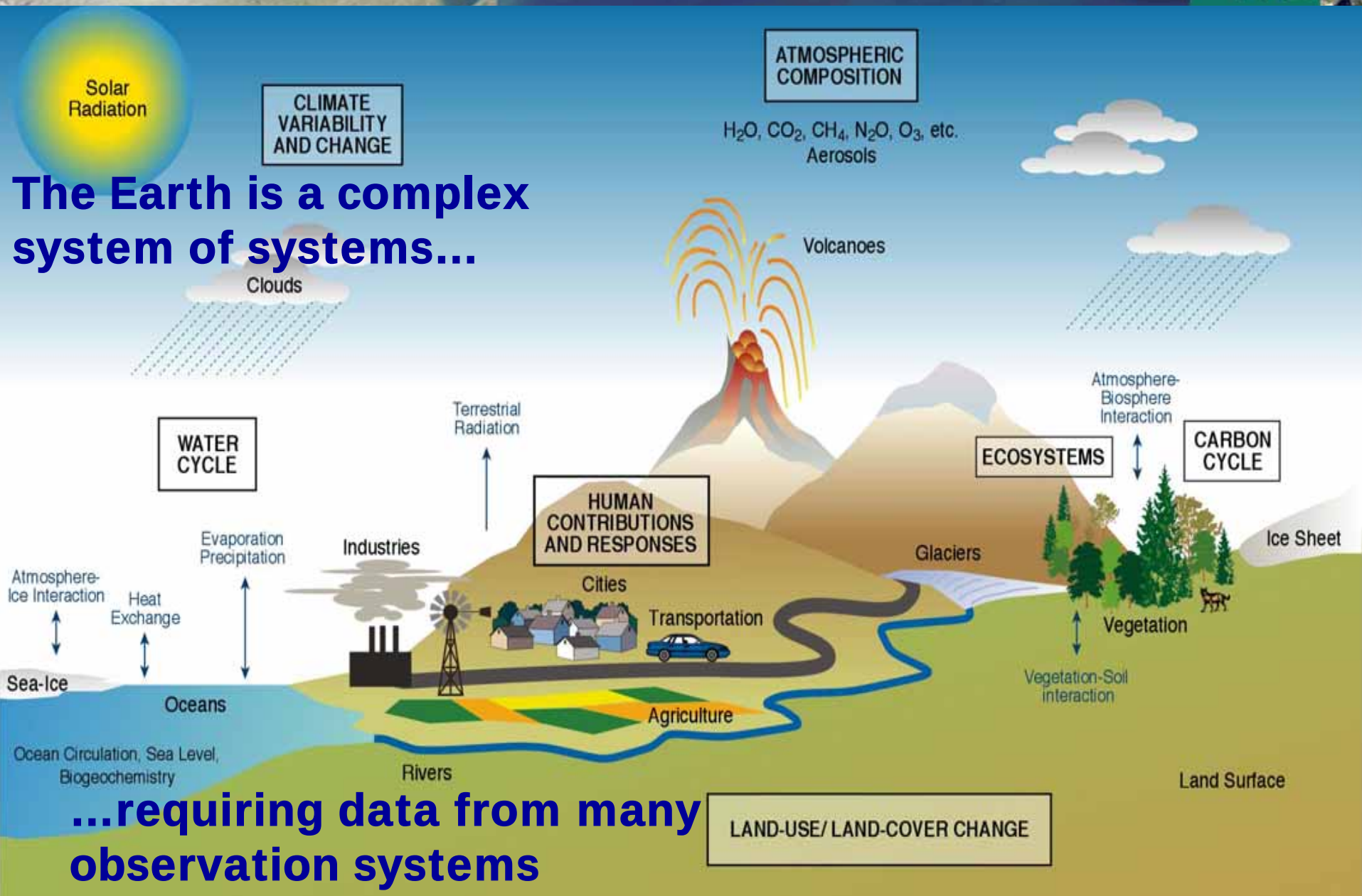
Group on Earth Observations

GEO: Understand Trends, Forecast Changes, Support Informed Decisions

José Achache
Director
GEO Secretariat

Group on Earth Observations



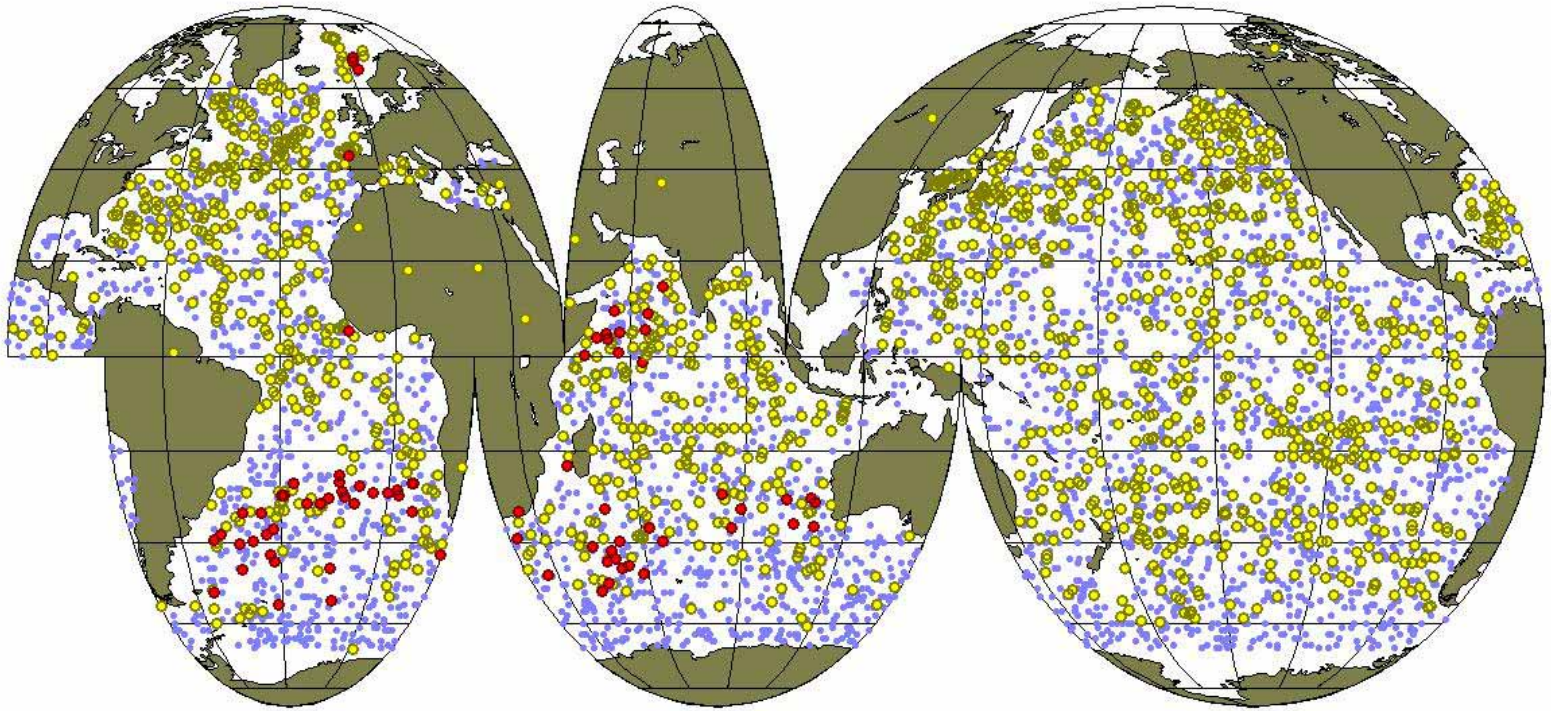
The Earth is a complex system of systems…

…requiring data from many observation systems

Global In-situ Networks

Argo Float Array

Global Argo Float Array (red – Argo UK; yellow – all Argo; blue – proposed array)



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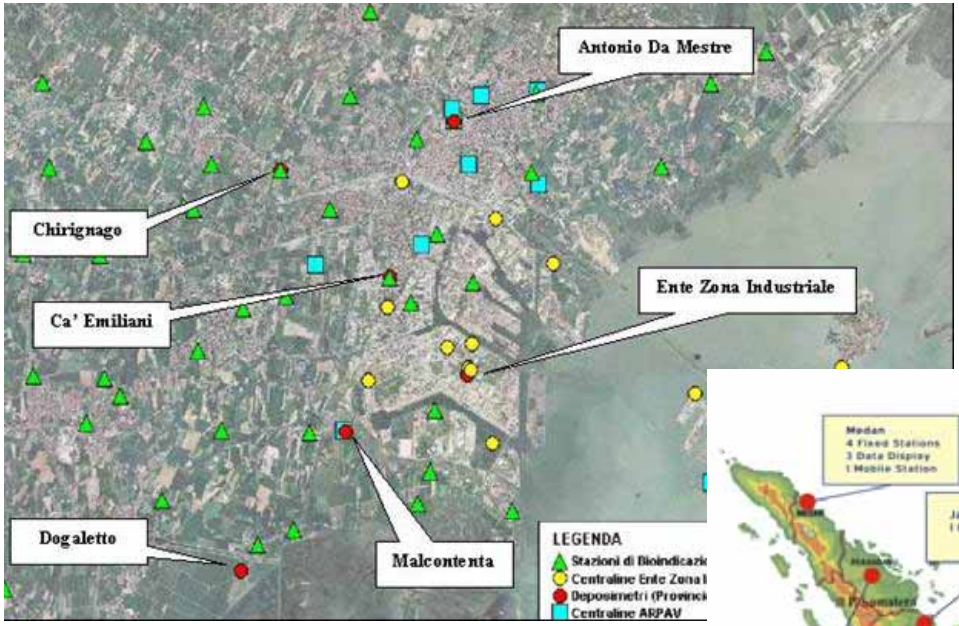
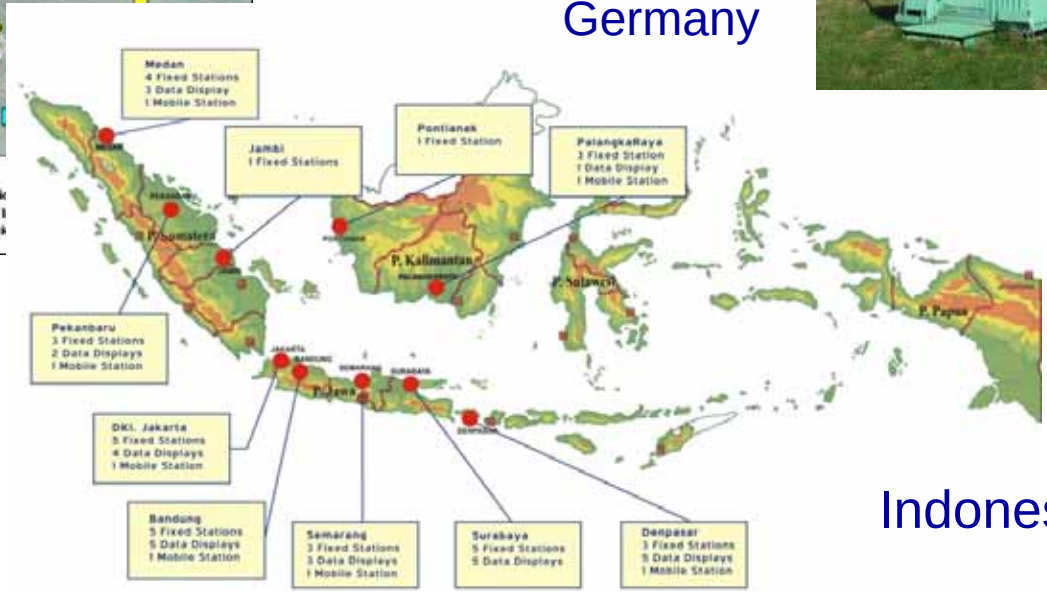
Regional and Local In-situ Networks



Venice, Italy

Air pollution measurement station Emden, Germany



Indonesia

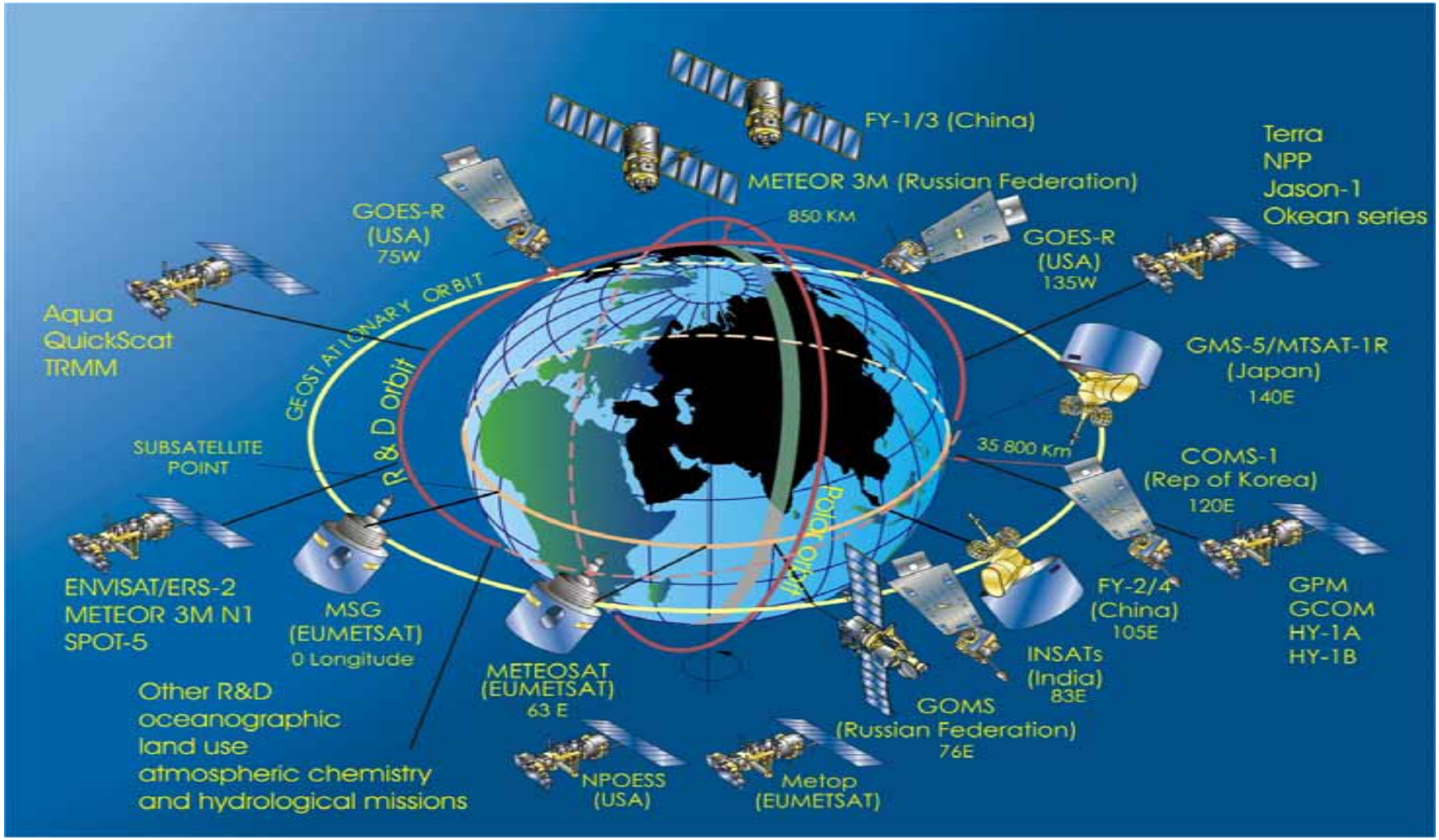
EXAMPLE:
Air Pollution
Observation

Assistant Deputy for Environmental Impact Control Facility
Deputy Minister for Technical Infrastructure for Environmental Management
Ministry Environment

Group on Earth Observations

Space Observing Systems

The WMO Global Observing System



The Tower of Babel

There is a Need to Share all Earth Observation Data in Standard Interoperable Formats

Group on Earth Observations

GEO : The Group on Earth Observations is an Intergovernmental Organization of 66 Member Countries, the European Commission and 46 Participating Organizations

Group on Earth Observations

GEOSS: A Global, Coordinated, Comprehensive and Sustained System of Observing Systems

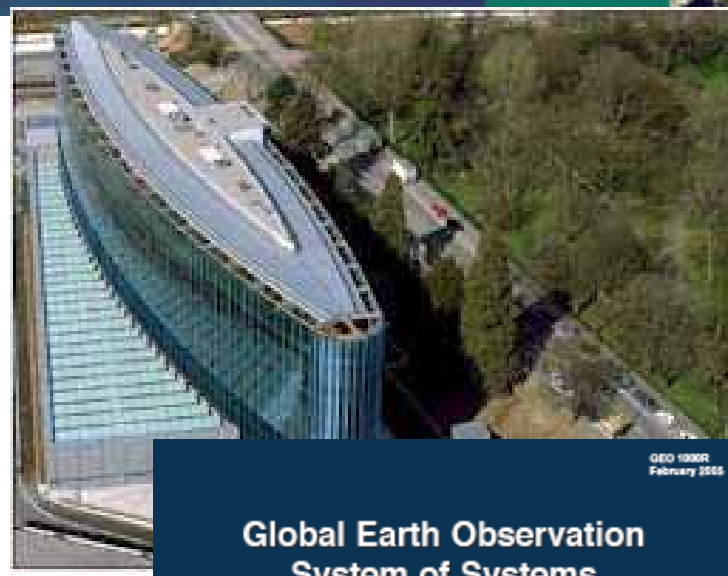
Group on Earth Observations

GEOSS will Address Nine Societal Benefit Areas

1. Reduction and Prevention of Disasters
2. Human Health and Epidemiology
3. Energy Management
4. Climate Variability & Change
5. Water Management
6. Weather Forecasting
7. Ecosystems
8. Agriculture
9. Biodiversity

