WP9 Earth Observation Applications

1st Annual Review Report to the EU

ESA, KNMI, IPSL, RAL/BADC, ENEA

- Introduction to EO scenario and requirements
  - WP9 Objectives
    - Achievements
      - Issues and actions
        - Plan for the year
- Summary

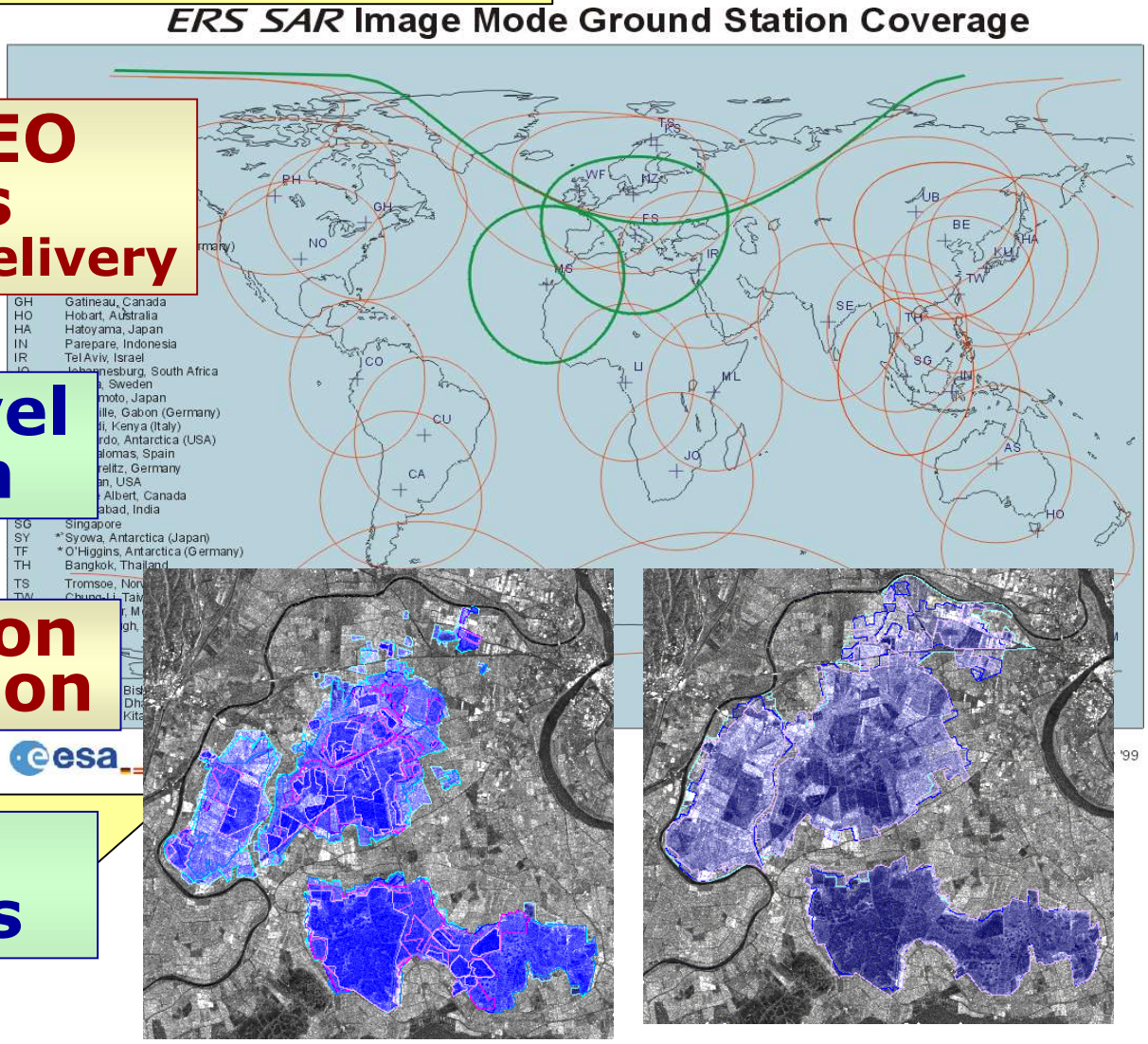
Earth Observation Community
GRID interactive scenario

