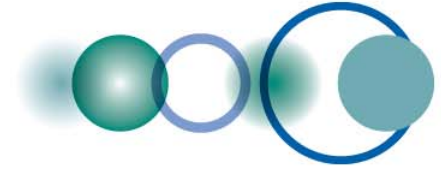


# Global Earth Observation System of Systems

**GEO Secretariat  
Geneva, Switzerland**

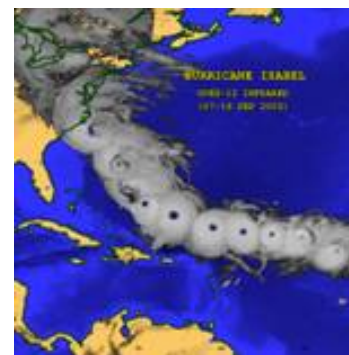
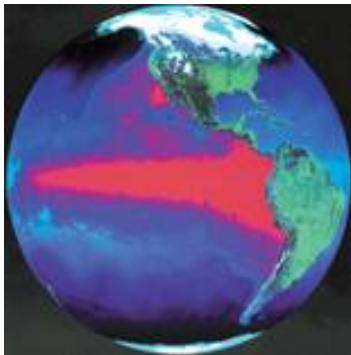


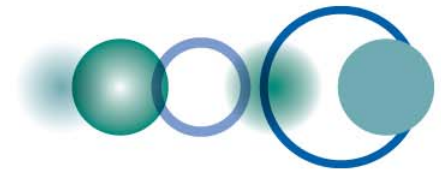


# GEOSs Imperative

- **Some 30% of our economy is tied to the environment**
- **Scientific understanding and ongoing knowledge of the Earth system is fundamental for well informed economic decision making**
- **Sustained Earth observations are critical**
- **Systems interoperability and open data access is fundamental**

**A global approach to Earth observation is required**

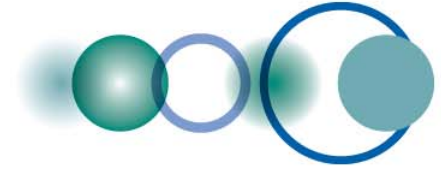




# Group on Earth Observations

Intergovernmental Organization with 80 Members and  
56 Participating Organizations



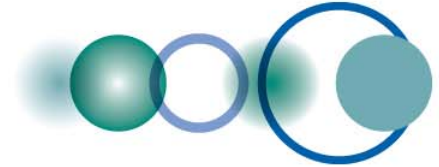


# GEO was created through a series of Earth Observations Summits



**Washington**  
**Tokyo**  
**Brussels**

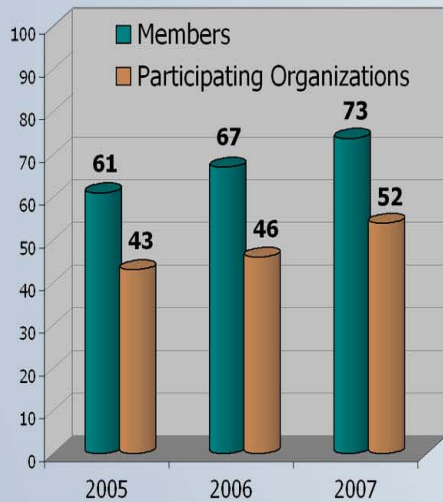
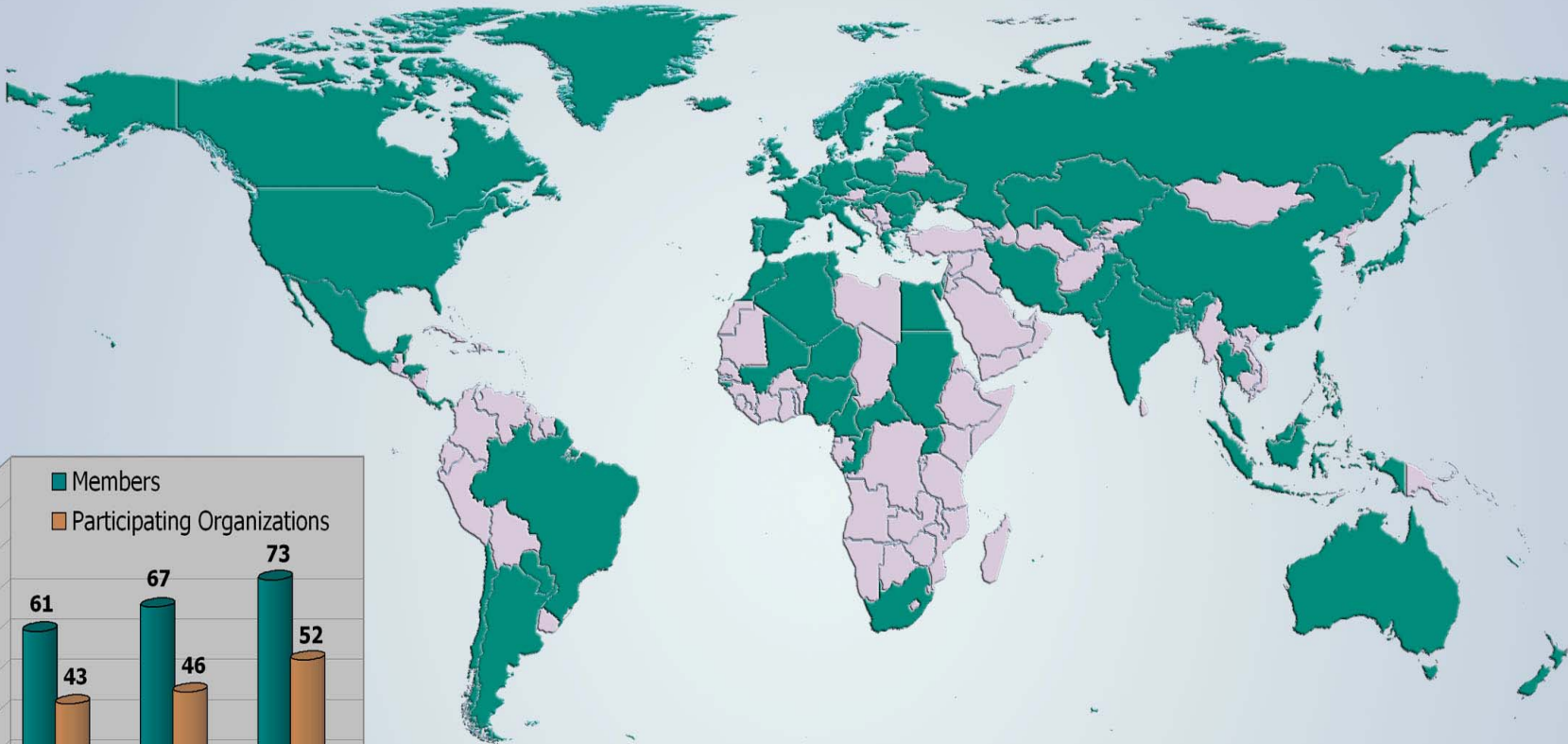


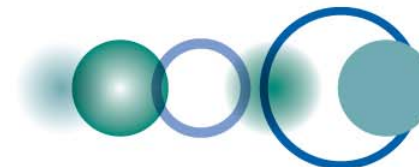


## **GEOSS - Global Earth Observation System of Systems...**

- **Coordinate and Sustain Observation Systems**
- **Provide Easier & More Open Data Access**
- **Foster Use through Science, Applications and Capacity Building**

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

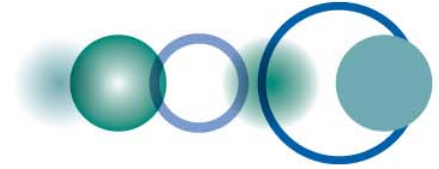




# GEO Progress



- **EOS I – July 2003: Washington DC**
  - 34 Members
  - 20 International Organizations
- **EOS II – April 2004: Tokyo**
  - 47 Members
  - 26 International Organizations
- **EOS III – February 2005: Brussels**
  - 60 Members
  - 34 International Organizations
- **EOS IV – Nov 2007: Cape Town**
  - 74 Members
  - 52 International Organizations
  - First Ministerial Meeting Since 10 Year Plan Adopted
- **EOS V – Nov 2008: Bucharest**
  - 75 Members
  - 51 International Organizations
- **EOS VI – Nov 2009: Washington DC**
  - 80 Members
  - 56 International Organizations

