

# The EO community vision for Long Term Data Preservation: Needs & technological, infrastructure, operational and political plans

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DPE, Planets and CASPAR Third Annual Conference  
Nice, 29-30 October 2008

- **EO community perspective**
  - **Example of needs**
- **Operational and political plans**
- **Technologies and infrastructure aspects**

## Presentation goals

**Provide an overview of the needs of the Earth Science specific community for data long term archiving and preservation**

## GEOSS, KOPERNIKUS & ESA Living Planet



European independence in data sources for environment and security monitoring (ex GMES)



EUROPEAN COMMISSION  
European Research Area

The European contribution to the Global Earth Observation System of Systems

Earth Observation Envelope Programme

GEO and KOPERNIKUS

ERS & ENVISAT Missions



Climate Change

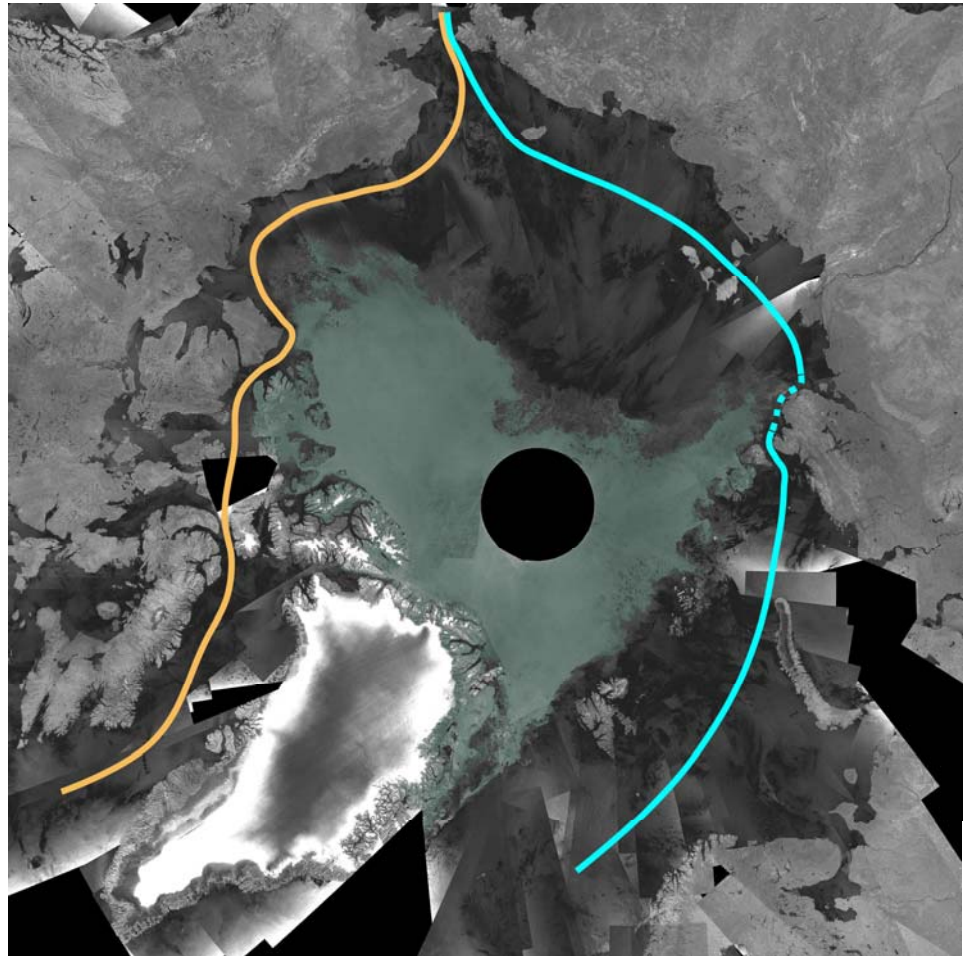
Earthnet / Third Party Missions

Charter on Space & Major Disasters

## Lowest Arctic ice coverage in “history”:

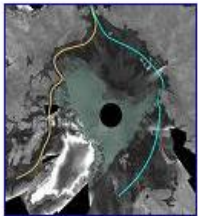
News published on ESA website on 14 September 2007

**Northwest Passage open (orange line) and Northeast passage only partially blocked (blue line). The dark grey colour represents the ice-free areas, while green represents areas with sea ice.**

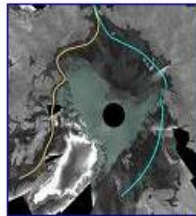


## Google search “Arctic ice coverage Envisat”

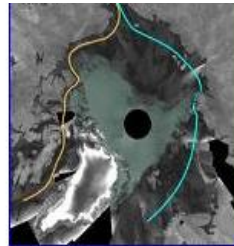
11 June 2008, most results are “copies” of ESA published data.