GEO Governance

- **Ministerial Summit (every 2 years)**
- **Plenary (co-chaired by RSA, EC, USA and PRC)**
- **Executive Committee (12 Members)**
- **Secretariat (16 staff in Geneva)**
- **10-Year Implementation Plan Endorsed**



GEO: A User-driven Process

- **Improve and Coordinate Observation Systems**
- **Provide Easier & More Open Data Access**
- **Foster Use through Science and Applications**

… to answer Society's need for informed decision making

Group on Earth Observations

GEOSS Architecture will Provide Systems Interoperability and Easier and More Open Data Access

Systems Interoperability

- Technical Specifications for Collecting, Processing, Storing, and Disseminating Data and Products
- Based on Non-proprietary Standards
- Defining only how System Components Should Interface to be Contributed to GEOSS

GEO Web Portal and Clearinghouse

- **Defining Standards for Quality Assurance of Derived Products**
- **Providing Online Calibration and Validation**
- **Providing Tools**

GEO Data Sharing Principles

- **Full and Open Exchange of Data…Recognizing Relevant International Instruments and National Policies and Legislation**
- **Data and Products at Minimum Time delay and Minimum Cost**
- **Free of Charge or Cost of Reproduction for Research and Education**

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GEO will Foster Interdisciplinary Developments Addressing Cross-cutting Issues, Linking Local to Global

Renewable Energy Management

- **Developing applications for monitoring renewable energy sources**
- **Improving forecasting of fluctuations and intermittency**

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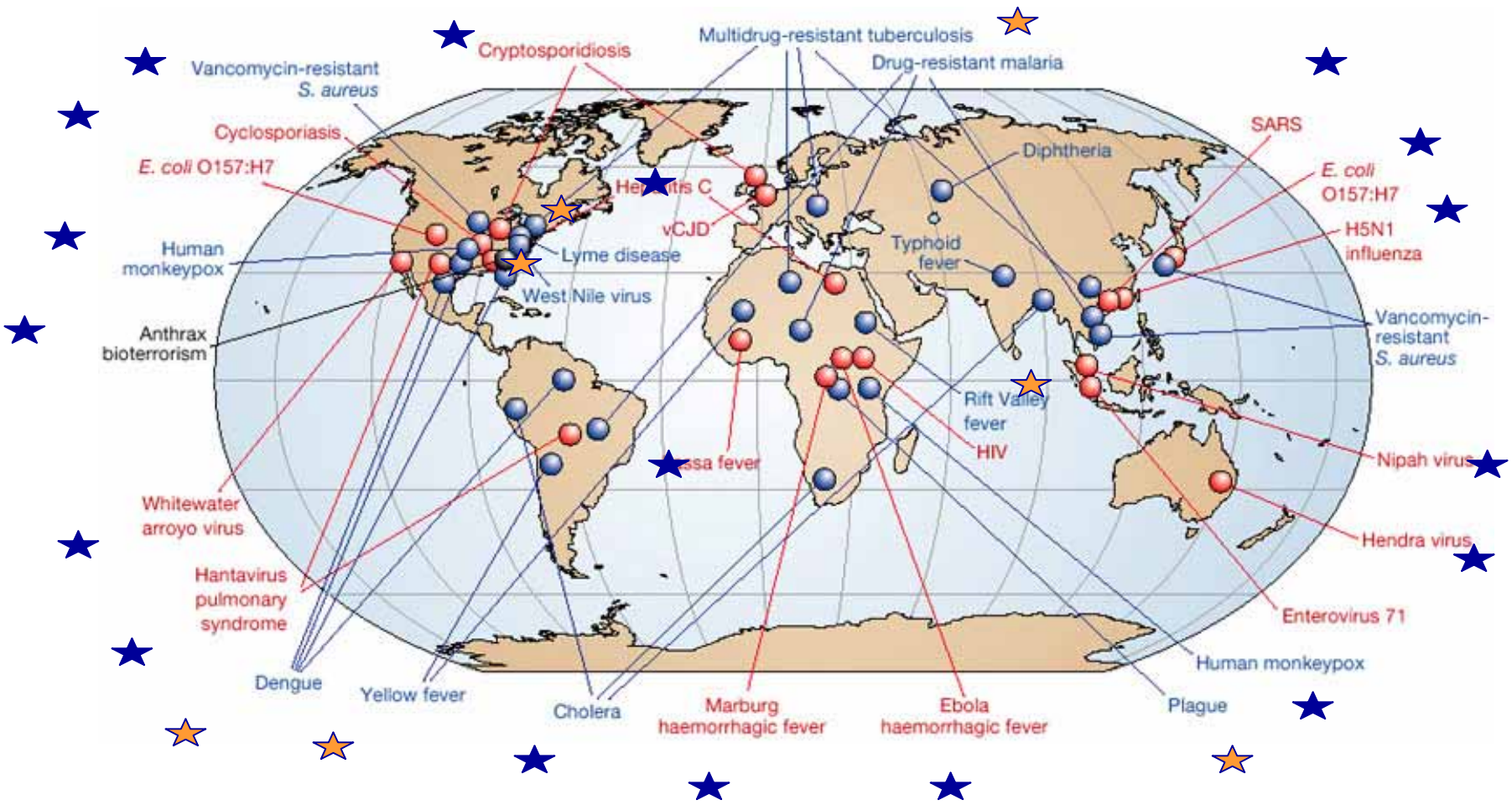
Forecasting Global Emerging Diseases



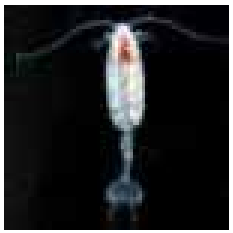
EMERGING
RE-EMERGING

★ ZOONOTIC
★ VECTOR-BORNE

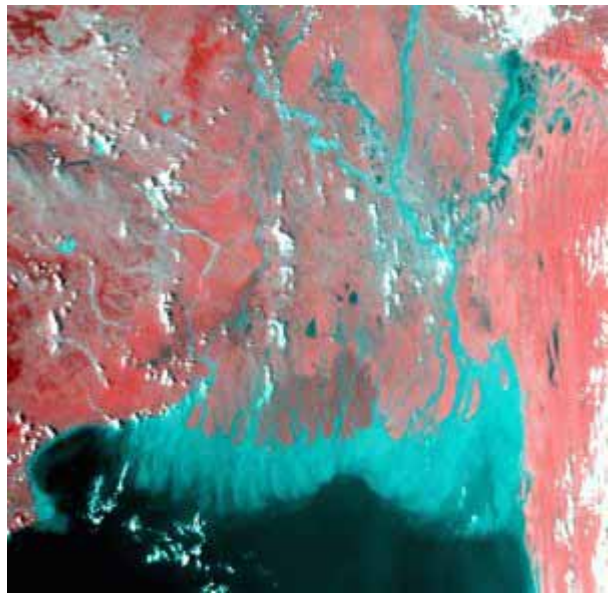
* Modified from Morens et al. 2004 *Nature* 430:242

Cholera Outbreaks

VIBRIO CHOLERAE HAS A MARINE ZOONOTIC CYCLE ASSOCIATED WITH ALGAL BLOOMS

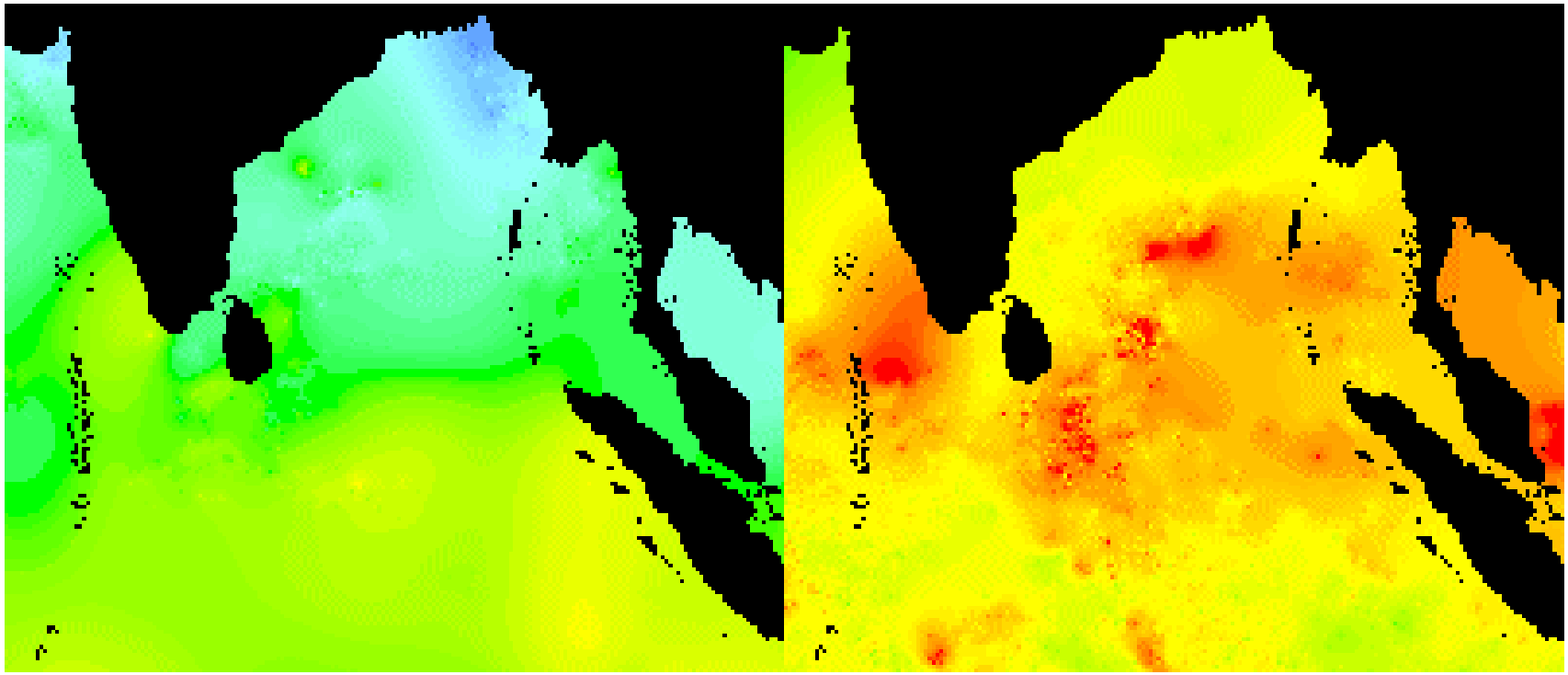


COPEPOD



BAY OF BENGAL

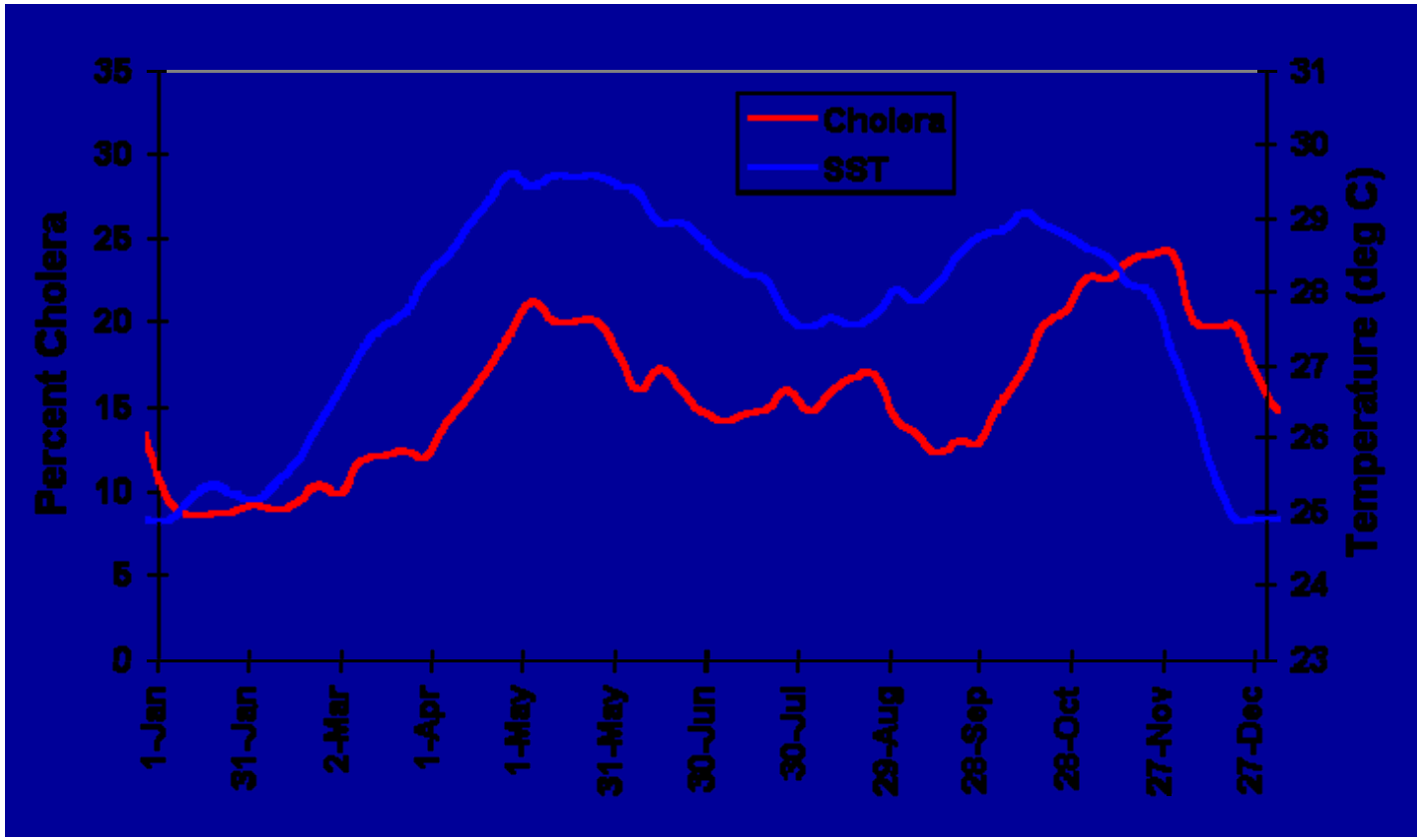
AVRHH SEPT 1992
FALSE COLOR INFRARED



JANUARY MAY

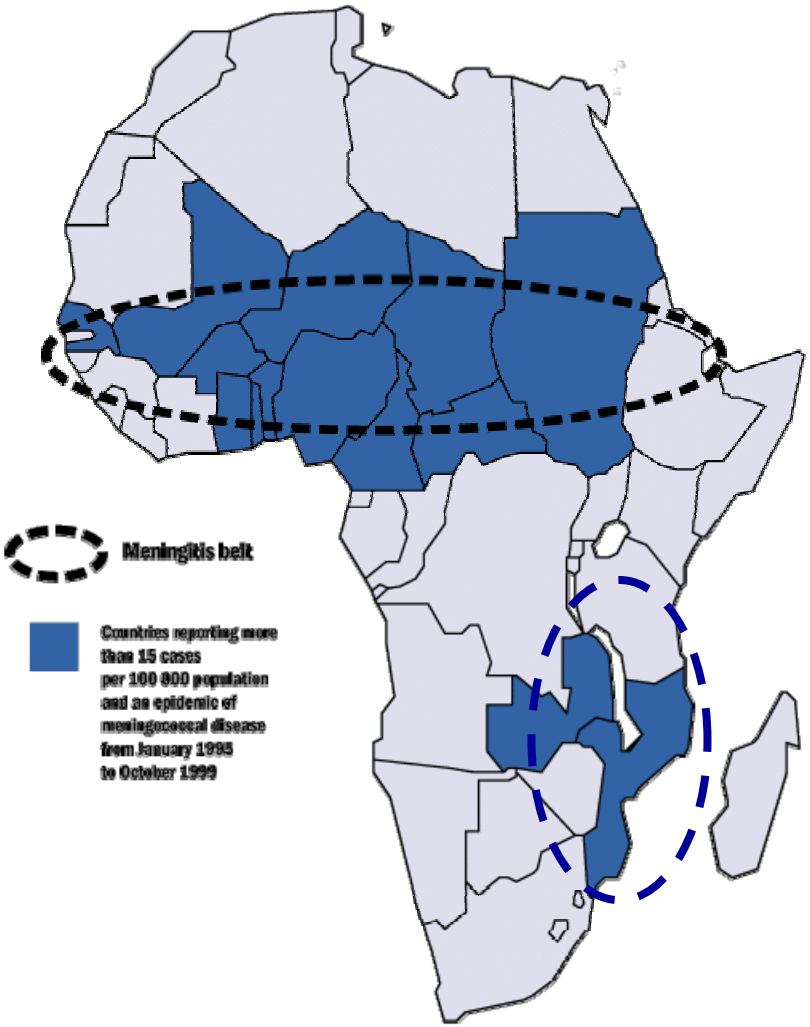
AVHRR Global Composite SST images from 1992

