



Group on
Earth Observations

The GEO - CEOS Workshop on Calibration and Validation Processes

Geneva, 2-4 October 2007



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**Any Single Problem Requires Many
Data Sets**

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



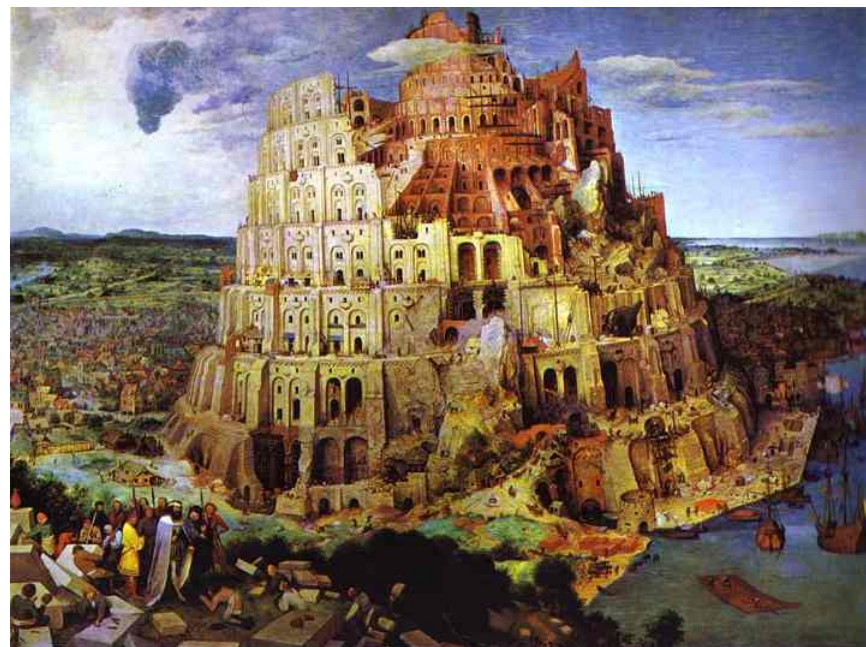
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GEO and GEOSS The Tower of Babel Problem!

**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, Archives and Networks**
- **Designed to Increase Quality and Accessibility of Information**
- **Providing Tools**





- **Earth Observation Summit I**

- July 31, 2003, Washington, D.C.
- 34 Countries and 20 International Organizations



EOS I

- **Earth Observation Summit II**

- April 25, 2004, Tokyo, Japan
- 47 Countries and 26 International Organizations



EOS II

- **Earth Observation summit III**

- February 2005, Brussels
- Nearly 60 Countries, EC and over 40 International Organizations



EOS III



- **Society needs informed decision-making**
- **Earth is a complex System of Systems**

GEO will help to:

- Improve and **Coordinate** Observation Systems
- Encourage Easier & More Open **Data Access**
- Foster **Use** of Earth observations (data & products)



GEO is GLOBAL - (Rotating) Members of the GEO Executive Committee:

- China, Japan, Thailand
- European Commission, Germany, Italy
- South Africa, Morocco
- Russia
- USA, Brazil, Honduras



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GEOSS Architecture

**will Provide Systems Interoperability and Easier
and More Open Data Access**

Seven shortcomings as target areas for GEOSS:

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



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Status GEO and GEOSS

- 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 77 Member Countries, the European Commission and 46 Participating Organizations
- One Objective: Establish a global, coordinated, comprehensive and sustained system of Earth observing systems, **GEOSS**



