



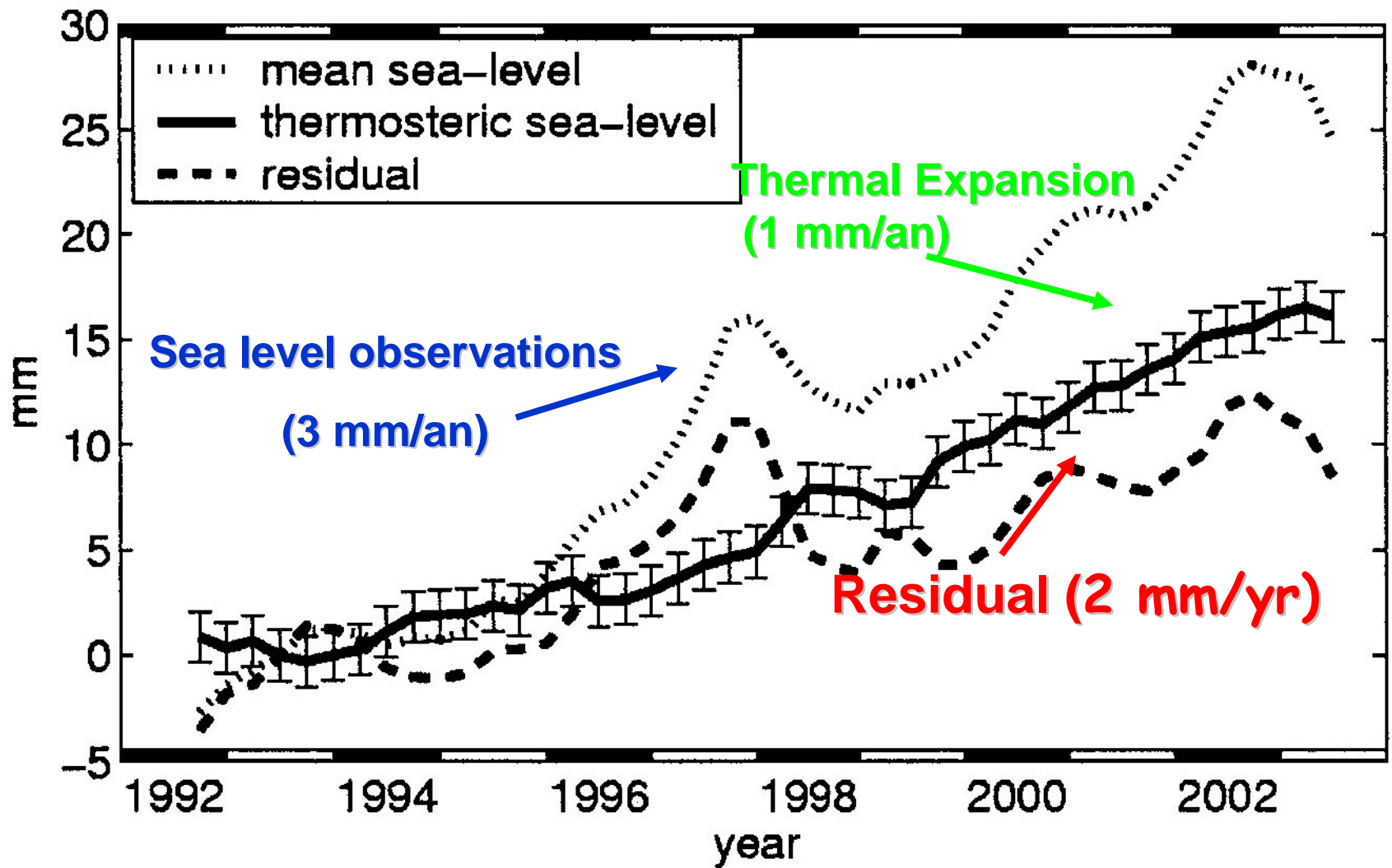
Group on
Earth Observations

GEO

To Understand Trends, Forecast Changes, Support Informed Decisions

ISPMRS, Davos 12-14 March 2007

Michael Rast
GEO Secretariat





**Any Single Problem Requires Many
Data Sets**

**A Single Data Set Will Serve Many
Communities**

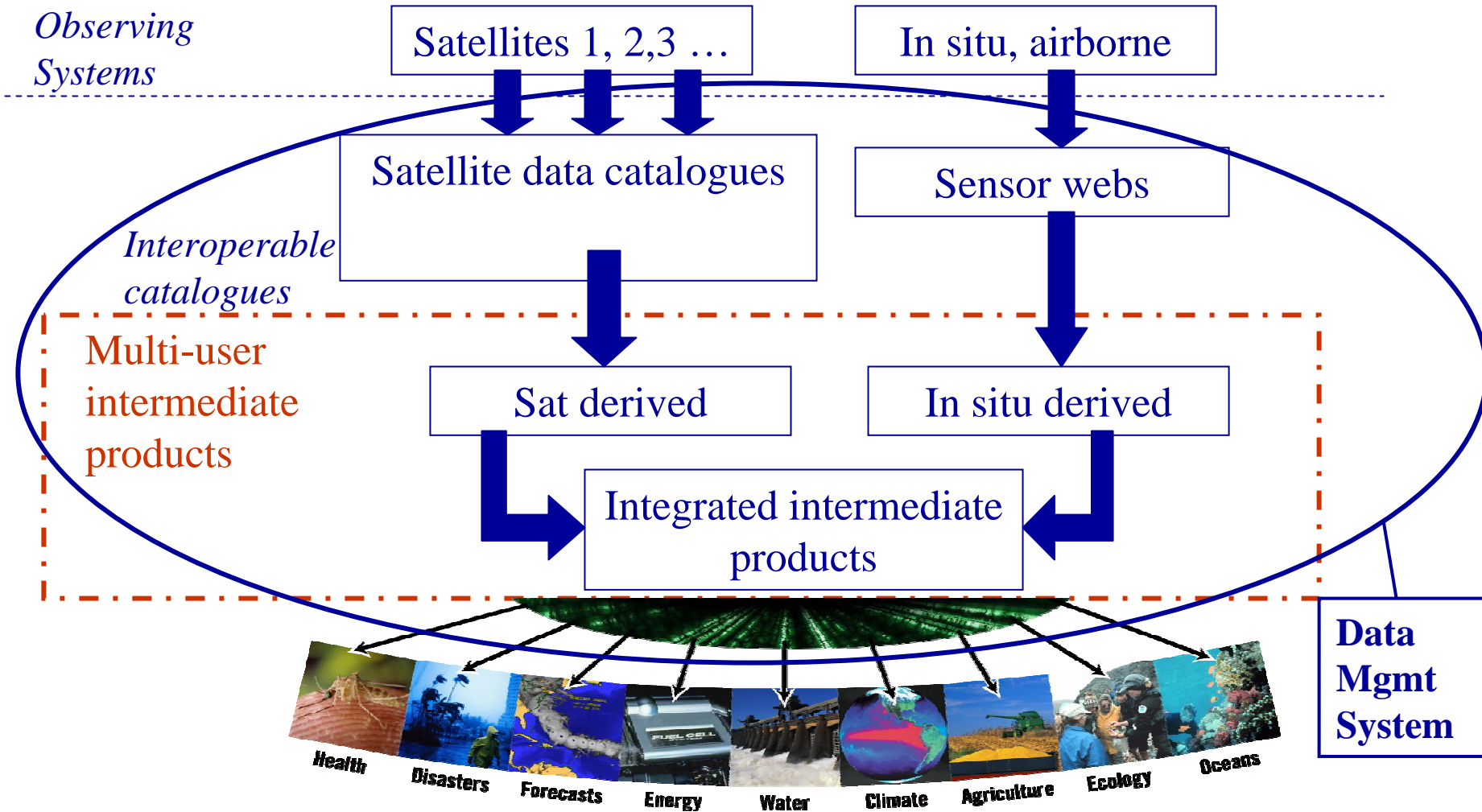


Group on Earth Observations

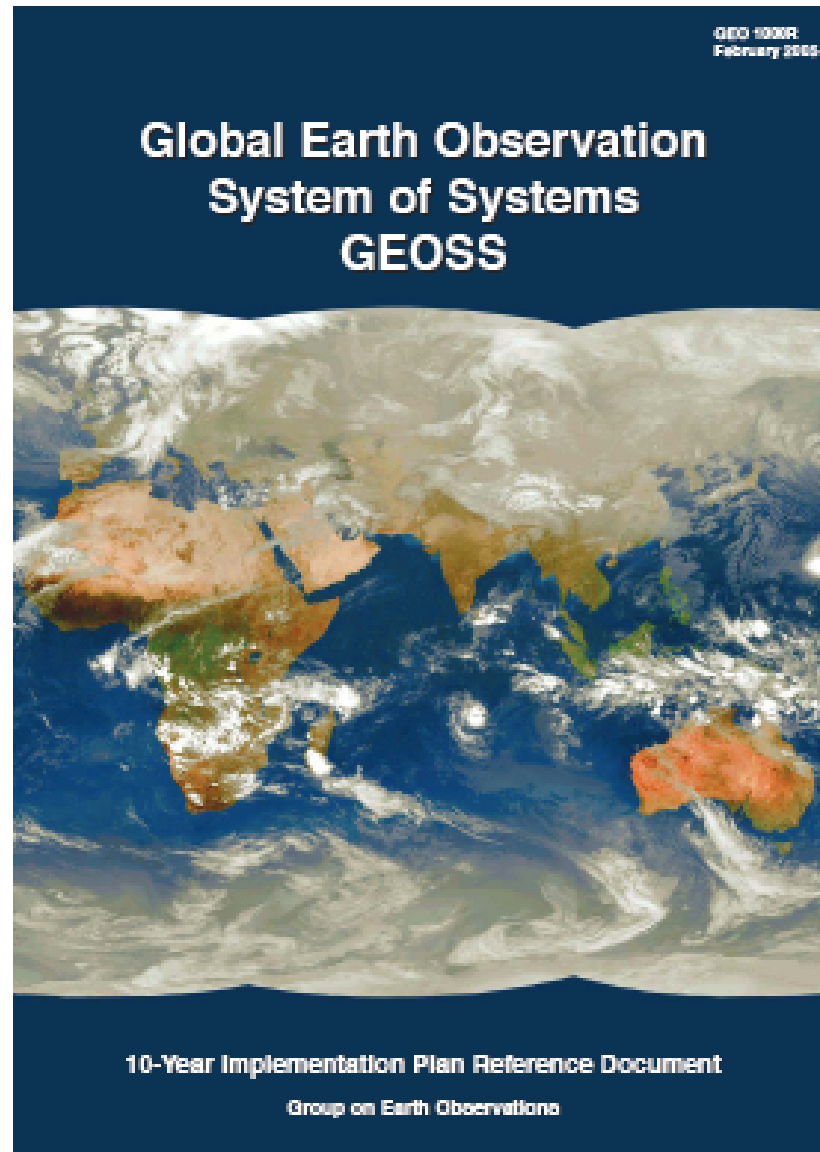
GEOS conceptual architecture

A Global, Coordinated, Comprehensive and Sustained System of Earth Observing Systems