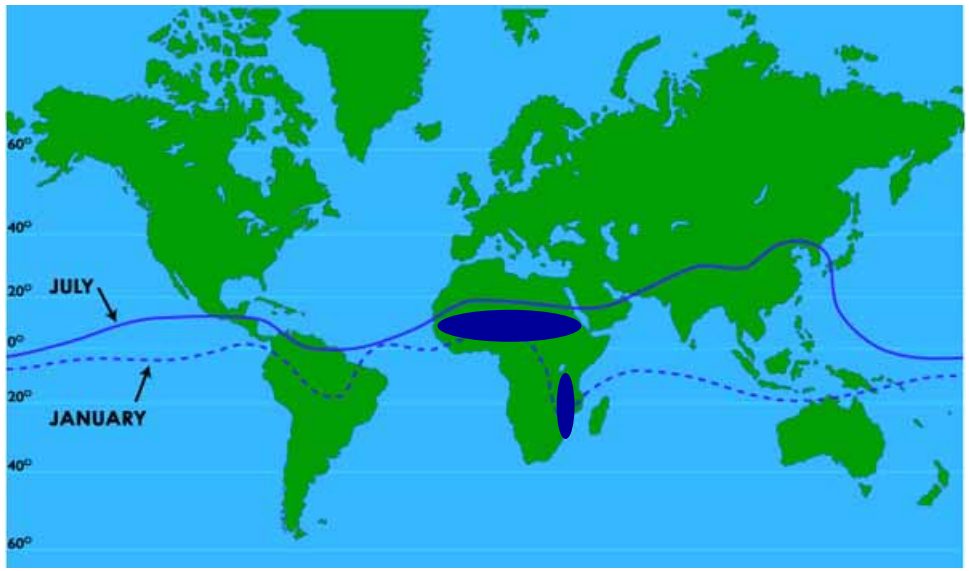
CHOLERA CASES FOLLOW SEA SURFACE TEMPERATURE



BAY OF BENGAL

 Lobitz et al. 2000 PNAS 97:1430





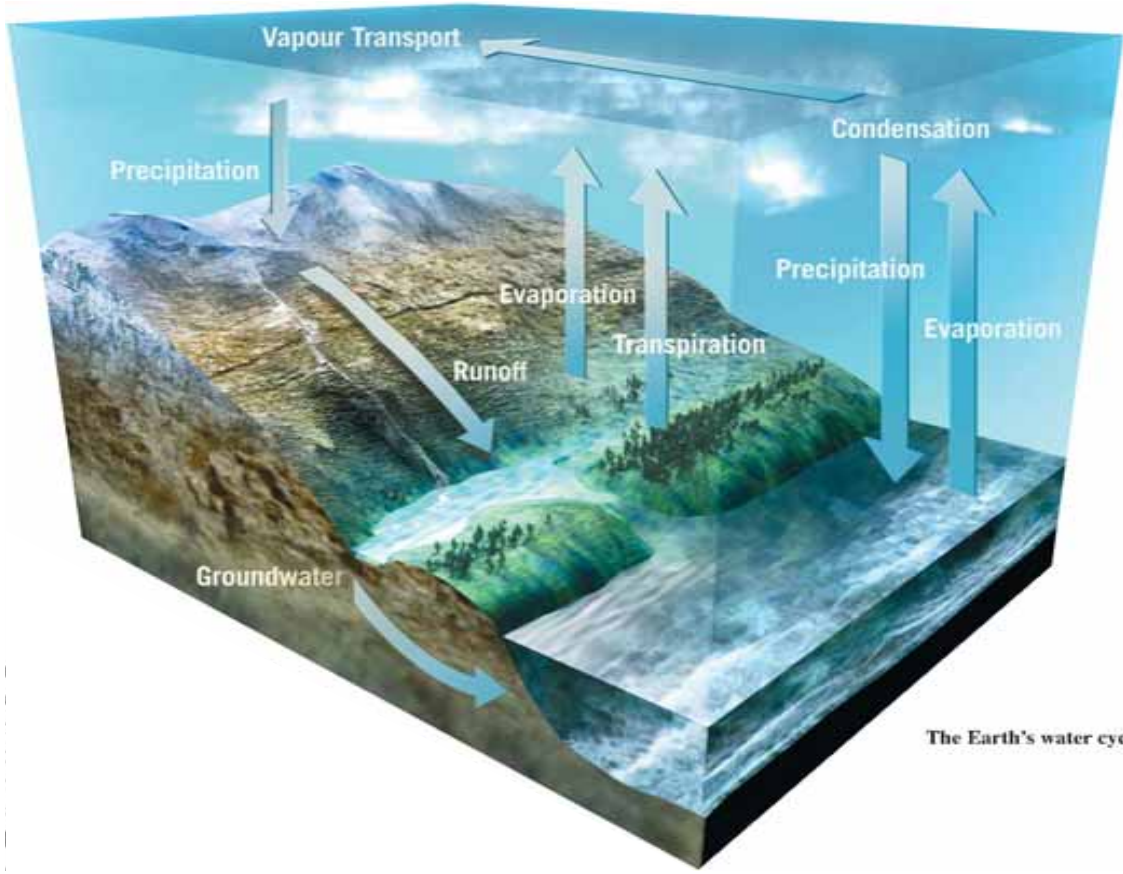
Relative Positions of « Meningitis Belt » and Intertropical Convergence Zone (July and January)

Group on Earth Observations

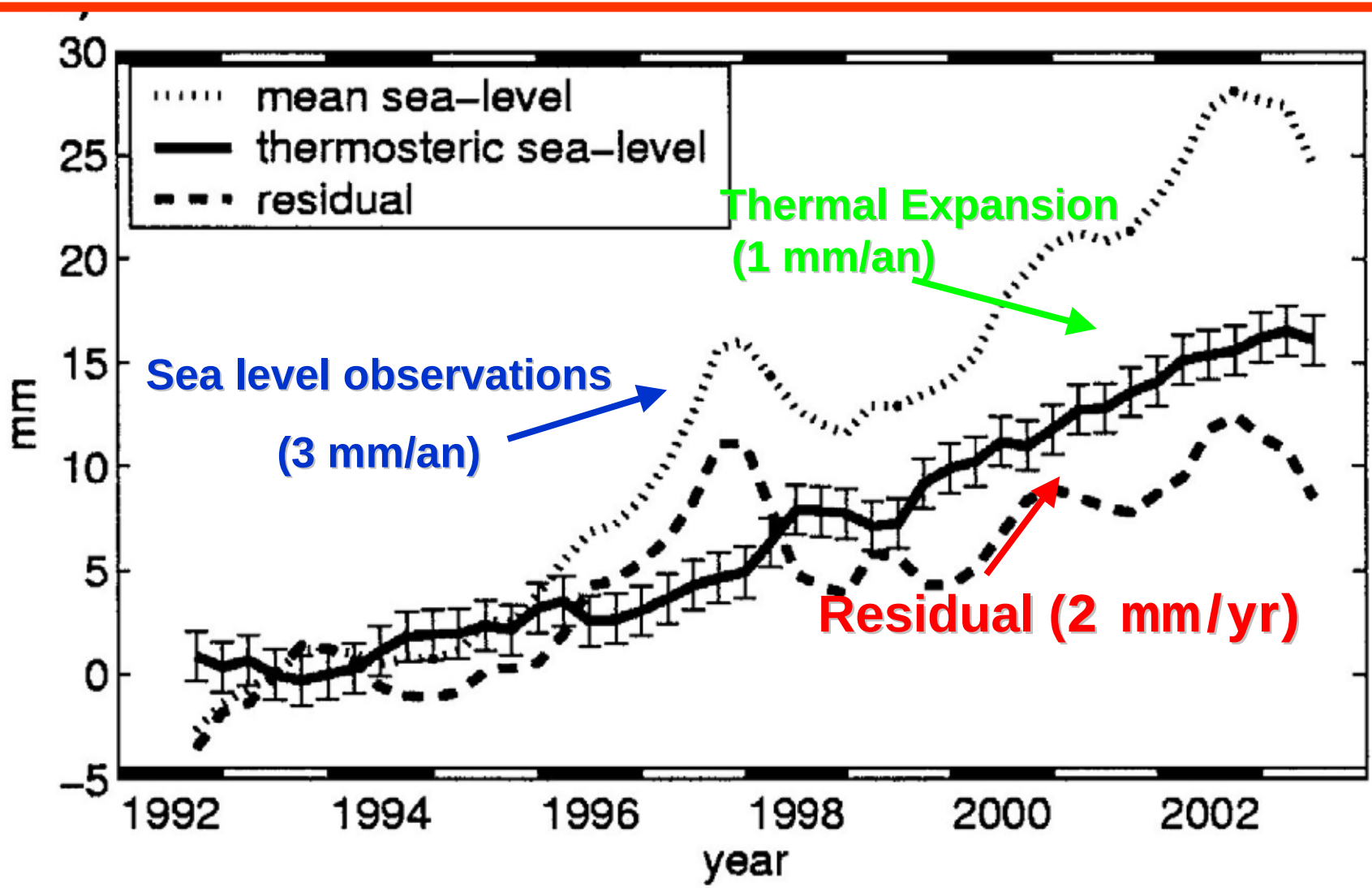
Monitoring Continental Water Cycle for Improved Water Resource Management

Share the Resource, Forecast Floods and Monitor Global Changes

- **Power Generation**
- **Irrigation**
- **Drinking & Sanitation**
- **Flood and Droughts Prevention**
- **Understanding Sea-level Rise**



The Earth's water cyc



Challenges

- **Lack of or inaccessibility to crucial data is a major constraint for sustainable management of water resources and improvement of forecasts.**

- **Current water cycle observation capability is inadequate for monitoring long-term changes in the global water system.**

HARON: Hydrological Applications and Run – Off Network

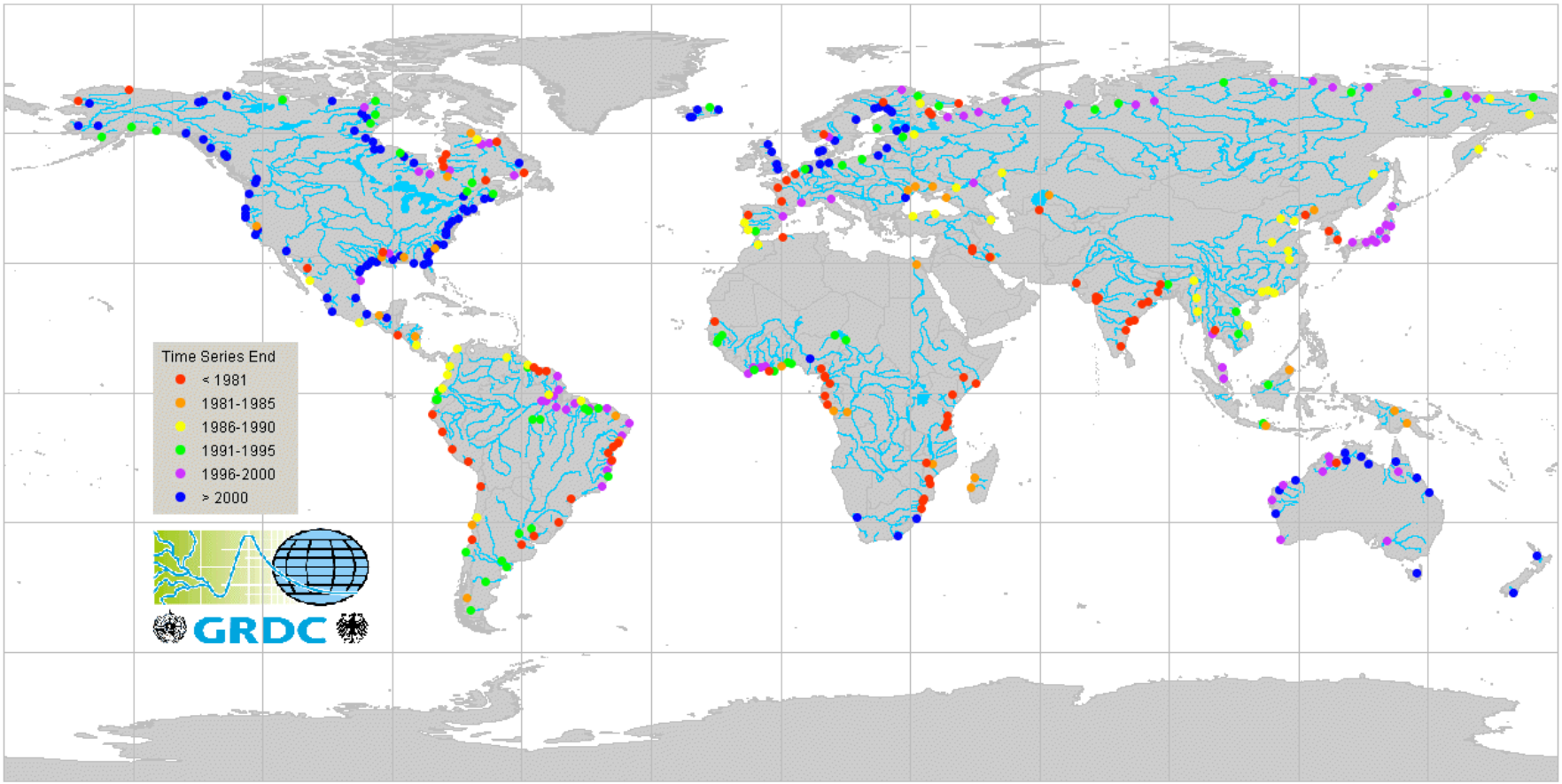
To restore existing Hydrological stations networks to improve and support the closure of the global water budget and support water resources management.
(Note: in line with objectives of WMO, IGWCO, GCOS and GEWEX)

HARON – Phase 1

Upgrade and (re-)connect the 380 major global river discharge stations of the Global Terrestrial Network for river discharge (GTN-R).

Note: The up-stream position of these stations (up to 600 km) ensures independence of gauge measurements from tidal effects

HARON – Phase 1



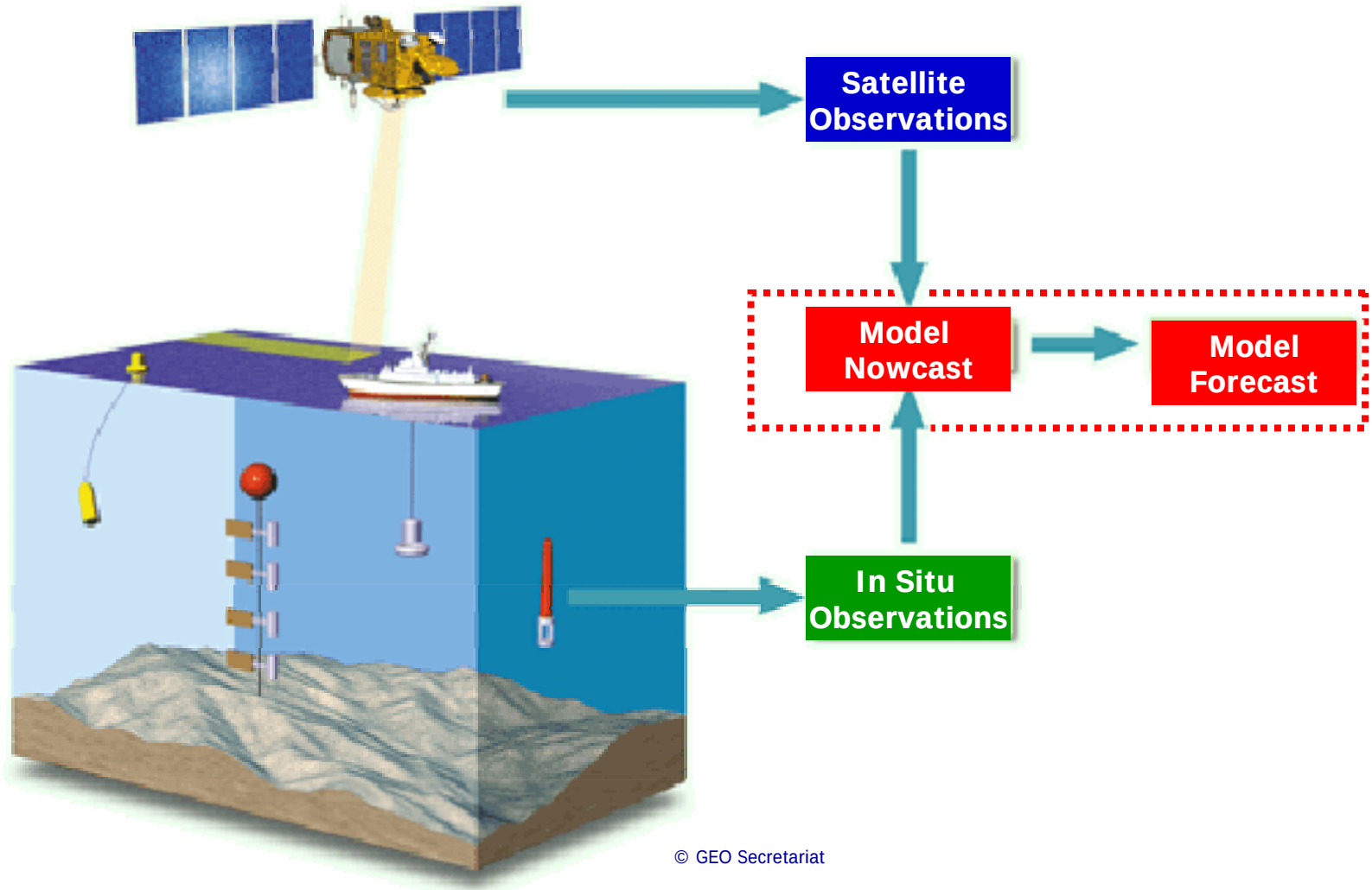
Proposed river discharge baseline network (GTN-R; 380 stations)