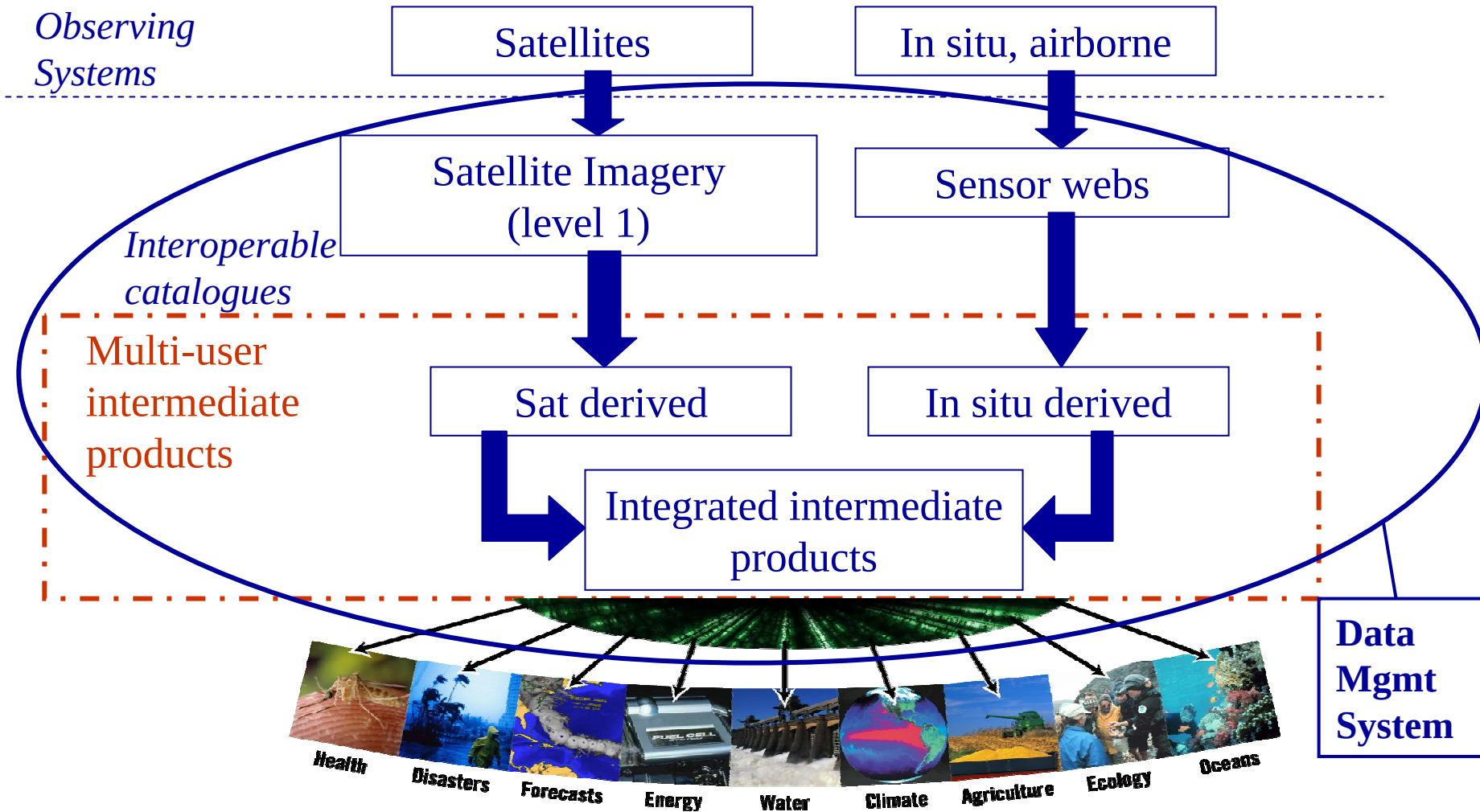


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GEOSS: A Global, Coordinated, Comprehensive and Sustained System of Observing Systems