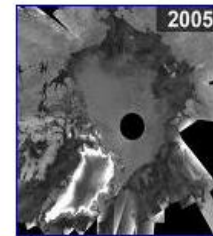
Satellites witness lowest Arctic ice ...  
400 x 400 - 87k - jpg  
[www.networlddirectory.com](http://www.networlddirectory.com)



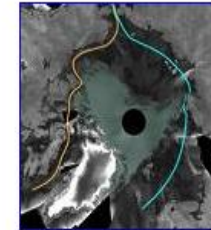
Envisat ASAR mosaic of the Arctic ...  
400 x 400 - 47k  
[keithsoneplanet.blogspot.com](http://keithsoneplanet.blogspot.com)



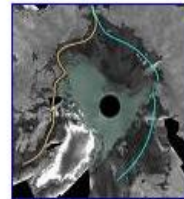
... retreat of Arctic sea ice, ...  
2700 x 2700 - 1732k  
[darwin.eeb.uconn.edu](http://darwin.eeb.uconn.edu)



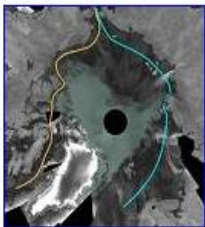
Envisat ASAR mosaic animations for ...  
600 x 600 - 928k - gif  
[inel.wordpress.com](http://inel.wordpress.com)



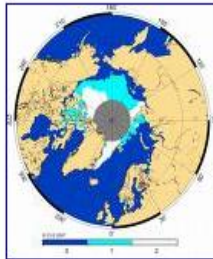
Envisat ASAR mosaic of the Arctic ...  
550 x 550 - 65k - jpg  
[inel.wordpress.com](http://inel.wordpress.com)



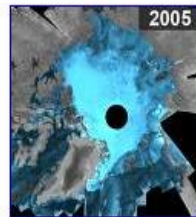
Envisat ASAR mosaic of the Arctic ...  
280 x 280 - 21k - jpg  
[www.physorg.com](http://www.physorg.com)



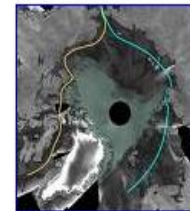
ENVISAT - summer 07 ice coverage  
2700 x 2700 - 149k - jpg  
[www.flickr.com](http://www.flickr.com)



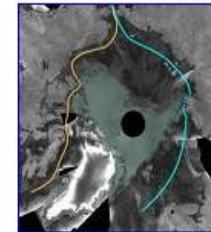
Sea ice coverage averaged in 1°x1° ...  
1036 x 1133 - 78k - gif  
[www.aviso.oceanobs.com](http://www.aviso.oceanobs.com)



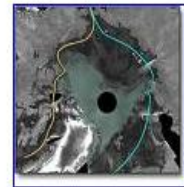
Satellites witness lowest Arctic ice ...  
400 x 400 - 319k - gif  
[www.climatechangenews.org](http://www.climatechangenews.org)



Satellites witness lowest Arctic ice ...  
358 x 358 - 36k - jpg  
[www.geoconnexion.com](http://www.geoconnexion.com)



Envisat ASAR mosaic of the Arctic ...  
580 x 580 - 91k - jpg  
[www.polares.org](http://www.polares.org)

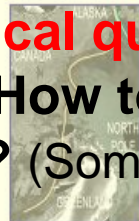


Arctic Ice Coverage smallest in ...  
263 x 251 - 54k - jpg  
[www.pcigeomatics.com](http://www.pcigeomatics.com)

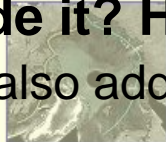
**A philosophical question:** which image is the original one? How to decide it? How to preserve its identity? (Some have also added information)



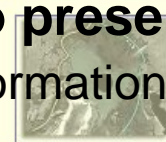
Satellites witness lowest Arctic ice ...  
200 x 200 - 57k - jpg  
[www.zeeburgnieuws.nl](http://www.zeeburgnieuws.nl)



Arctic Sea Ice Shatters All Previous ...  
300 x 459 - 70k - jpg  
[photos.mongabay.com](http://photos.mongabay.com)



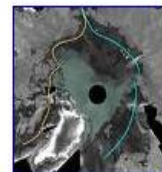
Envisat ASAR mosaic of the Arctic ...  
200 x 160 - 12k  
[www.terradaily.com](http://www.terradaily.com)



Satellites witness lowest Arctic ...  
202 x 145 - 7k - jpg  
[www.spaceret.com](http://www.spaceret.com)