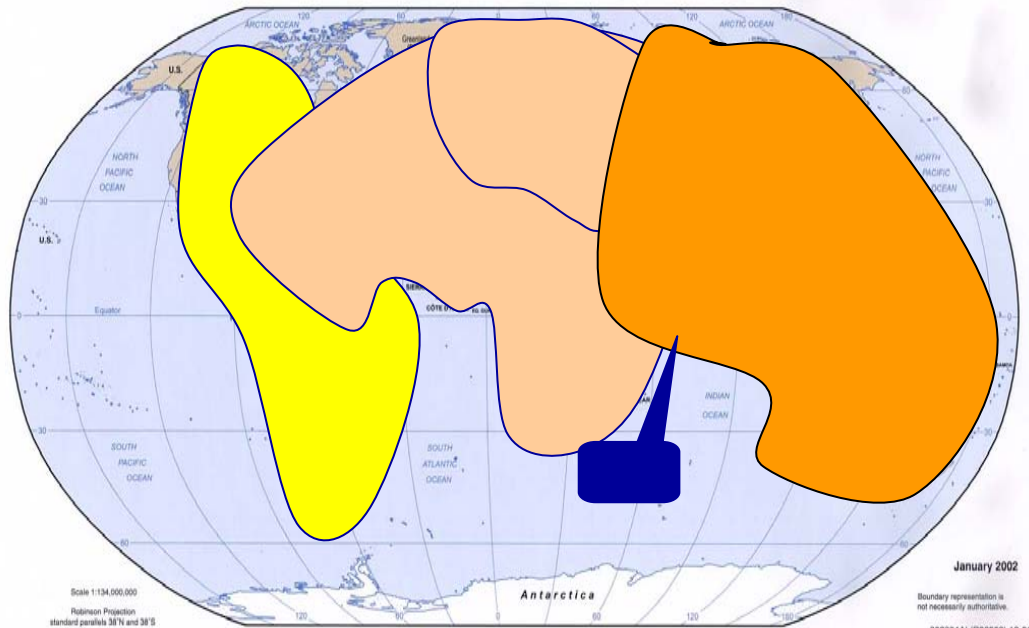


- **GEOSS 10-Year Implementation Plan Endorsed**
- **GEO Secretariat established in Geneva**









Disseminate and provide easy access to space-based, air-borne and in situ data, metadata and products to Users from all Societal Benefit Areas.



Global Coverage (Proposed)

Contributors

-  WMO
 -  EUMETSAT
 -  NOAA
 -  CMA, Others
- 中国气象局
www.cma.gov.cn



GEO: A User-driven Process

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

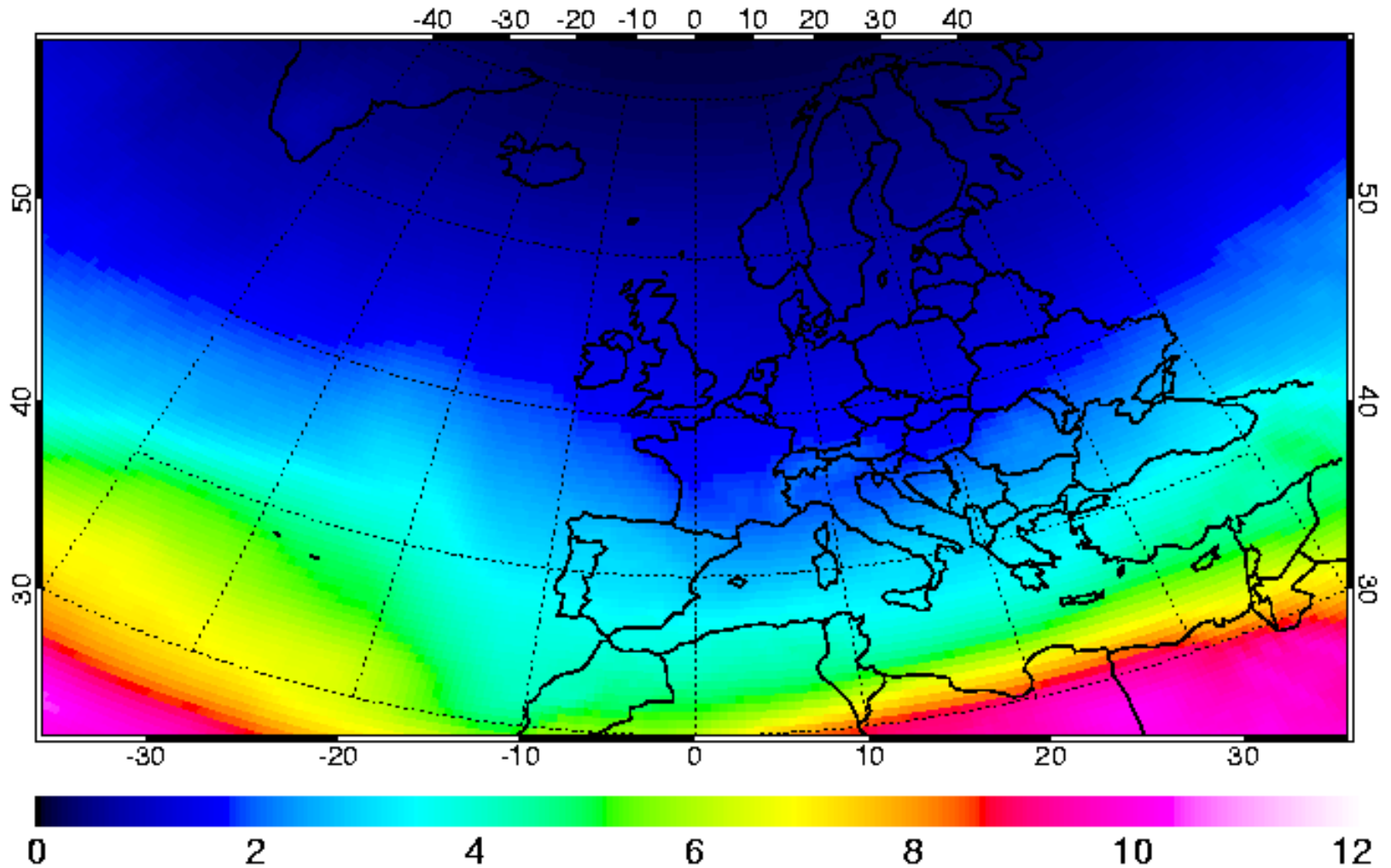
**... to answer Society's need
for informed decision making**

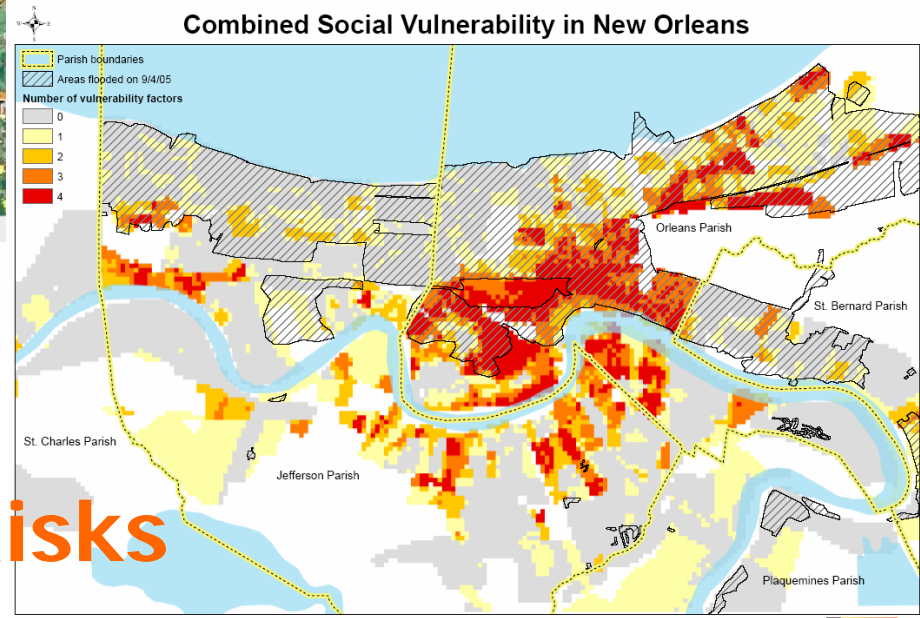
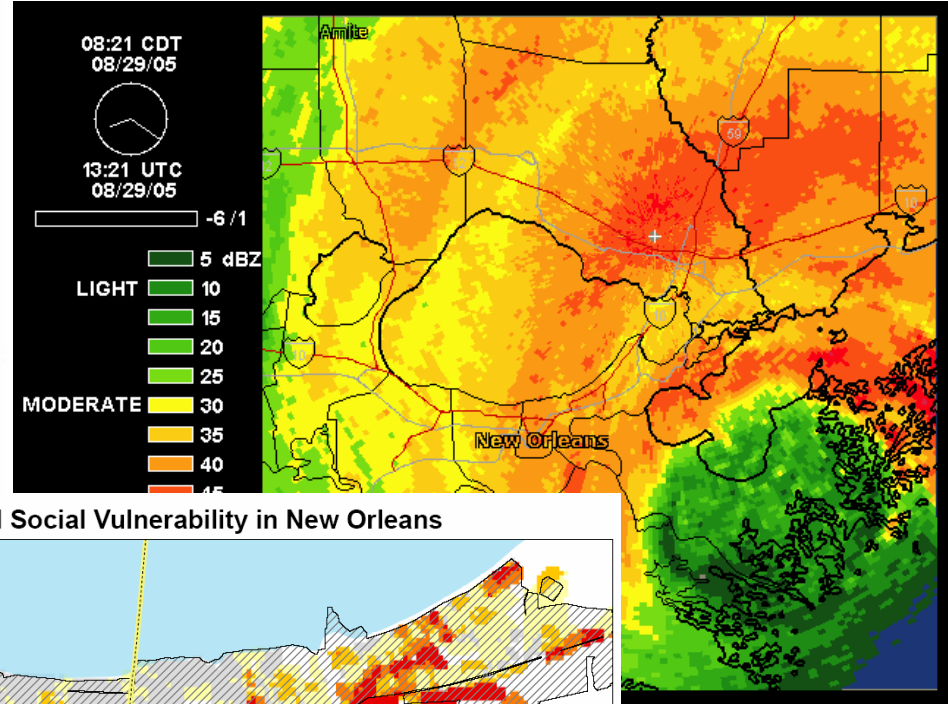
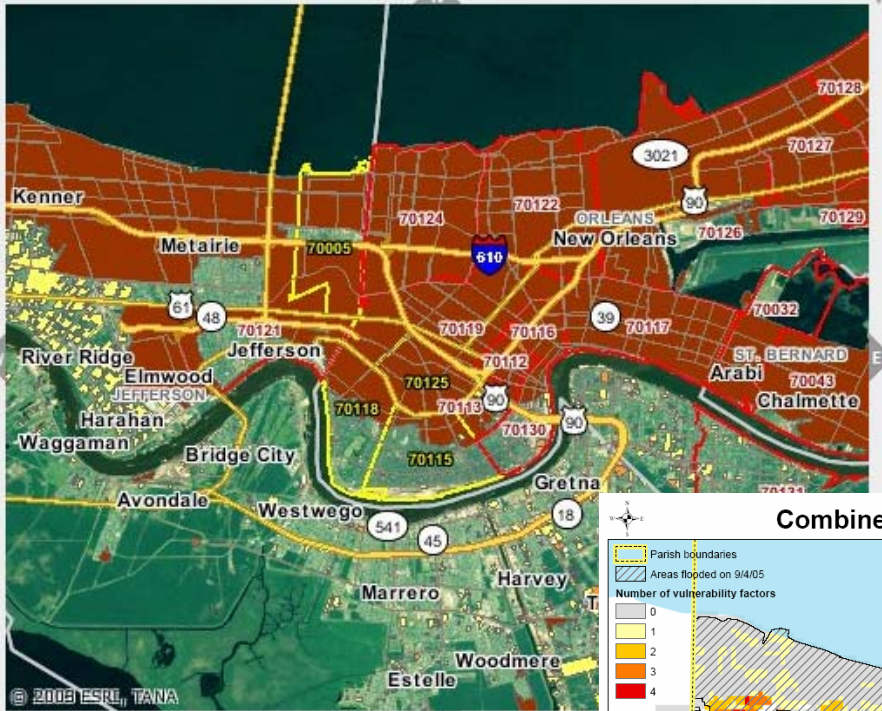