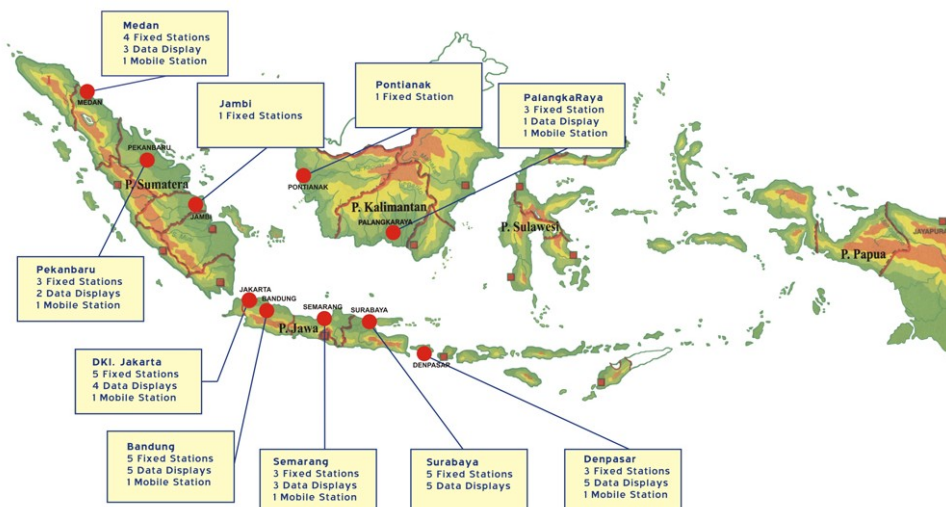
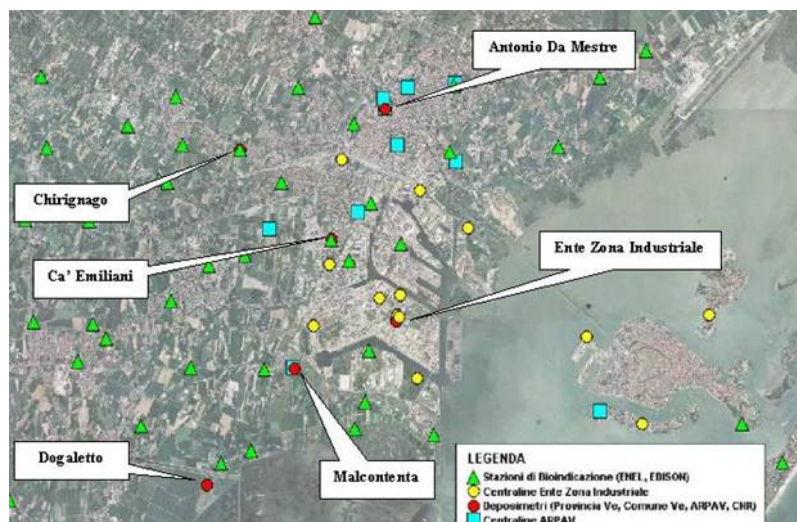
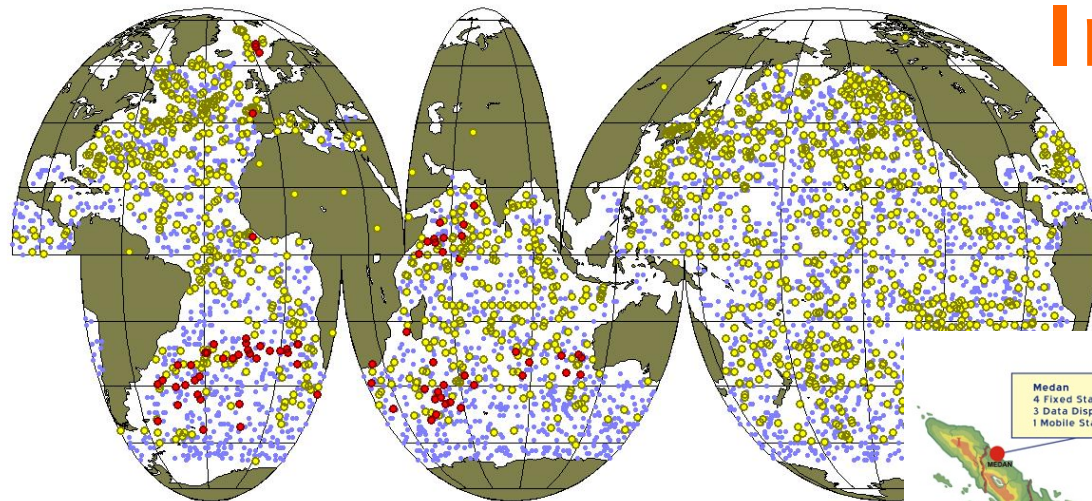
GEOSS conceptual architecture





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

In Situ Observation Systems



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

GEO Web Portal (and Clearinghouse)