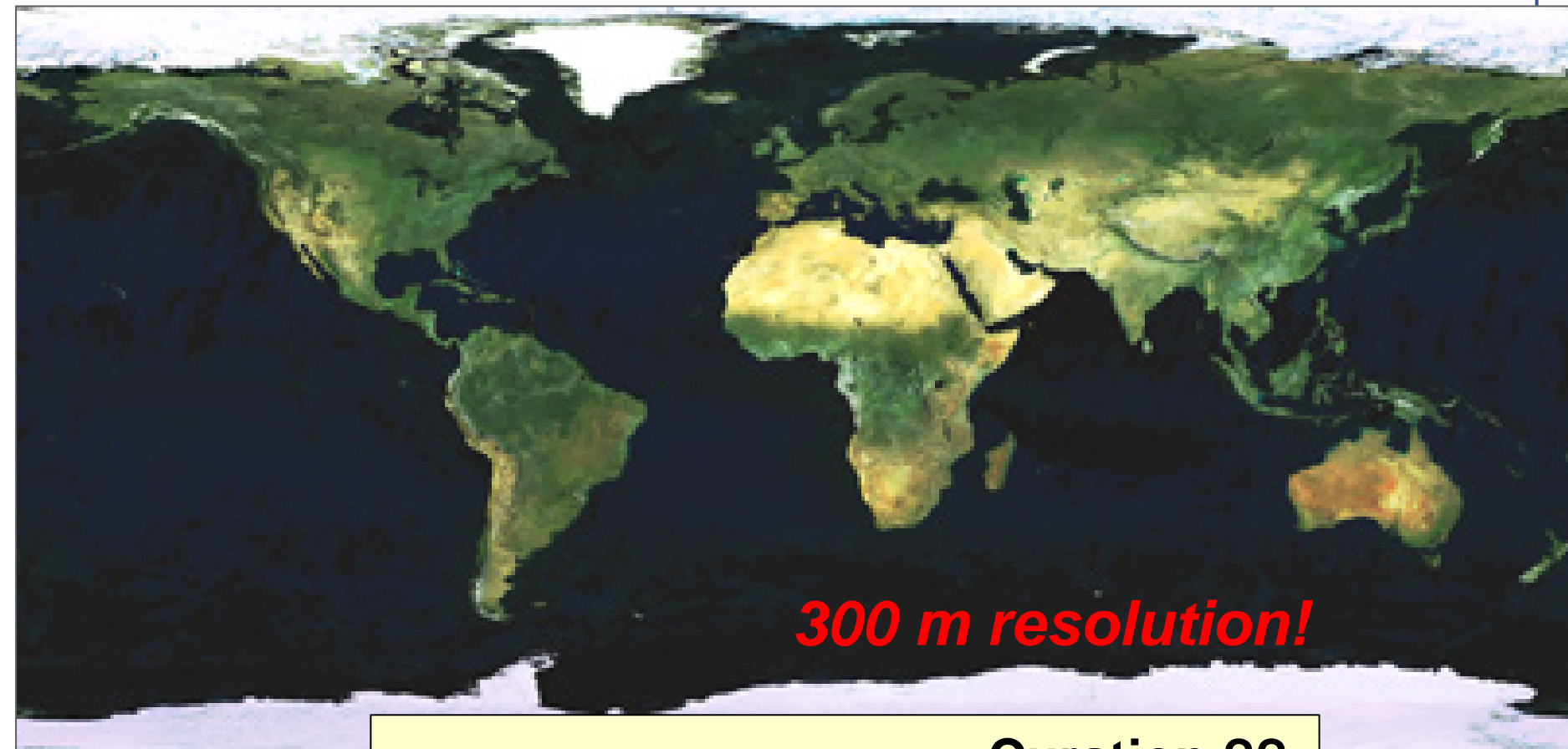


... Arctic ice coverage in history  
1188 x 1923 - 2653k - jpg  
[esamultimedia.esa.int](http://esamultimedia.esa.int)



... covered by sea ice in the Arctic ...  
160 x 160 - 8k  
[biopact.com](http://biopact.com)

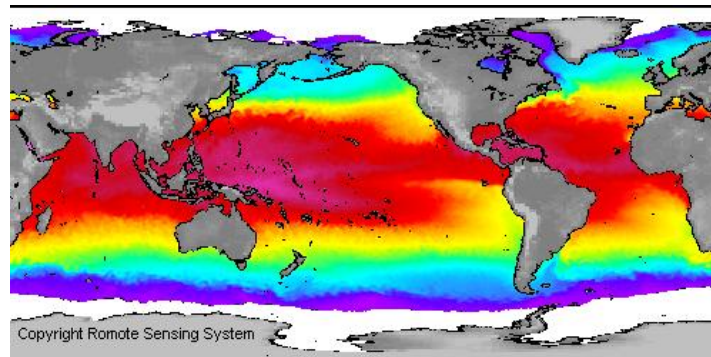
## GlobCover: New portrait of Earth shows land cover as never before



