# Earth Science and Observation Community Insight

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**European Space Agency**

Alliance for Permanent Access, Annual Conference 2009, The Hague

# Outline

- Strategy for long term DP at ESA
- DP in Earth Science: towards operational requirements
- DP in Earth Science: drivers and potential barriers
- DP in Earth Science: Alliance's role in 2010 and beyond

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# Starting point

- Being space data a **humankind asset**, their preservation has to be considered as a long term challenging responsibility for the Space Agencies and the data owners

- ESA's Earth Science archives
  - Extend from a few years to decades
  - Valuable data representing scientific long time-series
  - ~150 TB archived in early '90s -> about 3 PB archived today -> over 30 PB expected in the next 10 years. Same trend is expected for other EU EO archives owners

- DP seen as including data integrity and enabling data awareness (knowledge), data access, data exploitation

# Basics

- Analysing the current state of the Earth, its environment and its variability over time requires a very **large number** of observations

- Usually it is **impossible to resample** environmental data, therefore global and complete measurements need to be performed

- The current value of an environmental data stream can hardly be stated and it is **impossible to foresee** its potential future uses

# European challenge

- Traditionally poor cooperation in DP field
- Lack of common approach for preserving EO space data
- Single organizations have difficulties to afford DP
- Identify costs, optimising costs and efforts, identifying commonalities
- Define a coordinated approach and a harmonized management of EO space data archives
- Action taken. Under its mandate for space coordination, ESA coordinates a European framework for preserving EO data in the long-term (LTDP)

# ESA's LTDP strategy: phase 1

- 2009-2011
  - Enhance ESA EO archive facilities and infrastructure
  - Perform technology studies, identify data set, archives interoperability, certification, security..
  - Address standardization issues
  - Interface to European and international organisations
  - Coordinate the *European EO LTDP framework*
  - Define common guidelines
  - Detail LTDP framework workplan
  - Issue programme proposal for Phase 2 (funding scheme incl)

# ESA's LTDP strategy: phase 2

- 2012-2017 (European LTDP Framework)
  - Coordinate the European LTDP Framework. Open to all possible members
  - Gather contribution from European EO space data owners through their ideas and possibly infrastructures in accordance to commonly agreed guidelines
  - Implement the workplan progressively (short/mid/long-term activity). The European LTDP Framework is sustained through a cooperative long term programmatic funding framework
  - Possibly contribute to trigger the availability in the long term of additional permanent funding sources

# Parse.Insight at ESA

- PARSE.Insight includes a case study on EO, represented by ESA

- ESA's partnership and activity in PARSE.Insight is perfectly aligned with its role of coordinator at European level to ensure preservation and accessibility for ESA's and Member States' EO data in the long-term

- In the context of PARSE.Insight, ESA issued a public user consultation to get an insight about community's awareness of data preservation and current/envisaged exploitation of historical environmental data streams, including opportunity of experience

# Parse.Insight at ESA: objectives

- To get an insight in the Earth Science community on the topic of long-term availability of environmental data