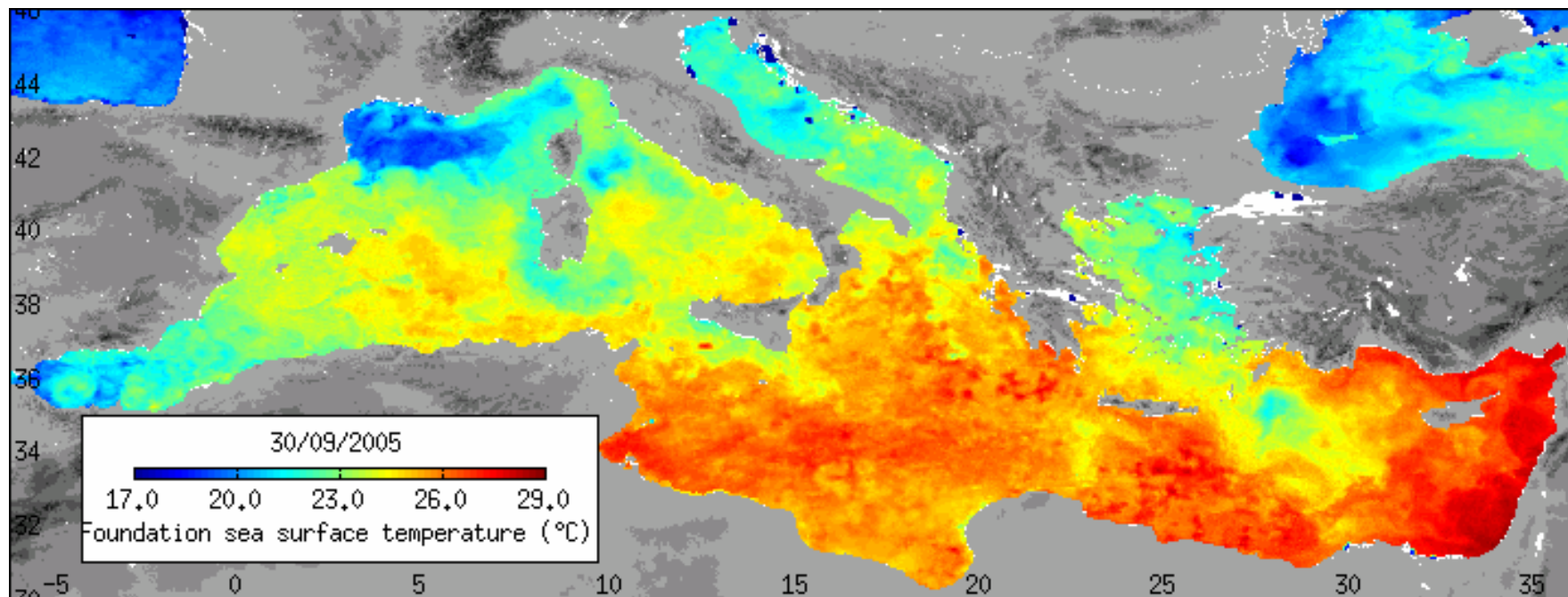
- **Offering Access to Data and Services**
- **Providing Calibration and Validation**
- **Providing Tools**



Next Step: Link to GHR SST?

