference data sets by GRDC - historical runoff data series and future provision of terrestrial water-level observation of selected rivers

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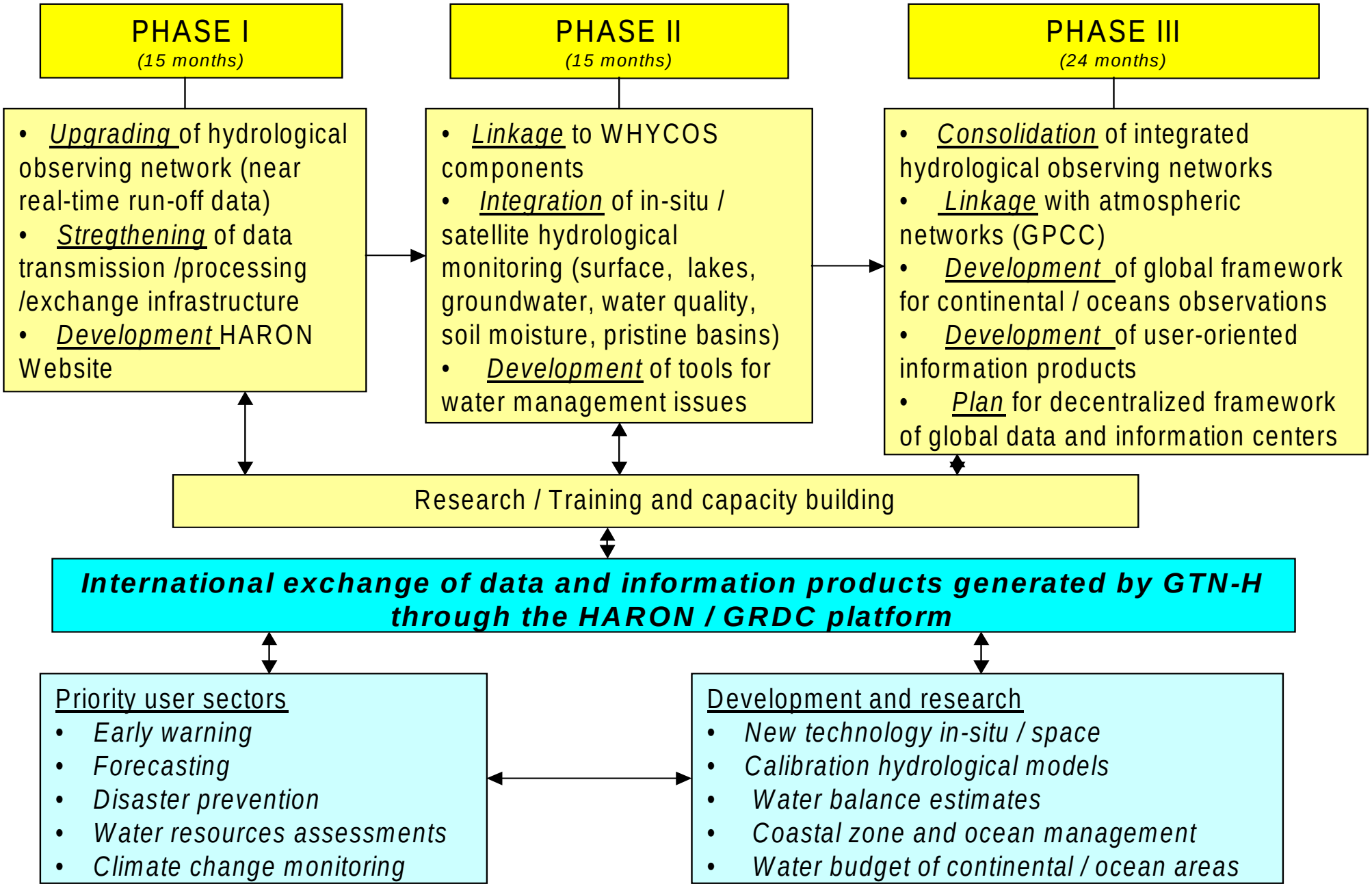