Erythemal UV index

SCIAMACHY - KNMI/ESA

local solar noon
29 February 2004





A grid cell is considered vulnerable if it falls in the top 3 deciles for one or more of the following measures:
- % of residents living below the poverty line
- % of residents who are African American
- % of households without a vehicle
- % of housing units occupied by renters

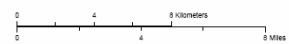
Hazard

Exposure

Evaluate Risks

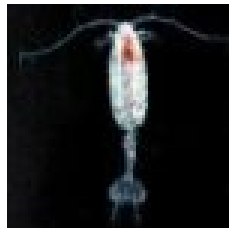
Vulnerability

Powered by ArcWeb Services

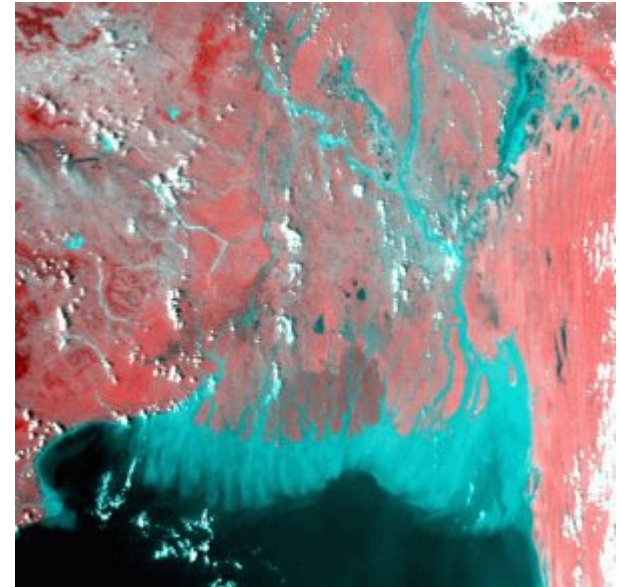


Forecast Epidemic Outbreaks

**VIBRIO CHOLERAE HAS A
MARINE ZONOTIC CYCLE
ASSOCIATED WITH ALGAL
BLOOMS**



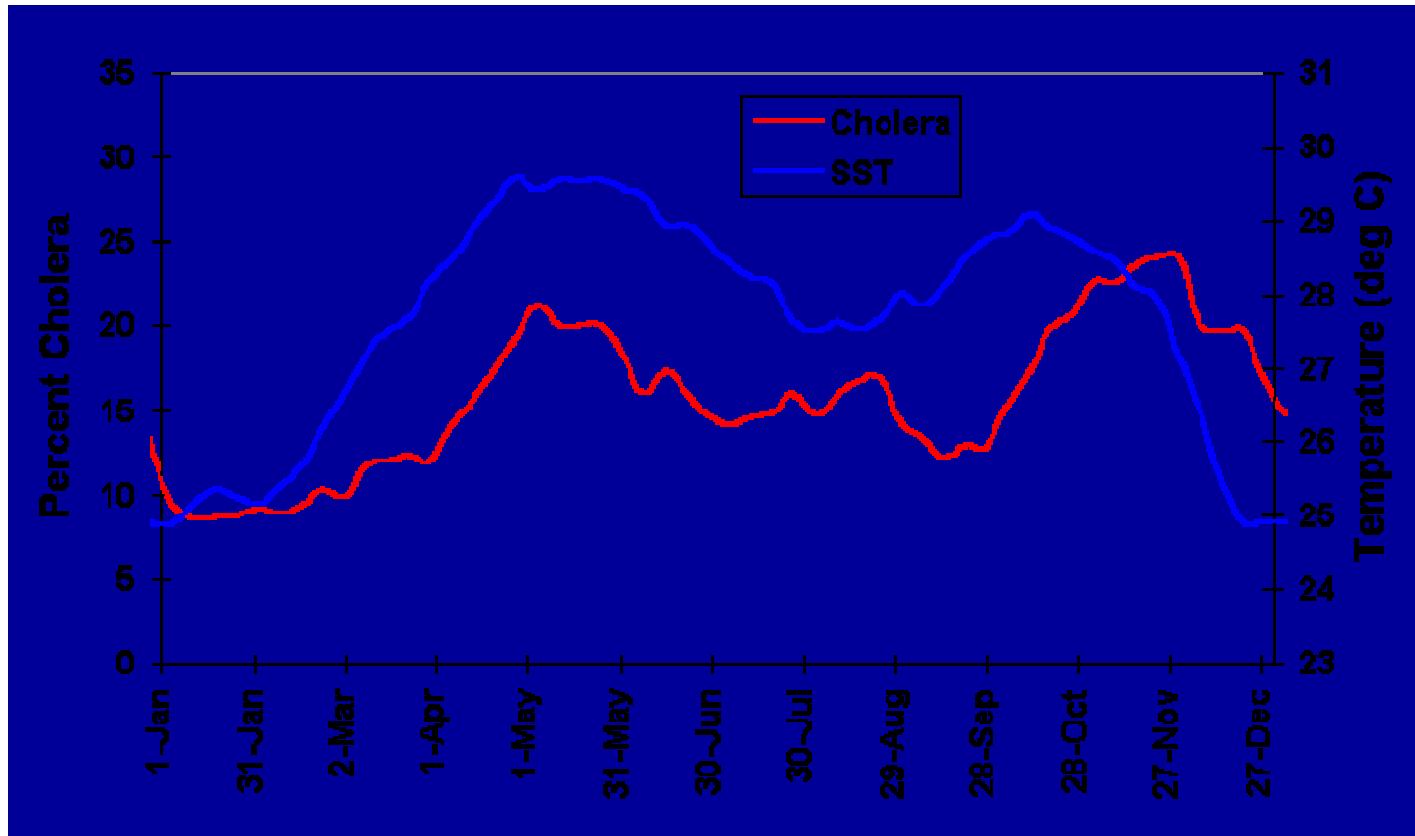
COPEPOD



BAY OF BENGAL

**AVRHH SEPT 1992
FALSE COLOR INFRARED**

SEA SURFACE TEMPERATURE PREDICTS CHOLERA CASES

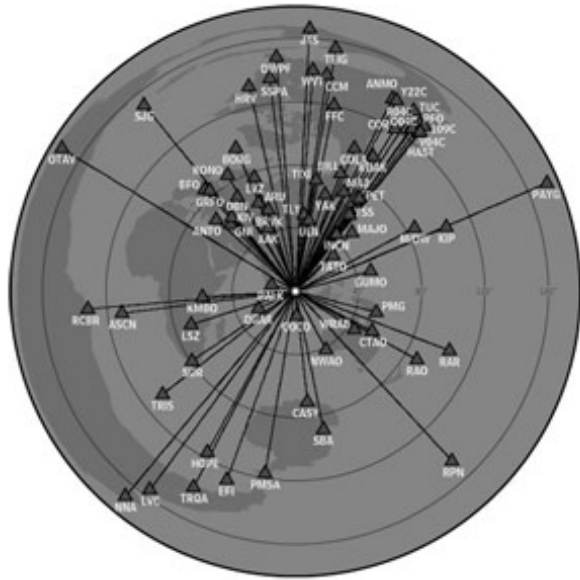


BAY OF BENGAL

Space Systems



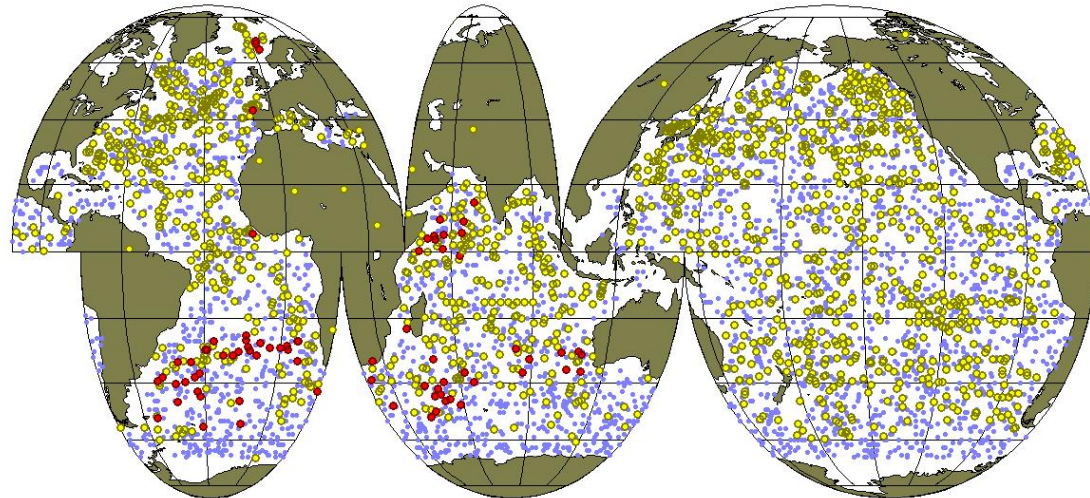
Global In-situ Networks



Seismic Networks