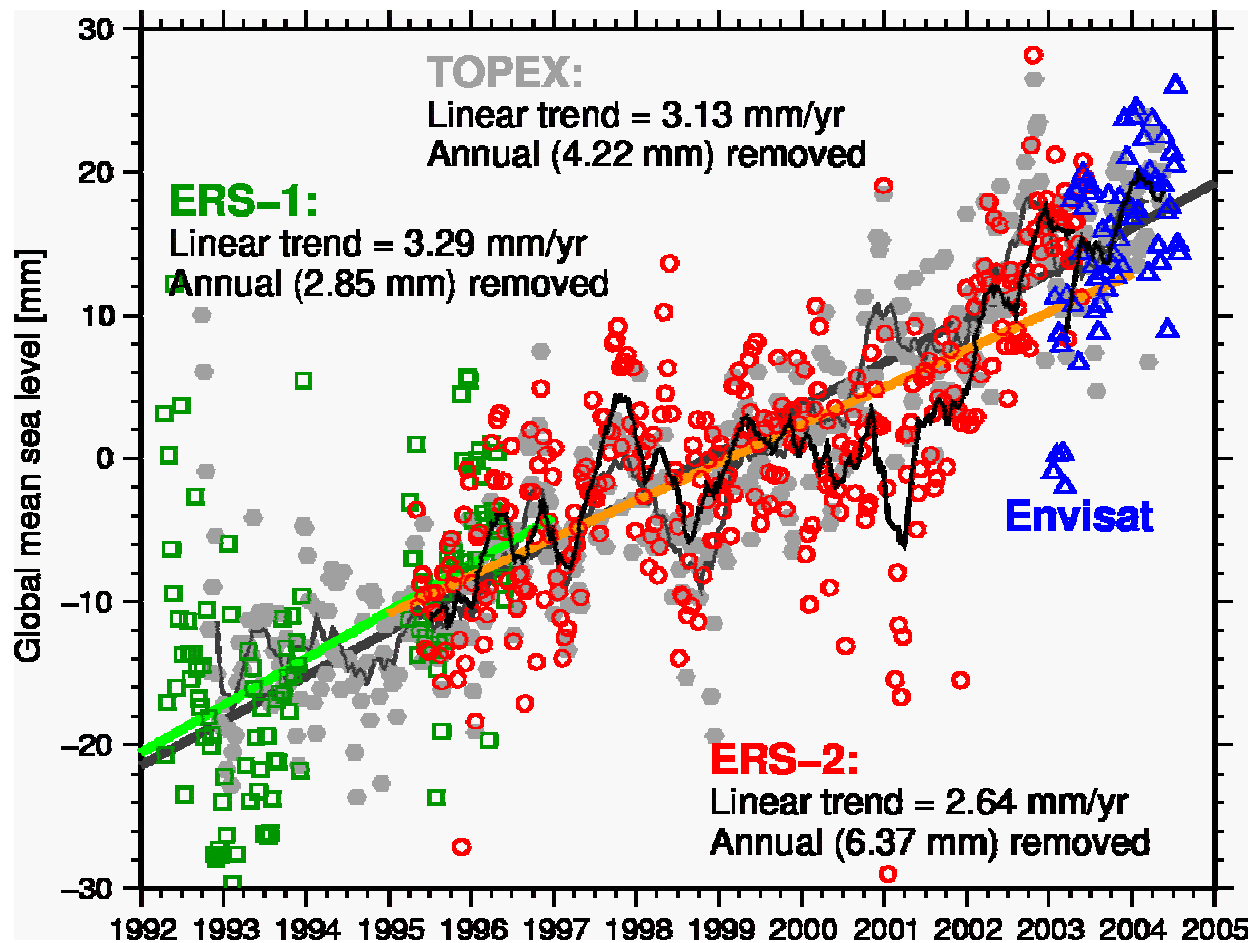
Sea Surface Temperature

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>



The Tower of Babel

**Need for Standard
Interoperable
Formats to Benefit
from all Earth
Observation Systems**



Main objective: To identify and scope key elements needed to develop and implement a "data quality strategy"

First main elements:

- **Methodology and guidelines for cal/val**
 - Best practises in Cal / Val Processes.
- **Cal/val site characterisation & certification**
- **Satellite and *in situ* cal/val data access**
- **Harmonisation of quality information**
 - Harmonisation and Standardisation of Quality Control and Calibration / Validation Processes.
- **Governance**
 - The role of CEOS in the Certification of those processes.
 - Implementation Strategy.

GEOSS Data Quality Framework

(accessible throughout GEOSS cal/val website)

Links to different Agencies

1. Instrument characteristics
(Radiometry,
Spectral resolution,
Geometry)

**2. Satellite data,
in-situ measurements,
and metadata**

**3. Reference
Methods and
protocols**
(Cal./Val.
Techniques)

*includes RTC procedures
and
all error propag. models and
methods to establish QA
characteristics. Use:*

- operational processor (by all)*
- use common data format*

**Cal/Val and
data quality
assessment
framework
system
elements
for GEOSS**

Calibration Metrics
(sensor data)

Diagnostic sites
(land/sea *in-situ* data)

**Ancillary information
networks**
e.g. AERONET

Database
e.g. Sade

Database
e.g. Nilu

*for data
combination
and merging*

4. Data Compliance with Interoperability Requirements

**Global standards,
Global products,
Global information base for management
decisions**

Users (Legislation and Operational Agencies)



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A Portal to DATA and SERVICES