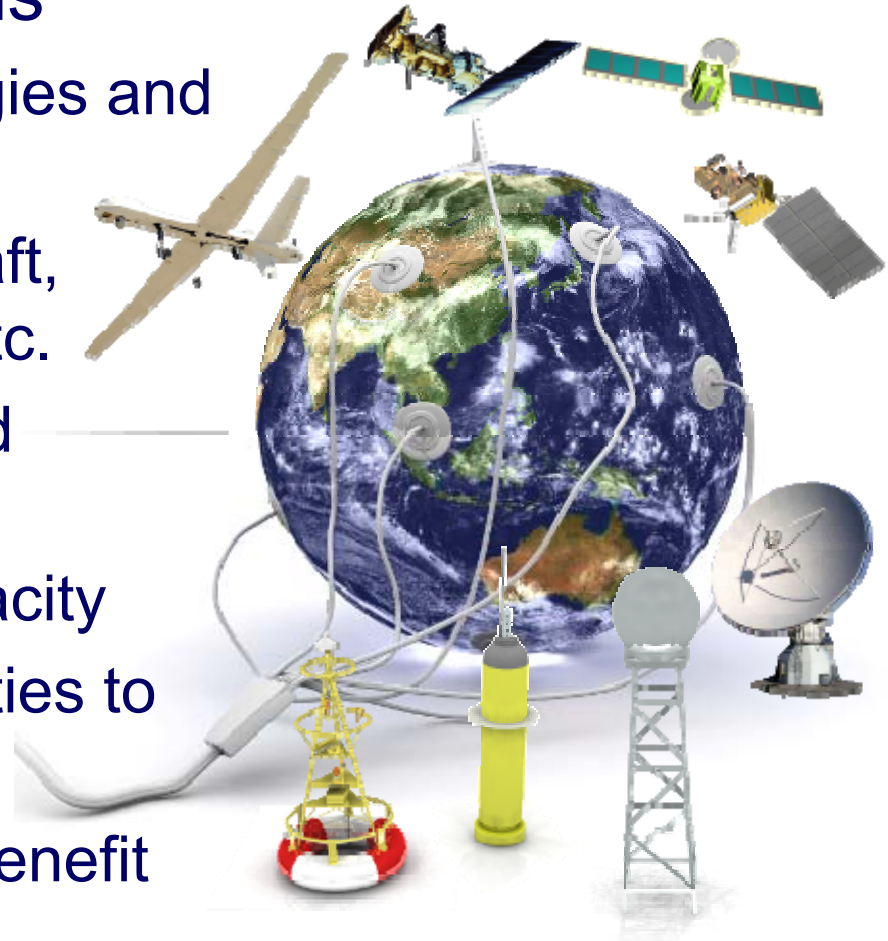


# **GEOSS**

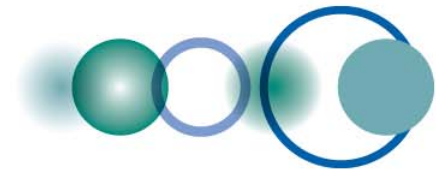
## ***Global Earth Observation System of Systems***

### **Distributed system of systems**

- Improve coordination of strategies and observation systems
- Link all platforms: in-situ, aircraft, satellite, and buoy networks, etc.
- Facilitate exchange of data and information
- Identify gaps in our global capacity
- Improve decision-makers' abilities to address pressing policy issues
- Enable solutions for Societal Benefit

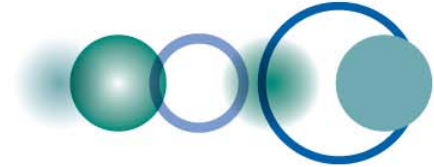






## Environment and Climate Change

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, inter alia, 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.



# RESPONSIBLE LEADERSHIP FOR A SUSTAINABLE FUTURE

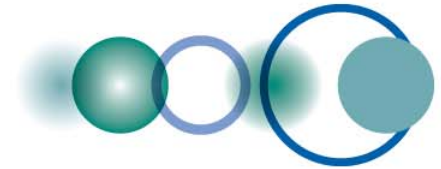


## Natural disasters

To address the increased threats of **natural disasters** and **extreme weather phenomena** caused by **climate change**, such as increased flooding, storm surges, droughts and forest fires, we will act to **improve risk preparedness**, prevention, **monitoring** and response times, particularly in **developing countries**, by:

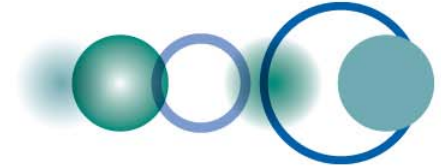
a) defining common guidelines for disaster prevention and management to be used in developing national plans, in collaboration with the UN International Strategy for Disaster Reduction (UNISDR) and the World Meteorological Organisation (WMO), building on the Hyogo Framework for Action and on national experiences, as well as improving management of risks, awareness raising and training of the population and civil protection real-time response, such as logistical support for emergency situations;

**b) supporting the ongoing work on the development of the Global Earth Observation System of Systems (GEOSS).**



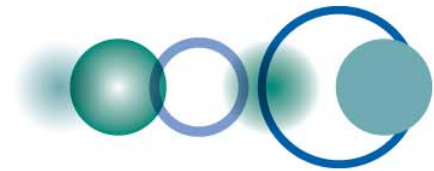
# A Global, Coordinated, Comprehensive and Sustained System of Observing Systems





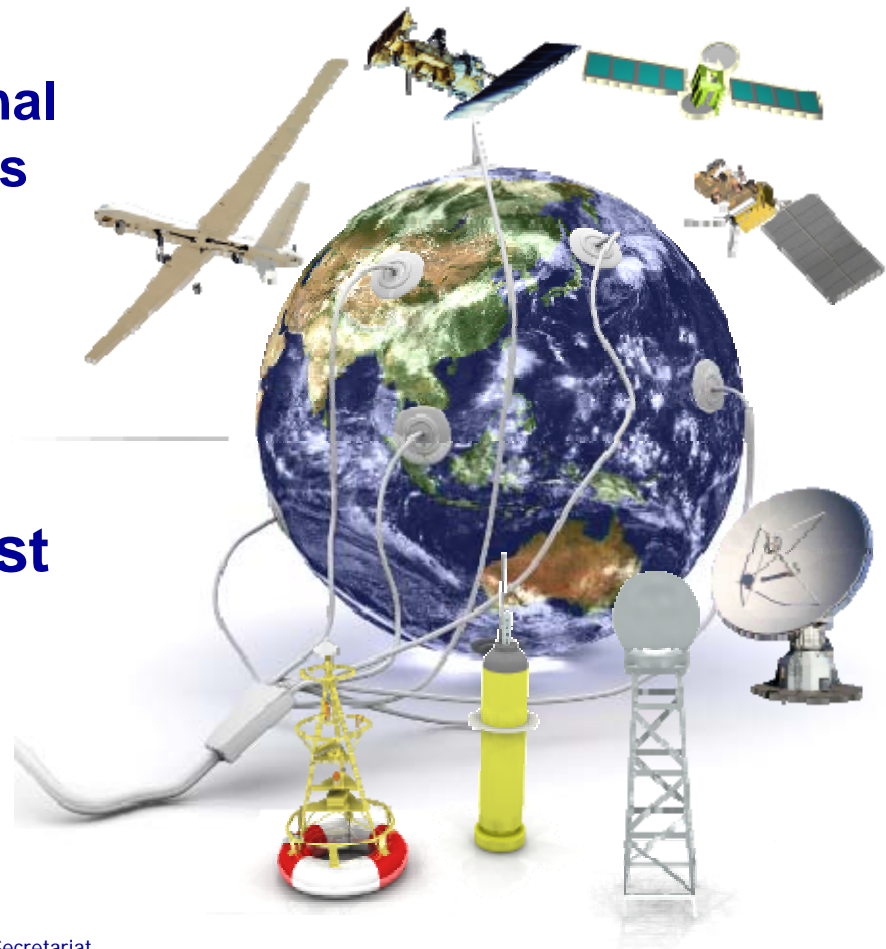
# GEOS Implementation

- **Ensure Access for All**
- Make Basic Data Sets Available
- Develop End-to-end Services
- Coordinate Observing Systems



# GEOS Data Sharing Principles

- **Full and open exchange of data, metadata, and products**
  - Shared within GEOS
  - Recognizing Relevant International Instruments and National Policies
- **Data and Products**
  - Minimum Time delay
- **Free of Charge or minimal Cost**
  - For Research and Education





# GEO Portal



- HOME
- ABOUT GEOPORTAL
- CONTACTS
- NEWS
- MAP VIEWER
- ADVANCED SEARCH
- DOWNLOAD GEOPORTAL
- ABOUT GEO

Provide Feedback to GEO

BROWSE RESOURCES BY SOCIAL BENEFIT AREAS

- DISASTERS
- HEALTH
- ENERGY
- CLIMATE
- WATER
- WEATHER
- ECOSYSTEMS



### BREAKING NEWS

#### FLOODS IN IOWA, USA

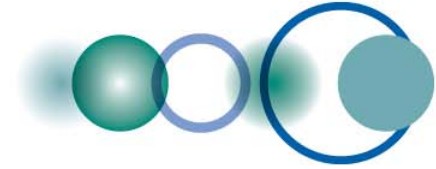
Further to the flooding which occurred on 10 June, 10,000 people were forced to evacuate. The water is now moving towards Iowa City and Des Moines.