Common access to EO missions catalogues
Acquisition plan, order, delivery

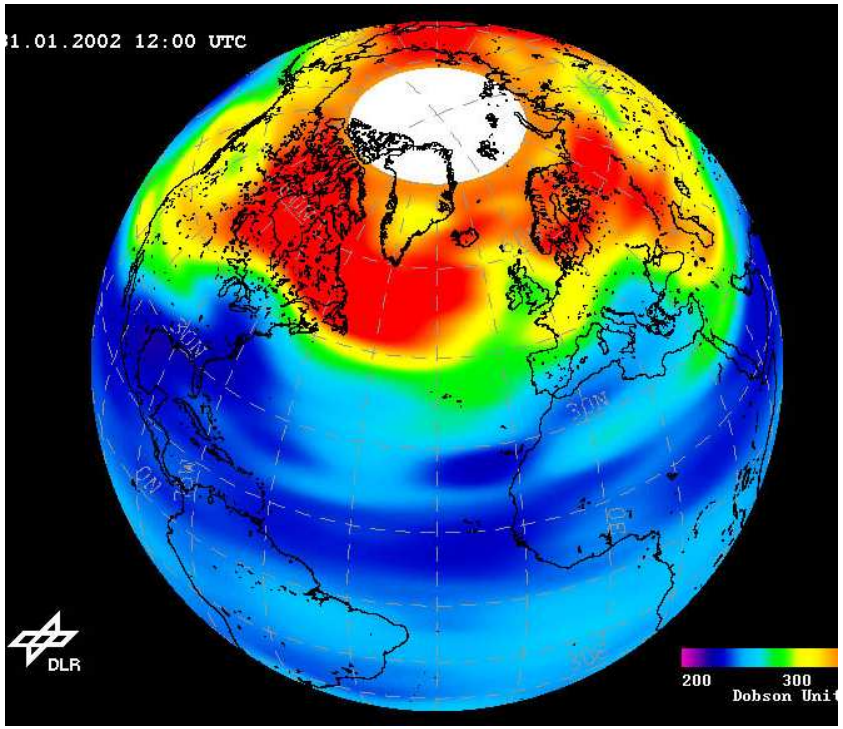
On demand high level products generation

Parametric data fusion and models integration

Collaborative publishing of results



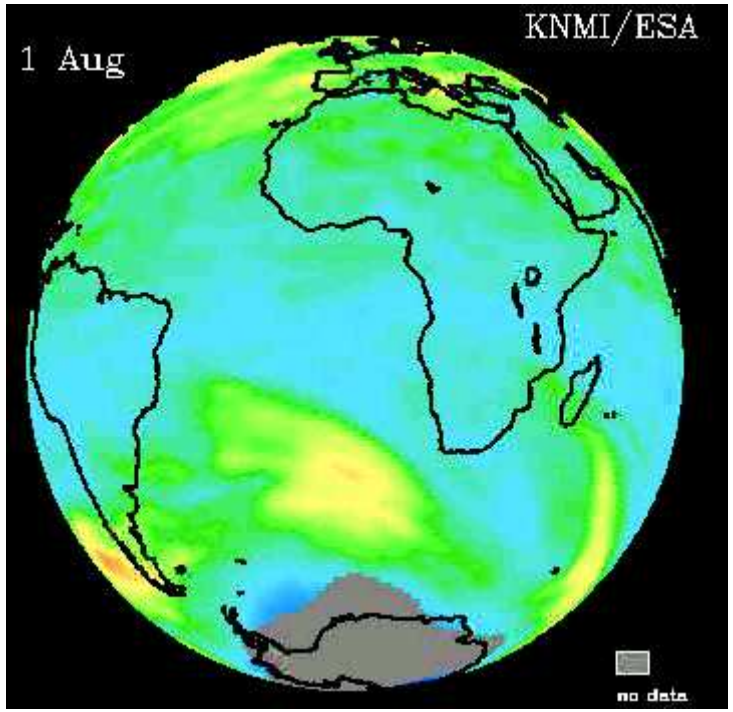
OZONE: a case of Global Environmental Monitoring



GOME analysis detected ozone thinning over Europe
31 Jan 2002

GRID requirements:

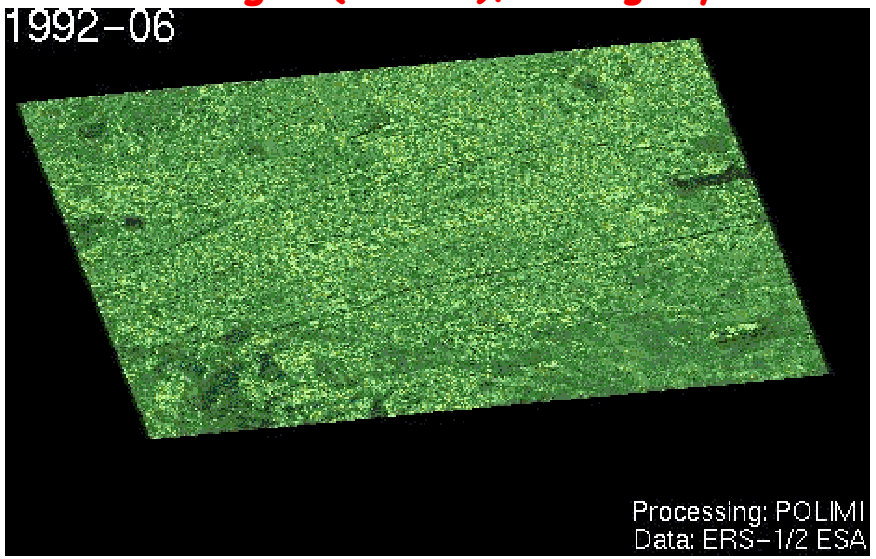
- Multi instrument data fusion
- Distributed data sources, science and institutional users
- Complex data processing (1d data = 40 d) processing
- Near real time deliv.

