

# **GEO, building a Global Earth Observation System of Systems: overview and opportunities for Latin America**

**LARS 2013**

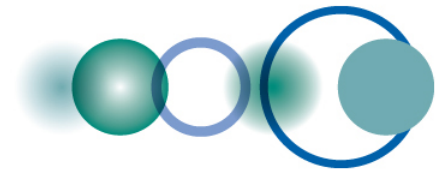
**23 October, 2013**

**Santiago del Chile**

**Francesco Gaetani, PhD**

**GEO Secretariat**





**Created in 2005, to develop a coordinated and sustained  
Global Earth Observation System of Systems (GEOSS) to  
enhance decision making in nine Societal Benefit Areas  
(SBAs)**

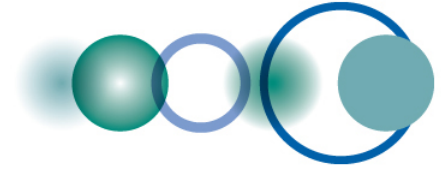
**GEO today:**

**91 Members**

**67 Participating**

**Organizations**





# GEO



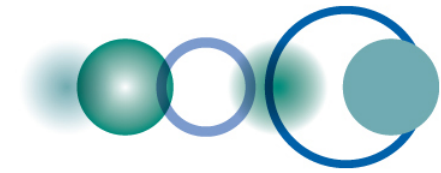
**91 Members**

**67 Participating Organizations**

# GEOSS



**14 M resources**

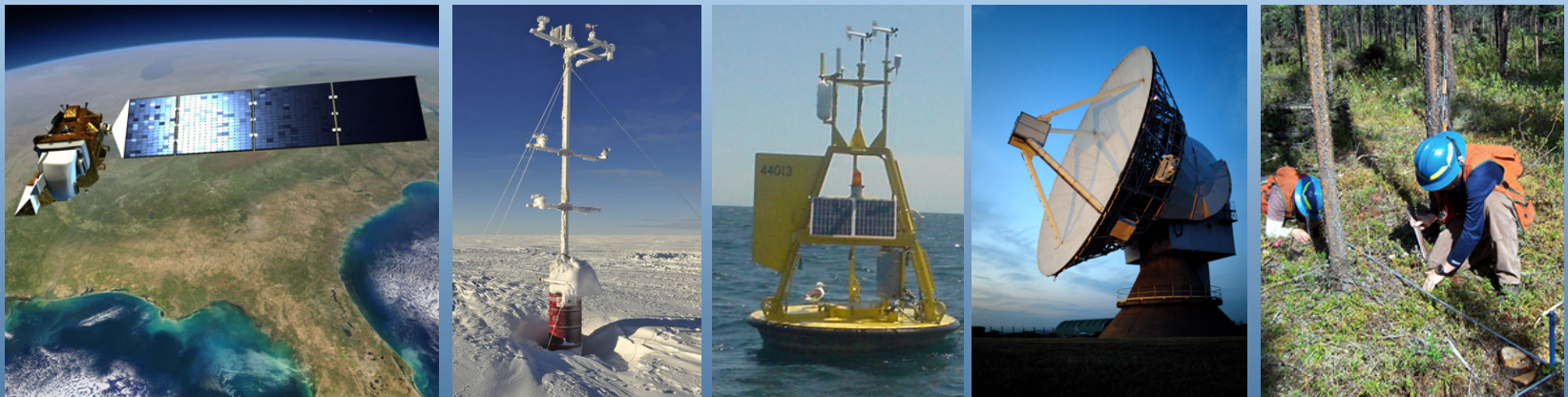


# 67 Participating Organizations



# A broad Commercial Sector spans the entire information value chain

Data providers



Value-Added providers



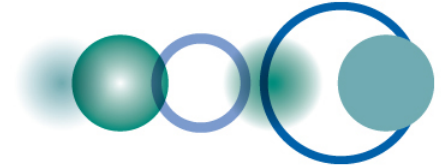
Downstream users





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





## GEO Objectives

- **Improve and Coordinate (existing) Observing Systems**
- **Provide Easier & More Open Data Access**
- **Foster Use (ST Applications)**
- **Build Capacity for the use of EO data**

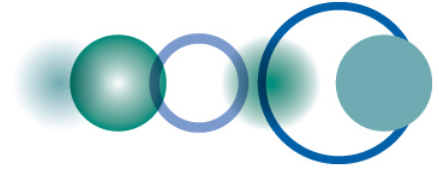
**GEOSS** will be built from the expansion and interlinking of existing observation and information systems and the investments of Members and Participating Organizations in new systems.