[More...](#)

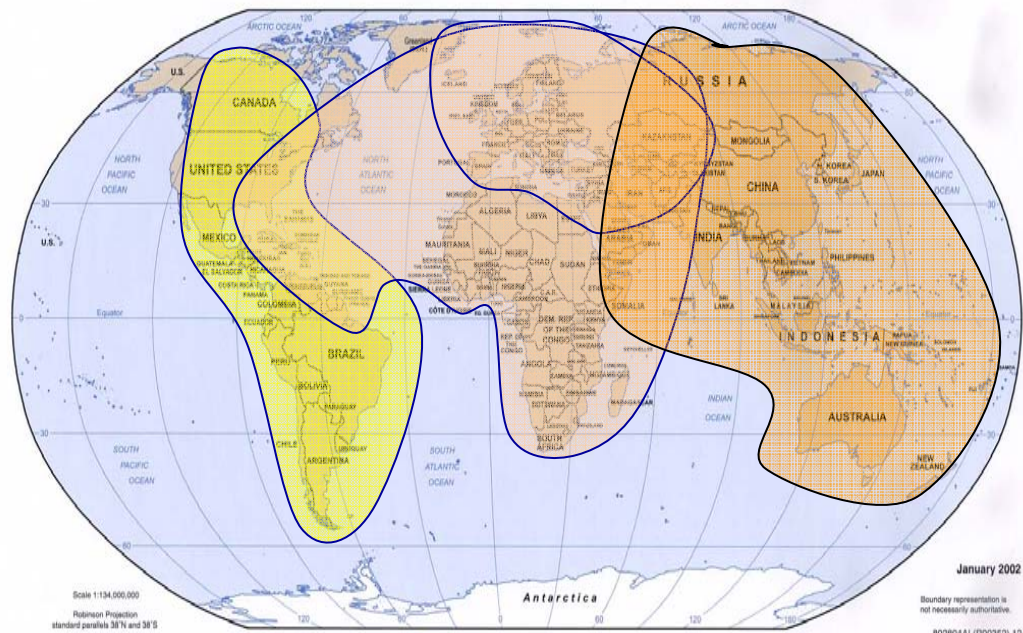
### WELCOME TO GEOPORTAL

The GEOportal provides an entry point to access remote sensing, geospatial static and in-situ data, information and services.



# GEONETCast

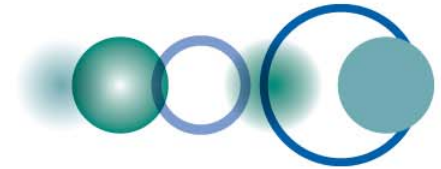
## Space-based Dissemination System for Data, Products, Services and Early Warning



**Global Coverage**

**Contributors**





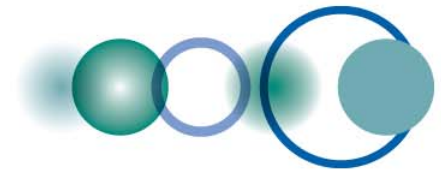
# GEONETCast Receiving Stations

- Dedicated personal computer (~ \$1000)
- Satellite antenna dish (1-3 m) (~ \$300-1200)
- DTH receiver card or box (~ \$200)



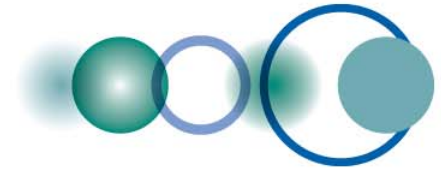
*Data analysis and processing should be done on separate computer(s)*



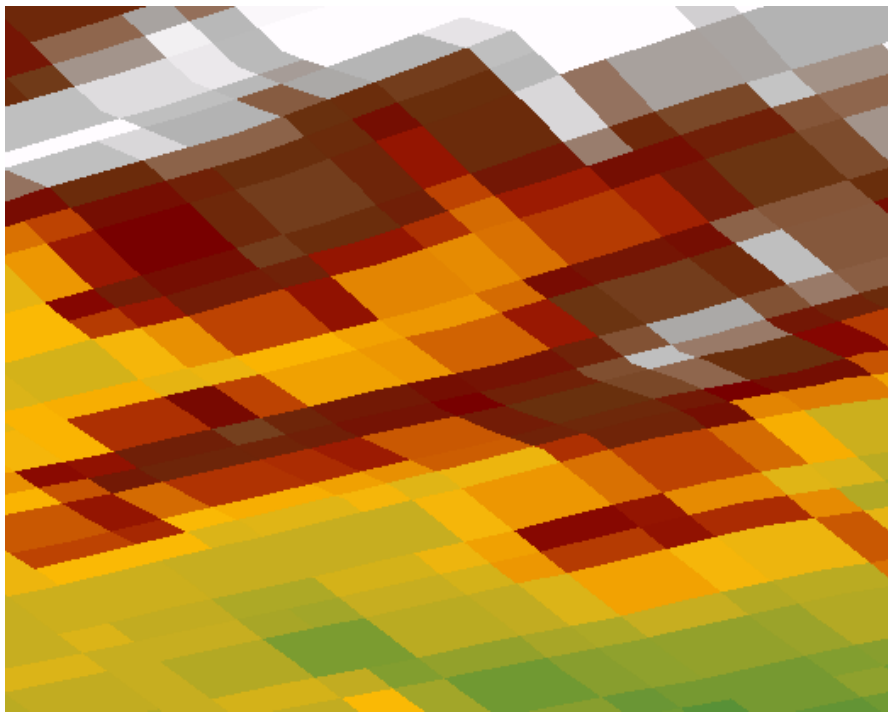


# GEOSS Implementation

- Ensure Access for All
- **Make Basic Data Sets Available**
- Develop End-to-end Services
- Coordinate Observing Systems