HARON – Phase 2

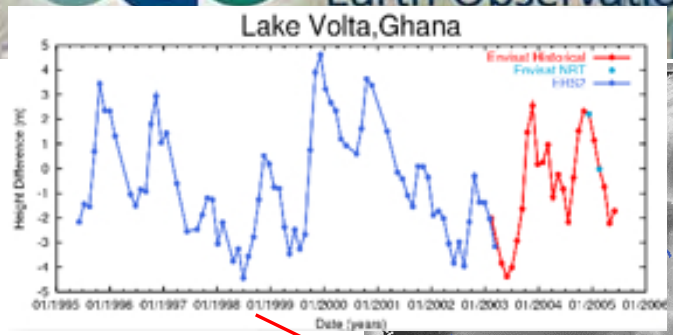
- **Link in-situ water-level observations with remote sensing data from Radar Altimetry and Grace gravity data.**

- **Link Global Network to basin-wide hydrological information systems, focusing on international river basins of WMO's WHYCOS Programme.**

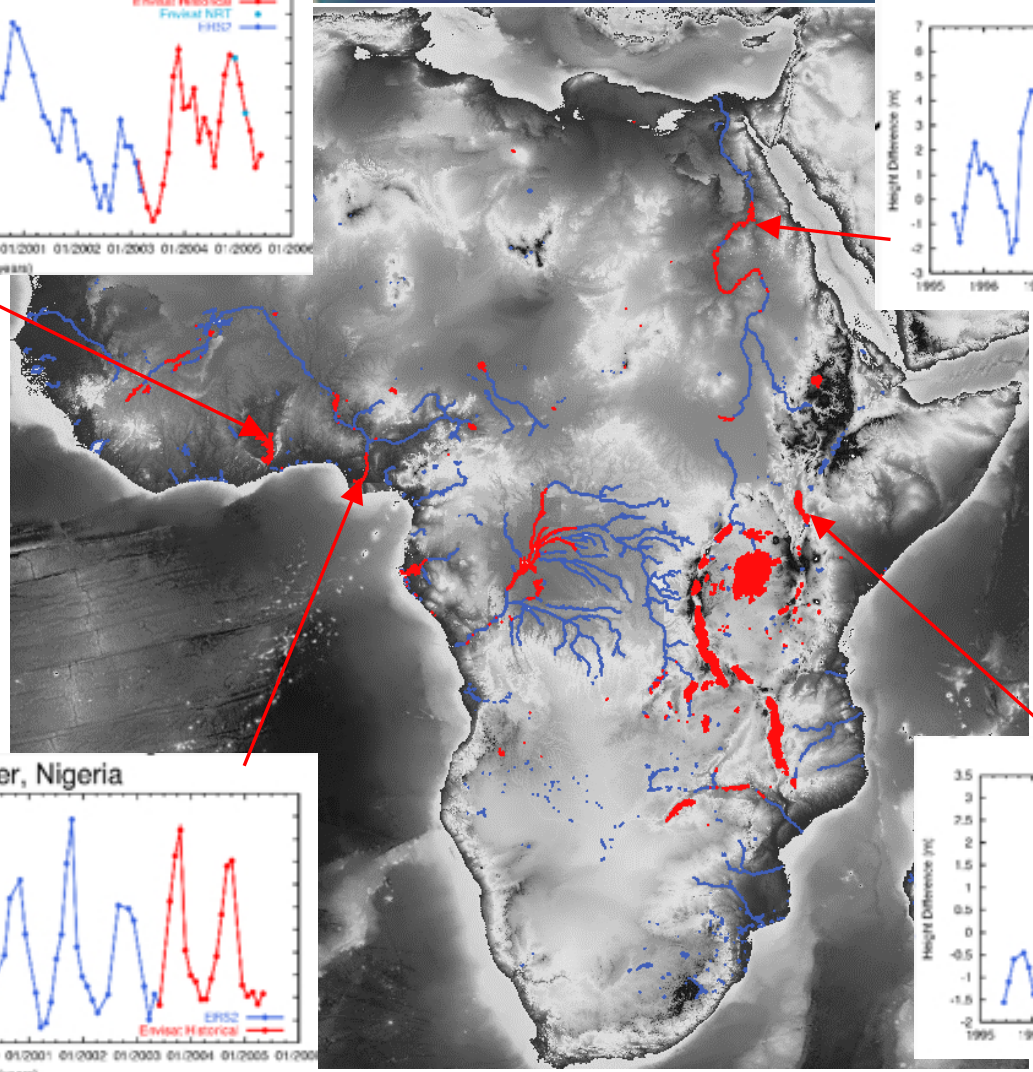
Integration of space and in-situ observations



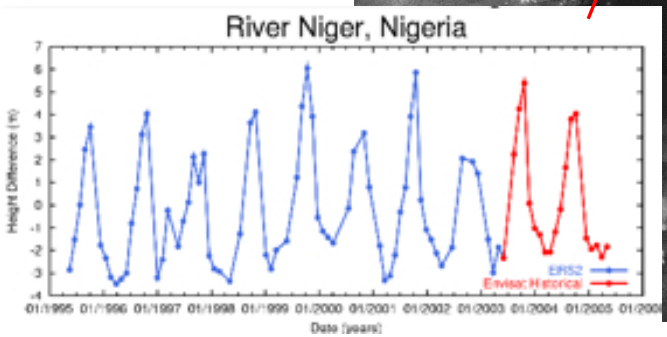
Group on Earth Observations

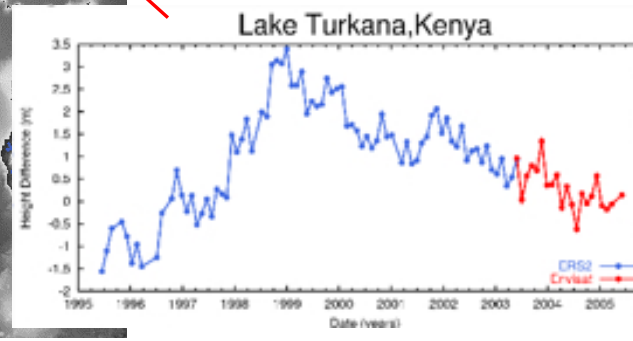


Red indicates area where NRT products are currently generated

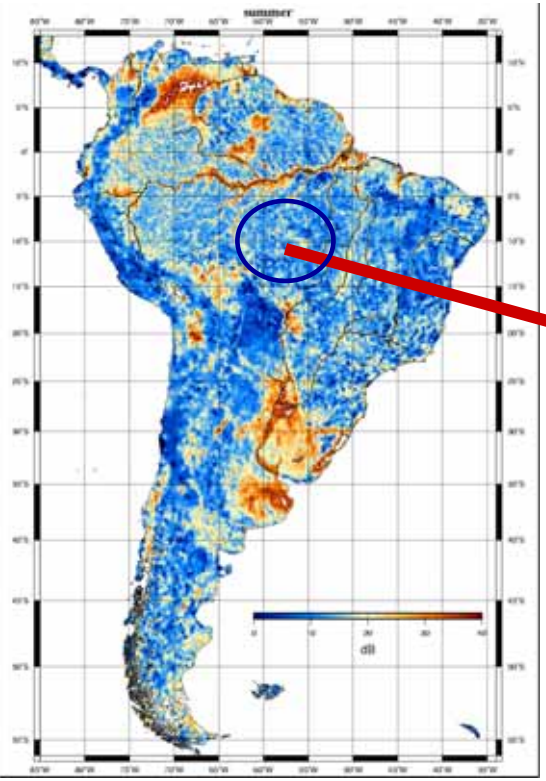


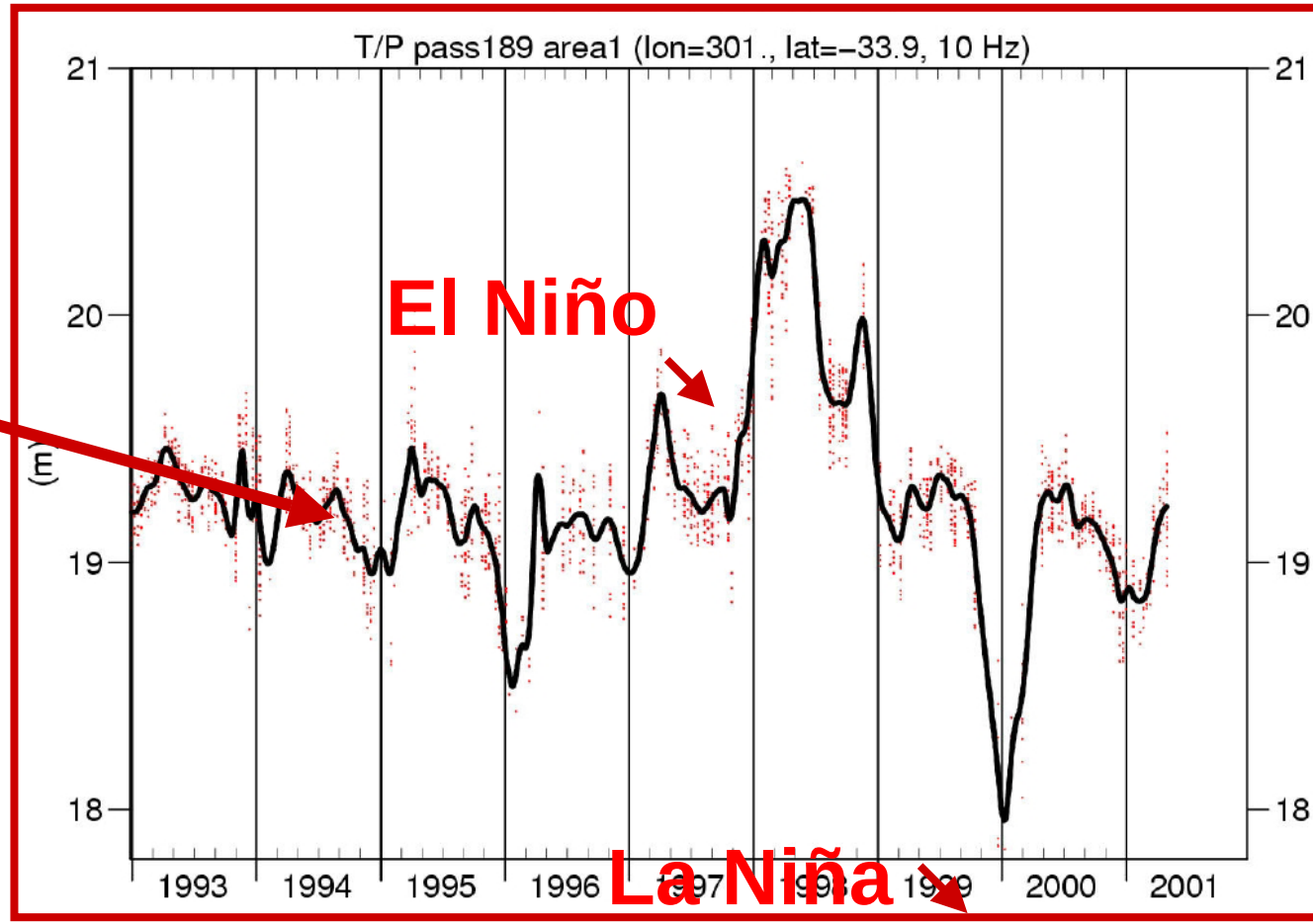
Blue indicates area where products may be generated in the future.



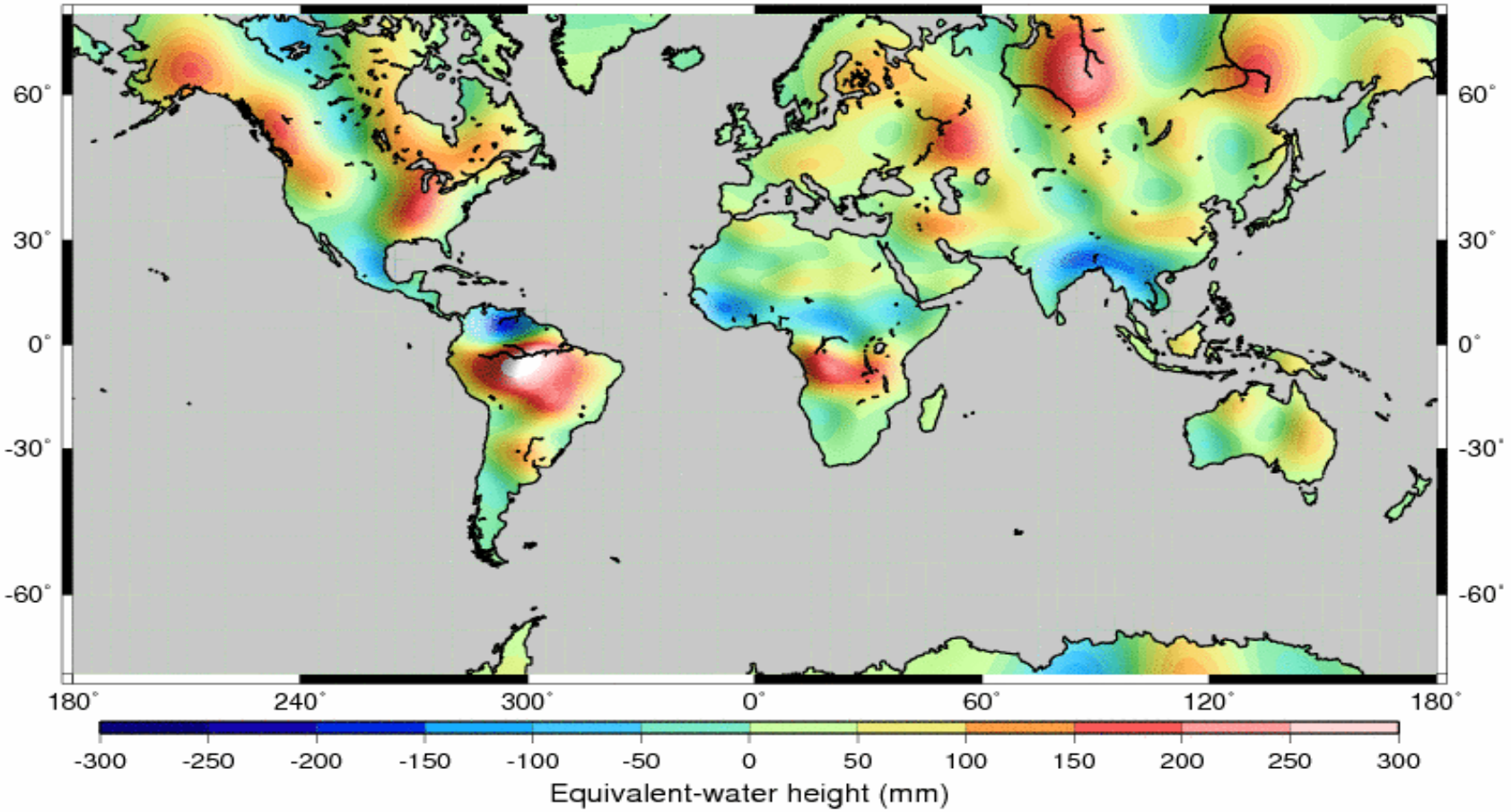


PARANA





GRACE LW SOLUTION --- APR MAY 2002 --- DEG=25-30 --- 5 ITERATIONS



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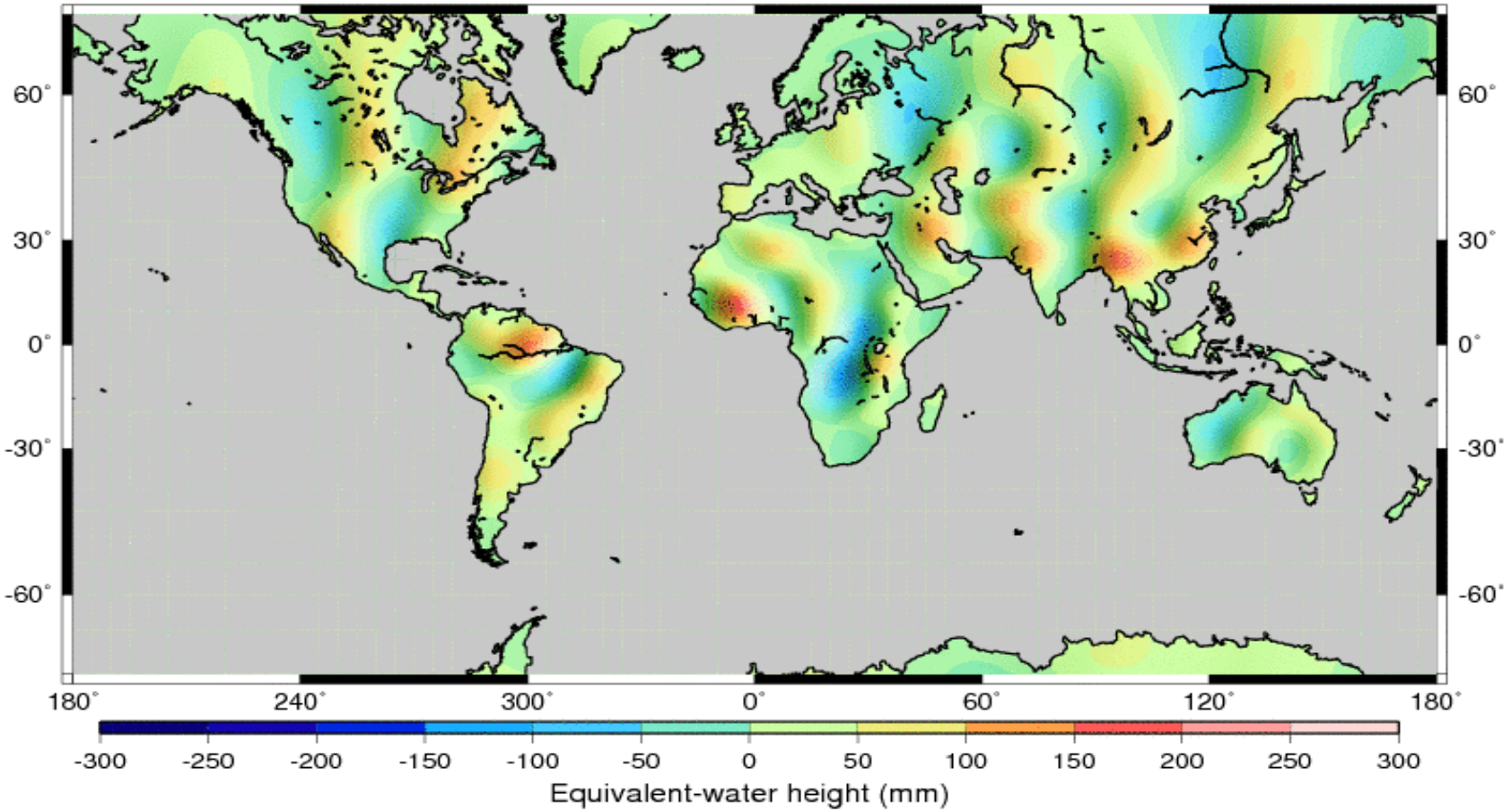