## **GEOSS Targeted Gaps**

- 1. Uncertainty over continuity of observations**
- 2. Large spatial and temporal gaps in specific data sets**
- 3. Eroding or little technical infrastructure in many parts of the world**
- 4. Lack of relevant processing systems to transform data into useful information**
- 5. Limited access to data and associated benefits in developing world**
- 6. Inadequate data integration and interoperability**
- 7. Inadequate user involvement**



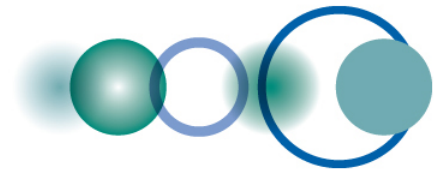


## **GEOSS Implementation requires: *Data Sharing Principles***

- **Full and Open Exchange of Data, recognizing Relevant International Instruments and National Policies**
- **Data and Products at Minimum Time delay and Minimum Cost**
- **Free of Charge or minimal Cost for Research and Education**

**Data to be seen as an infrastructure, rather than a service**

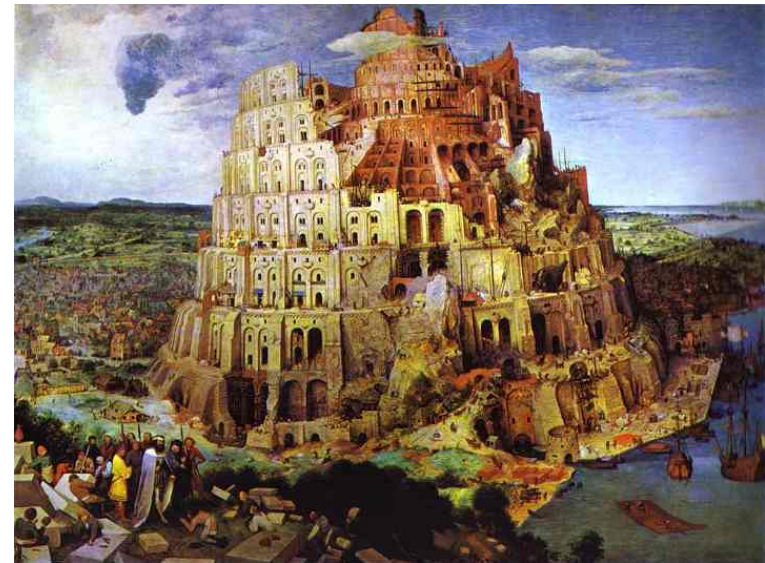




# Systems Interoperability

How different systems can work together

- Interoperability standards for Collecting, Processing, Storing, and Disseminating Data and Products
- Based on Non-proprietary Standards



**GEOSS** has not a monolithic approach.  
The GEOSS architecture will specify just those "few things that must be the same so that everything else can be different".



## Infrastructure

Space-based + *in situ* instrumentation  
Architecture + Data management + Data portals  
Software + tools

## Institutions

Networking  
Governance  
Data sharing



## Human capital

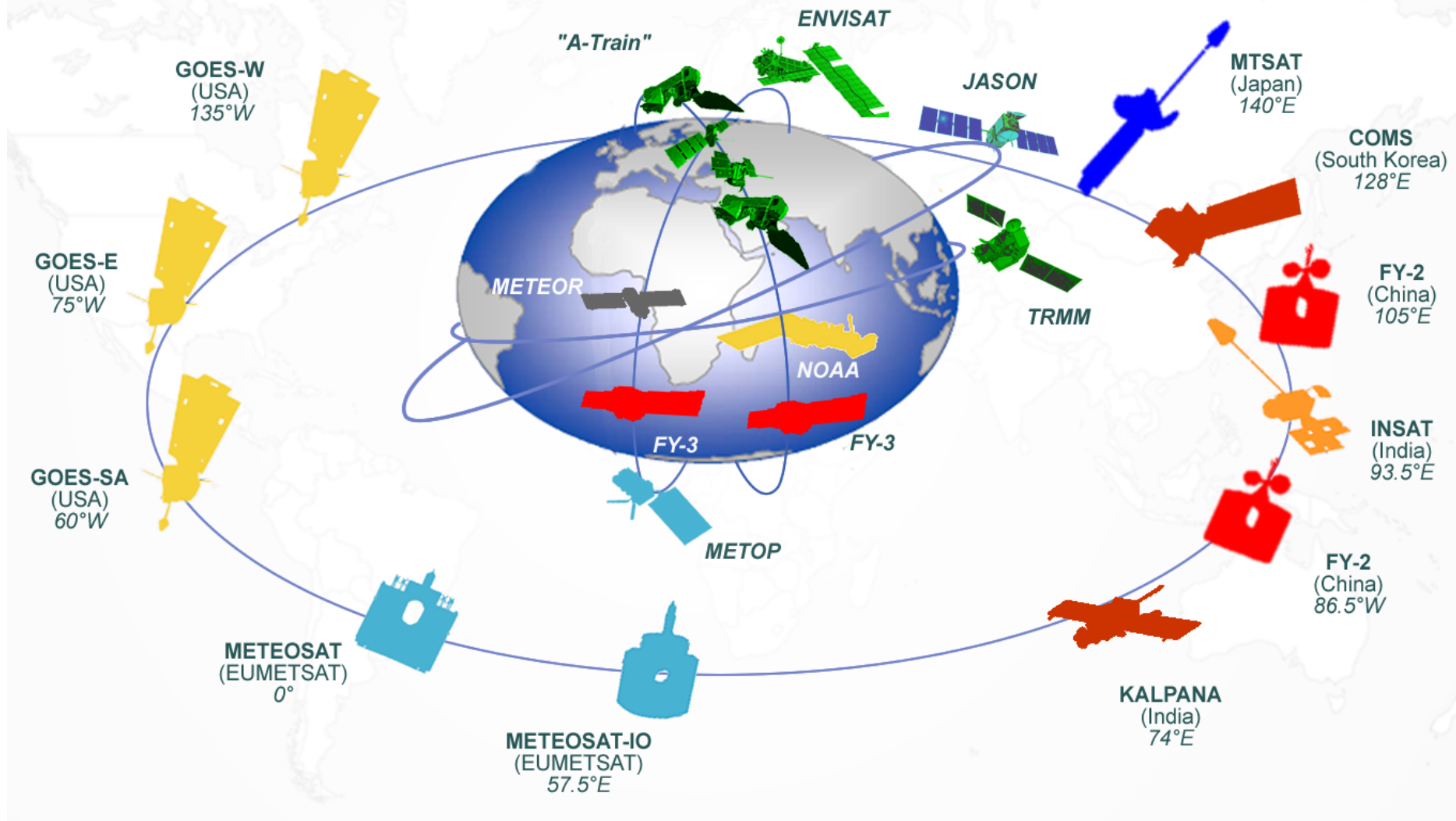
Experience + expertise  
Informal + formal  
Capacity building