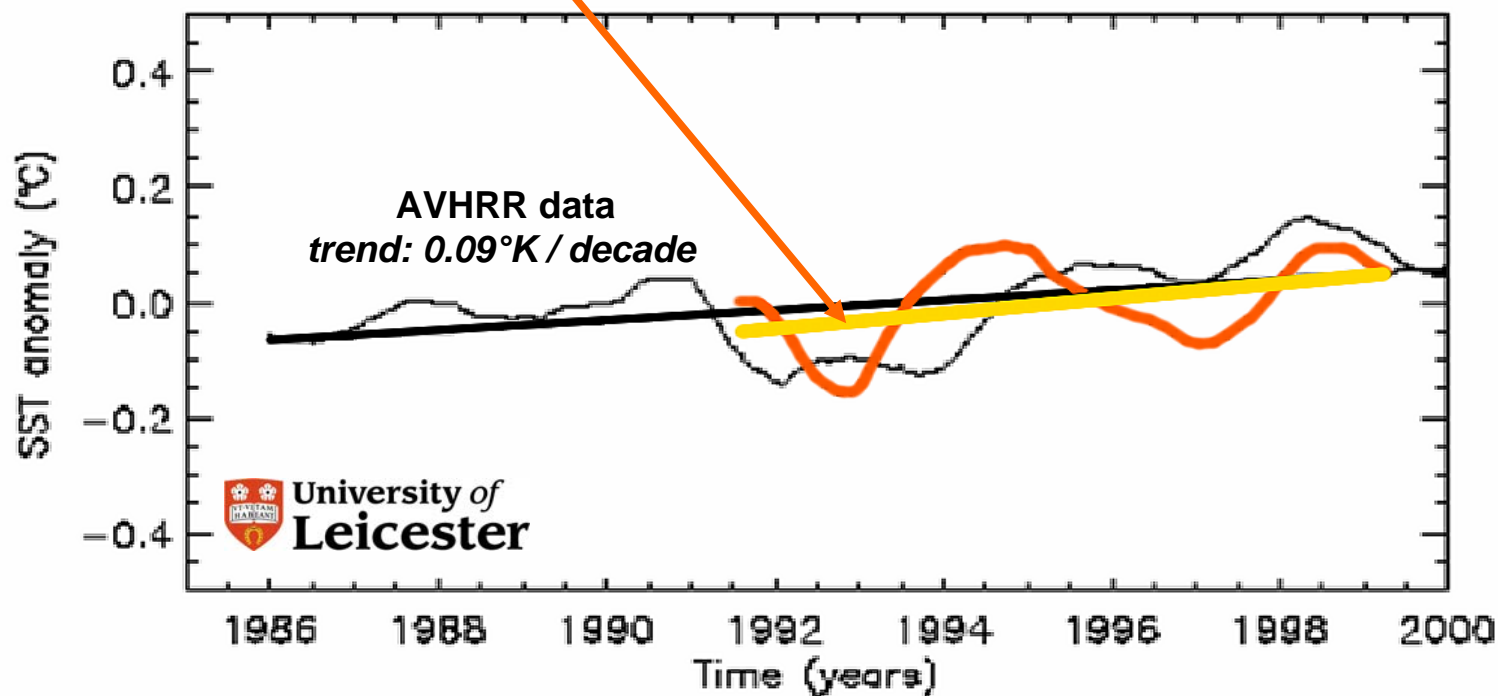
**300 m resolution!**

Curation ??  
preservation information ??