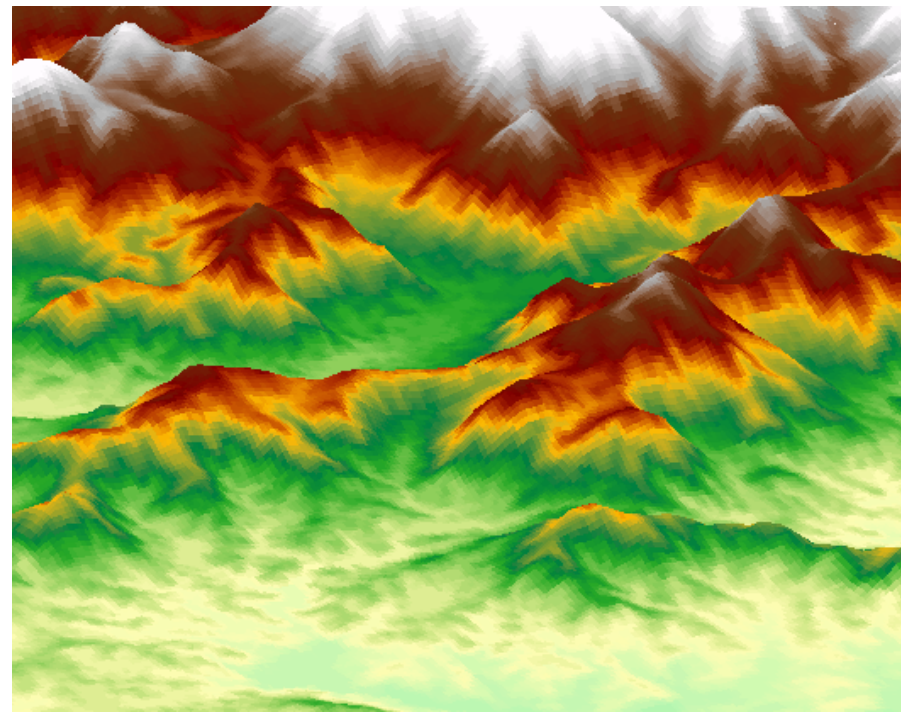


# Global Digital Elevation Model 30 meter resolution US and Japan

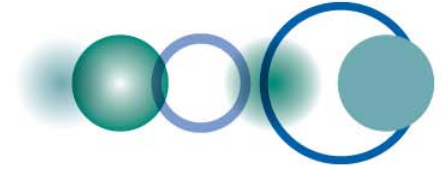


90 m

Comparison courtesy of V. Gorokhovich, CIESIN

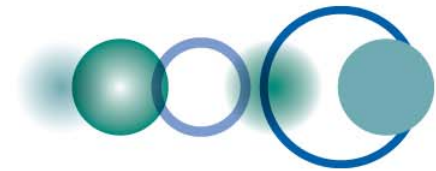


30 m



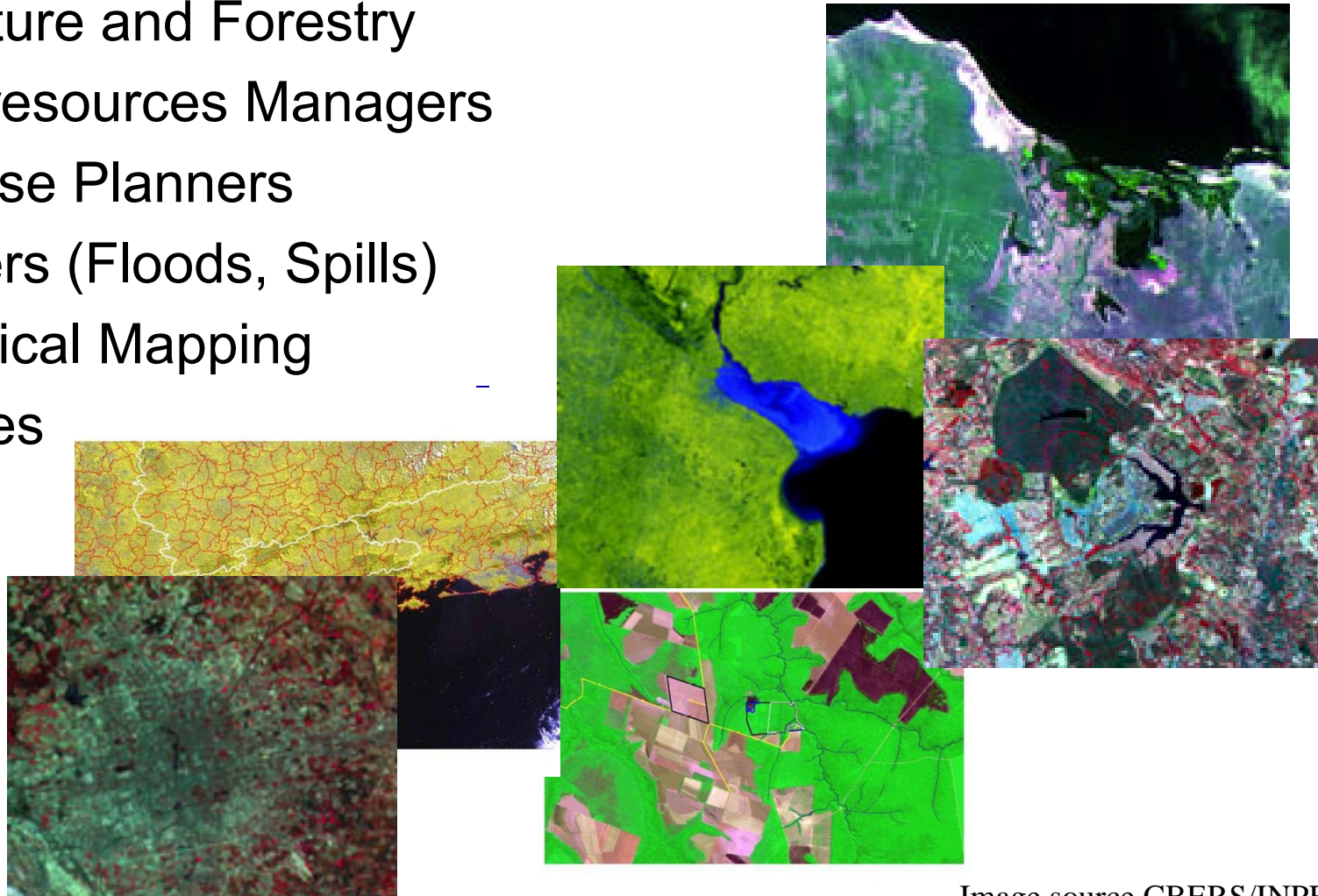
# GEOS Implementation

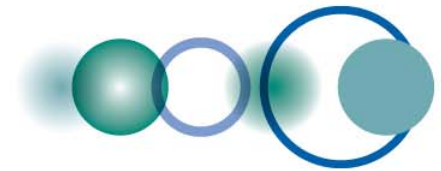
- Ensure Access for All
- Make Basic Data Sets Available
- **Develop End-to-end Services**
- Coordinate Observing Systems



# Applications and End-users

- Agriculture and Forestry
- Water resources Managers
- Land Use Planners
- Disasters (Floods, Spills)
- Geological Mapping
- Fisheries

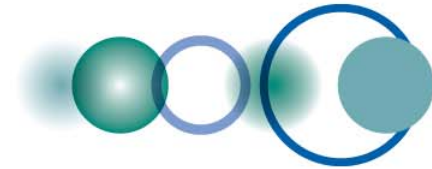




# Forest Mapping and Carbon Tracking

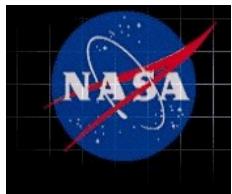
- ❖ Forest monitoring is essential to tackling climate variability and change, dealing with adaptation and evaluating other services.
- ❖ GEO is working actively on forest monitoring and is developing a collaborative forest monitoring system which will
  - consolidate observation requirements and reference products;
  - coordinate the provision of remote sensing data
  - integrate data from different sources in order to ensure operational observations and relevant products;
  - define and activate a limited number of test sites for pilot projects focused on in situ observation, validation of methodologies and tools, and capacity building.
  - Led by Australia, Finland, Japan, Norway, USA, the European Commission, FAO, GOF-C-GOLD, CEOS and GTOS.





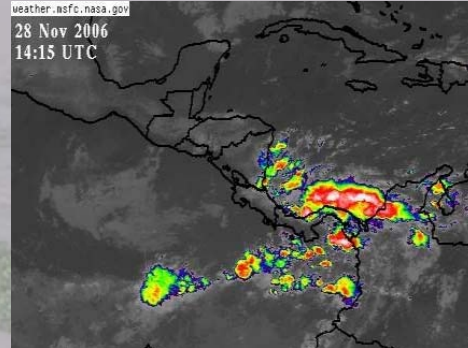
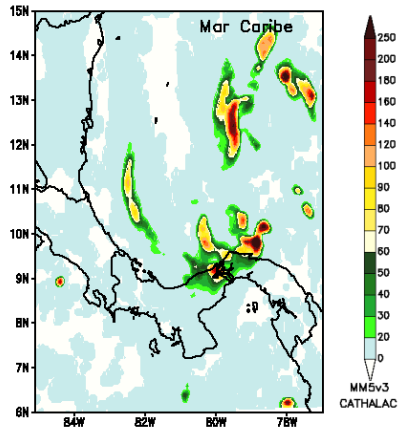
# SERVIR