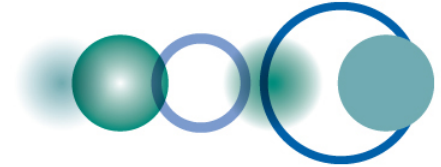
## Deliverables

Information for supporting decision-making



# Space-based Assets



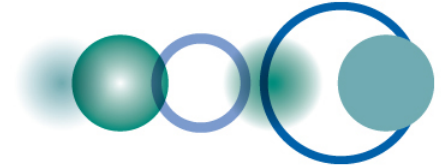


## What Do We Have on the Space Side?

- The Committee on Earth Observation Satellites (CEOS) – the space coordination arm of GEO
- The Coordination Group for Meteorological Satellites (CGMS)
- The UN Office of Outer Space Affairs (UNOOSA)
- The UN Office of Satellite Training (UNOSAT)

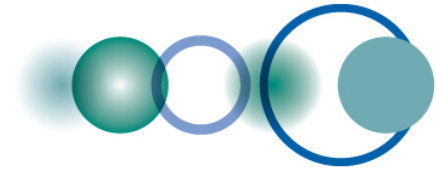
# In-situ Systems



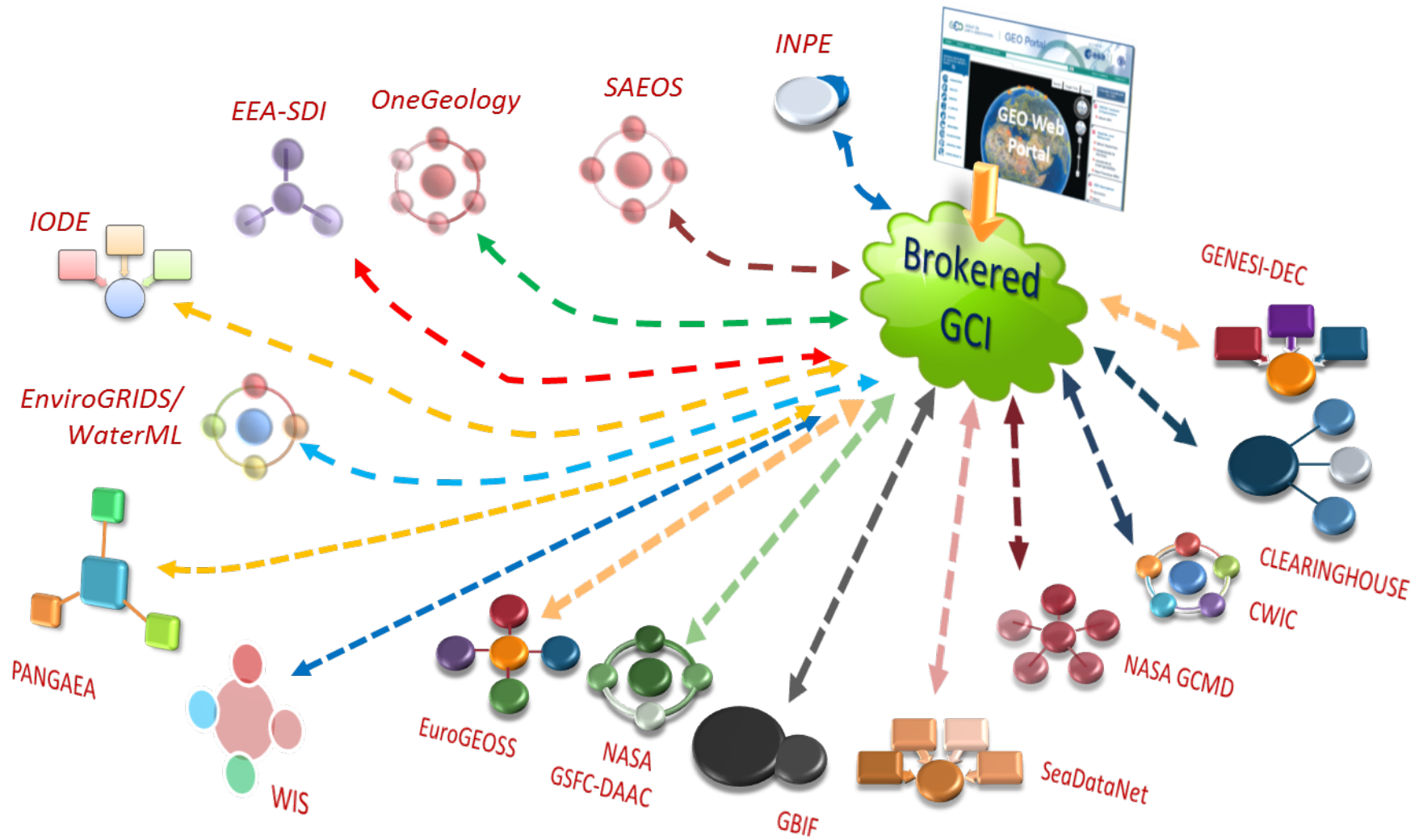


## In-Situ Coordination Challenges

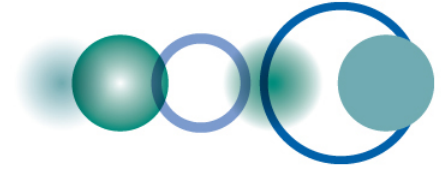
- Coordination, if it exists, is domain-based -- (the silo issue)
- Data policies and practices generally more restrictive – prerogative of not only national governments, but local governments