## Measurement of Residual Trends in Global Sea Surface Temperature

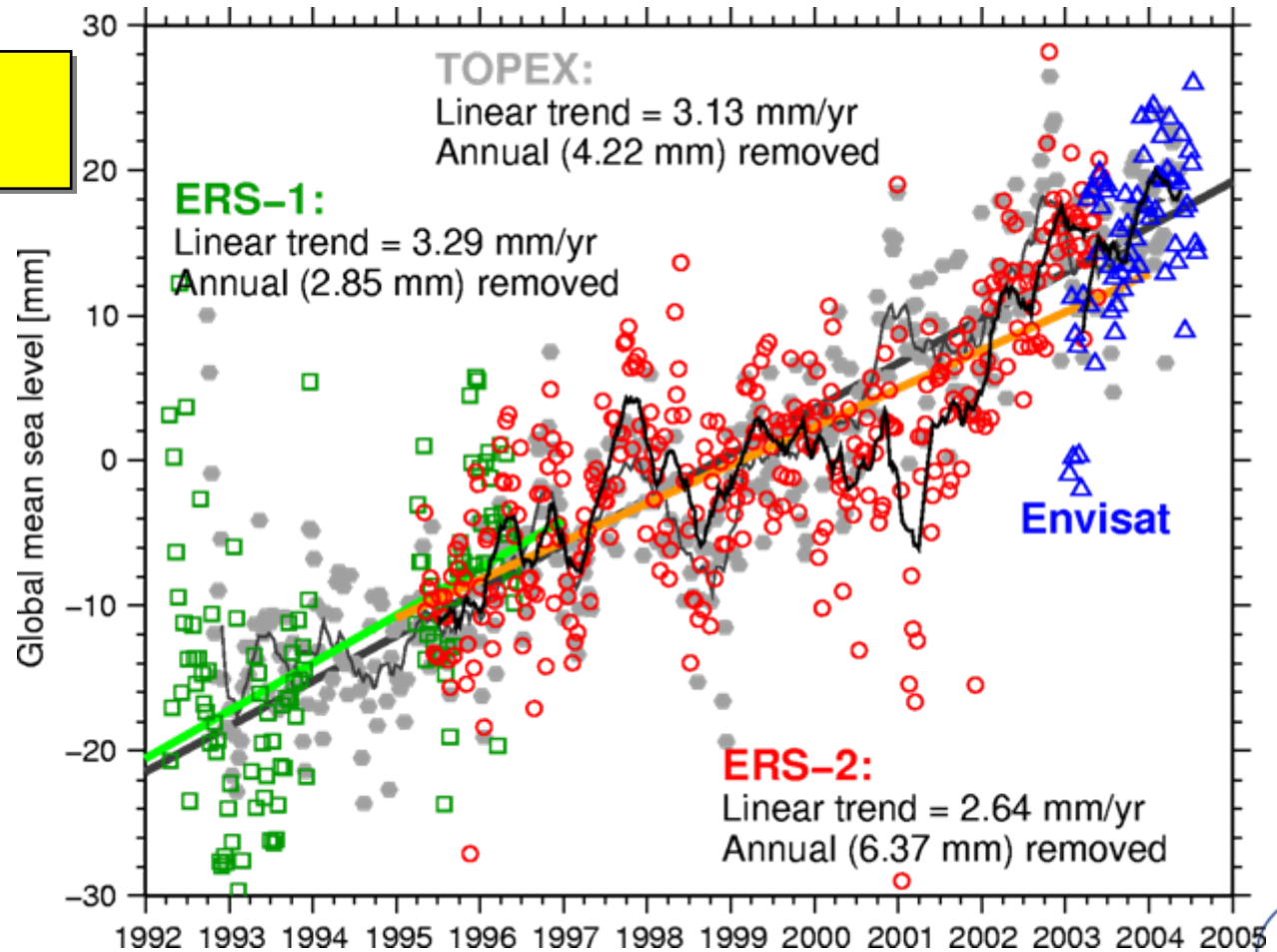


ERS / Envisat  
Trend:  $+0.13^{\circ}\text{K} / \text{decade}$



The ENVISAT altimeter provides continuity to the measurements initiated in the early 1990