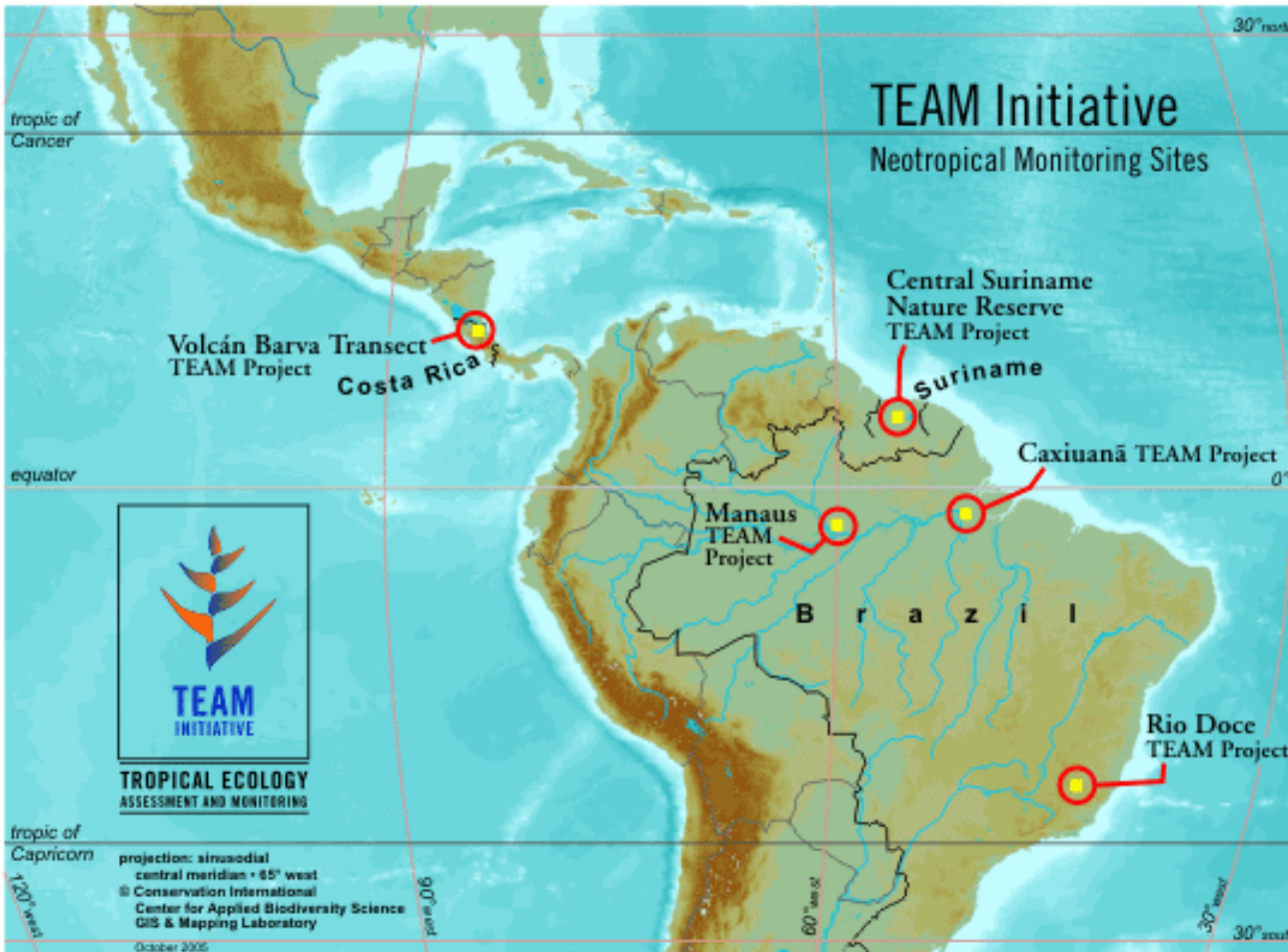
Argo Float Array

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





Regional and Local In-situ Networks



TEAM
**Tropical Ecology
Assessment &
Monitoring
Initiative**

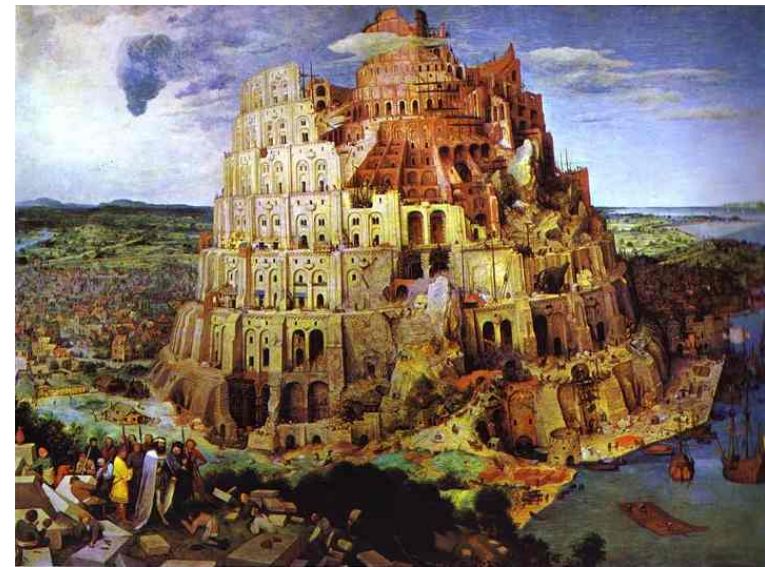
The Tower of Babel

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



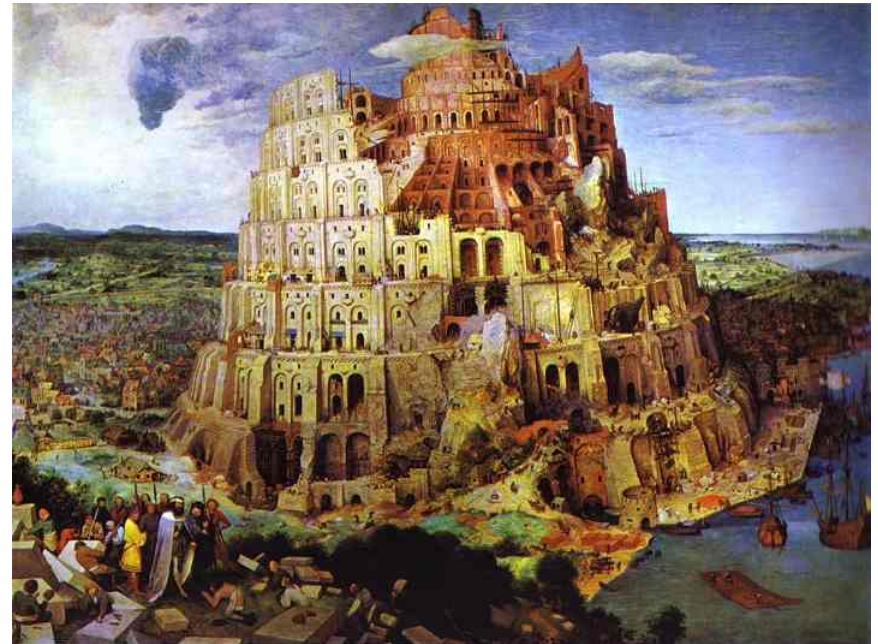
Interoperability Arrangements

- **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**



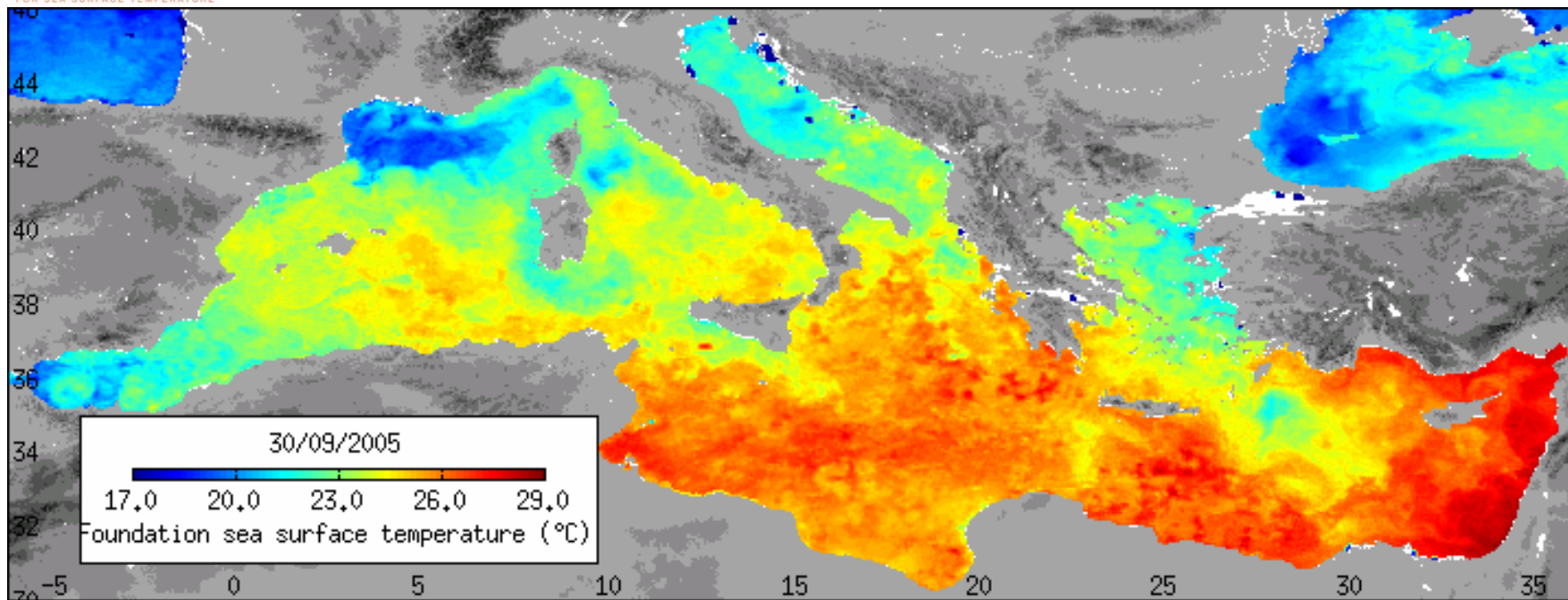
Interoperability Arrangements

*“What few things
must be the same
so that everything
else can be different”*





Sea Surface Temperature Mediterranean Sea in September 2005

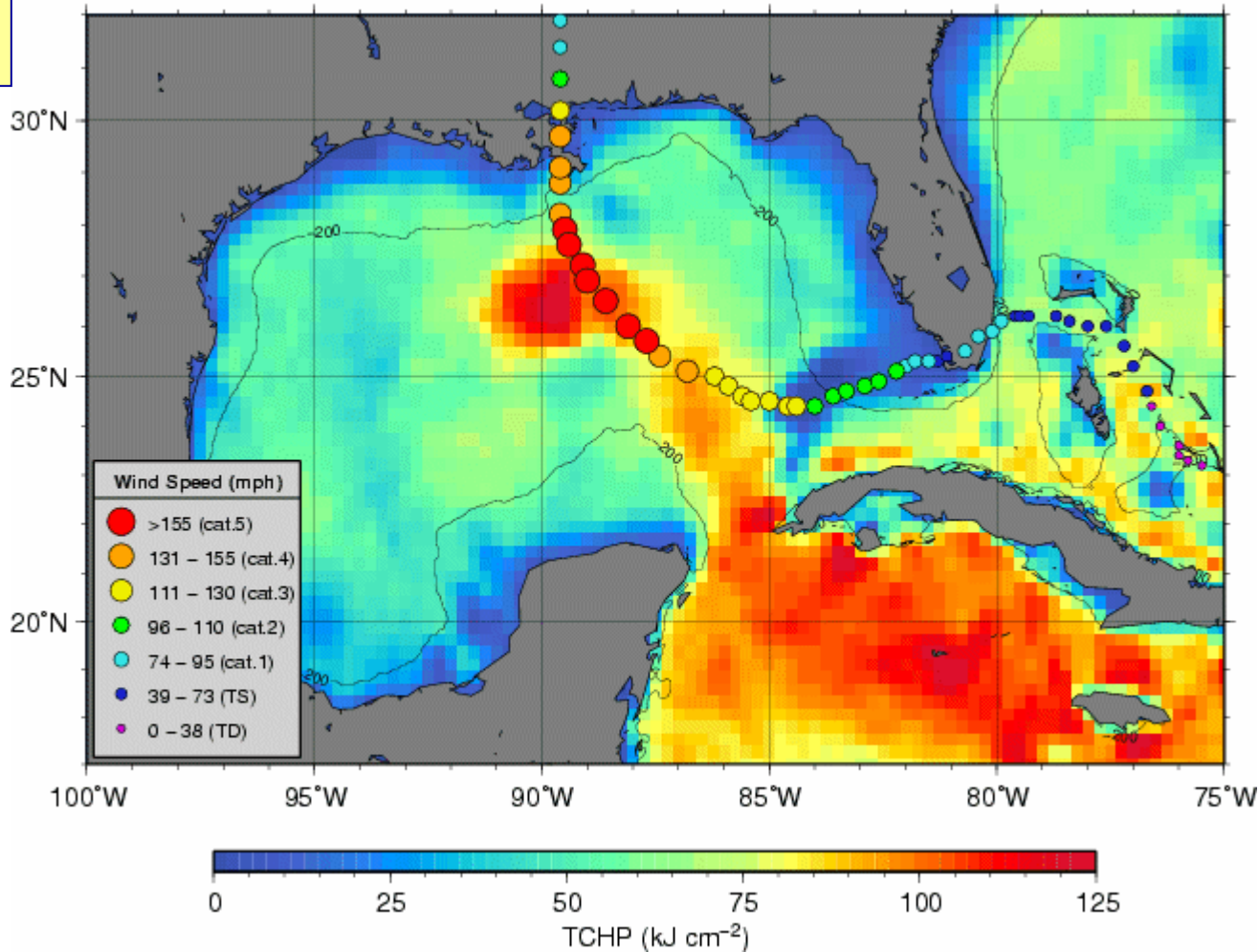


The Medspiration project combines SST data measured independently by different satellites, including Envisat AATSR, into a set of products that represent the best measure of SST, presented in a form that can be assimilated into numerical ocean forecasting models.