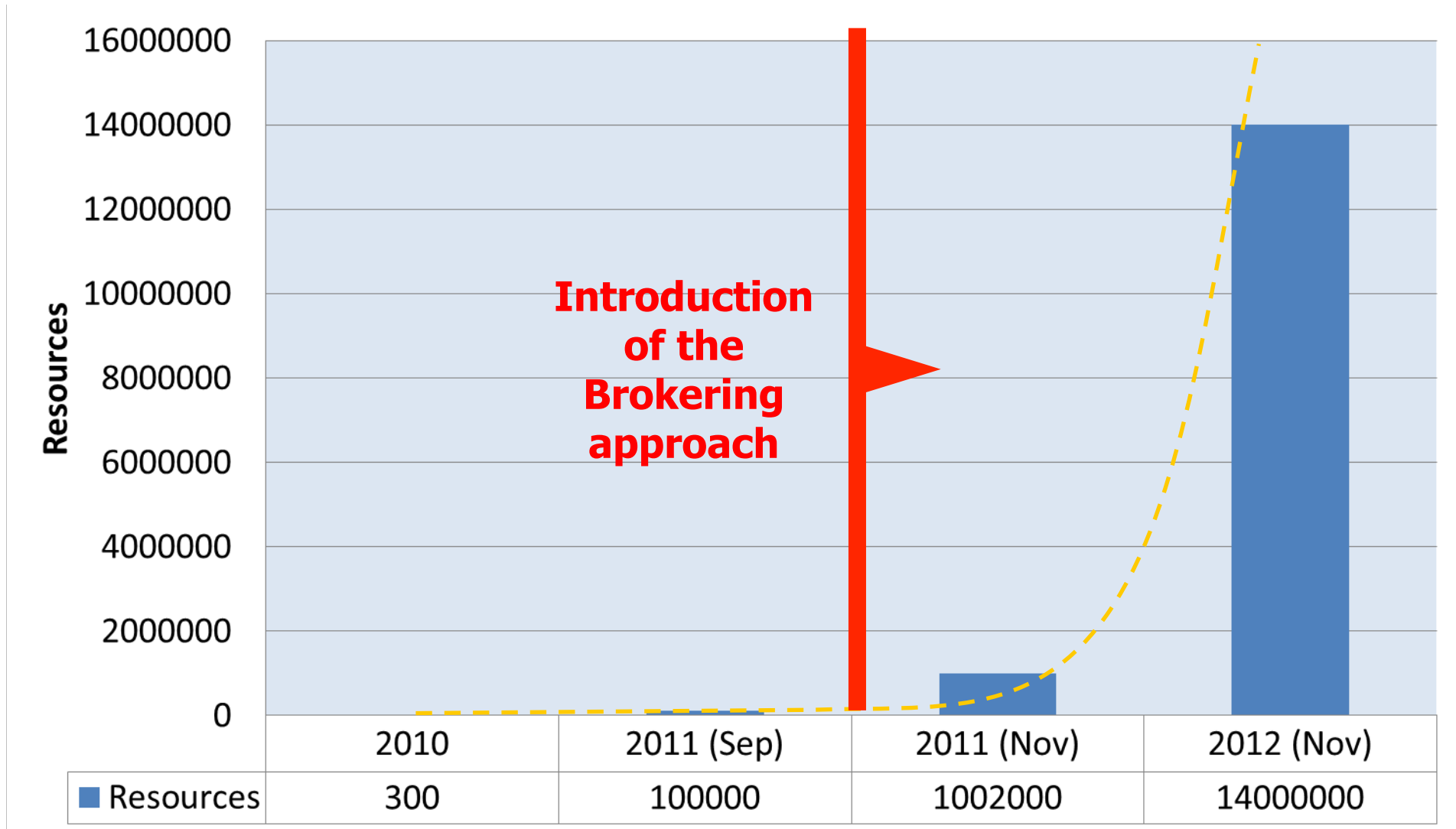
# Interoperability Brokering Strategy







# Resource Growth



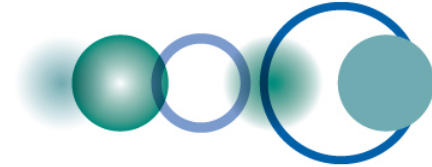


## GEO Work Plan – What is it?

Agreed framework for implementing the GEOSS 10-Year Implementation Plan (2005-2015)

Set of practical Tasks carried out by various GEO Members and Participating Organizations

Living Document – Annually updated



## GEO Work Plan (2012-2015)

**3 Parts (IN, ID, SB)**  
**9 SBA**  
**26 Tasks**

### Global Initiatives

*Blue Planet*

*Global Land Cover*

*GFOI*

*Global Urban Obs. Mon.*

*GSNL*

*GMOS*

*Global Carbon Obs.*

*Water Cycle Integrator*

*GEO-MON*

*GEOGLAM*