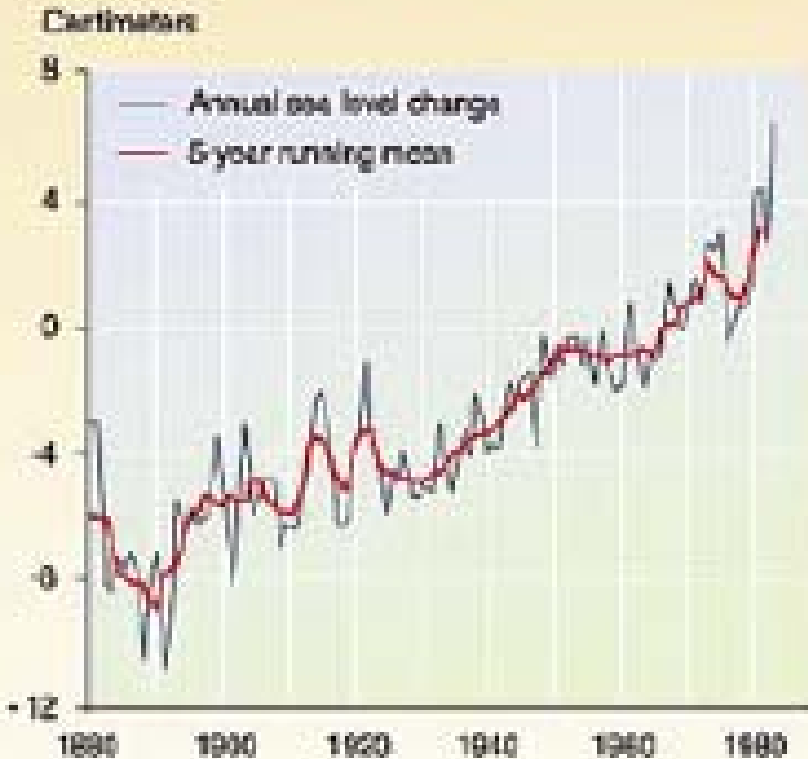
Sea level rise  
Trend: +3 mm/yr



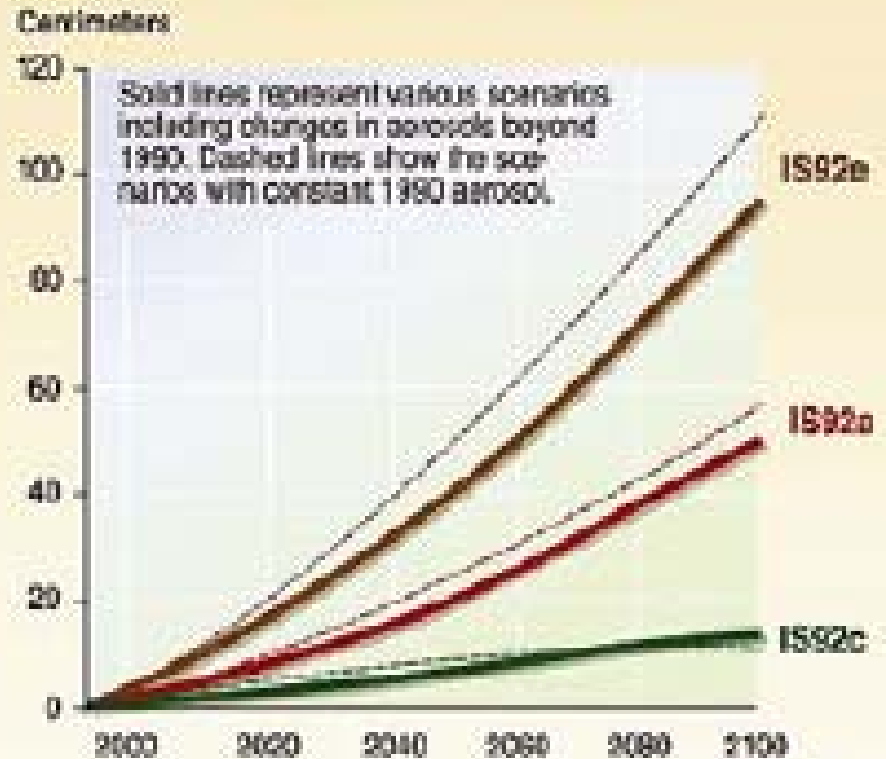


## Sea level rise due to global warming

### Sea level rise over the last century



### Sea level rise scenarios for 2100

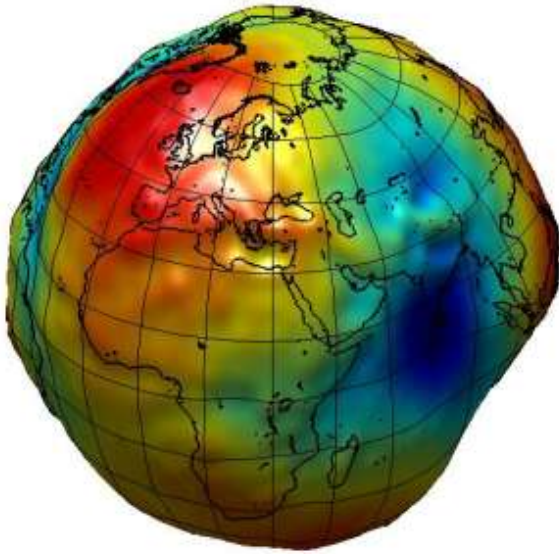


IPCC  
AR4  
Working Group I  
Contribution to the Fourth Assessment Report

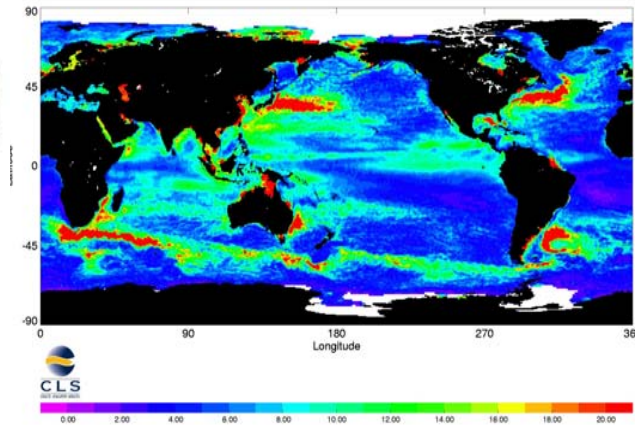
**Preservation of data is not enough!**

Source: Climate Change 1996, The science of climate change, contribution of the working group I to the second assessment report of the Intergovernmental Panel on Climate Change, Cambridge University Press, 1996; Sea level rise over the last century, adapted from Gornitz

## ESA's Gravity Mission mission : **GOCE**



Gravity field map and improved global geoid models



Improved understanding of ocean circulation and energy distribution



Global unification of height systems

**Future projects shall follow preservation standards**

## In short:

- **Understand historical data**
- **Make data and products heritage usable / comparable**
- **Maintain the available knowledge for future access**
  - Transfer methodology and science achievements to other communities for interoperation
- **EO data are increasing with a high rate...**
  - Reduce costs for generation of preservation information

**But today's ESA mandate for " data archiving" is limited to 10 years after mission operations completed**

## European Earth Observation Initiative on Data Preservation – <http://earth.esa.int/gscb/ltdp/>

- **Wanted by ESA and GSCB**
  - ground Segment Coordination Body, representing Space Agencies in Europe (ASI, CNES, DLR, ESA, EUMETSAT) and Canada Space Agencies (CSA)
  - Very large no. of EO mission data from all involved agencies (ERS, ENVISAT, SPOT...)
- **Building political momentum for long term funding**
  - Proposal to be submitted to ESA Ministerial Conference (Nov 2008)
- **First LTDP workshop organized by ESA in May 2008**



involving all **European EO data owners/providers and archive holders**

- Exchange information on LTDP policies and technical approaches;
- Collect feed-back and derive recommendations for a European LTDP common approach/policy;
- Identify sharing opportunities;
- assess the impact (benefits, drawbacks) of the proposed European LTDP common policy to each archive owner.