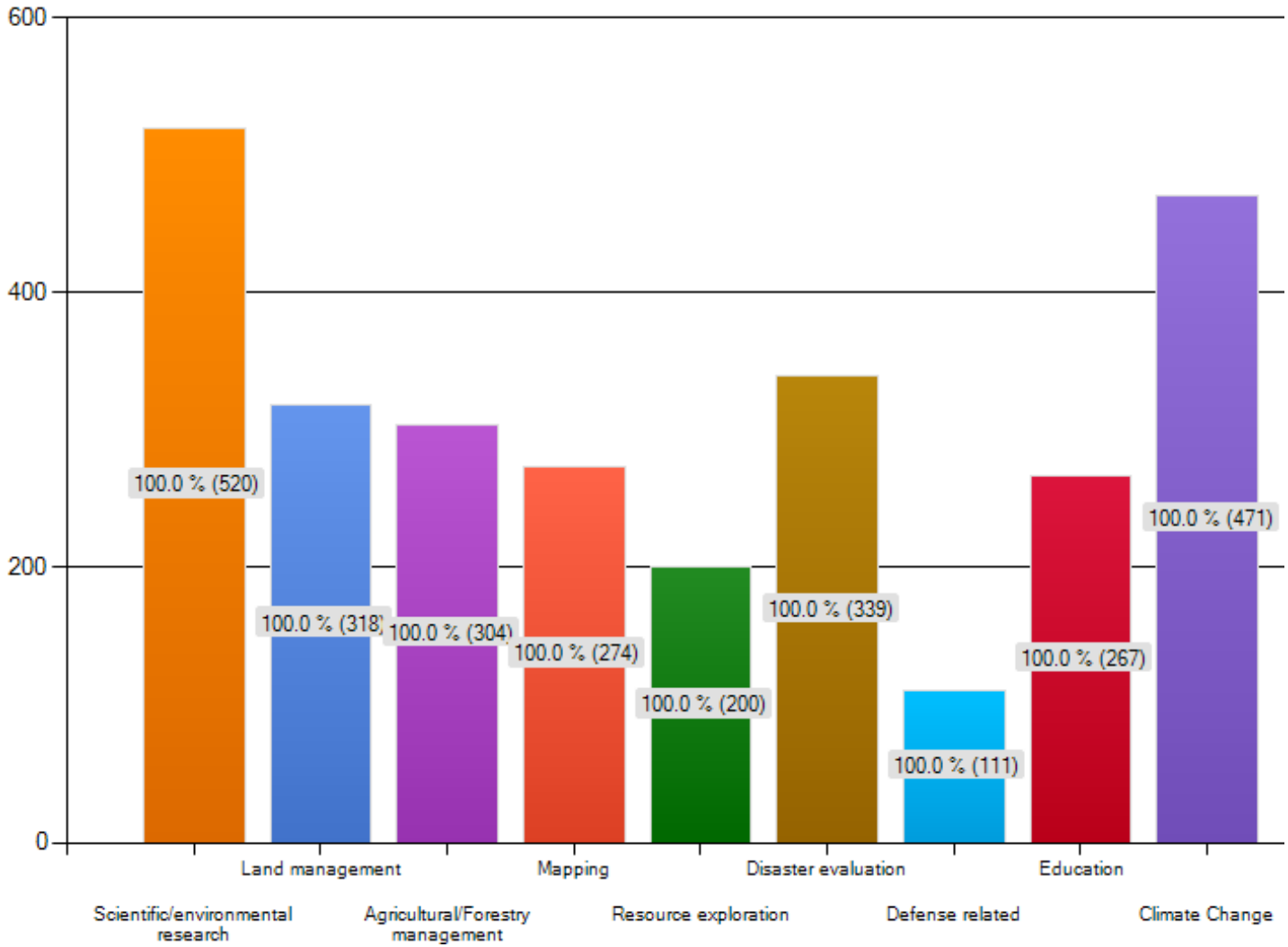
- To contribute to fill the gap between
  - EO data generation, archiving and maintenance
  - EO data exploitation

- To understand EO data users' standpoint and requirements about historical space/non space data exploitation
- To provide input vision to the European strategy for preserving EO data

# Parse.Insight at ESA: user consultation

- General familiarity with DP issues
- High majority constantly need to access historical environmental data
- High majority required at least once to access them
- Cases on data losses or unavailability reported by the 25%
- Major threats to DP are identified

# Parse.Insight at ESA: DP as value-adding



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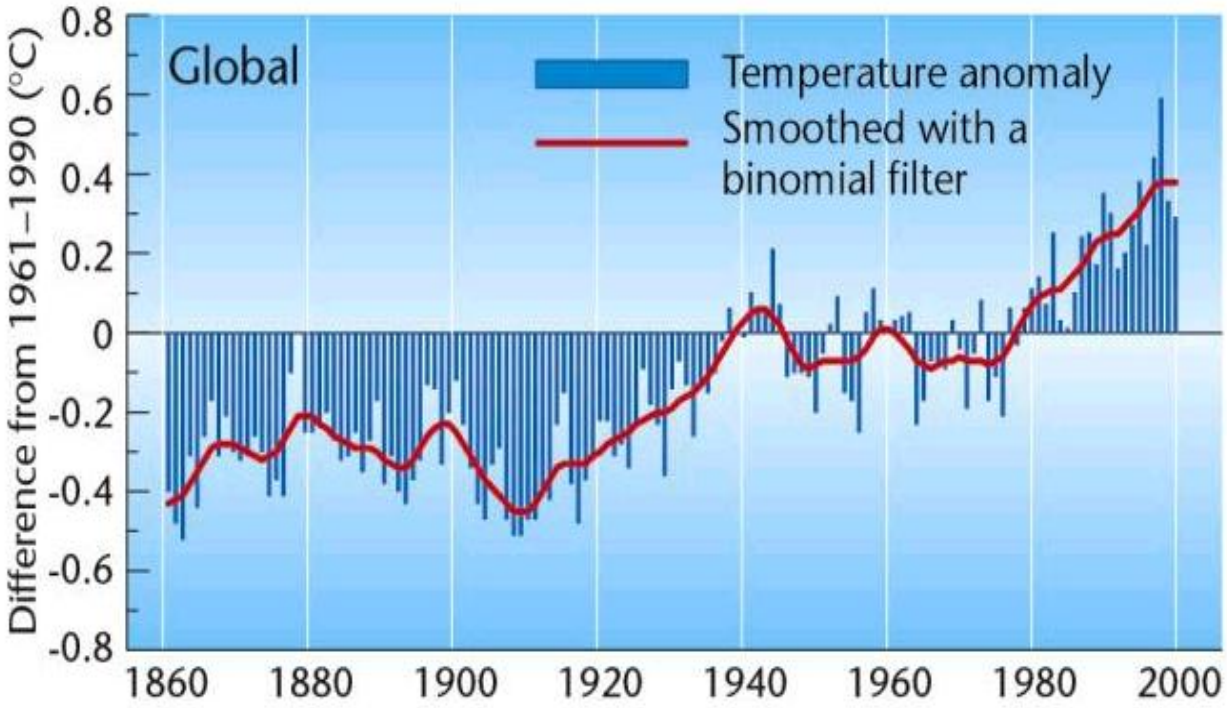
# Science requirements