*GEO-BON*

*Cold Regions*

#### INFRASTRUCTURE

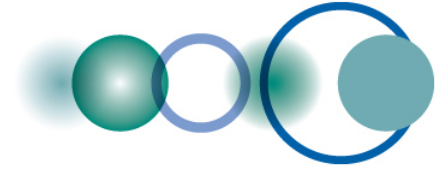
*IN-01 Earth Observing Systems.....*  
*IN-02 Earth Data Sets.....*  
*IN-03 GEOSS Common Infrastructure (GCI).....*  
*IN-04 GEOSS Communication Networks.....*  
*IN-05 GEOSS Design and Interoperability.....*

#### 1 INSTITUTIONS AND DEVELOPMENT

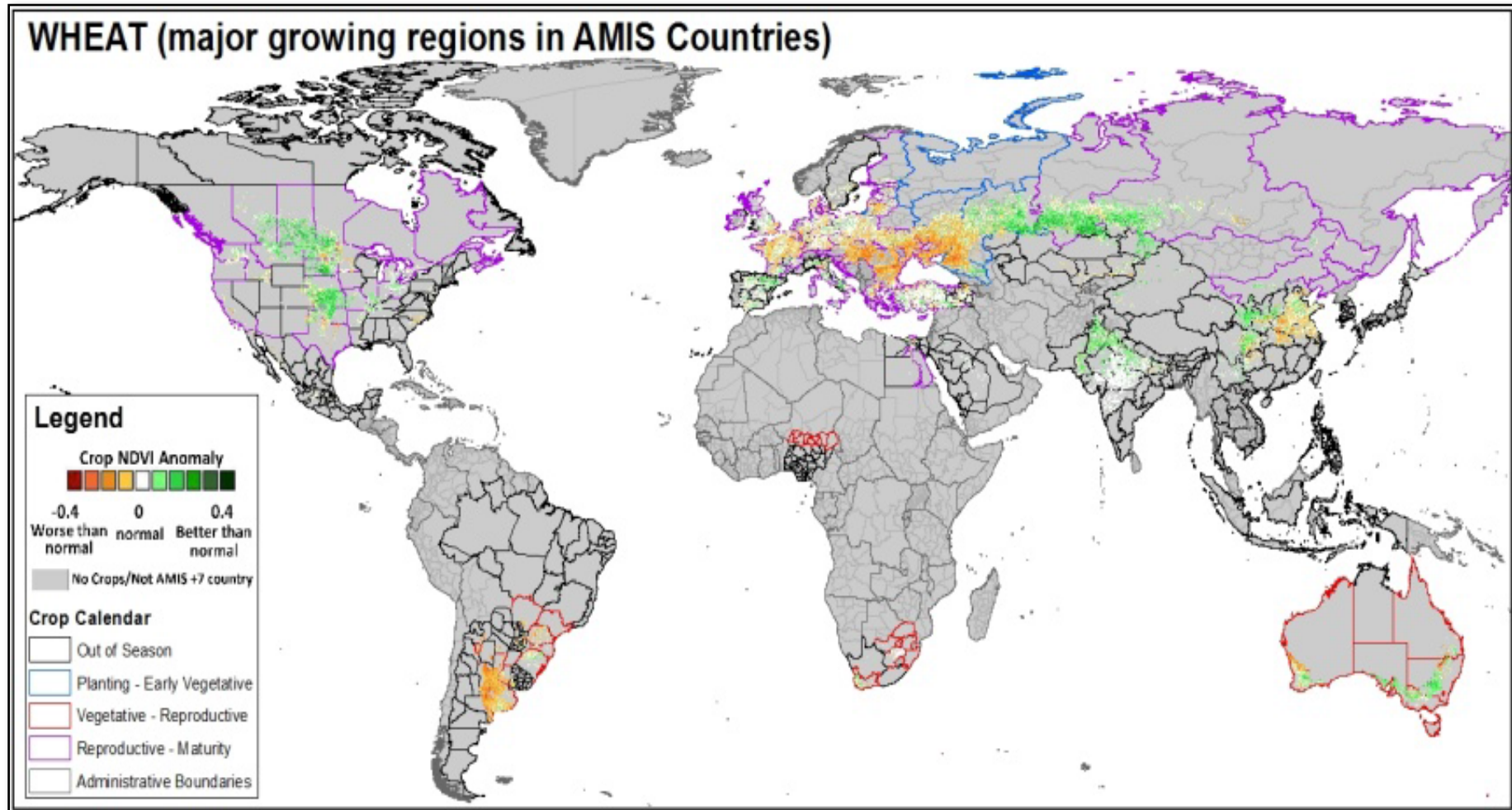
*ID-01 Advancing GEOSS Data Sharing Principles .....*  
*ID-02 Developing Institutional and Individual Capacity .....*  
*ID-03 Science and Technology in GEOSS .....*  
*ID-04 Building a User-Driven GEOSS .....*  
*ID-05 Catalyzing Resources for GEOSS Implementation .....*