<http://www.medspiration.org>

Gulf of Mexico – Tropical cyclone heat potential (TCHP) 08/28/2005

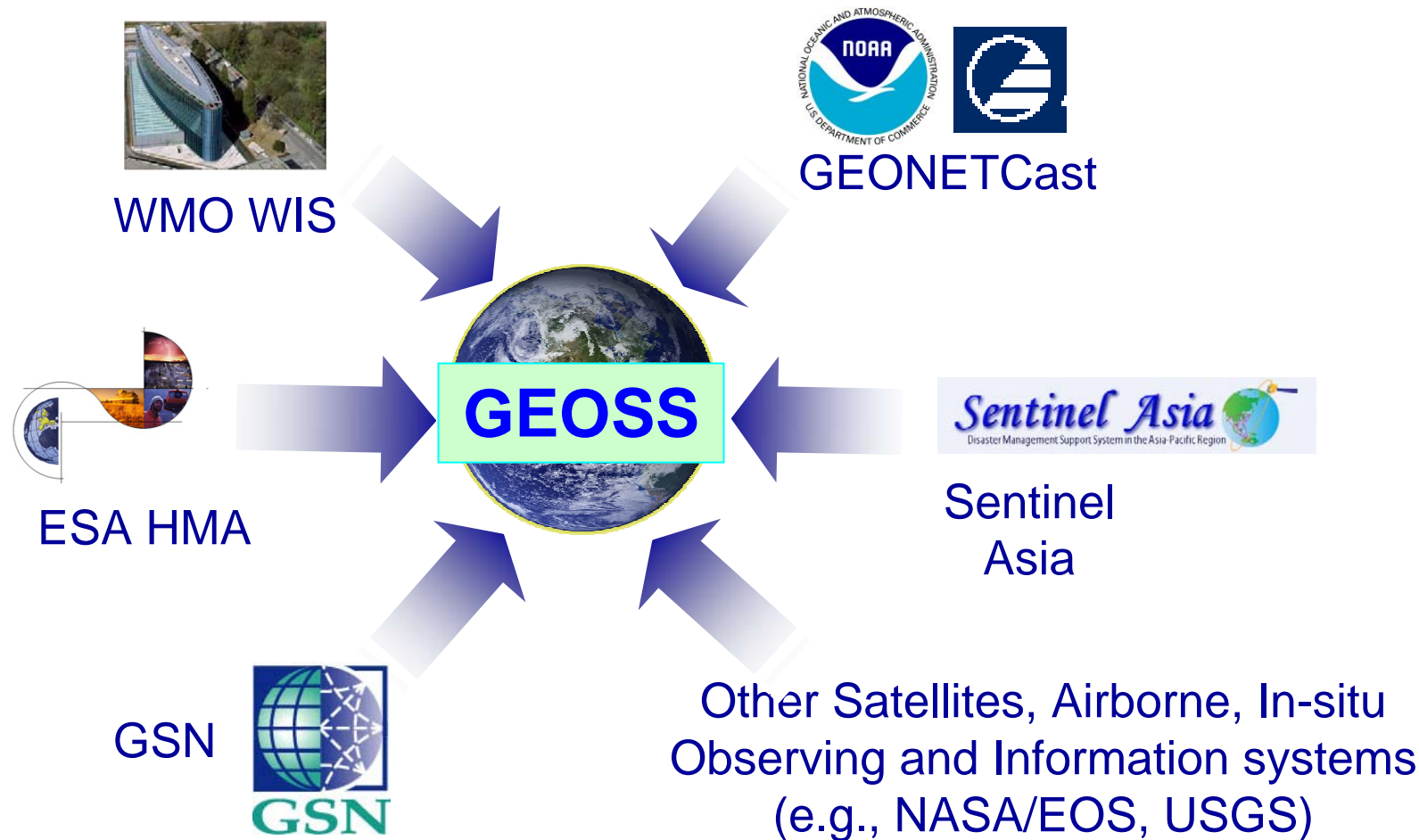
Hurricane Katrina



Altimetry data from ESA Envisat, NASA/CNES Topex/Poseidon & Jason-1, US Navy GFO

Figures courtesy of Gustavo Goni, NOAA/OAR/AOML

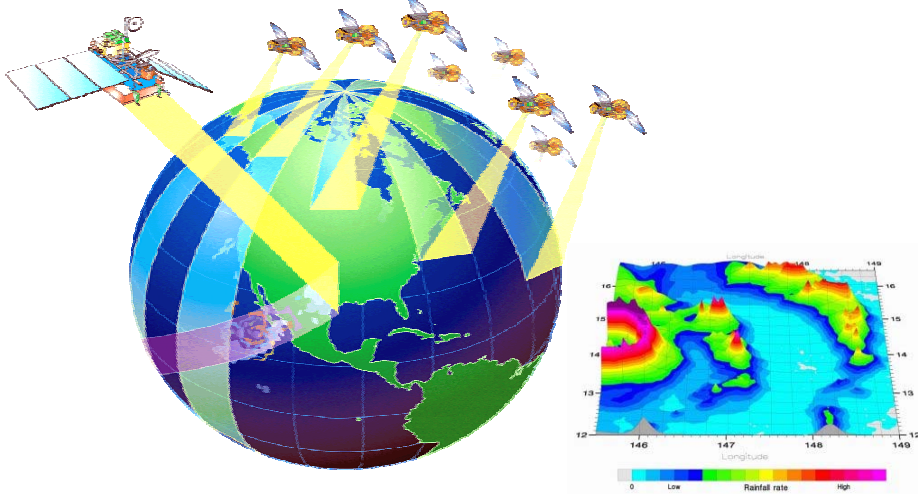
GEOSS Components Commitments



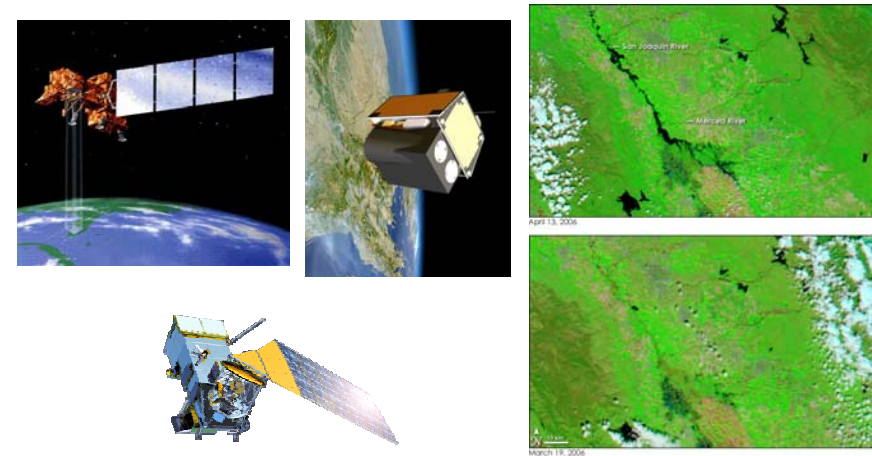
Initial Candidates of Component Contributors

Virtual Constellations

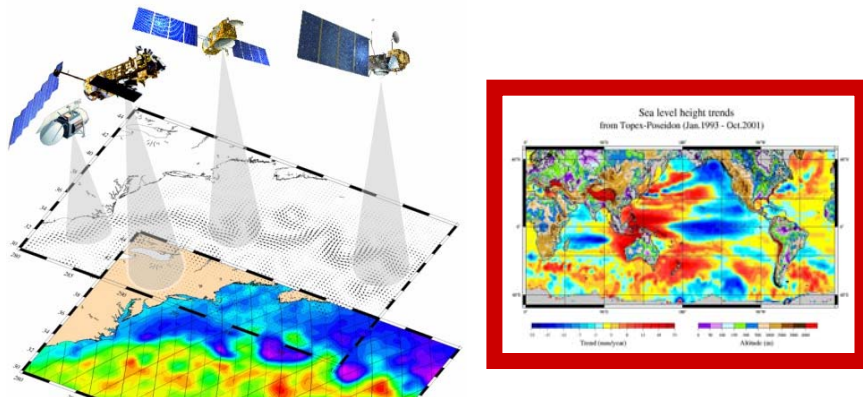
Precipitation



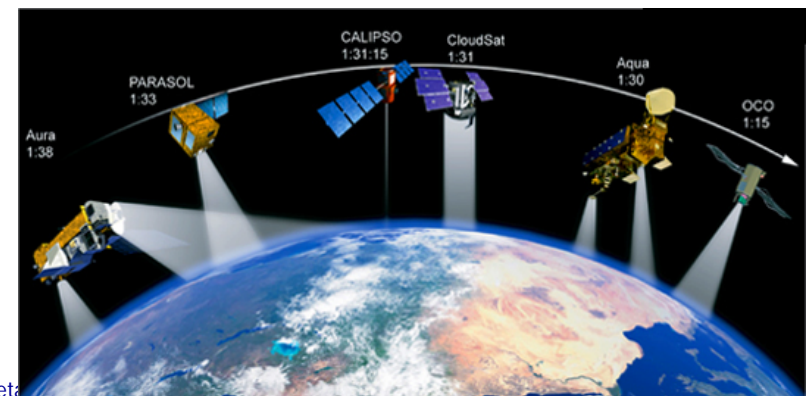
Land-Surface Imaging



Ocean Surface Topography



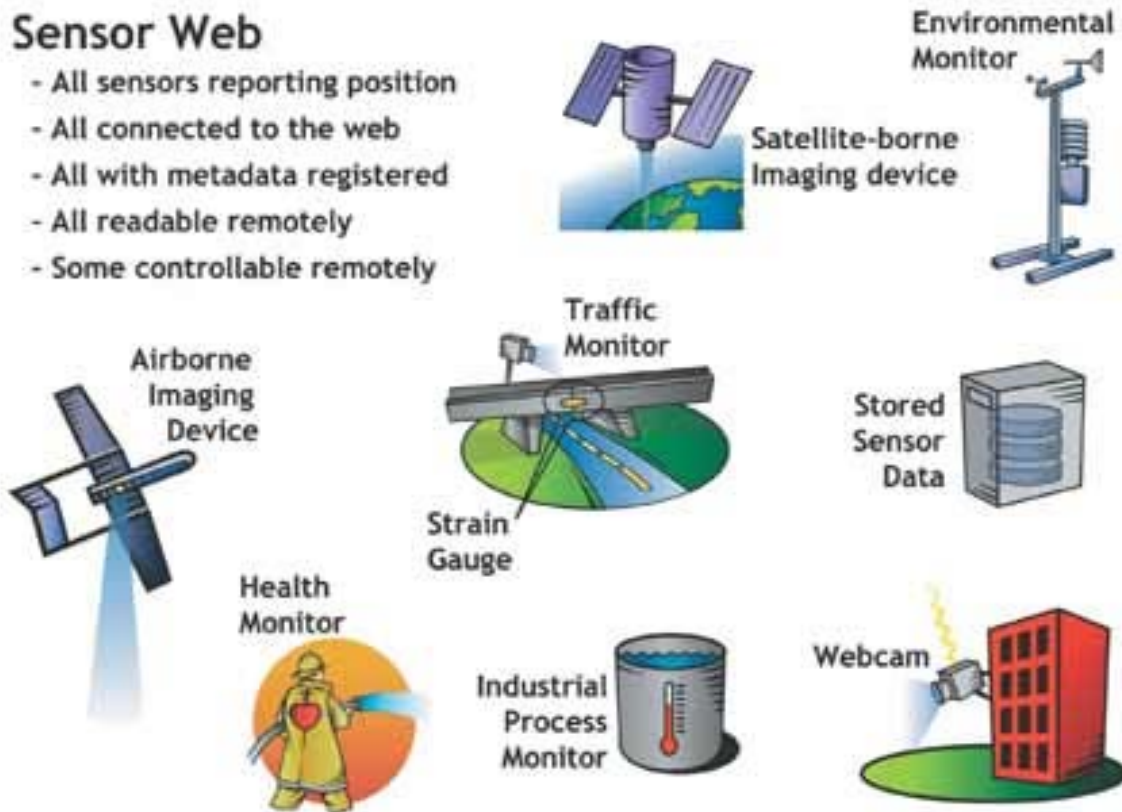
Atmospheric Chemistry



Sensor Web For In situ Networks

Sensor Web

- All sensors reporting position
- All connected to the web
- All with metadata registered
- All readable remotely
- Some controllable remotely