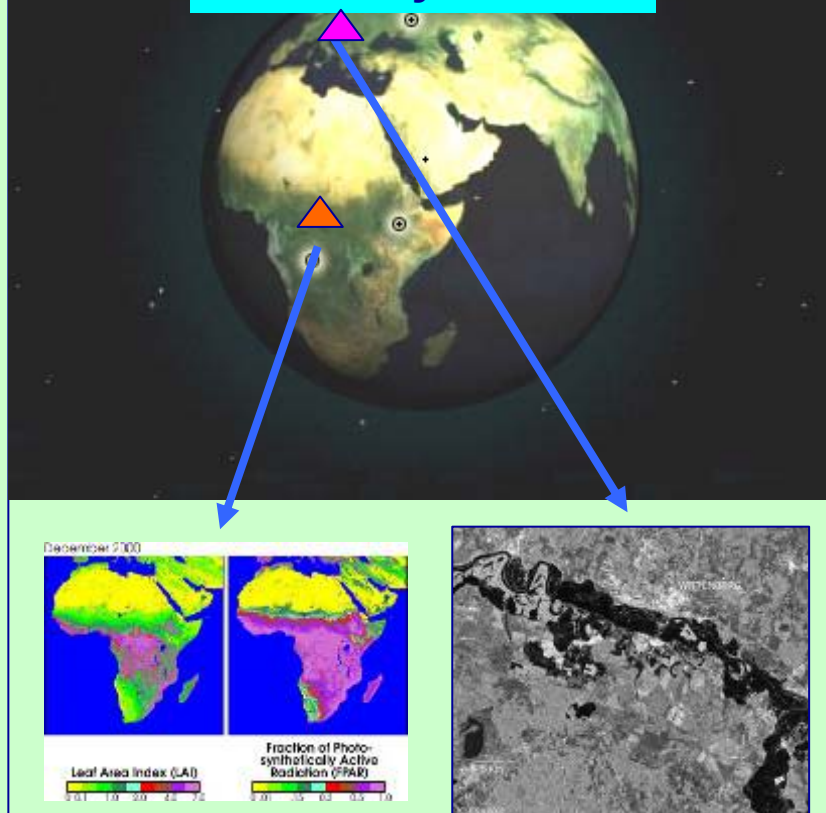
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Disaster
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Water
Weather
Ecosystem
Agriculture
Biodiversity

Direct Access
To
Data & Services

Search by location



[About
GEO](#)

Capacity
Building

GEONETCast

User Types & User Scenarios

GEO Web Site



Capacity Building Information Site

Data & Services through Clearinghouse

GEONETCast Information Site



GEO Web Portal

Search the services

Clearinghouse

Registries

Catalogue

Data Access

**Value Added
Services**

AR-07-01

Initial Sets of Registries



ESA



NASA



JRC



Canada



Japan



...

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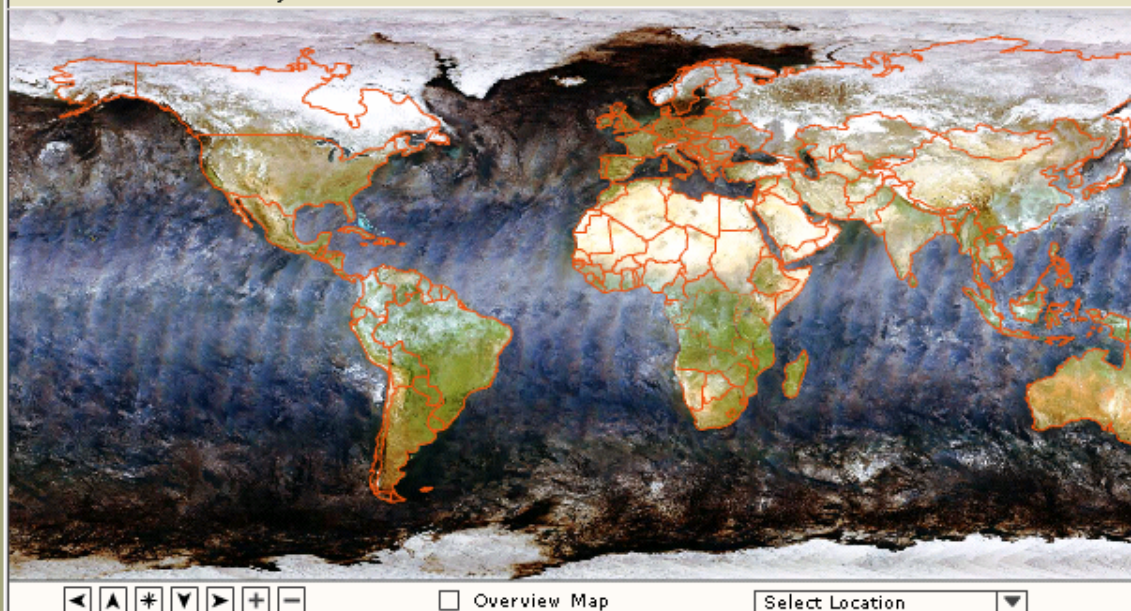
Browse Resources by Societal Benefit Areas