#### INFORMATION FOR SOCIETAL BENEFITS

*SB-01 Oceans and Society: Blue Planet .....*  
*SB-02 Global Land Cover.....*  
*SB-03 Global Forest Observation.....*  
*SB-04 Global Urban Observation and Information.....*  
*SB-05 Impact Assessment of Human Activities.....*  
DISASTERS  
*DI-01 Informing Risk Management and Disaster Reduction.....*  
HEALTH  
*HE-01 Tools and Information for Health Decision-Making.....*  
*HE-02 Tracking Pollutants.....*  
ENERGY  
*EN-01 Energy and Geo-Resources Management.....*  
CLIMATE  
*CL-01 Climate Information for Adaptation.....*  
*CL-02 Global Carbon Observation and Analysis.....*  
WATER  
*WA-01 Integrated Water Information.....*  
WEATHER  
*WE-01 High-Impact Weather Prediction and Information.....*  
ECOSYSTEMS  
*EC-01 Global Ecosystem Monitoring .....*  
AGRICULTURE  
*AG-01 Global Agricultural Monitoring and Early Warning.....*  
BIODIVERSITY  
*BL-01 Global Biodiversity Observation (GEO BON)*



# Global Agricultural Monitoring Initiative (GEOGLAM) Crop Monitor Assessment

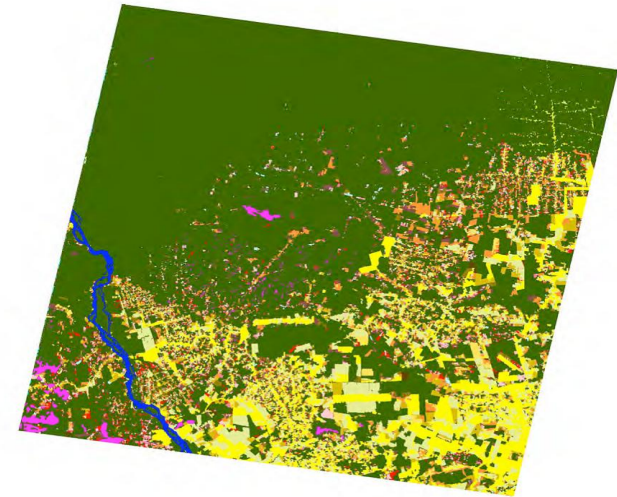




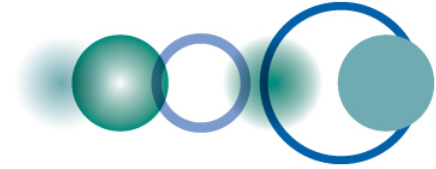
## **GEO Global Forest Observation Initiative (GFOI)**

Ensure sustained availability of satellite and ground observations in support of national forest information systems.

Develop a long-term data acquisition strategy and a 5-year plan for space data coverage and continuity in support of global forest observation requirements.