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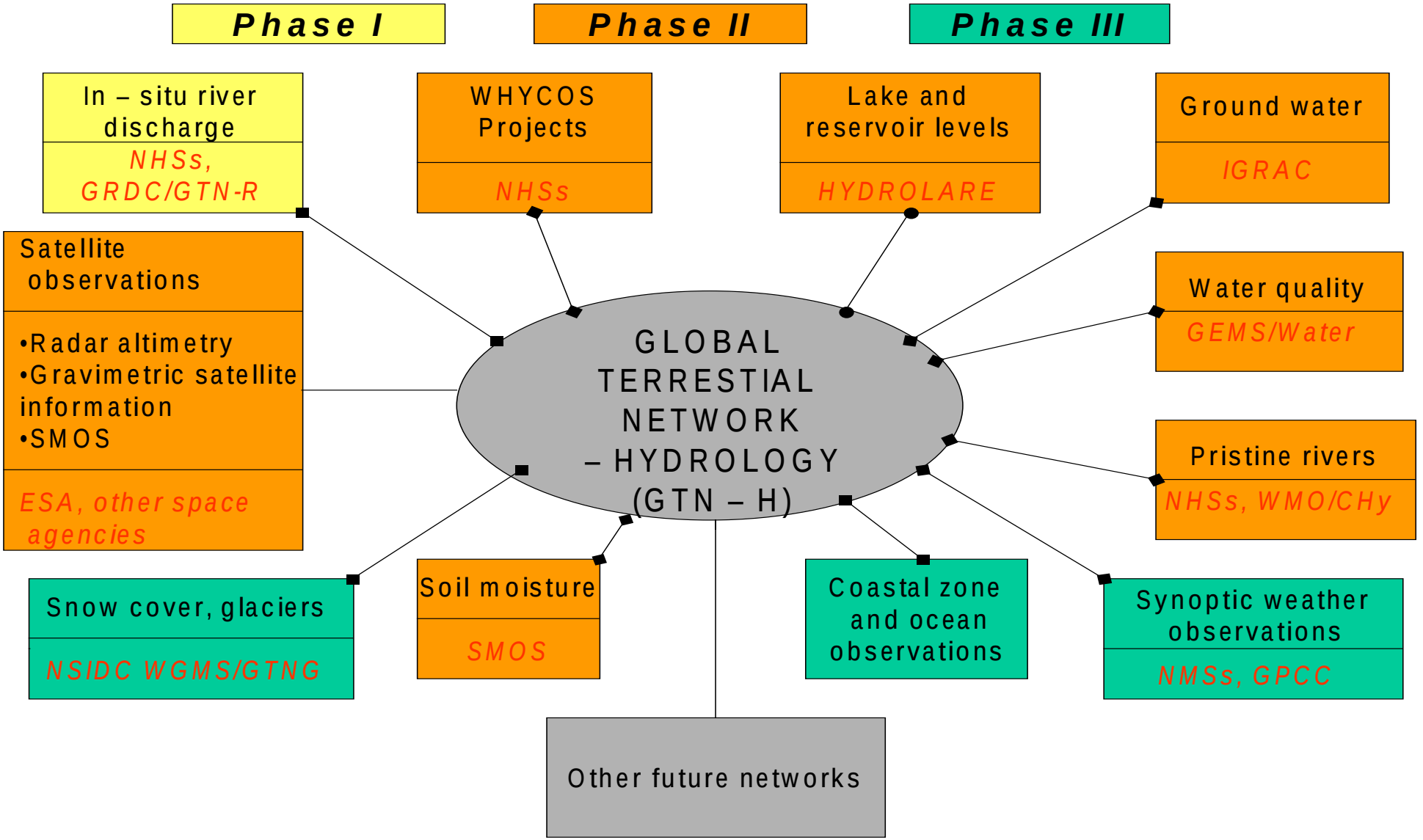
Phased Linkage of Networks with HARON