- Less development of ground based sensing network
- Develop use cases to demonstrate the value of the technology
- Target SBAs (Disaster, Health, Biodiversity, Ecosystem, Water)

FIGURE 1 The Sensor Web will comprise diverse, location-aware environmental sensing devices that report data about their surroundings in real time.

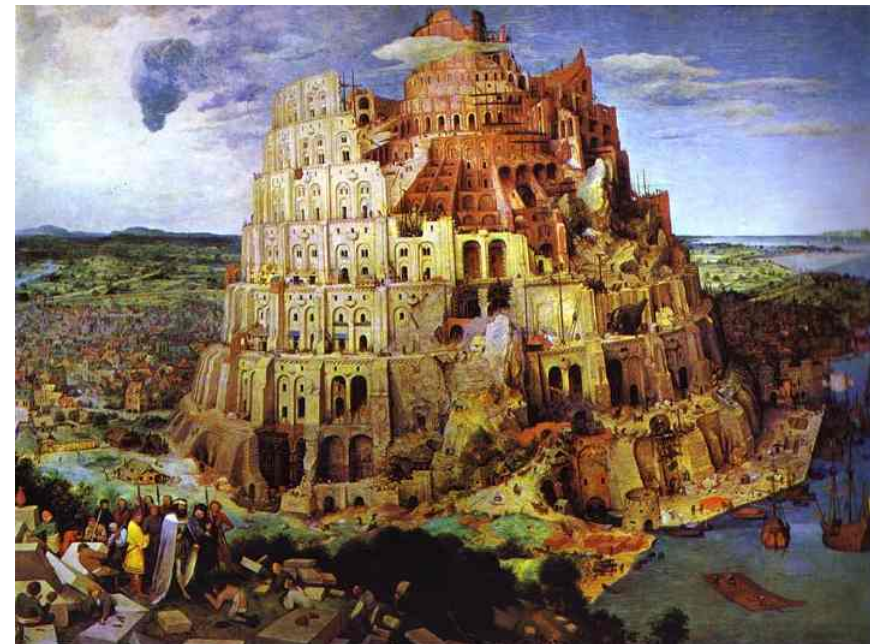
Image courtesy of OGC

GEO should Provide Easier and More Open Data Access



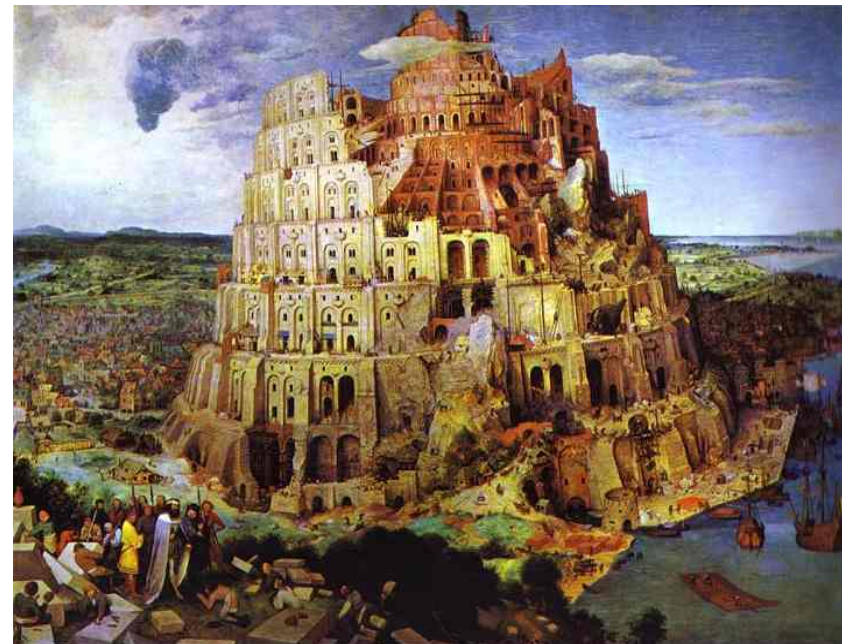
GEO Web Portal and Clearinghouse

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

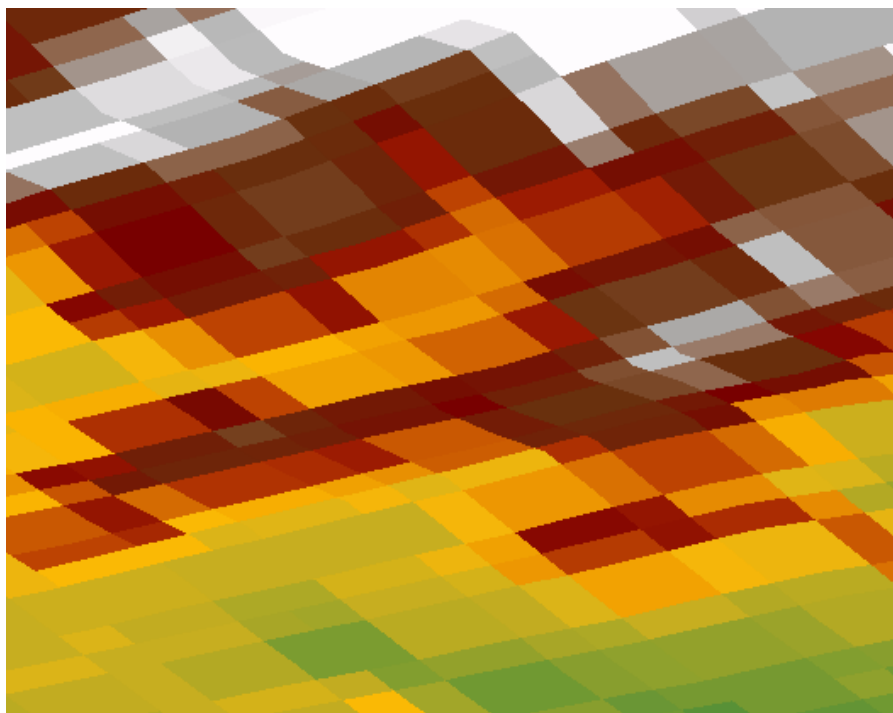


GEO Data Sharing Principles

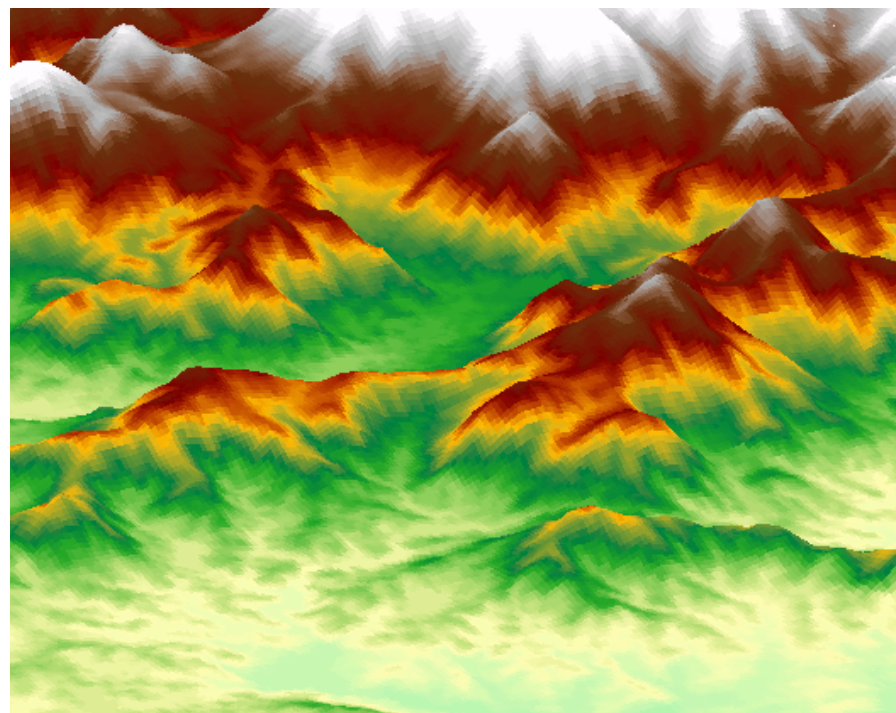
- **Full and Open Exchange of Data...Recognizing Relevant International Instruments and National Policies and Legislation**
- **Data and Products at Minimum Time delay and Minimum Cost**
- **Free of Charge or Cost of Reproduction for Research and Education**