- Earth Science community increasingly need access to **new missions data** but also to **historical datasets**, spanning 30 years and more

- To monitor sea-level & surface temperatures increase, observe seasonal growth of plankton, gauge ocean winds & currents, detect variations in thickness of ice sheets
- To detect changes in land surface, monitor vegetation growth, measure surface temperatures & soil moisture
- To watch out for symptoms of climate change in ice cover, changes in cloud cover and other atmospheric features
- …

# e.g. Global mean ST

Global mean surface temperature has increased more than .5°C since the beginning of the 20th century, with this warming likely being the largest during any century over the past 1,000 years for the Northern hemisphere.



# Operational requirements

- **ESA's Climate Change Initiative**
  - processing of global historical time-series
  - regular re-analysis of the archived data
  - periodic re-processing of basic datasets

- **ESA's Living Planet Programme**
  - includes Earth Explorer missions and Earth Watch element
  - facilitates the delivery of EO data for use in operational services

- **EC / ESA's GMES**
  - includes Sentinel missions
  - enables access to timely information to better manage the environment and to ensure civil security. Includes not only space data utilization
  - operational services for European policy-makers

# Operational scenarios, some facts

- **Similar services**. New programs together with evolving user needs impose the implementation of similar services both for historical and current missions, like:
  - data preservation, access and distribution (HMIs)
  - metadata, speed, formats, processing, algorithms..

- **Not only data repositories**. DRs constitute only one component within a larger infrastructure required in operational scenarios..

- **Focus on end-to-end operational systems**. So far several projects have focused on different aspects and elements of the digital data preservation

# Challenges

- DP in Earth Science, enabling operational data access requires:
  - **Clear mandates** for all partners and **common policies**
  - Coordinated approach between all partners
  - Commonality and harmonization of services
  - Standardization at different levels
  - Adequate infrastructure implementation and availability
  - Sharing of resources
  - ...

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# Drivers

- In addition to recent and new data the scientific community need and want to access historical environmental data and historical time series of earth observations
- The **community aim at a more active involvement** in the process not only via reporting experiences and suggestions, but as customer of a global information system
- Earth Science data users require and expect timely solutions to the current infrastructures' constraints

- Keywords - data availability, data quality, faster data access, faster reprocessing, data conversion into useful information, data policies, free access, possibly minimum shop stop…

# Potential Barriers

- Lack of high level European policies
- Scattered initiatives
- Best efforts and personal initiatives
- Unclear long term commitment from organizations
- Lack of coordination and missing firm plans
- Absence of common models
- Resources limitation

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# The dilemma…

- Given the limited resources, where to focalise the effort?
  Is it worth to try to recover historical data, maybe difficult to identify and to maintain OR is it better to focus on implementing an infrastructure able to ensure current and future data preservation and availability?

- Furthermore, are there successful and sustainable models implemented and exportable to most of the domains represented by the Alliance?

# Alliance's role in 2010 and beyond

- Science DP and permanent access 'sponsors' should **refocus emphasis** from justifying the need of long term DP **to users' requirements on data access**
  - Thus leading to end-to-end infrastructure implementation to ensure DP from now on
- Alliance members initiatives should involve the partnership of EC for mutual benefits:
  - Not only gaining from EC funding opportunities (e.g. PARSE.Insight) but also proposing single and multilateral organisations' initiatives
- **EC** should be **called as prime coordinator** of all European initiatives on DP and access, towards harmonized infrastructure implementation
  - EC shouldn't be seen only as funding source for scattered initiatives
- The **Alliance** should play the role of **driving entity** to move partners forward into a pre-operational phase

# ESA* and the Alliance, mutual benefit

*In the long term ESA should be intended as single entity, not only concerned with Earth Science and Observation

- ESA recognizes as very beneficial to be member of the Alliance as complementary partner of the current strategy
  - The Alliance is and will be fundamental in view of the operational challenge
- ESA can contribute for technological aspects, adopting proven models, sharing resources, common projects, expertise, experiences
  - The Alliance can contribute to ESA through the leadership/coordination of new initiatives, projects, EC partnership, enlargement of horizons by bringing its knowledge and experience in the field..
- The process requires a more active contribution to the partnership, that cannot be based only on personal initiatives, but should **involve organisations' management at all levels**

# Thank you!

# Any Question?

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http://earth.esa.int/gscb/ltdp/
http://www.parse-insight.eu/
http://www.eomd.esa.int/
http://dup.esrin.esa.it/
http://www.esa.int/esaLP/ASERBVNW9SC_index_0.html
http://www.esa.int/esaLP/SEMRRI0DU8E_LPgmes_0.html
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