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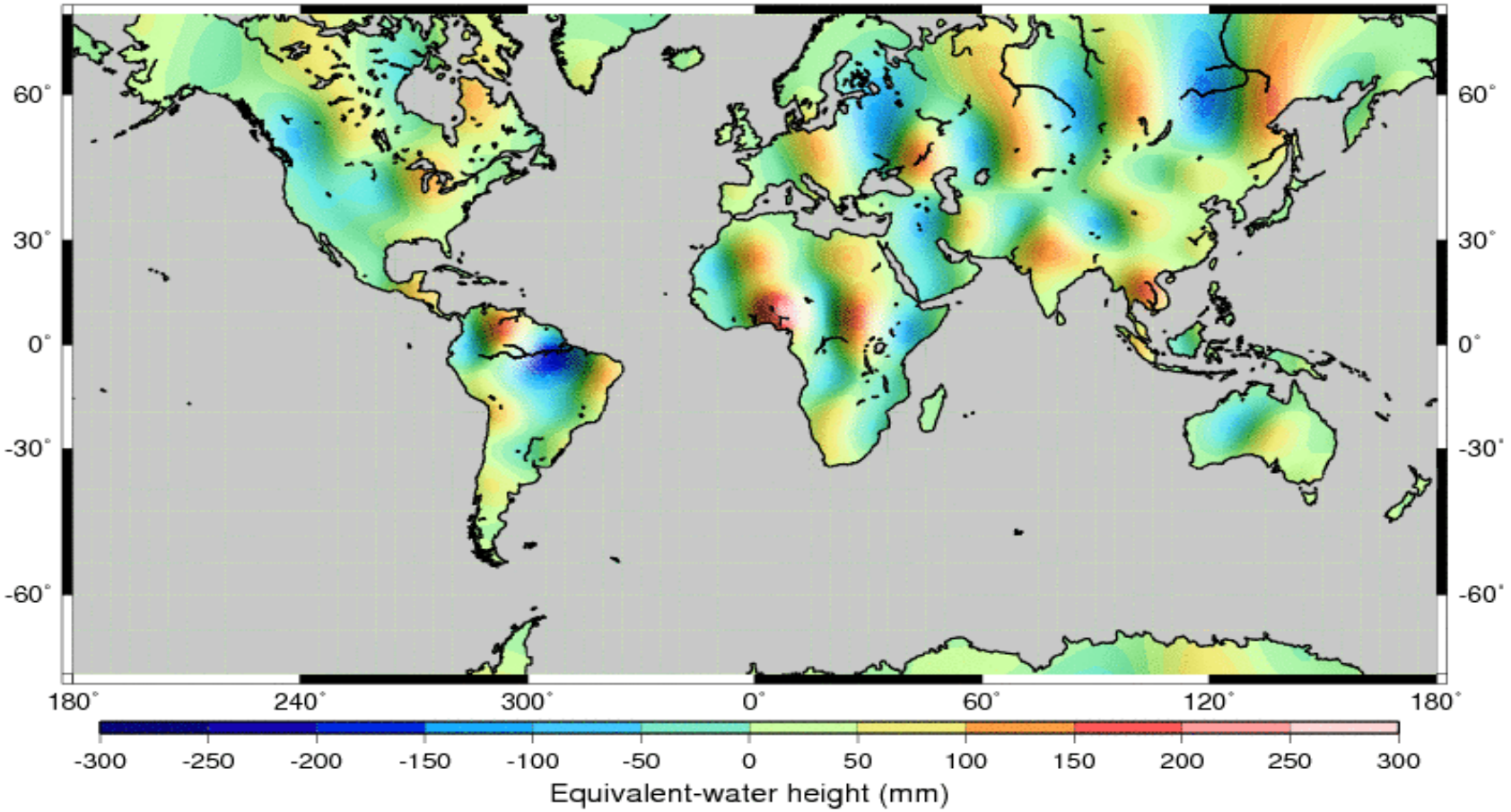

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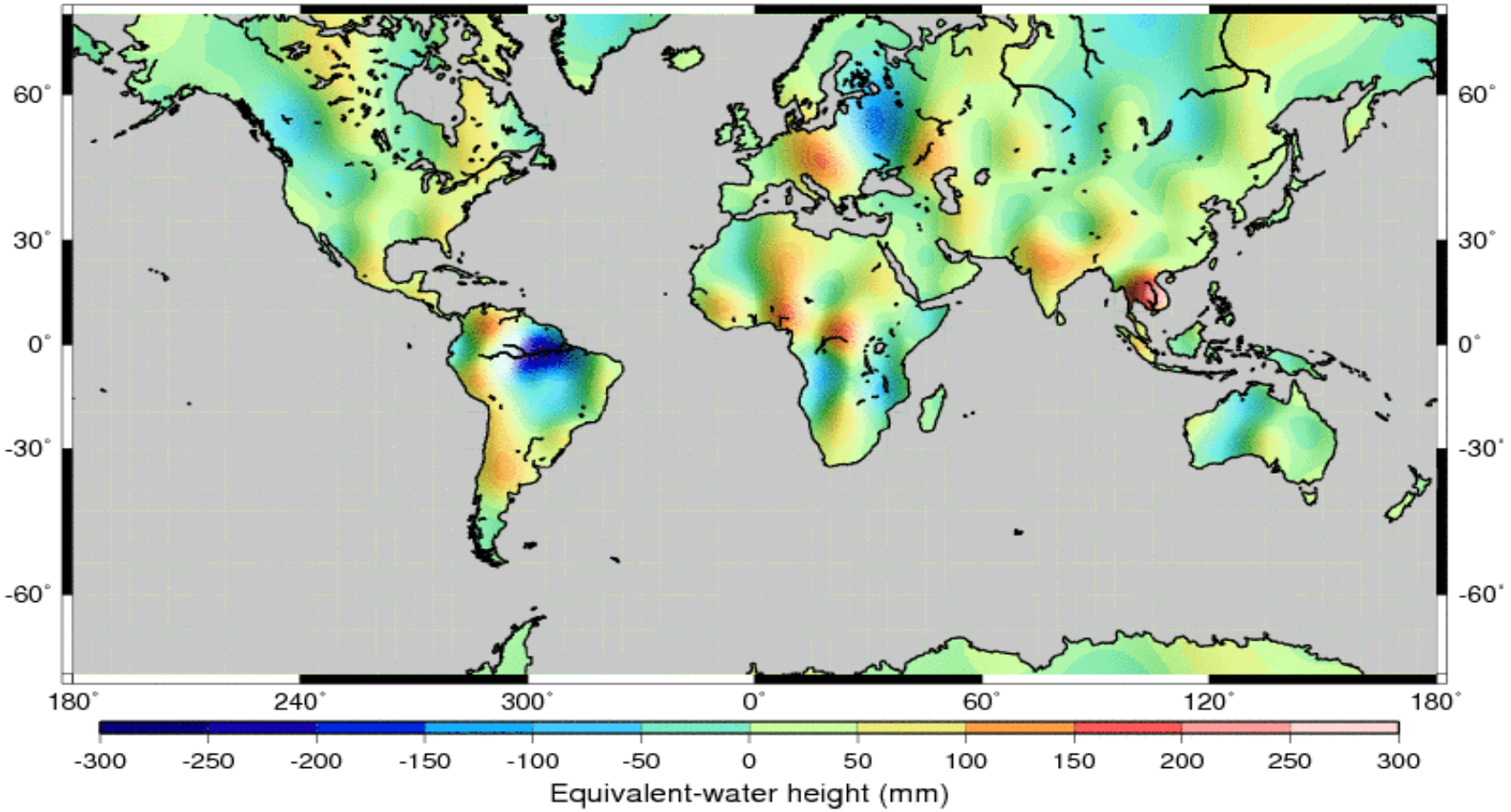

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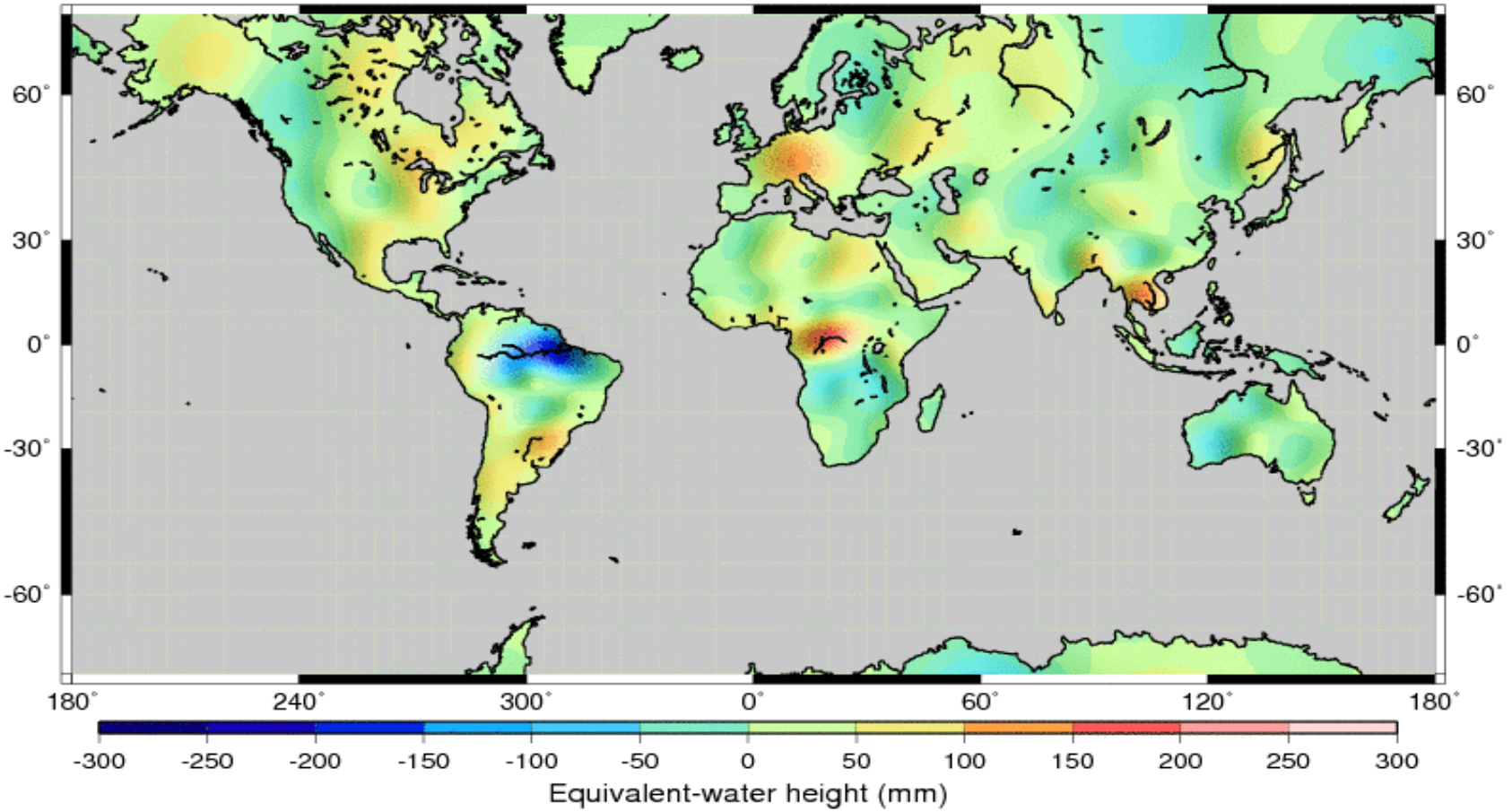

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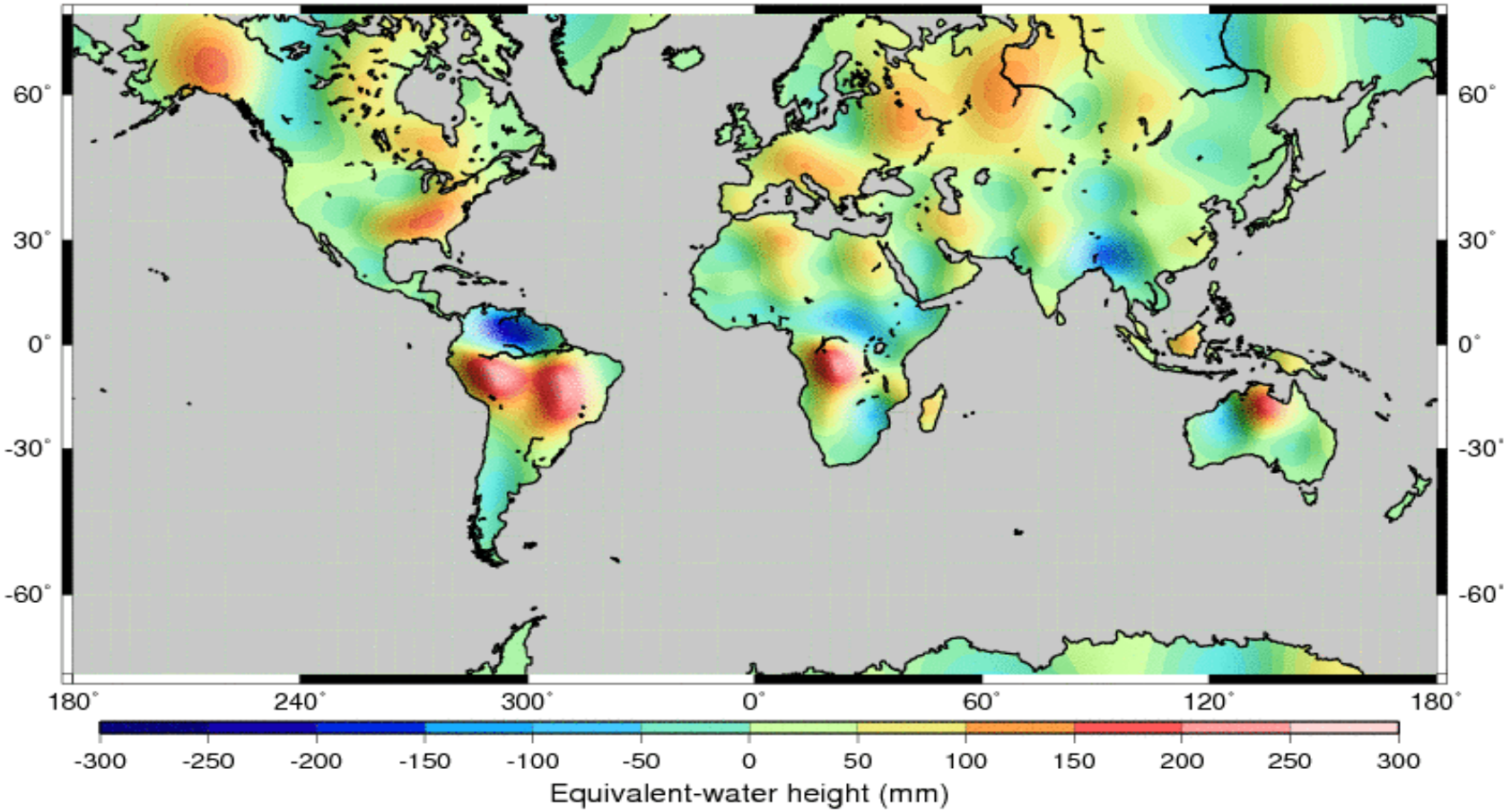