Challenge: National Security



90 m



30 m

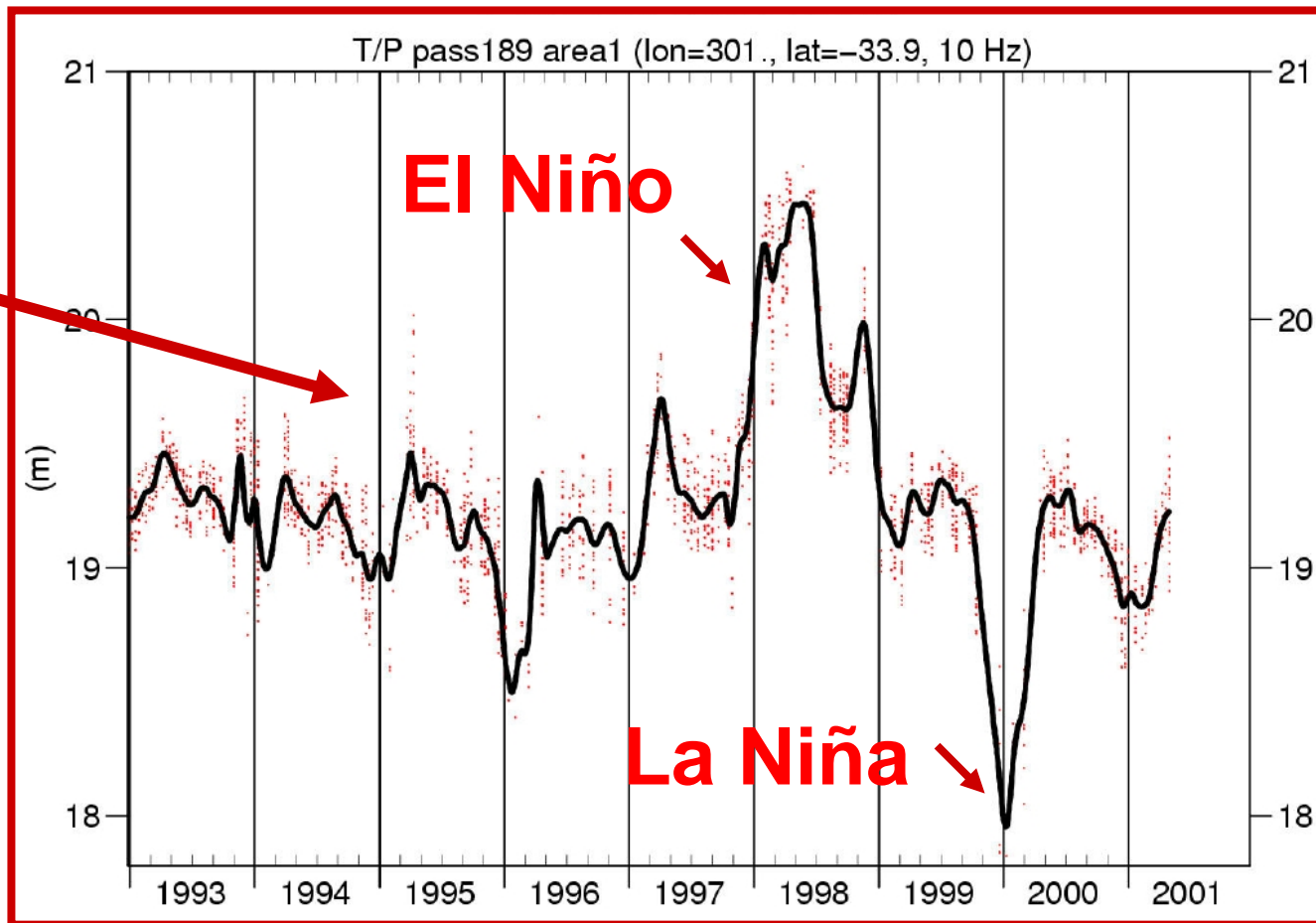
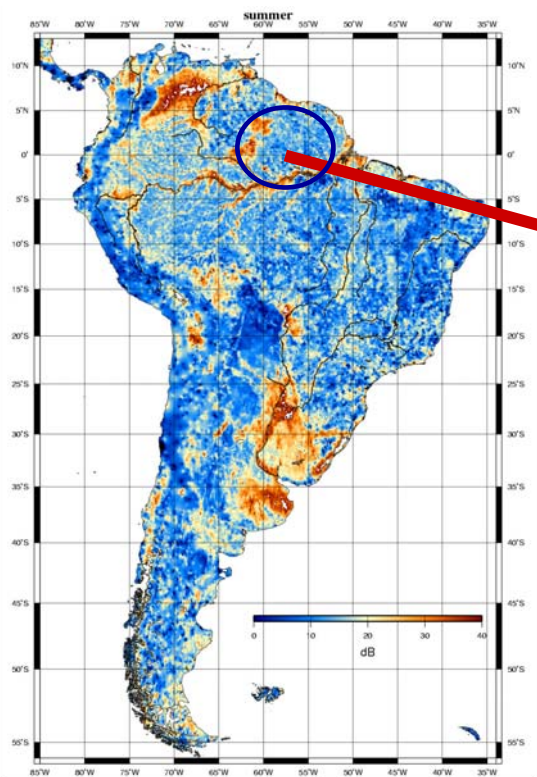
GEO will Foster Interdisciplinary Developments Addressing Cross-cutting Issues, Linking Local to Global



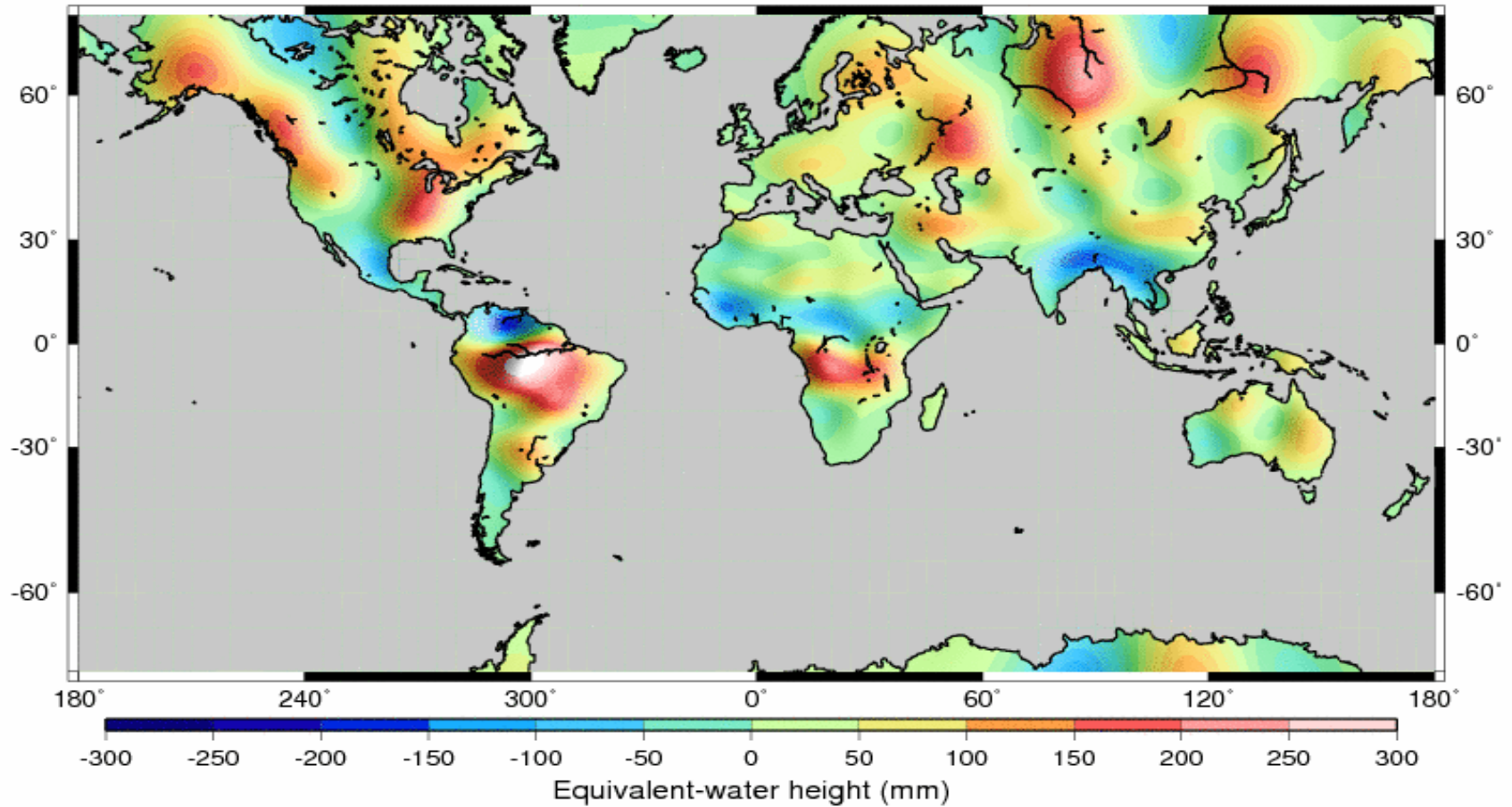


Integrate Space and In-situ Observations

PARANA



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



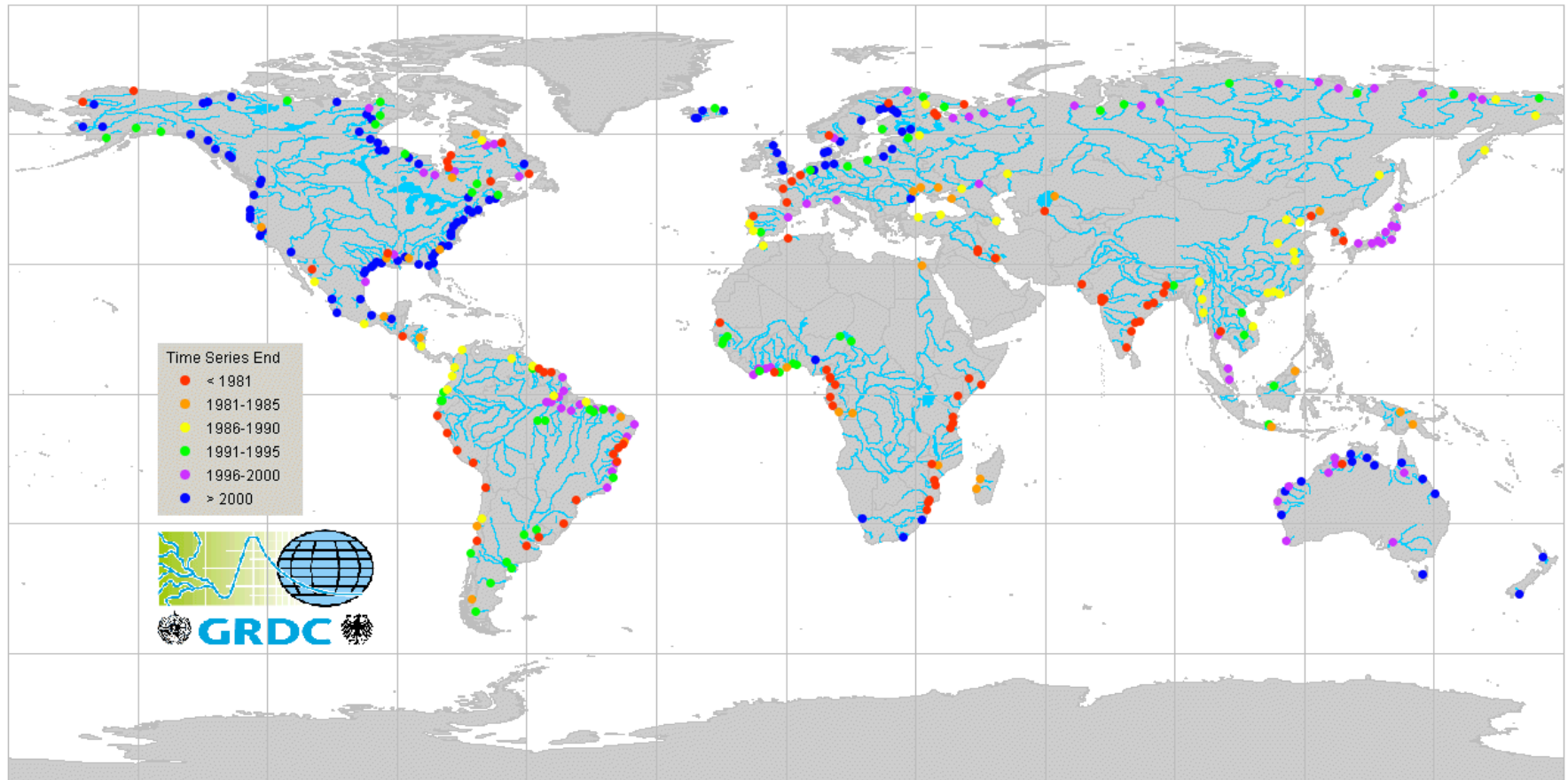
Hydrological Applications and Run – Off Network