**Forest cover and change (1997-2009)  
Amazon, Brazil (INPE/PRODES)**

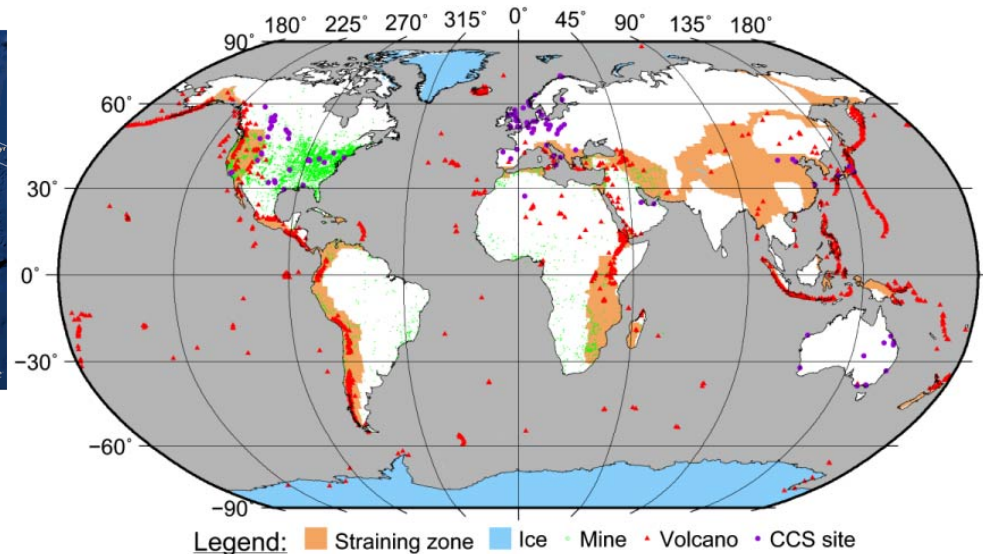
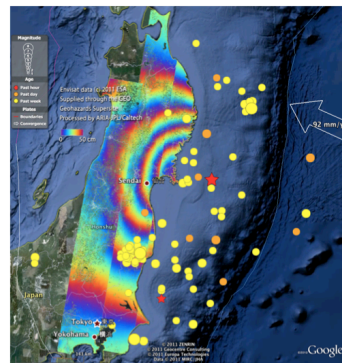
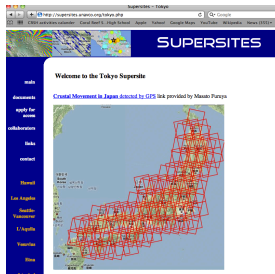


## Geohazard Supersites and National Laboratories (GSNL)

Pooling Satellite imagery and terrestrial in-situ data for earthquake and volcano studies.

There are 3 different level of sites:

- **Supersite** → all data
- **Event Supersite** → all data in case of large scale event
- **Natural Laboratories** → Global Network of Natural Laboratories. Providing online access to historic multi-sensor SAR data sets (digital heritage of Earth Observation for geohazards).

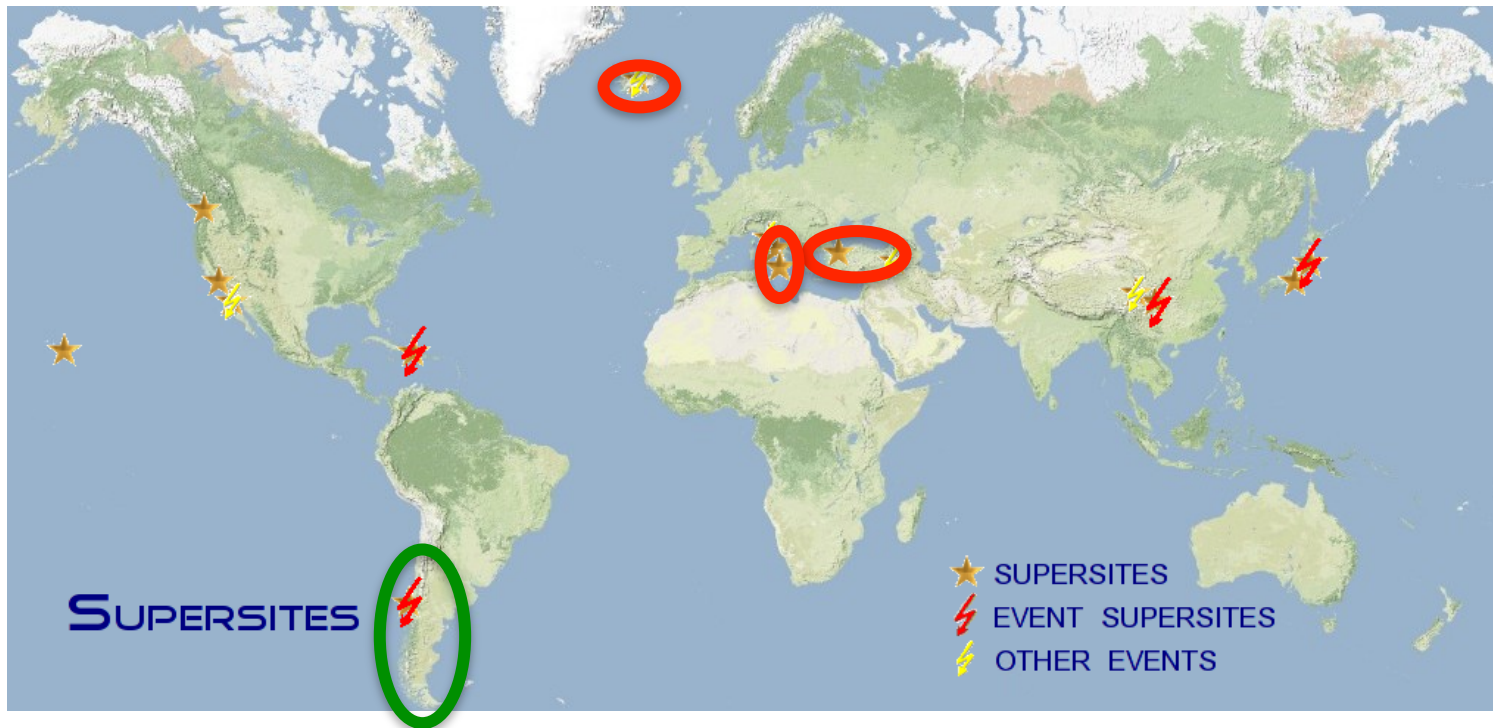


- Seismic, GPS
- SAR
- (gas, gravity change)