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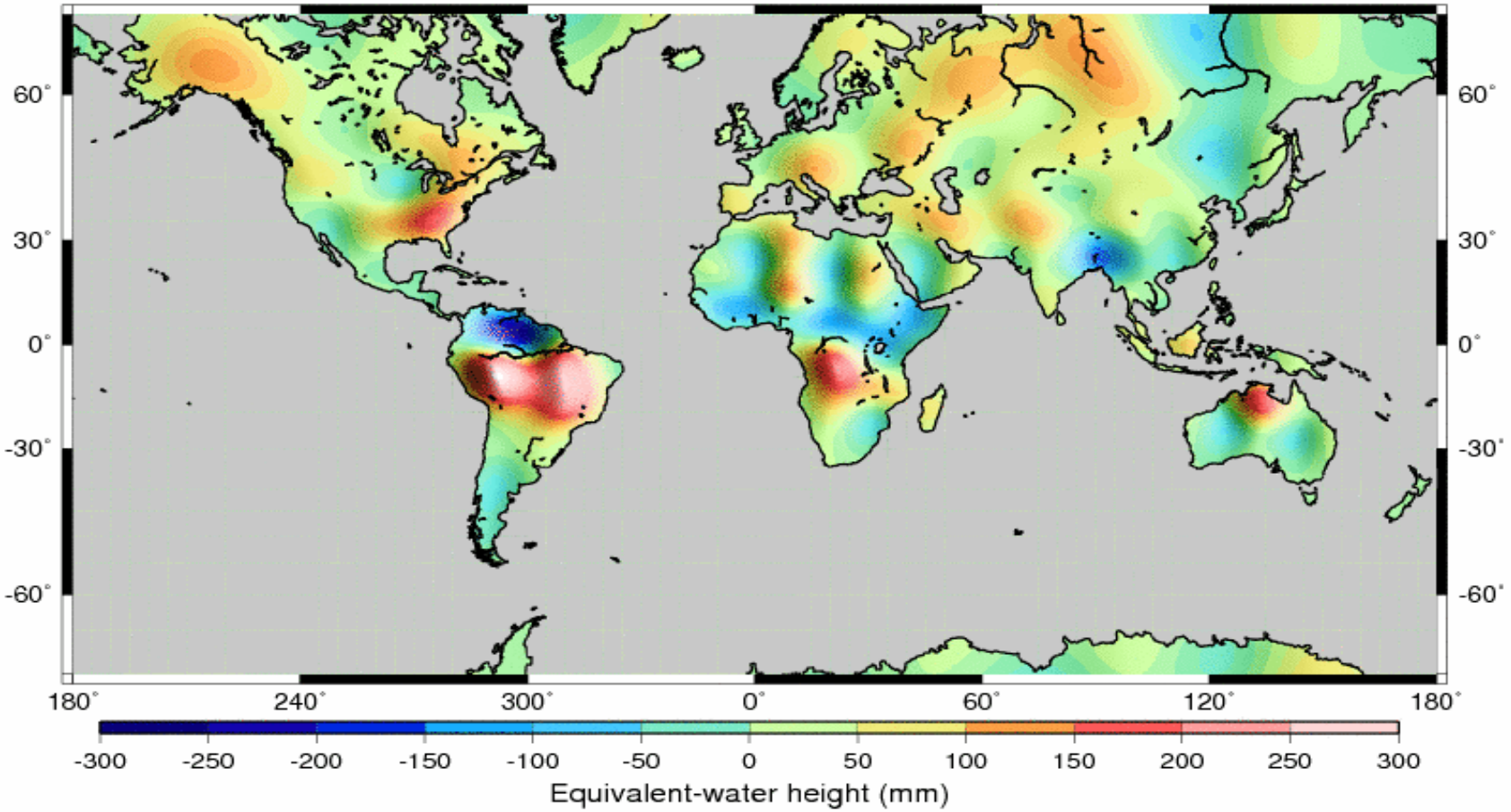

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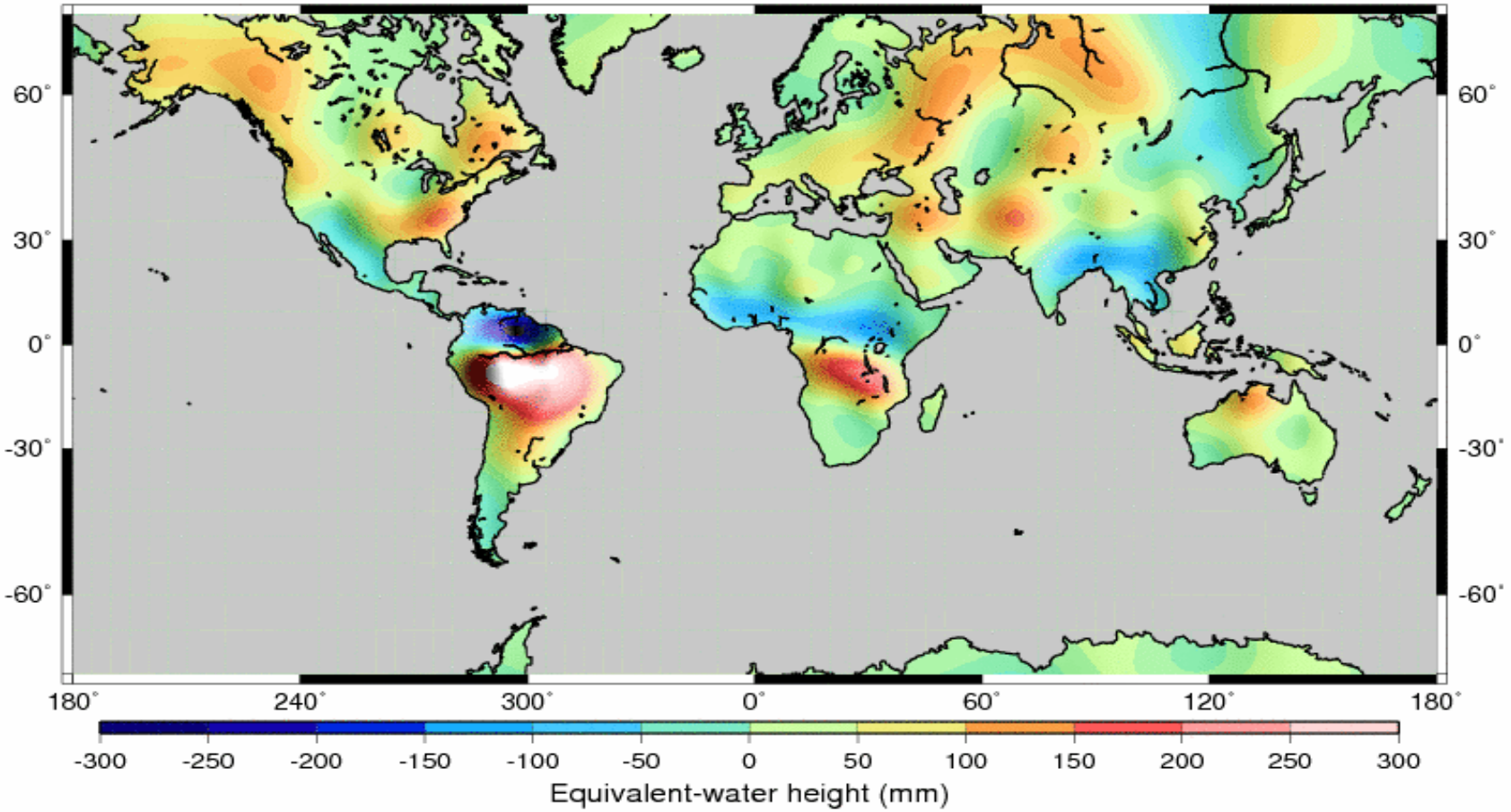

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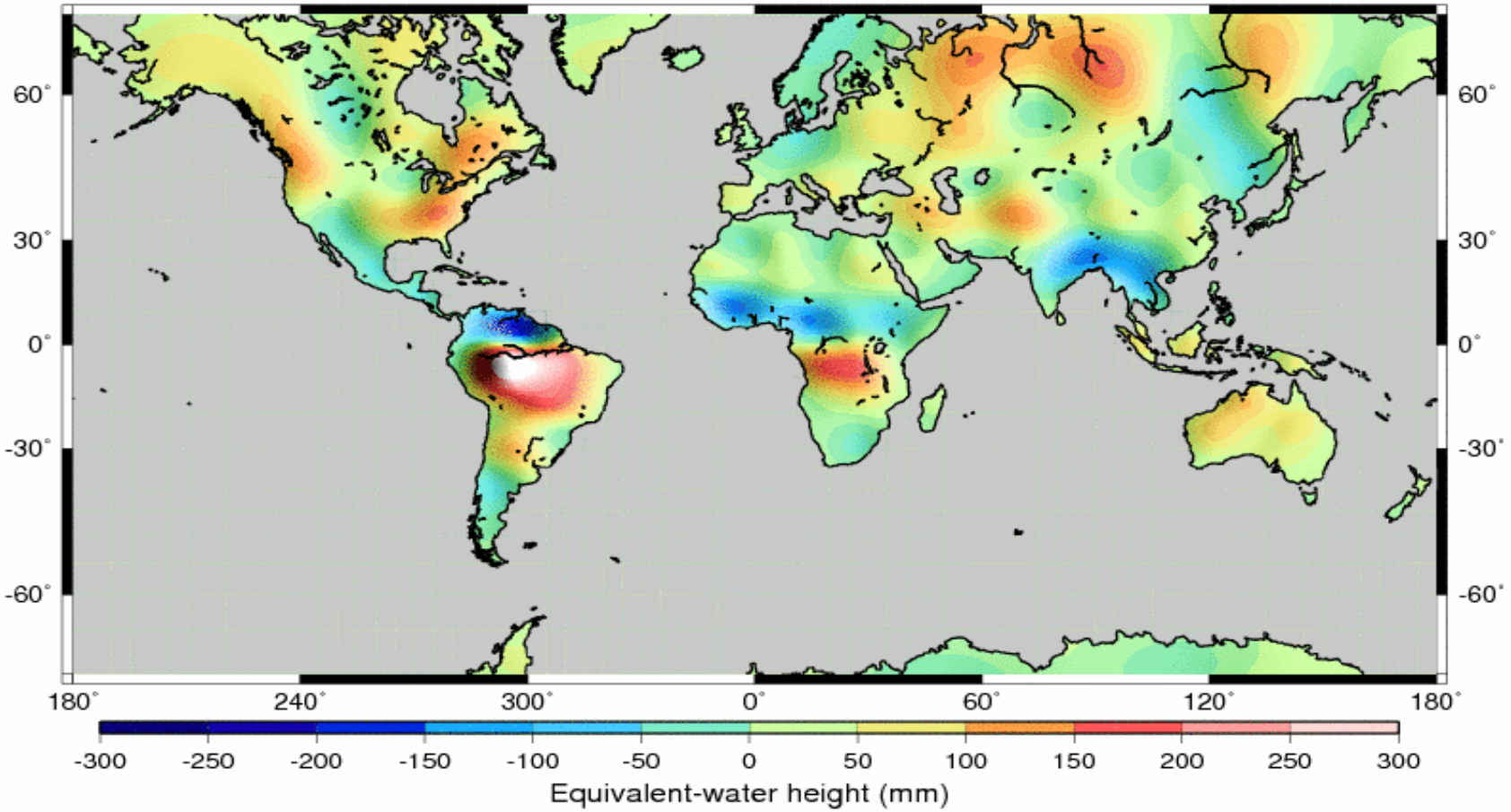

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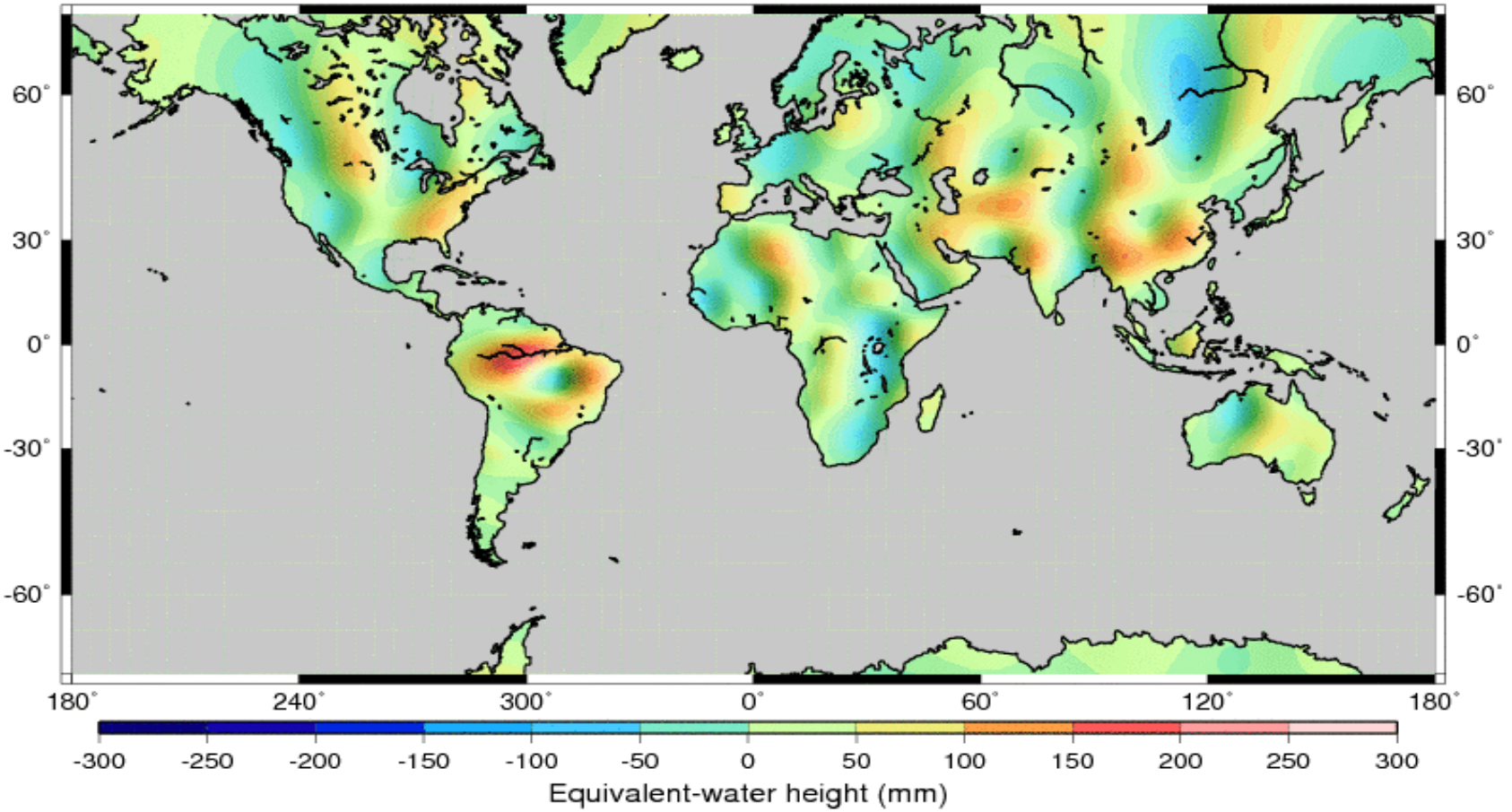

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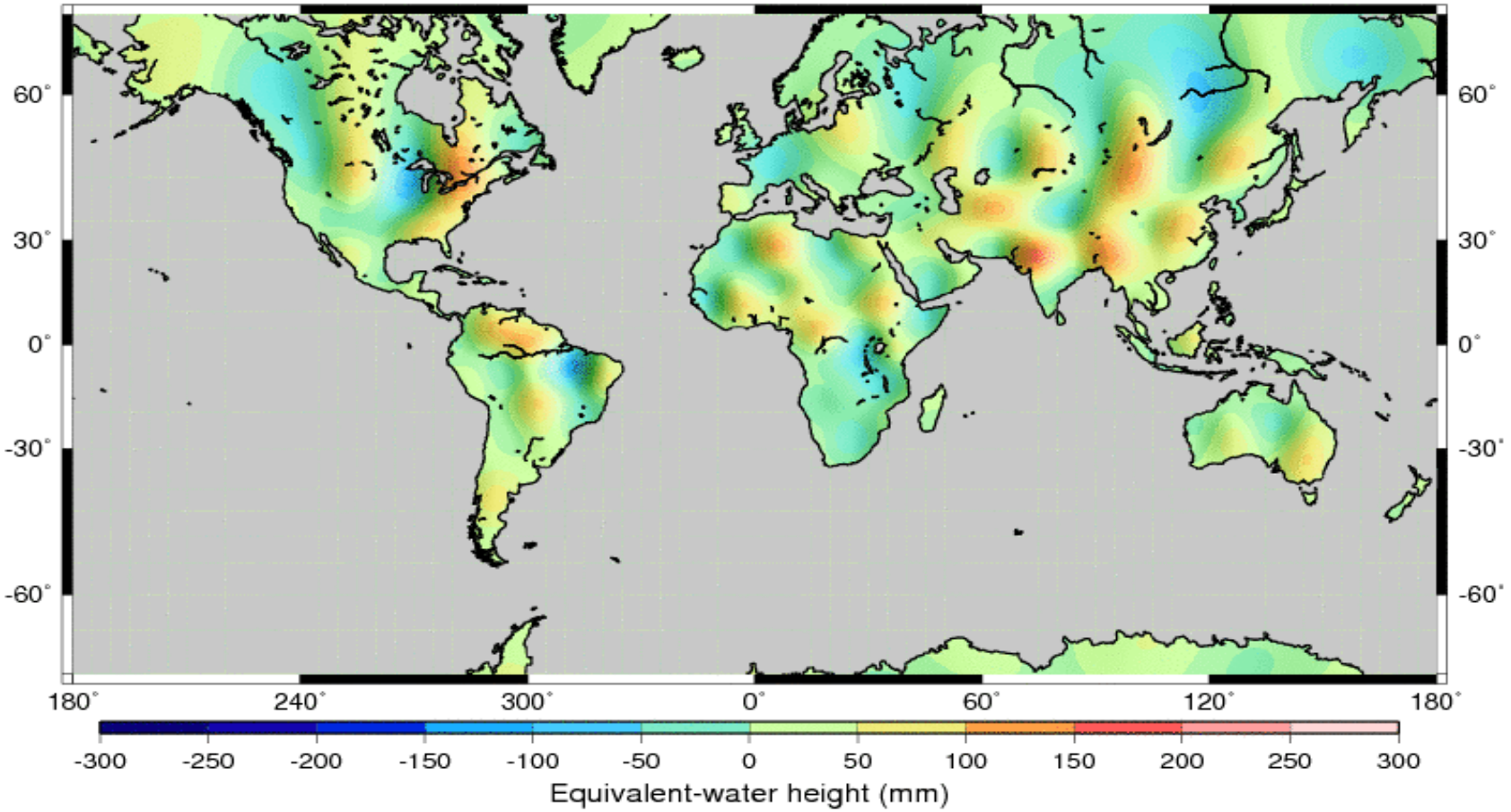