## Geospatial One Stop Shop for Disaster Management in Central America & Mexico



# SERVIR Response to Flooding in Panama

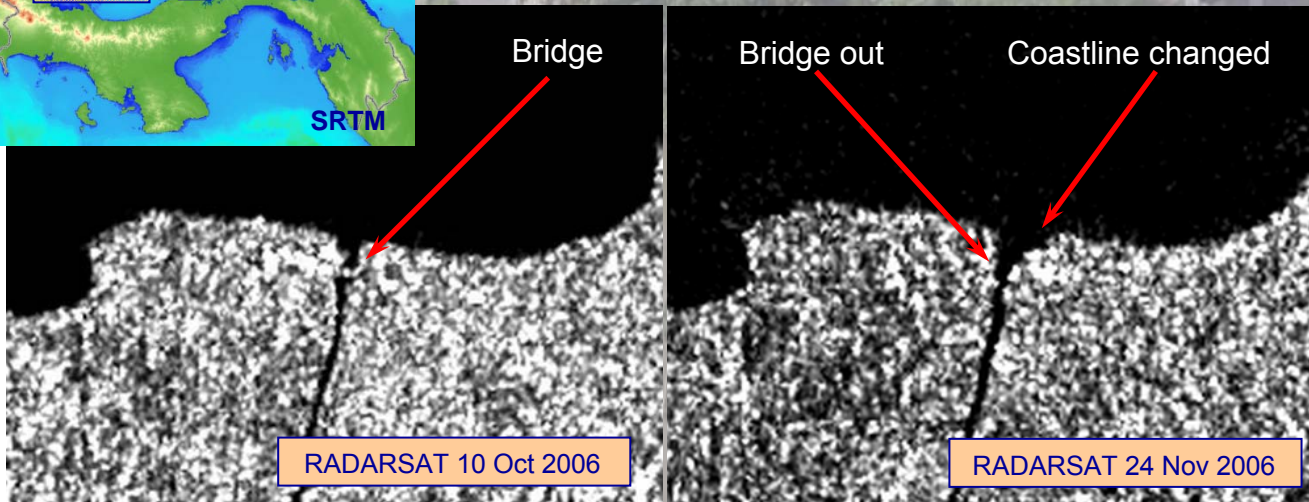
3-hour Peak Rainfall  
23 Nov 2006 08UTC



Met products such as MM5 (left), WRF, and SPoRT model outputs, along with GOES imagery (above), provide a continuous support mechanism for decision makers.



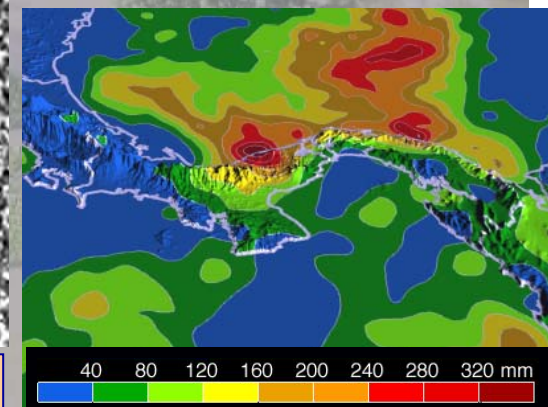
Panamanian President Martin Torrijos (left) consults with meteorologist Annette Quinn and Director of CATHALAC Emilio Sempres at the SERVIR facility in the City of Knowledge, Panama.



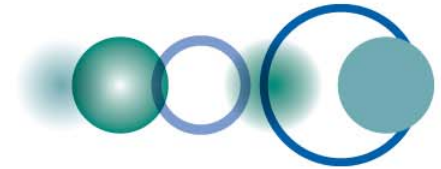
RADARSAT 10 Oct 2006

RADARSAT 24 Nov 2006

TRMM data (below) are used to show total rainfall accumulation over the period November 20-28, 2006.



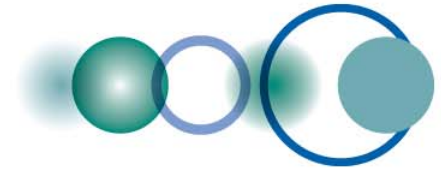
Change detection analysis (above) based on RADARSAT data near Rio Indio, Panama. These images help the Panamanian disaster response agency to focus their efforts in the areas of the flood's greatest impact.

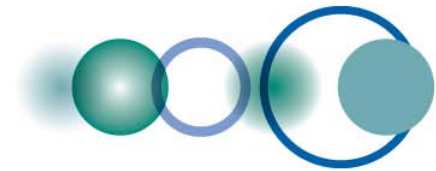


# GEOSS Implementation

- Ensure Access for All
- Make Basic Data Sets Available
- Develop End-to-end Services
- **Coordinate Observing Systems**





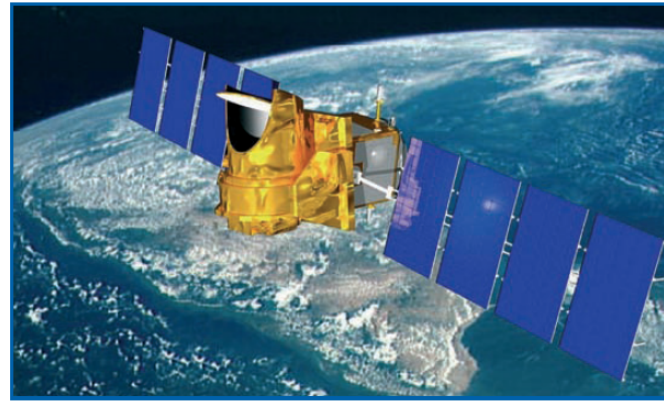


# Virtual Constellations

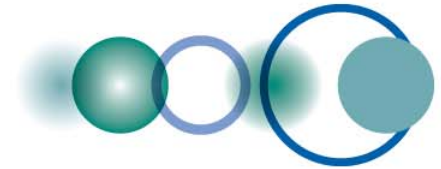
## Participants

Australia, Germany, Japan, USA,  
CEOS, ESA, NASA, GCOS, GTOS,  
IEEE, WMO.

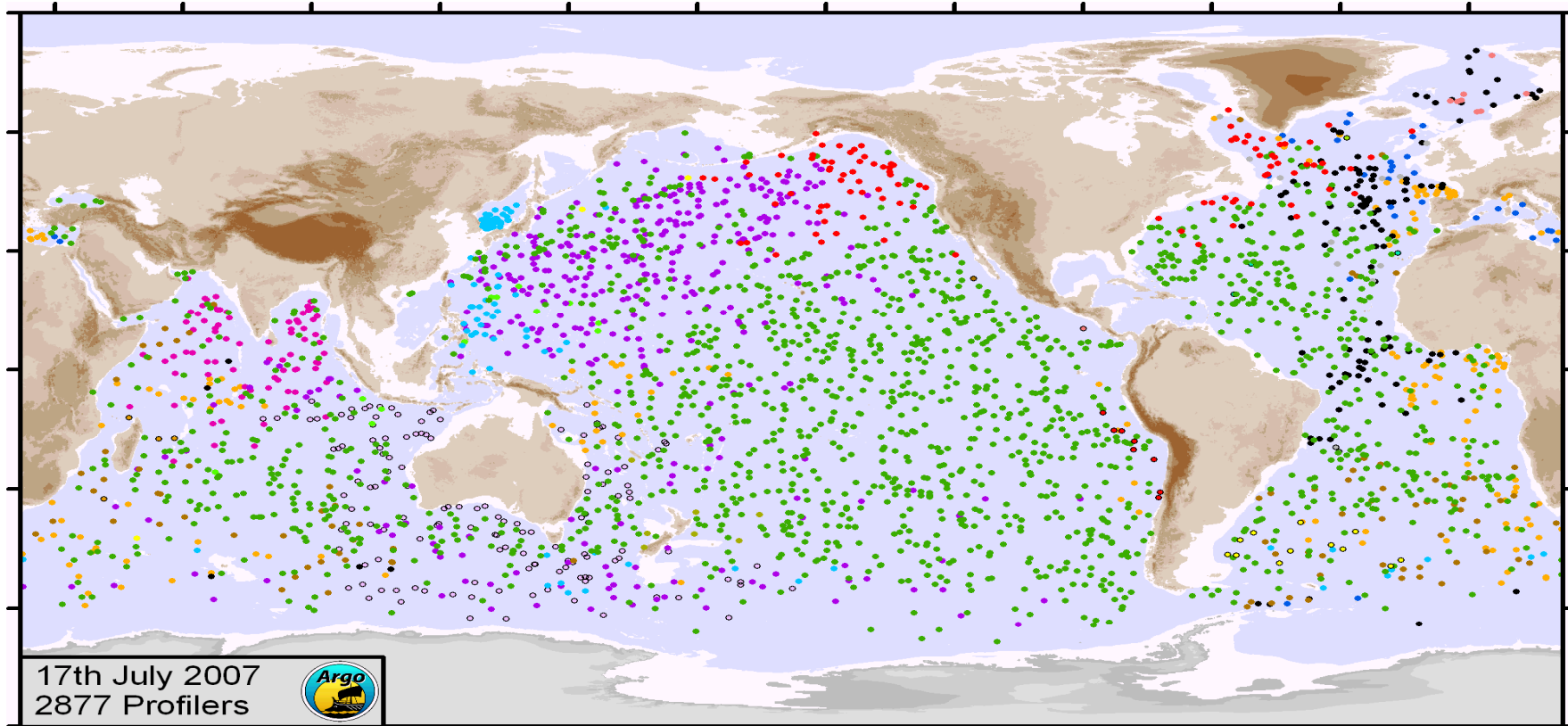
*The French-Indian MEGHA-Tropiques mission,  
planned for flight in 2009, is proposed as part  
of the Global Precipitation Constellation*