A project is proposed aiming to restore an existing Hydrological stations network

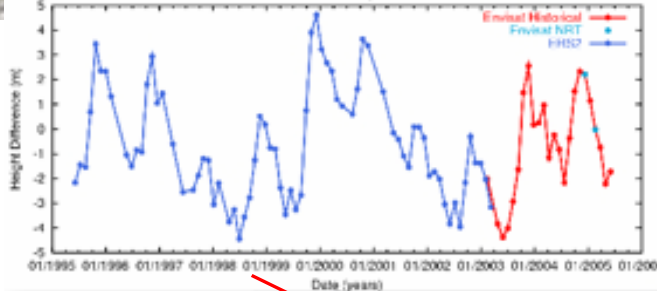
- **initial phase: upgrade and sustained maintenance of major global run-off stations monitoring continental freshwater fluxes into the world's oceans**
- **2nd Phase: Combining hydro-meteorological and related in-situ components with satellite observations**
- **3rd Phase: Produce an implementation plan for a broad global water cycle data integration system that combines in-situ, satellite data and model outputs**

The main purpose of the initiative is to improve and support the closure of the global water budget in line with objectives of WMO, IGWCO, GCOS and GEWEX and to support water resources management also in the context of food security

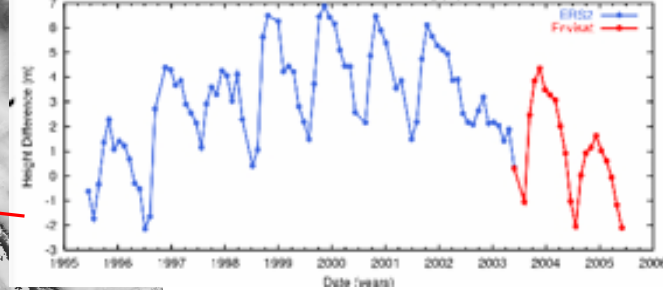
Proposed river discharge baseline network (GTN-R; 380 stations)



Lake Volta, Ghana

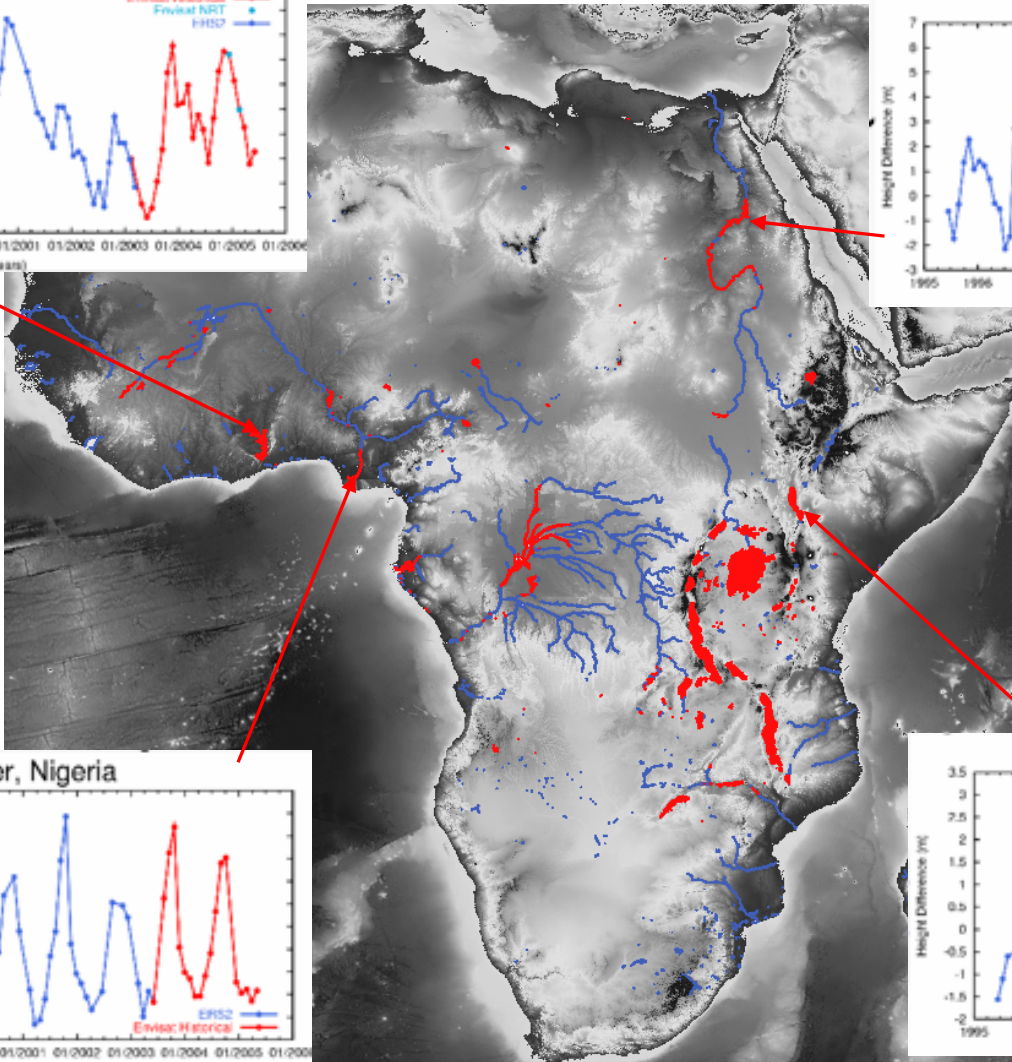


Lake Nasser, Egypt

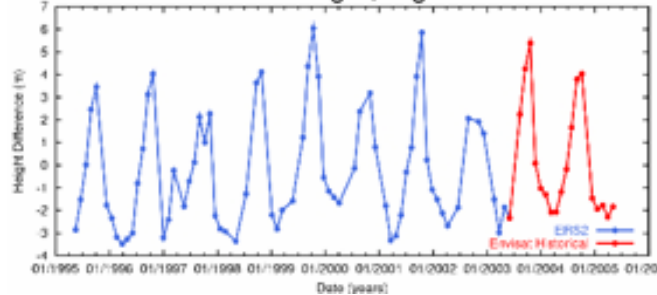


Red indicates area where NRT products are currently generated

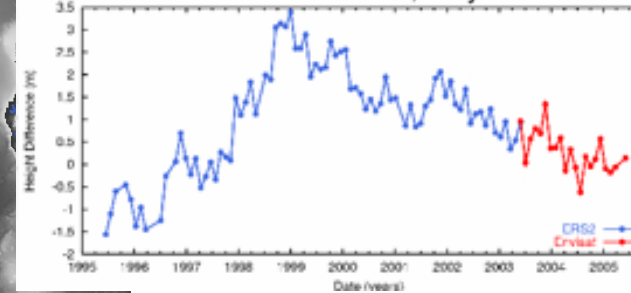
Blue indicates area where products may be generated in the future.



River Niger, Nigeria



Lake Turkana, Kenya





Information Providers and Web Services

Google Earth

File Edit View Add Tools Help

Fly To Local Search Directions

e.g. 37 d 25' 19.07"N, 122 d 05' 06.34 "W

Search

Places

- Fussen
- Trip 2 US
 - Universal Studios
 - Orlando Disney
 - Iaiagara
- Sightseeing
- default
Google Earth default view
- Temporary Places

Layers

- Layers
- Keyhole Community BBS
- User-Supplied Collections
- Dining
- Lodging
- Banks/ATMs
- Bars/Clubs
- Coffee Houses
- Malls/Shopping Centers
- Major Retail
- Movie Rentals
- Grocery Stores

Pointer 34°49'05.01" N 142°32'58.60" E Streaming 100% Eye alt 8115.40 mi

© 2005 Google

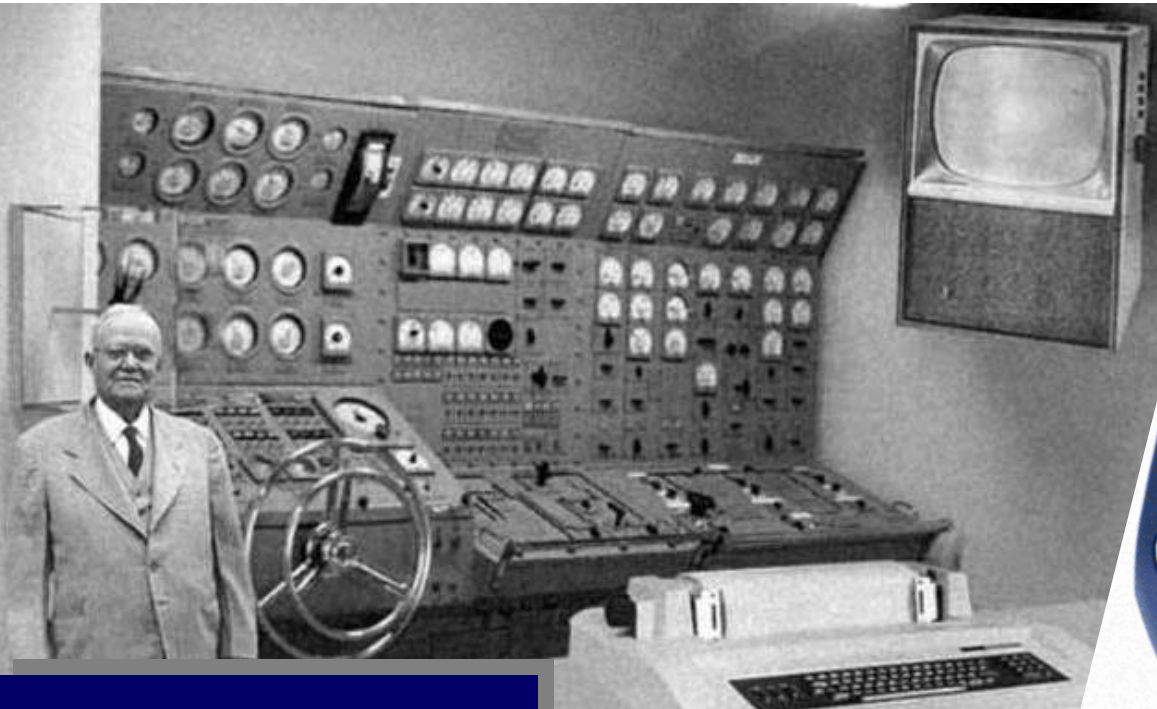
Lodging Dining Roads Borders Terrain Buildings





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The Future of Earth Observation?



1964 Vision

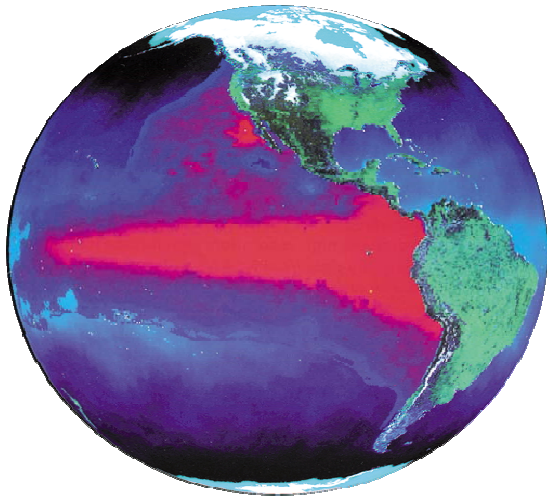


2004 Reality



Group on
Earth Observations

**To Provide the Right Information, in the Right
Place, at the Right Time, to the Right People
to Make the Right Decisions.**



www.earthobservations.org