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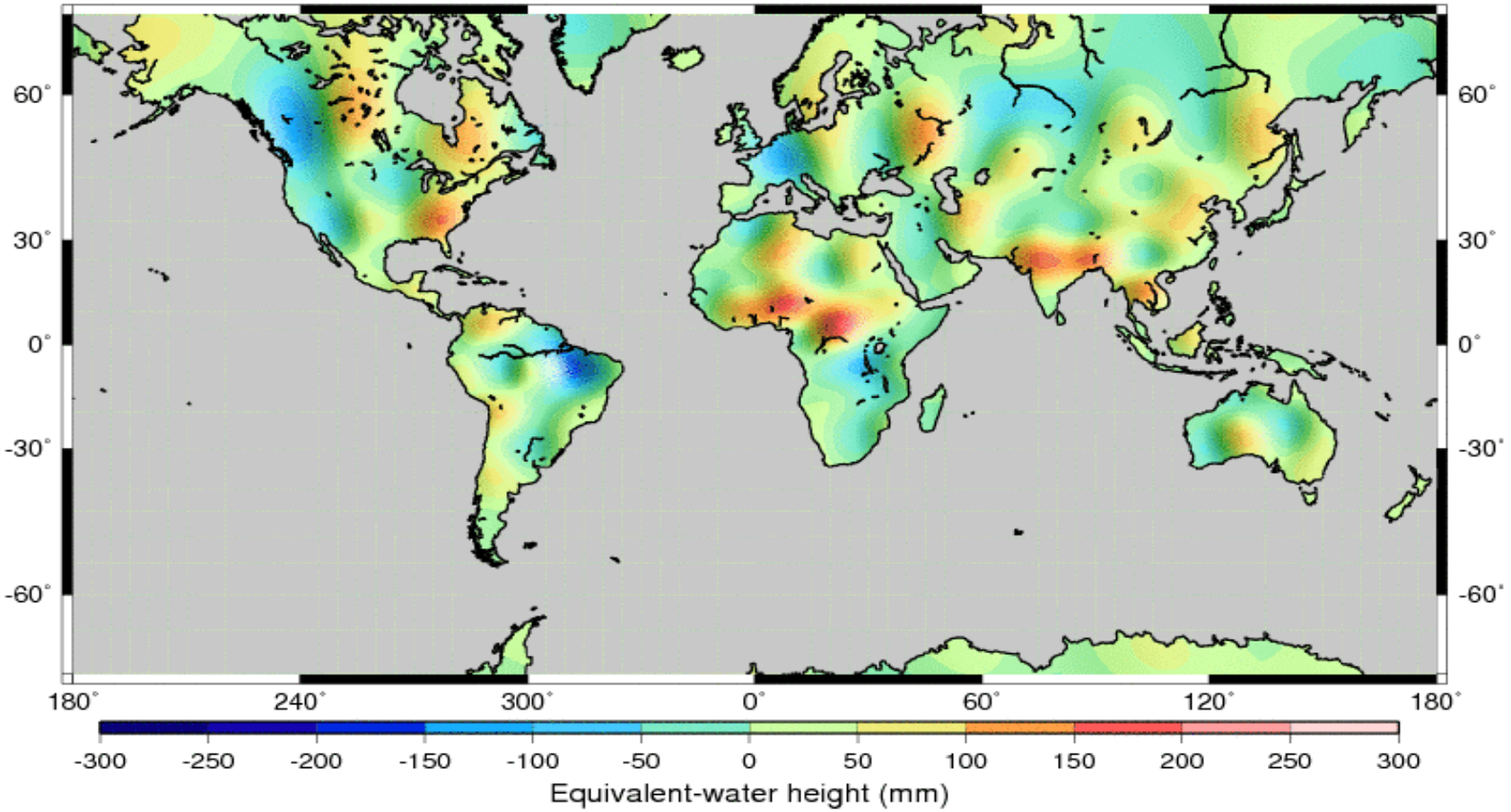

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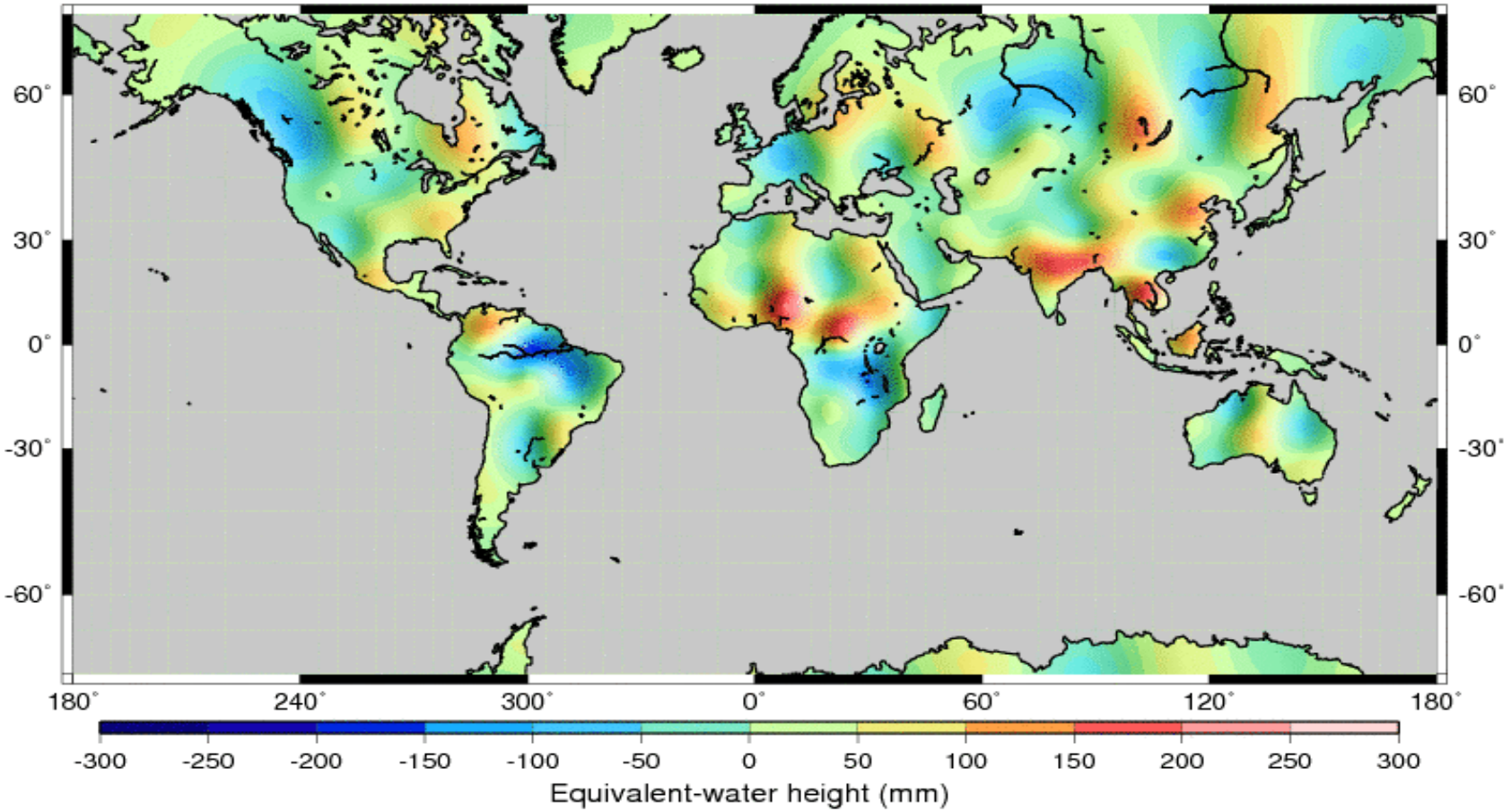

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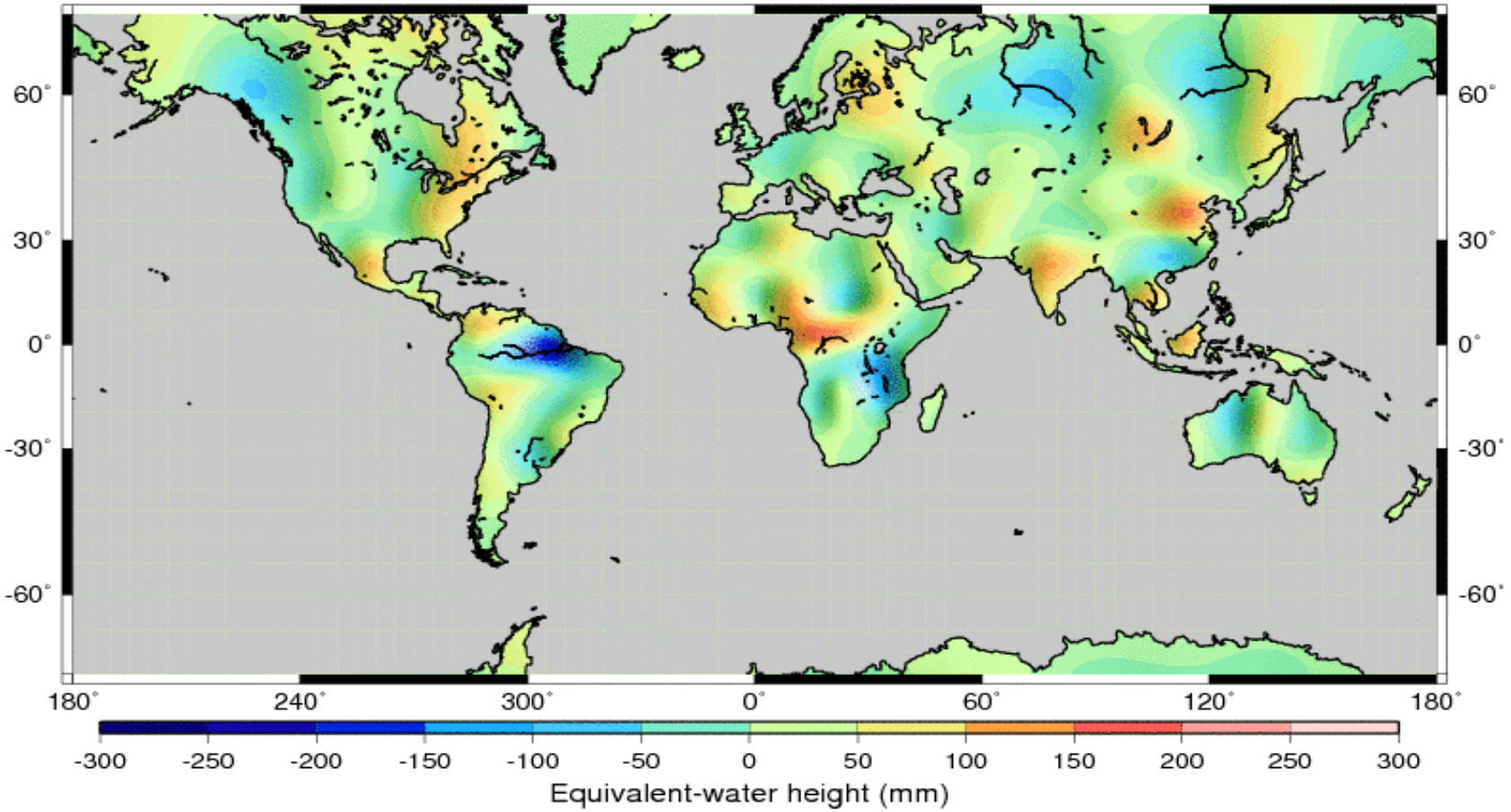

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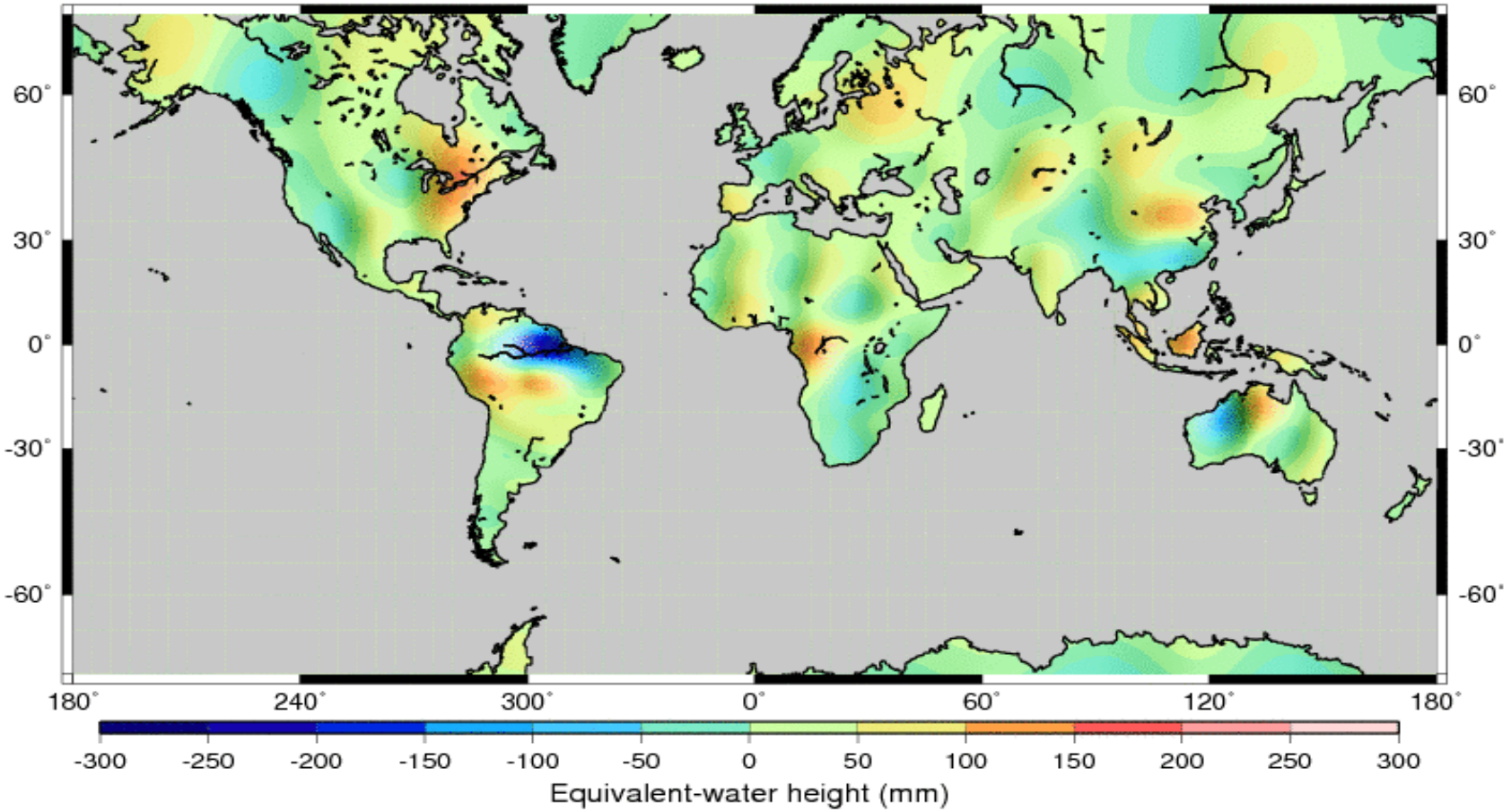

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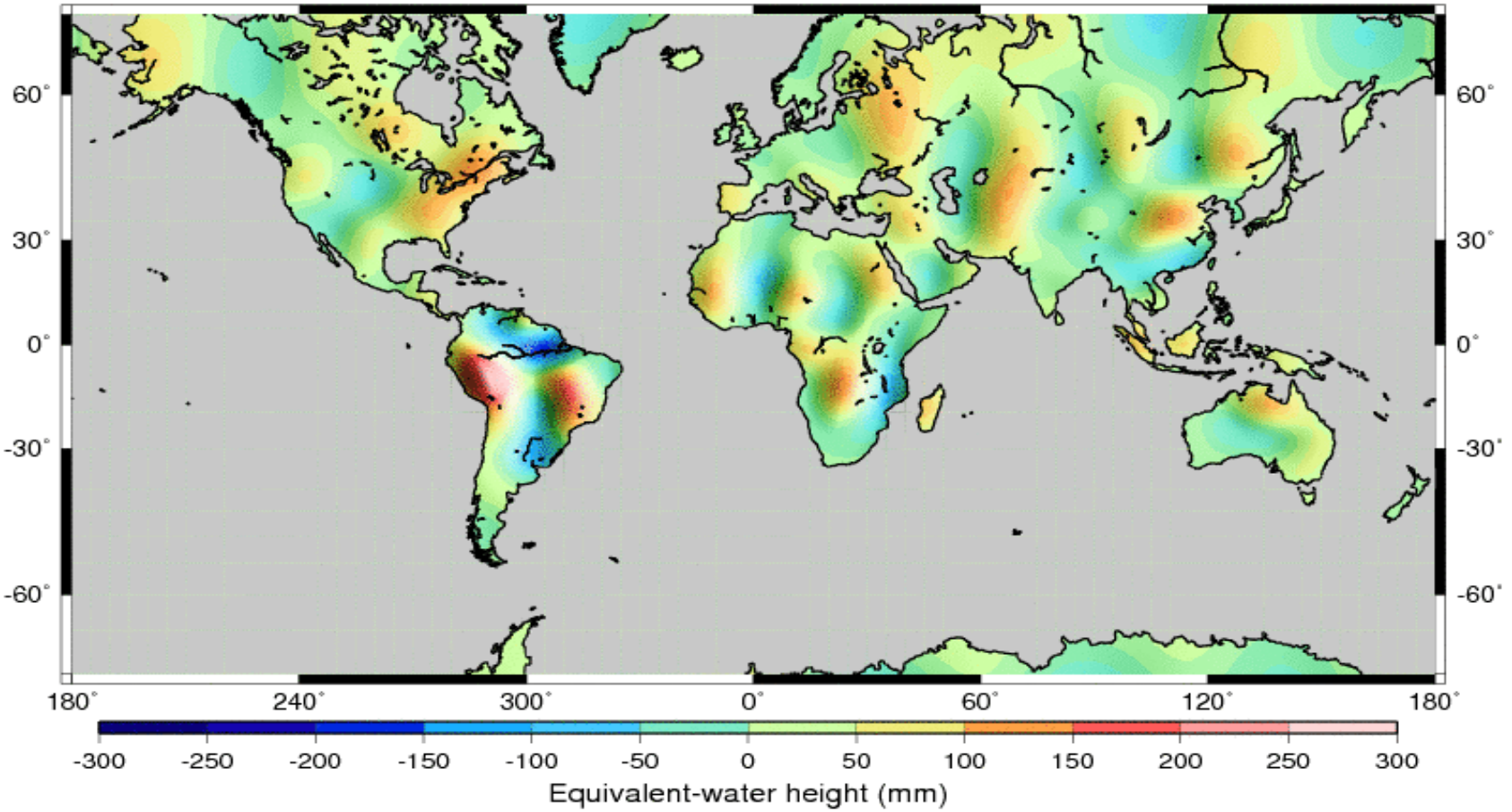