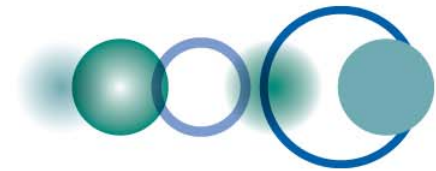
- Atmospheric Composition
- Land Imaging
- Precipitation
- Ocean Surface Topography
- Ocean Color
- Ocean Surface Vector Winds



# ARGO Buoy Observation System



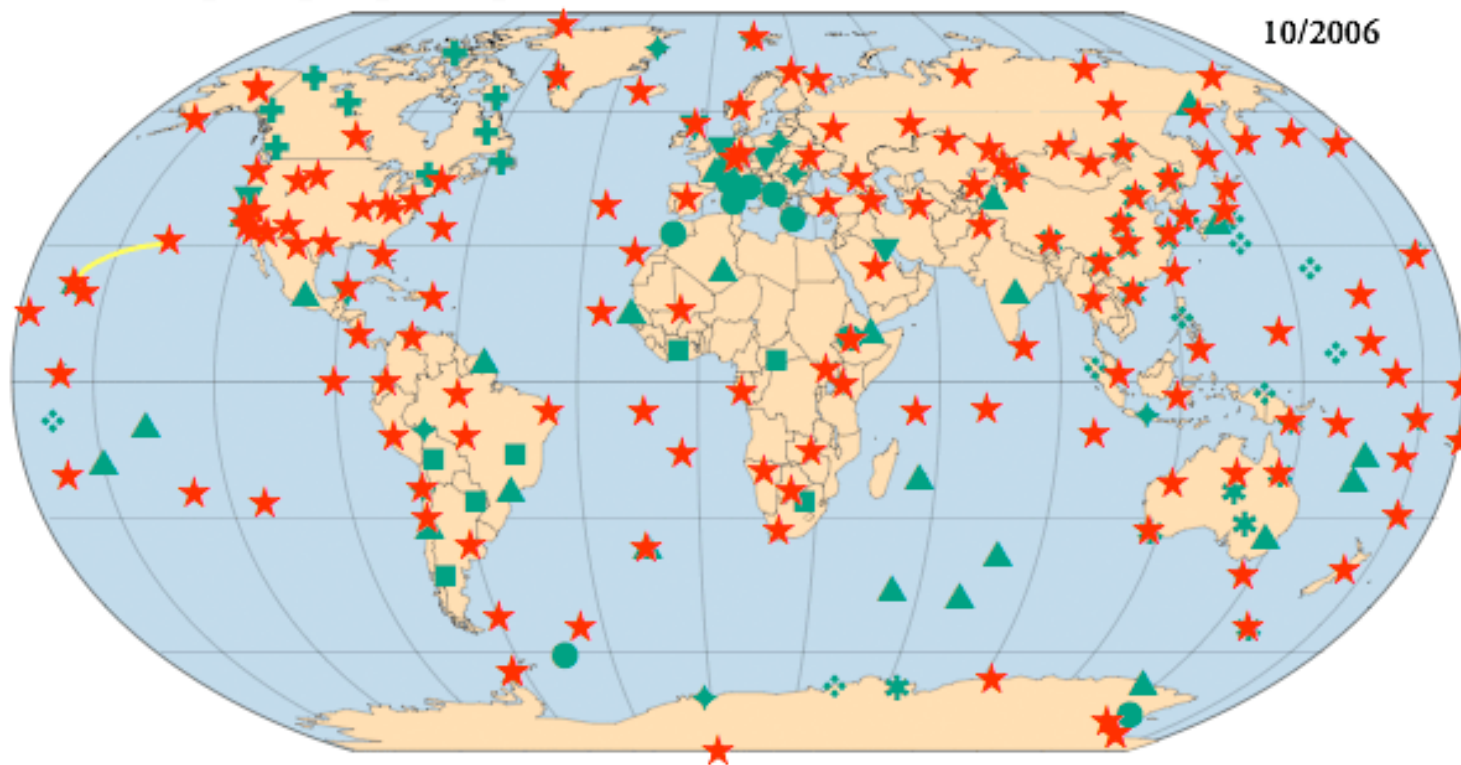
- |                   |                       |                        |                          |
|-------------------|-----------------------|------------------------|--------------------------|
| ● Argentina (12)  | ● Costa Rica (1)      | ● Japan (378)          | ● Norway (8)             |
| ● Australia (136) | ● European Union (31) | ● Korea, Rep. of (102) | ● Russian Federation (3) |
| ● Brazil (2)      | ● France (172)        | ● Mauritius (4)        | ● Spain (3)              |
| ● Canada (98)     | ● Germany (126)       | ● Mexico (1)           | ● United Kingdom (92)    |
| ● Chile (8)       | ● India (77)          | ● Netherlands (10)     | ● United States (1593)   |
| ● China (12)      | ● Ireland (1)         | ● New Zealand (7)      |                          |