volcanoes: time delay for ground-based data as desired by observatory

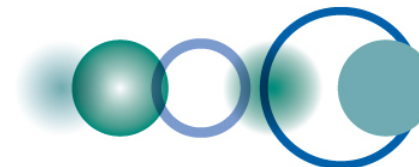


# GSNL Global network of Natural Laboratories

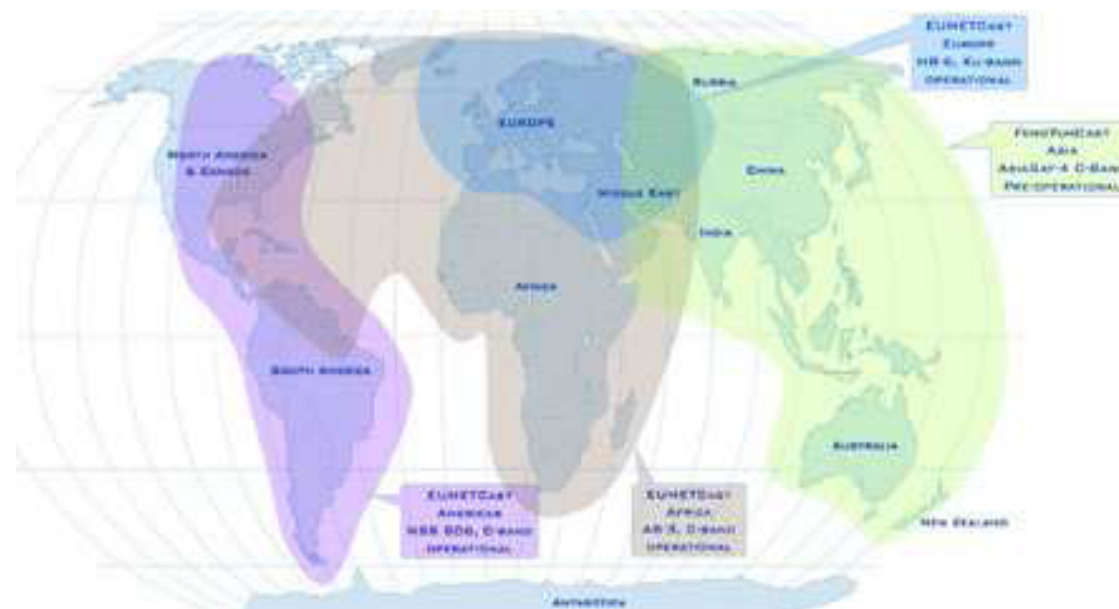


- **Europe, Africa:** Turkey, Iceland, Italian volcanoes, East Africa,...
- **Americas:** Central-southern Andes, Northern Andes, Caribbean, ...
- **Asia:** Japan, Southeast Asia, Himalaya, ...

initial configuration



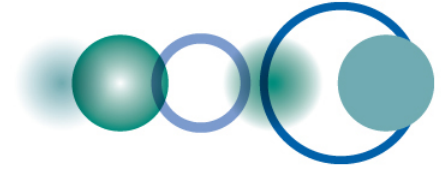
# GEONetCast



EUMETSAT, US, China, WMO

- Meteosat image data
- GOES East and West image data
- Land and Ocean Sea Ice Satellite Application Facility (SAF) products
- EUMETSAT meteorological products
- NOAA-NESDIS meteorological products
- NOAA-NESDIS Ocean colour and sea surface temperature products
- VEGETATION products from VITO
- MODIS Ocean colour products
- CMA FY2C satellite images
- CMA FY2C meteorological products





## 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)*



# Summary

Focus on:

- Targeted gaps in observing systems
  - Advocacy for national investments in both space and *in situ* networks
  - Global monitoring initiatives
  - International advocacy for broad open data sharing
- 
- While every organization needs to respond to its members with associated infrastructures, GEO links these infrastructures with interoperability arrangements creating a true system of systems.



## **2014 Ministerial Summit and “GEO week”**

### **13 to 17 January 2014**

- Centre International des Conférences in Geneva (CICG)
- GEO Implementation Board meetings
- GEO Executive Committee meeting
- GEO-X Plenary meeting
- High-level Side Events
- Exhibition, open to the public
- Ministerial Summit on 17 January

**Thank You!**

**Francesco GAETANI**

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**tel +41 22 7308281**