- LTDP must be seen in a **very long term prospect**
  - should be intended as a permanent initiative
  - EO mission independent activity
  - with a (funding) timescale around 15-20 years.
- **Progressively cooperate** to jointly perform:
  - technology development, standardization activities;
  - operational solutions, data exploitation for cost-effective.
- **ESA to trigger and coordinate** following steps
  - toward the progressive LTDP System implementation

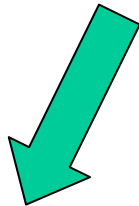
- All European EO Space **data owners**
  - contribute to the European LTDP System through their infrastructure.
- The **LTDP Common Policy**
  - is to be intended as a **Guideline**,
  - full adherence to be pursued in the mid-long term.
- Sustained through a cooperative (multi-source) programmatic and **long term funding framework**
  - **Multilateral Cooperation with multiple funding sources (e.g. European EO data owners).**

- **Archived data shall contain:**
  - Raw data
  - Global or higher level products generated systematically
  - Metadata and browse images when generated
  - Spacecraft ephemeris information and Auxiliary data required to process the telemetry payload data
  - CAL/VAL databases (including processing/reference validation data sets).
  - Mission related documentation.
  - Processing algorithms description and processors needed to obtain mission



- **Adoption of OAIS standard reference model**
- **Archives maintenance and data integrity**
  - Periodical data migration
  - Data repackaging
  - multiple copies of the same data
  - common certification / security / procedures
- **Reprocessing**
  - Data reprocessing as needed with maintenance of history
- **Data access and interoperability**
  - inventory, metadata and browse maintenance
  - processing chains maintenance
  - Ensure on-line access and on-line delivery.
  - Evolution of systems
  - Standard interfaces
  - Harmonization of EO products specifications
  - Common development of technology

- **The EO world is an interesting, but narrow science community ...**



Shared  
Infrastructures

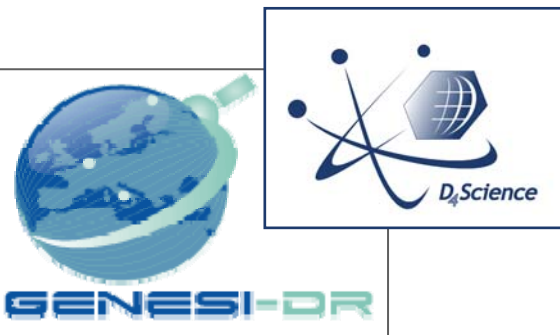


Alternative and  
complementary  
technologies for  
preservation



Other  
communities  
requirements

**Many other projects / initiatives are to be compared**



← Alliance for Permanent Access →



# Ground European Network for Earth Science Interoperations

## Digital Repositories

Stefano Beco  
Elsag Datamat spa

# GENESI-DR

EC Grant Agreement no. 212073

EGEE'08

Istanbul – 24/09/2008

**INFRA-2007-1.2.1 • Scientific Digital Repositories**  
**Duration • January 1, 2008 – December 31, 2009**  
**Total EC funding • 4.4 M€**

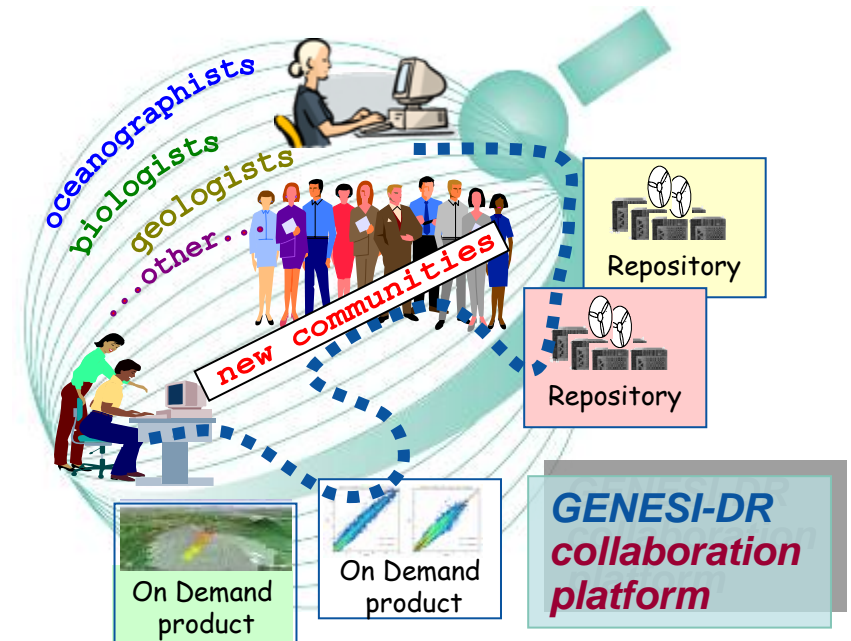
**For scientists to get access  
and share seamlessly  
observations of the Earth  
System and derived  
information and knowledge**