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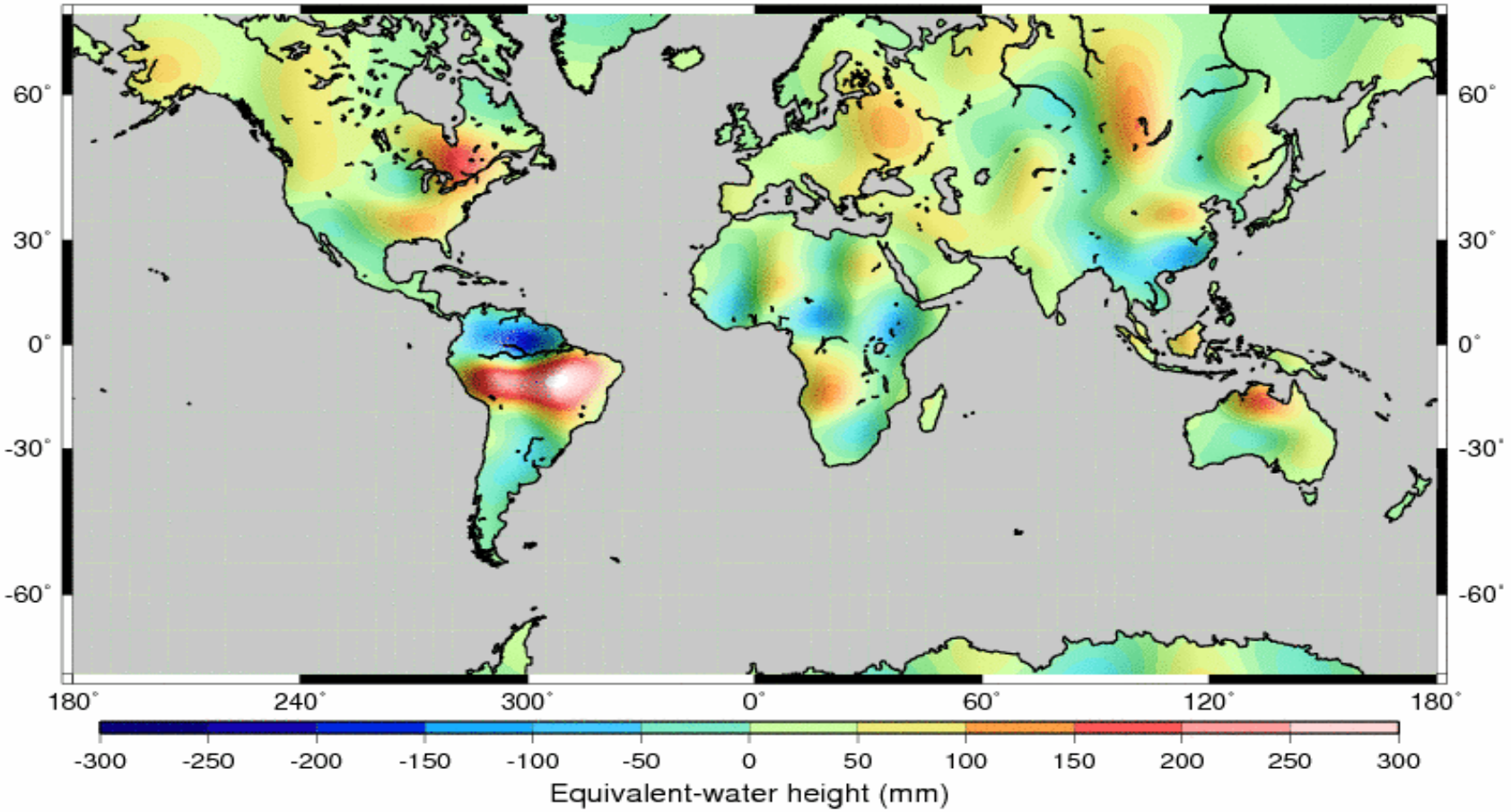

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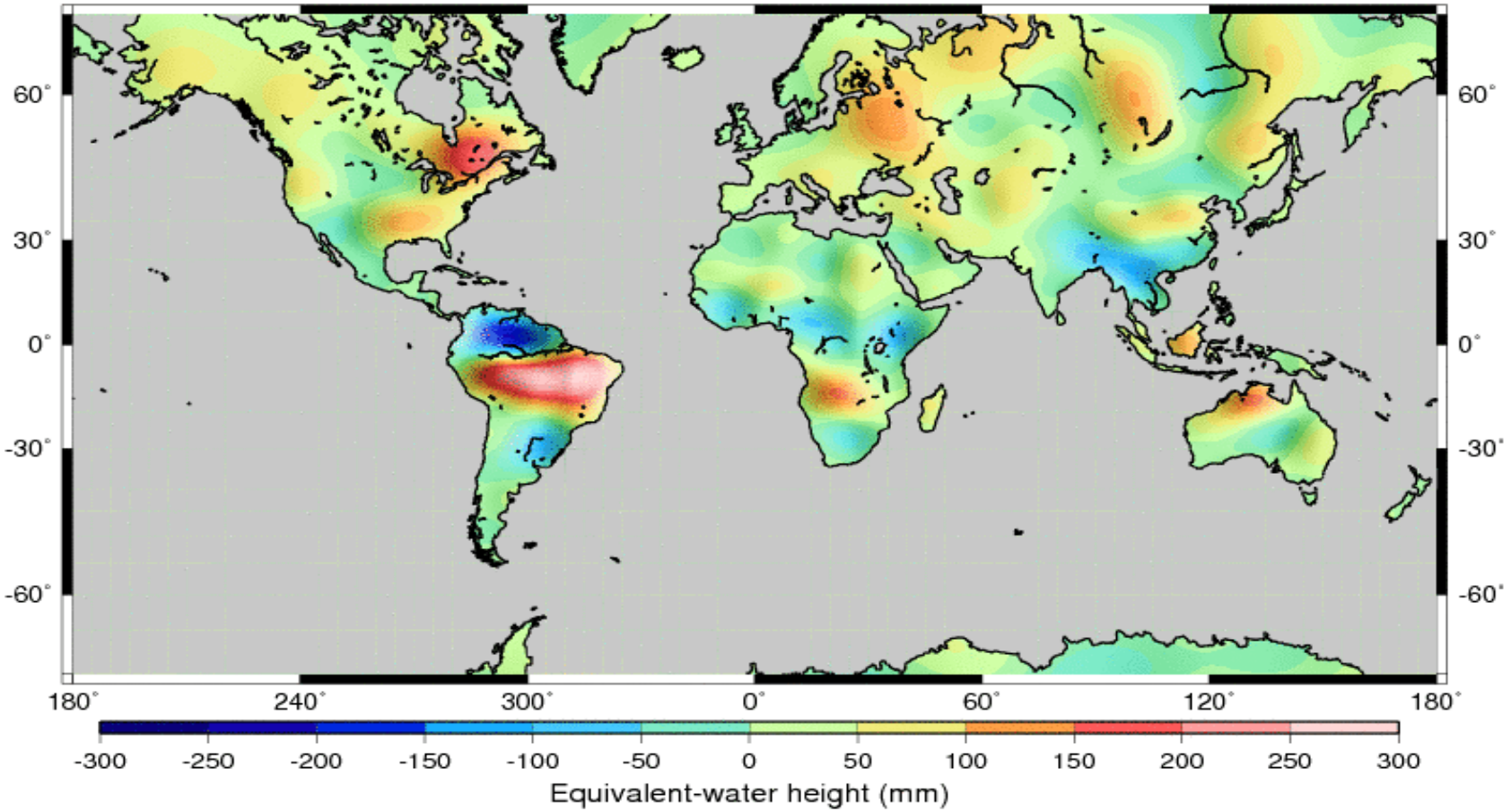
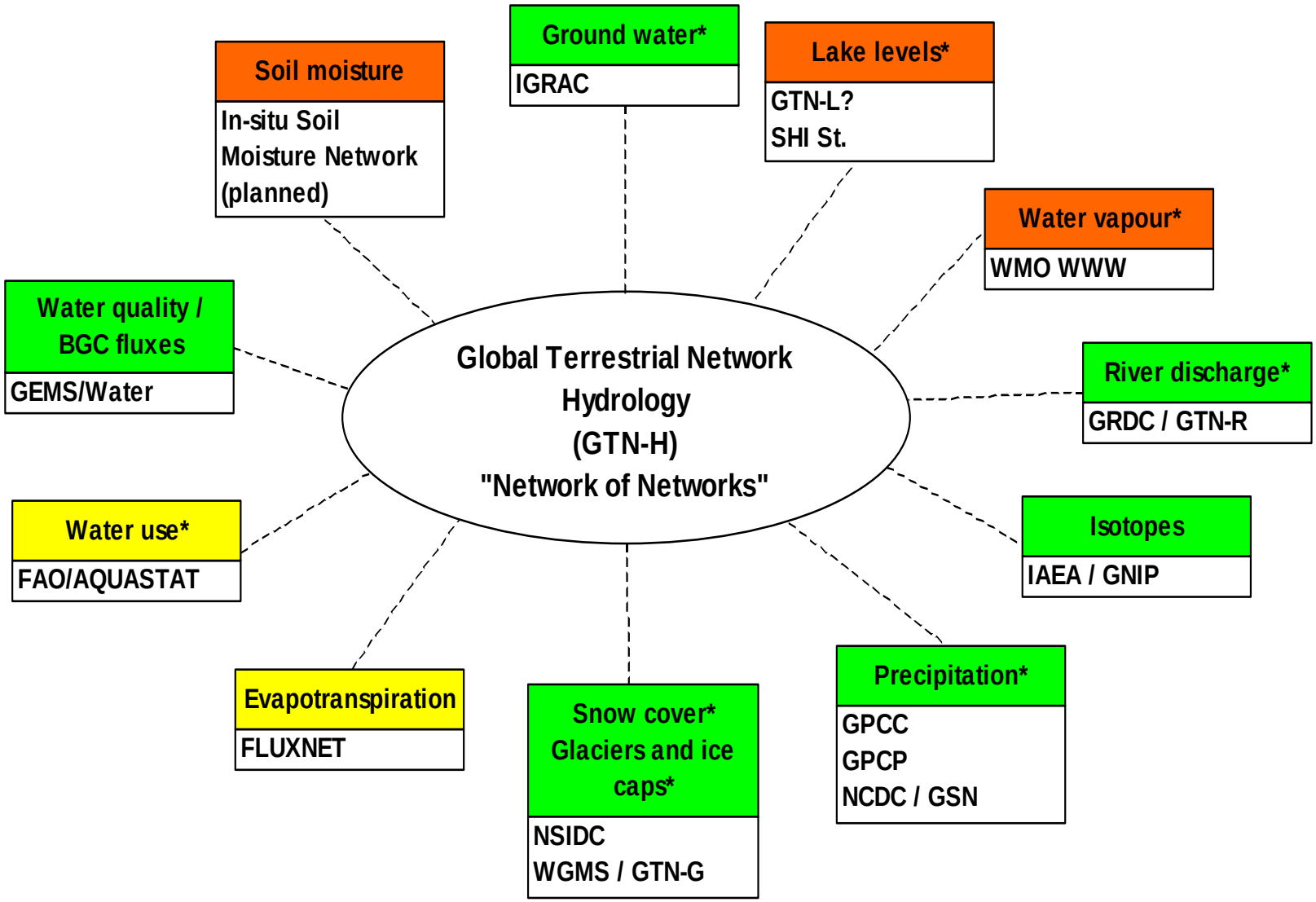


HARON – Phase 3

- **Link to other Programmes and Organisations, e.g, Global Precipitation Climatology Centre (GPCC) with over 7000 synoptic data takes daily and archives of about 40000 rain gauge stations.**

- **Consolidate the development of user-oriented information products**

Phase 3: Connecting the Networks



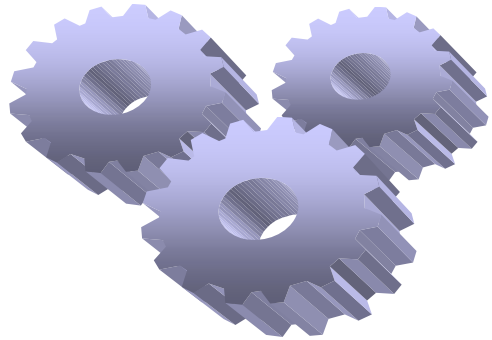
Conclusions & Expectations

- **Establish an integrated global hydrological observing system, with distinct components such as Runoff, Precipitation, Lakes/Reservoirs, Ground Water, Cryosphere and Soil Moisture.**

- **Provide an integrated and interoperable global hydrological observing system contributing in a cross-cutting fashion to all societal benefit areas of GEO**

- **Fill gaps in measurement capability and ensure interoperability of observing systems and standardization of data.**

GEO: A Voluntary Process

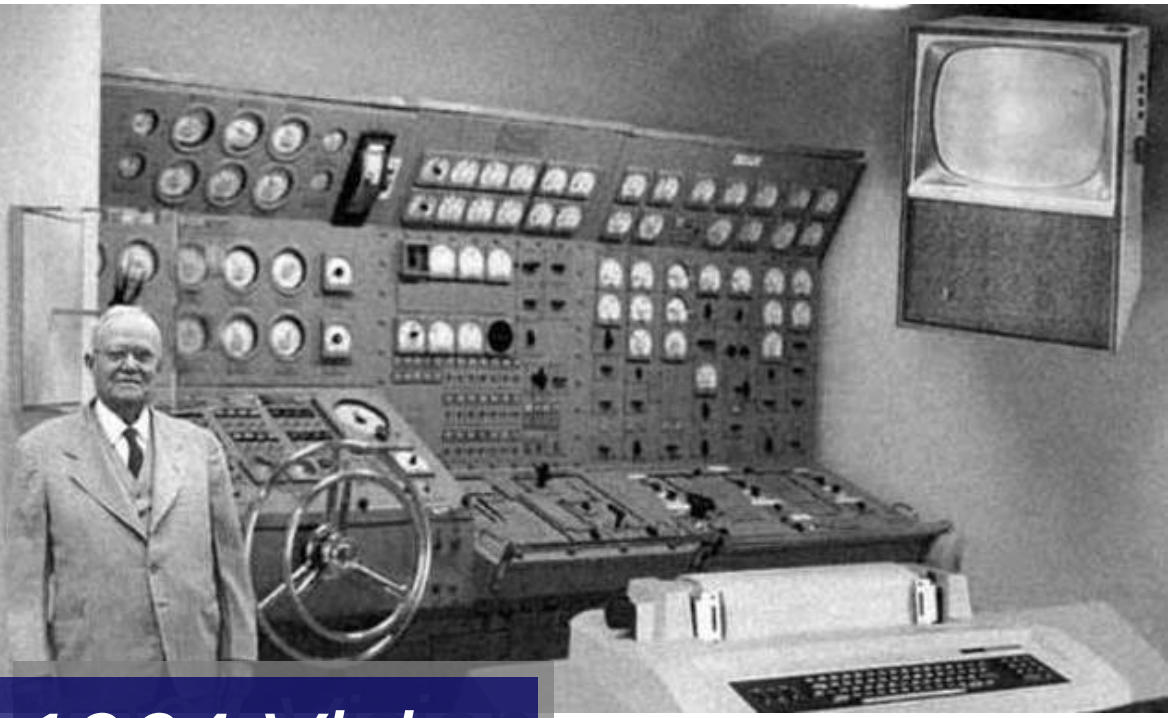


- **The Success of GEO will Depend on the Goodwill of its Members and Participating Organizations**

- **This Process Warrants that GEOSS Components are Delivered in a Short Time**

Group on Earth Observations

The Future of Earth Observation?



1964 Vision

2004 Reality

Group on Earth Observations

GEOSS

To Provide the Right Information to the Right People, at the Right Time,

to Make the Right Decisions.