# Global In-Situ Observation Systems



## International Federation of Digital Seismograph Networks

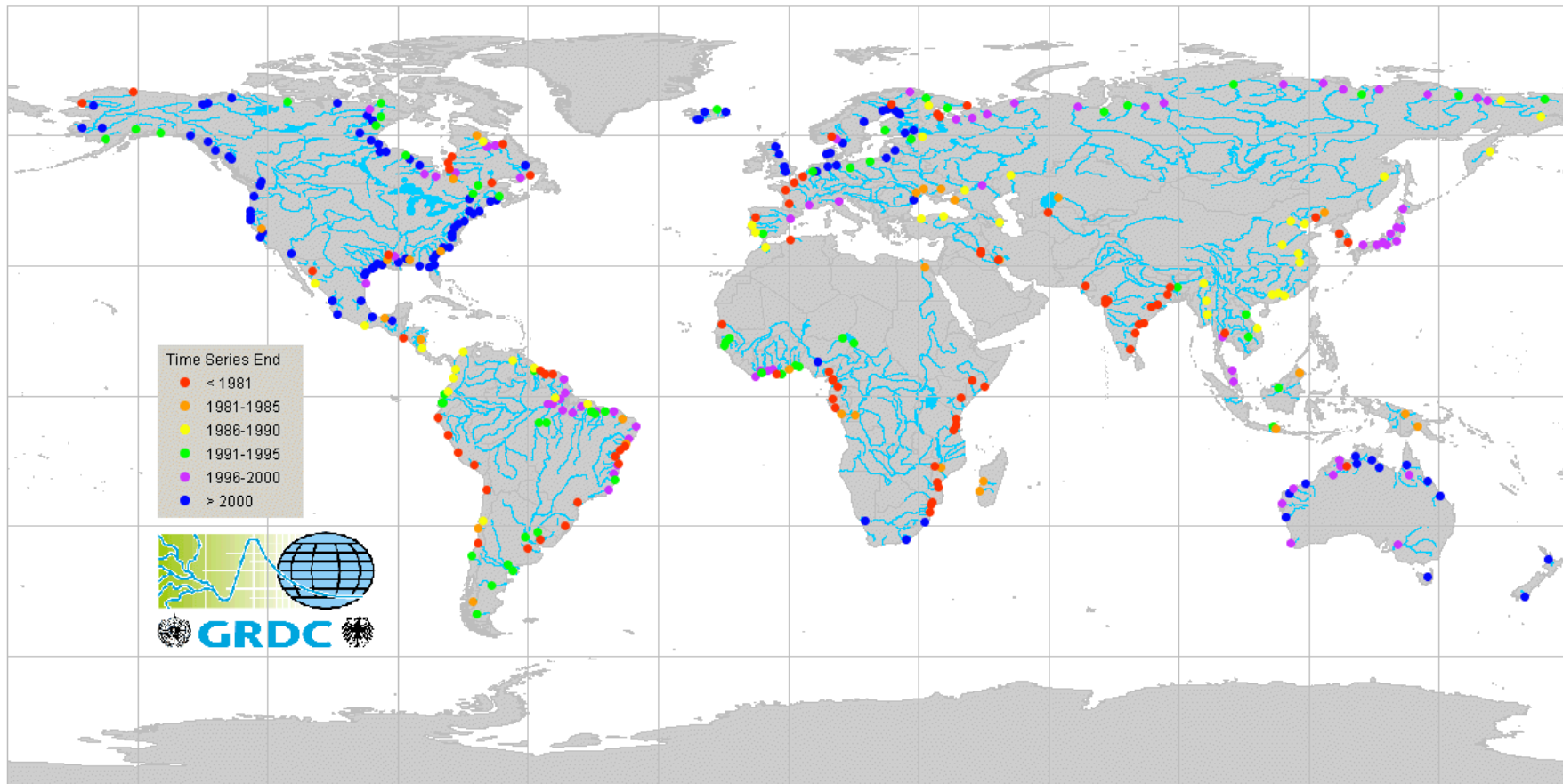


|          |           |        |        |         |       |       |      |       |
|----------|-----------|--------|--------|---------|-------|-------|------|-------|
| IRIS GSN | Australia | Canada | France | Germany | Italy | Japan | U.S. | Other |
| ★        | ✱         | +      | ▲      | ◆       | ●     | ❖     | ■    | ▼     |



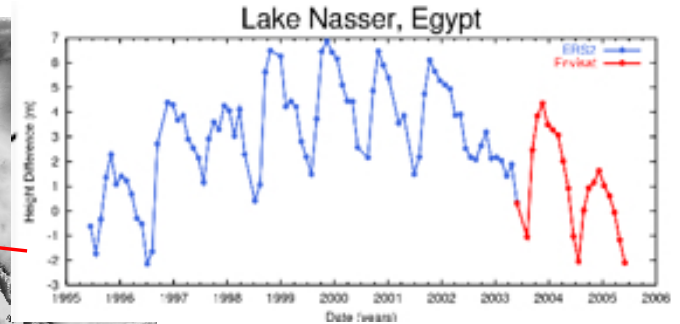
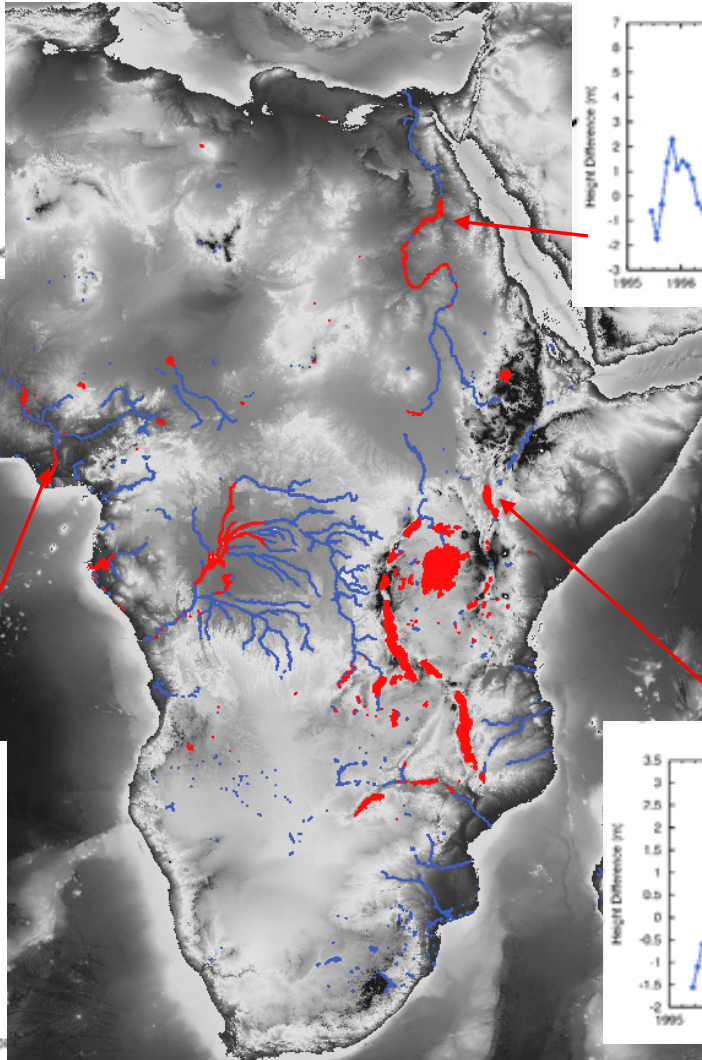
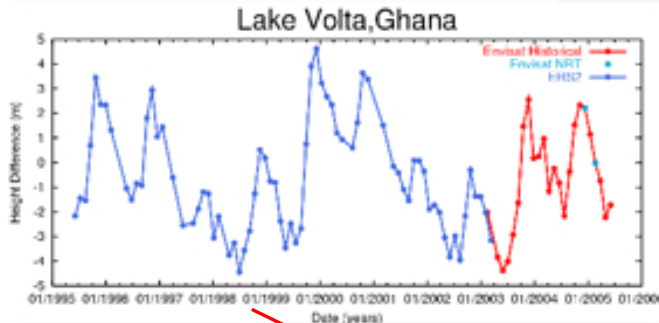
# Upgrade and integrate in-situ stations

## River Discharge



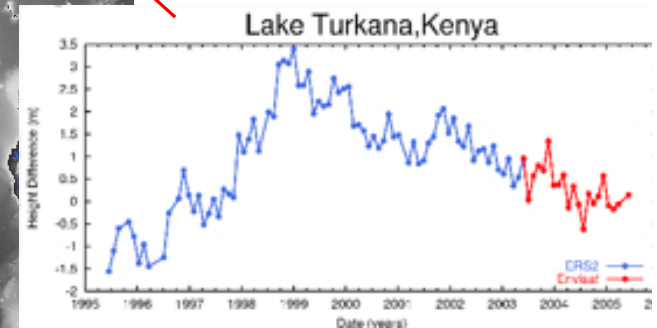
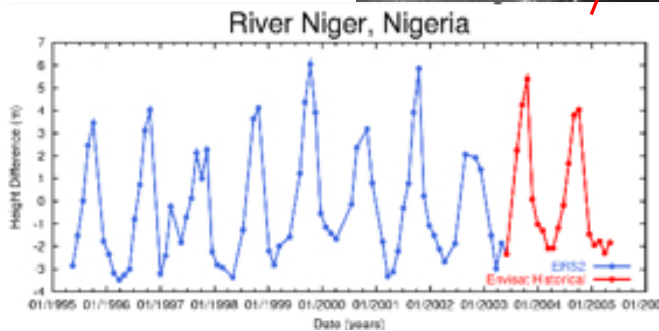


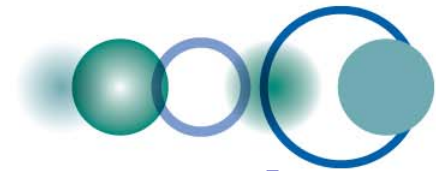
# ...together with space observations



Red indicates area where NRT products are currently generated

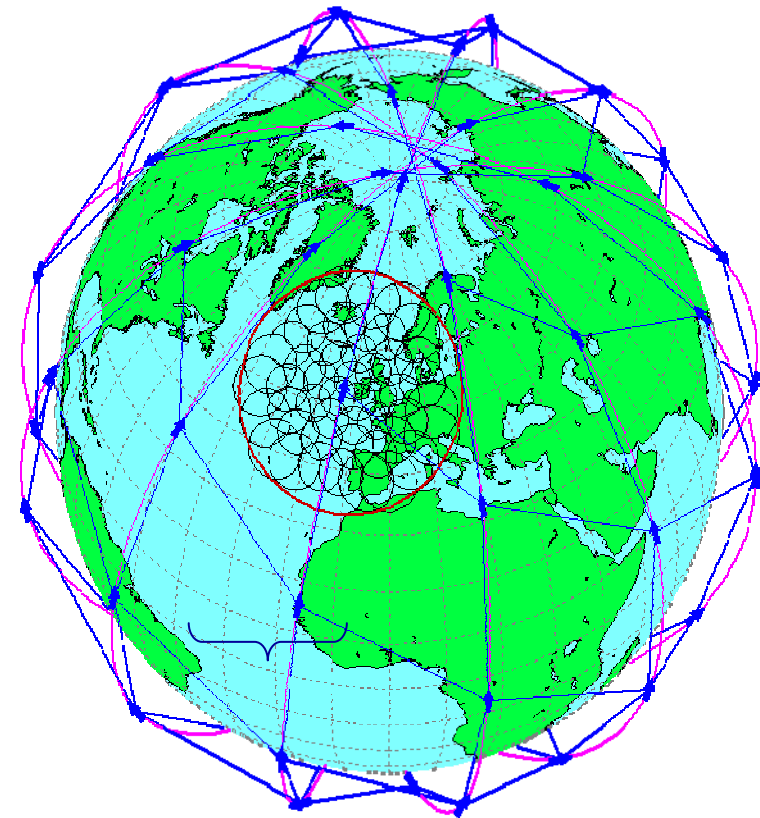
Blue indicates area where products may be generated in the future.