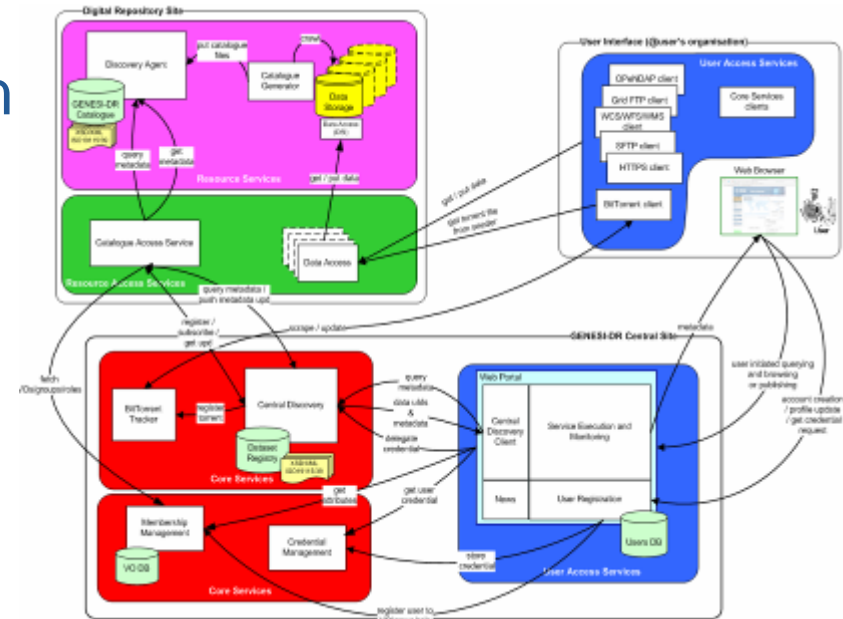
KONGSBERG



- To **provide a base for (establishing) a world-wide e-infrastructure for Earth Science repositories**
- To provide reliable, easy, effective, and **operational access to a variety of data sources** (space and non-space)
- To **harmonise operations at key Earth Science data repositories**
- To demonstrate effective **curation** and prepare the frame for **long term preservation**
- To validate capabilities to access distributed repositories for involving **new communities, including education...**
- To integrate **new scientific and technological derived paradigms**



- Exploit and strengthen best practice in distributed data archiving, **discovery**, **access** and processing
- A set of services for **indexing**, **searching**, **sharing** and **storing** very large spatial data sets.
- Publication of **data** through their of **metadata**, their syndication between peers automatically
- **Discovery** of data relevant to an application, establishment of **data usage / access rights**
- **Processing on user demand** in open Grid environment
  - Pre-processing (avoid bulk data transfer)
  - Move algorithm to data



- Need to document “Preservation Description Information”
  - Response to system changes (in hardware/storage, operating system, ...)
- Semantics
  - Documentation of meanings and inter-relationships
- Need to be able to **share the load**
- Exploit OAIS (Open Archive Information System) concepts to the fullest extent and **INSPIRE Directive**
- Need to preserve information and knowledge
  - Data and Documents...
  - more Representation Information




INSPIRE - Mozilla Firefox

File Modifica Visualizza Cronologia Segnalibri Strumenti ?

http://www.ec-gis.org/inspire/

Enter query...

Google inspire Cerca




**INSPIRE DIRECTIVE**

Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) was published in the official Journal on the 25th April 2007. The INSPIRE Directive entered into force on the 15th May 2007

1.1 Resource title	dc:title
1.2 Abstract	dc:abstract
1.3 Resource type	md:type
1.4 Resource locator	md:link
1.5 Unique resource identifier	md:uuid
1.6 Coupled resource	md:wp
1.7 Resource language	md:lang
2.1 Topic category	md:topic
3.1 Keyword value	dc:subject
3.2 Originating controlled vocabulary	md:vocabulary
4.1 Geographic bounding box	geo:box
5.1 Temporal extent	time:start
5.2 Date of publication	md:pubdate
5.3 Date of last revision	md:updatedate
5.4 Date of creation	md:createdate
5.5 Alternate references	undefi
6.1 Lineage	md:lineage
6.2 Spatial resolution	md:resolution
7.1 Specification	md:specification
7.2 Degree	md:conformity
8 Conditions applying to access and use	md:conditions
9 Limitations on public access	md:restrictions
10.1 Responsible party	md:contactname, md:contactmbox
10.2 Responsible party role	md:role
11.1 Metadata point of contact	md:contactname
11.2 Metadata date	md:mdpubdate
11.3 Metadata language	md:mdlang

HOME WHY INSPIRE?



3.2 Originating controlled vocabulary = *Semantic RepInfo*

6.1 Lineage = *Provenance*

7.1 Specification = *RepInfo*

8 Conditions applying to access and use = *DRM, Access Control*

- **EO community perspective**
  - **Example of needs**
- **Operational and political plans**
- **Technologies and infrastructure aspects**

Thank you