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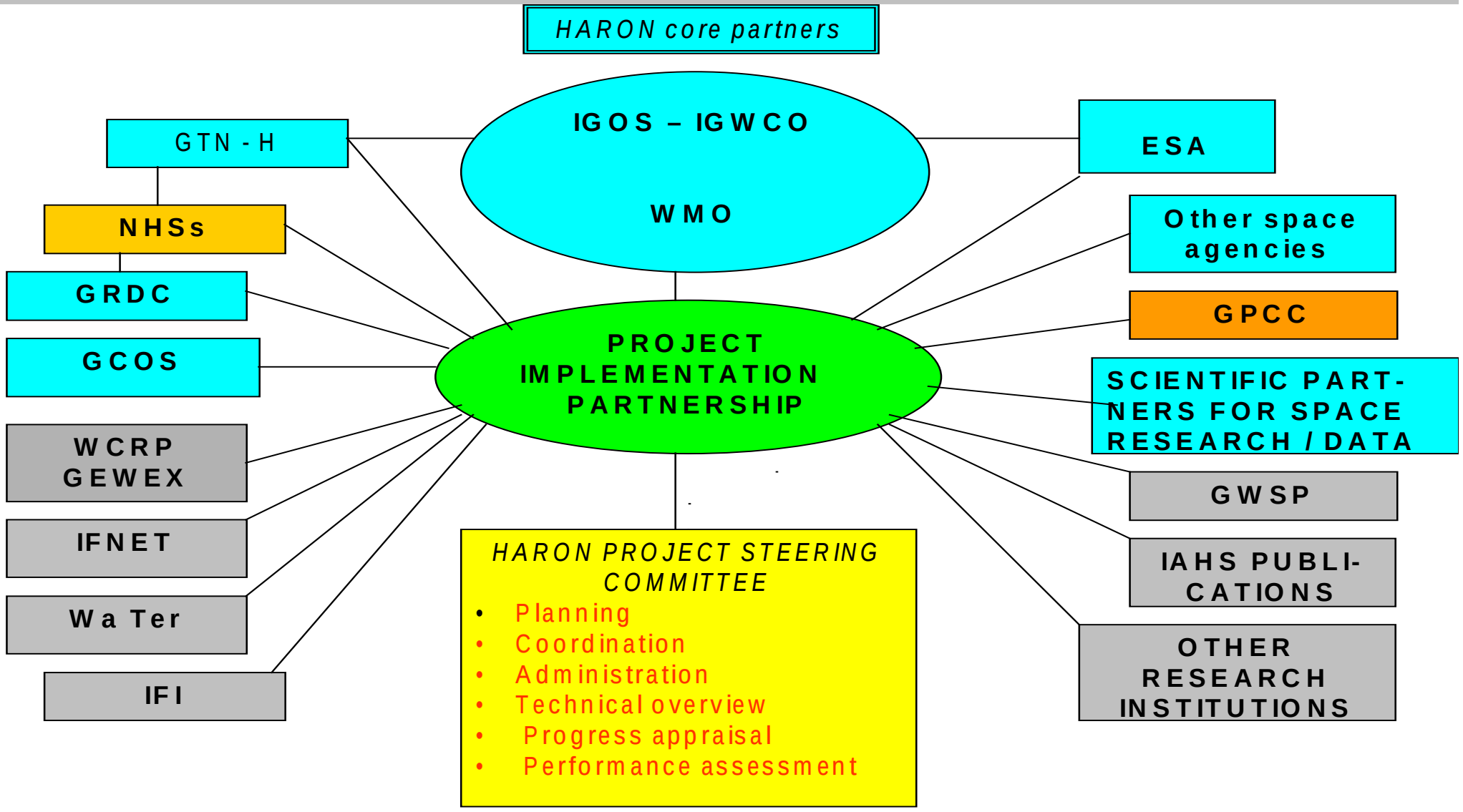
GEO Framework for Project Partnership and Coordination



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Expected Outcomes from HARON

- Integrated approach to global hydroclimatological monitoring
  - Improved *in-situ* monitoring systems
  - New/better satellite techniques for measuring temporal & spatial freshwater variability
    - including quality/quantity of surface water & groundwater (drinking water, recreation, irrigation)
  - Standardization of metadata for data sharing

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Expected Outcomes from HARON

- Strengthened research and development infrastructure (in-situ & space-based) for scientific applications
  - Increased availability of timely and reliable hydrological data
  - Interoperability of observing systems
  - Improved water resource-management through:
    - Hydrological forecasts
    - Access to Earth observation tools (especially developing countries)

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GEO and GEOSS

HARON will for the first time provide an integrated and interoperable global hydrological observing system contributing in a cross-cutting fashion to *all societal benefit areas established by GEO*

GEO Cross-cutting Societal Benefit Areas

Disaster Reduction / Prevention
Human Health
Energy Management
Climate Change
Water Management
Weather Forecasting
Ecosystems
Agriculture
Biodiversity

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THANK YOU!

Main sources of the images:

The UN World Water Development Report No.2, Chapter 4, UNESCO, WMO and IAEA, 2006

GEO, Global Earth Observations System of Systems, 10-Year Implementation Plan, 2005

Weather, Climate and Water and Sustainable Development, WMO No. 974, 2004

Final Report WMO / PROMMA No. 115-01 “Hacia un Programa Modernizado de Monitoreo Hidroclimatológico en México, December 2002