DISASTERS[HEALTH](#)[ENERGY](#)[CLIMATE](#)[WATER](#)[WEATHER](#)[ECOSYSTEMS](#)[AGRICULTURE](#)[BIODIVERSITY](#)

Resources Provided by

 [GEO Clearinghouse](#)

Browse Resources by Location

☐ Overview Map

EVENTS

IGARSS, 23-27 July 2007, Barcelona, Spain

The 27th International Geoscience And Remote

SHOWCASE

The Elbe region in Saxony was affected by heavy flooding following strong rainfall in conjunction with snowmelt in the Krkonose

Breaking News

Intense rainfall and the rise of the Parana and Gualeguay rivers produced severe flooding in the Santa Fe and Entre Rios provinces, affecting mainly the cities of Santa Fe, Rosario and Gualeguay in Argentina. Three people were killed and the total number of evacuees was estimated at between 30,000 and 40,000.

[more...](#)

Welcome to GEOportal

The GEOportal provides an entry point to access remote sensing, geospatial static and in-situ data, information and services. The site is currently under construction with a planned release of the operational ESA contribution to the

Develop a GEO data quality assurance strategy, beginning with space-based observations and evaluating expansion to in-situ observations, taking account of existing work in this arena.

To generate high-level products, operational services and research laboratories using data from different Earth observation sensors (space and/or in situ) require measurements whose quality is well characterised and sufficient to produce meaningful products. Accuracy assessment and reporting of measurement uncertainty is essential to assure product consistency and interoperability (e.g. comparison and /or combination). This implies that the instrument calibration and product validation activities need to be continuously monitored and traceable to standards.

Building upon the work performed for space observations by several international groups, such as the CEOS WG on Calibration and Validation and IEEE, the following activities will be performed:

- Document Earth observation sensors and methods used to derive level 1, level 2 (geophysical) and higher level products**
- Define standards for quality assurance of derived products**
- Create and maintain an internet-accessible information data base containing all information from (1) and (2)**
- Provide/publish reference methods in a readily accessible form and including pre-flight characterisation, vicarious calibration, radiative transfer computation, post-launch activities, calibration sites...etc.**
- Then expand to in situ observations the approach developed for space observations**



- **EO Data Pillars in GEO: Data Availability and Data Quality underlying condition for GEOSS**
- **CEOS Working Group Cal Val has been very active towards harmonising practices and procedures for Cal Val (White Paper on Cal/Val for GEOSS). Workshop to develop best procedures and practices**
- **A prototype Cal/Val portal has been developed - mainly focussing on optical payloads, with a plan to expand on also microwave and in-situ in the future**
- **Continue establishing best practices and guidelines and that through GEO it is going to be easier to reach out to have the guidelines accepted eventually on a global level**
- **Extend the portal and make it a contribution to GEOSS, which is a tool for harmonisation of practices and which will eventually allow to check the quality of data**
- **GMES and the components of CEOS (i.e. the virtual constellations) will adopt, what this Group will come up with - so the responsibility is rather big**
- **First step in an encouraging process. Start with a request and format for detailed documentation on data quality**
- **Cal/Val guidelines eventually gatekeeper of the GEO Portal and Clearinghouse**



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The success of GEOSS will depend on data and information providers accepting and implementing a set of interoperability arrangements, including technical specifications for collecting, processing, storing, and disseminating shared data, metadata, and products.

www.earthobservations.org