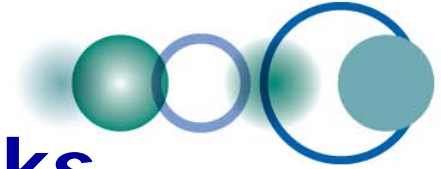




# IRIDIUM Secondary Payload Opportunity

- **Constellation Comprises 66 Satellites**
  - **Near-polar Low Earth Orbit (LEO)**
  - **780 Km (485 Mi) Altitude**
- **6 Planes Of 11 Vehicles**
  - **Nearly Circular Polar Orbits (86.4° Inclination)**
  - **Provide Global Coverage**
- **Feasibility study of four possible missions**
  - **Altimetry**
  - **GPS Radio Occultation**
  - **Earth Radiation Budget**
  - **Ocean/Land Imager**

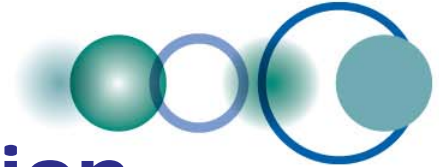




# GEOSS Architecture Tasks

- **GEOSS Common Infrastructure (GCI)**
  - Enabling Deployment of a GEOSS Architecture
  - GEOSS Architecture Implementation Pilot
  - GEOSS Best Practices Registry
  - Ontology and Taxonomy Development
- **Interoperable Systems for GEOSS**
  - Virtual Constellations
  - WIS
  - Sensor Web Enablement for In-Situ Observing Network Facilitation
  - Model Web Development
- **Advocating for Sustained Observing Systems**
  - Global Terrestrial Observations
  - Legacy of the International Polar Year 2007-08
  - Global Ocean Observation System
  - Global Observing System (GOS)
- **Dissemination and Distribution Networks**
  - GEONETCast
  - GEONET
- **Radio Frequency Protection**



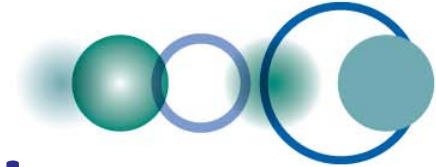


# Radio Frequency Protection

**Led by WMO (CBS/SG-RFC)**

***Point of Contact: Philippe Tristant, chairman of WMO SG-RFC***

- Radio-frequencies necessary for all GEOSS components, in particular in-situ, ground- and space-based observations
- Increasing economical and political pressure on corresponding parts of the spectrum, undertake appropriate coordinated advocacy activities in association with Member countries, including representations to the International Telecommunication Union (ITU) and other bodies in charge of frequency management.



# Radio Frequency Protection led by WMO

| Type        | Representing | Organisation                      | Name                 | EmailAddress                     |
|-------------|--------------|-----------------------------------|----------------------|----------------------------------|
| Lead(PoC)   | WMO          | CBS/SG-RFC                        | Philippe Tristant    | philippe.tristant@meteo.fr       |
| Contributor | Australia    | Bureau of Meteorolgy              | Roger Atkinson       | R.Atkinson@bom.gov.au            |
| Contributor | CEOS         | ESA                               | Edoardo Marelli      | edoardo.marelli@esa.int          |
| Contributor | EC           | DG INFSOC                         | Ari Sorsaniemi       | ari.sorsaniemi@ec.europa.eu      |
| Contributor | EC           | DG Research                       | Alan Edwards         | alan.edwards@ec.europa.eu        |
| Contributor | EC           | DG Research                       | Gilles Ollier        | Gilles.Ollier@ec.europa.eu       |
| Contributor | EC           | DG Research                       | Pascal Le Grand      | pascal.le-grand@ec.europa.eu     |
| Contributor | EC           | DG Research                       | Vojko Bratina        | Vojko.Bratina@ec.europa.eu       |
| Contributor | ECMWF        |                                   | Manfred Kloeppel     | Manfred.Kloeppel@ecmwf.int       |
| Contributor | ESA          | ESA                               | Edoardo Marelli      | edoardo.marelli@esa.int          |
| Contributor | EUMETNET     |                                   | Philippe Tristant    | philippe.tristant@meteo.fr       |
| Contributor | EUMETSAT     |                                   | Markus Dreis         | markus.dreis@eumetsat.int        |
| Contributor | France       | Météo-France, Direction Technique | Philippe Tristant    | philippe.tristant@meteo.fr       |
| Contributor | Germany      | DLR                               | Helmut Staudenrausch | Helmut.Staudenrausch@dlr.de      |
| Contributor | IEEE         | Frequency Allocation Committee    | David Kunkee         | David.Kunkee@noaa.gov            |
| Contributor | IEEE         | Ohio State University             | Joel Johnson         | johnson@ece.osu.edu              |
| Contributor | Japan        | JAXA                              | Osamu Ochiai         | ochiai.osamu@jaxa.jp             |
| Contributor | Netherlands  | KNMI                              | Wim Monna            | wim.monna@knmi.nl                |
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The Global Earth Observation System of Systems (GEOSS)

GEOSS themes:

- Disasters
- Health
- Energy
- Climate
- Water
- Weather
- Ecosystems
- Agriculture
- Biodiversity

GEOSS Common Infrastructure

GEO Portal  
Components Registry

Home



Are you new to GEO and GEOSS? Find out more [here!](#)

Highlights

The GEOSS Common Infrastructure (GCI)

Evaluating the GEO Portal prototypes

Evaluate the GEO Portals

The assessment phase for the GEO Portals runs until May 2009. The Portals are updated regularly so please make repeat visits and provide your feedback.

Components registration

Register your components

The GEO community is invited to register its data bases, catalogues, services and tools in the GEOSS Components and Services Registry

Standards registration

Register your standards here

The GEO community is encouraged to register standards, protocols and other specifications for ensuring an interoperable "system of systems" in the GEOSS Registry

Brazil to host GEO Forest Monitoring Symposium

The Brazilian National Institute for Space Research (INPE) and the Group on Earth Observations (GEO) are organizing a major symposium on forest monitoring in Foz do Iguacu, Brazil from 4 to 7 November. The goal of the Symposium is to advance international collaboration on monitoring the

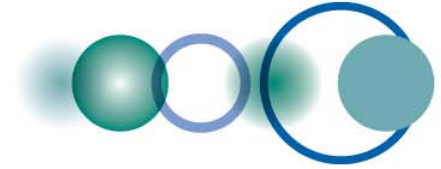
What's new?

GEO joins forces with Biodiversity Convention

The member governments of the Convention on Biological Diversity adopted a decision last May formally recognizing the role that GEOSS can play in achieving the Convention's goals. In an effort to enhance their collaboration on meeting governments' expectations, the heads of the GEO and CBD Secretariats signed a Memorandum of Understanding on 8 September. The MOU is posted [here](#).

Estonia becomes the 75TH member of GEO

The Government of Estonia has joined the Group on Earth Observations, bringing the total GEO membership to 74 countries plus the EC. Estonia's Minister of the Environment informed the Secretariat of his government's



# Summary

- GEOSS is a global coordinated network
  - Sustained and Comprehensive
  - Earth Observation System of Systems
- Goal of GEOSS to provide better information for decision making
  - Achieve Societal and Economic Benefits
- Scientific engagement is critical to the success of GEOSS
- Cross-cutting approach
  - Involving many Communities with International Dimension
- Tremendous Global mobilization and Interest
  - All Disciplines and Communities
- Process is always open to New Participants

**Thank you!**



# Thank you!

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