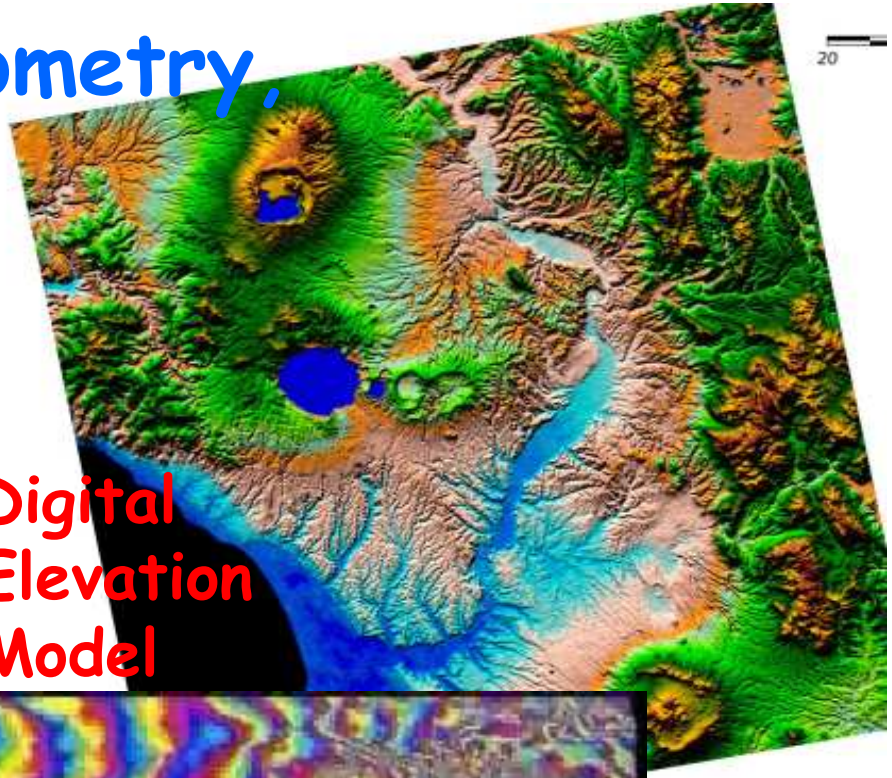


Number crunching: interferometry, subsidence, DEM generation

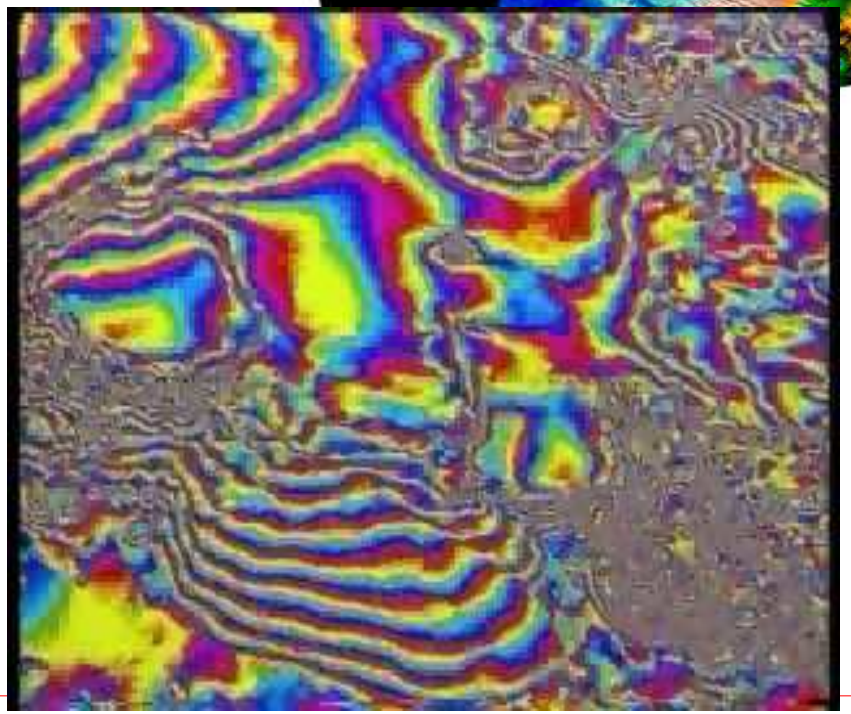
Pomona (Cal): subsidence velocity fields

40 ERS1/2 images (92-99), Ambiguity: 28 mm





Digital Elevation Model



GRID requirements:

- large data files (10+ GB)
- stages with intensive processing
- science driven value adding


ENVISAT Just launched !
• 3500 MEuro programme cost
• 10 instruments on board
• 200 Mbps data rate to ground
• 400 Tbytes data archived/year
• ~100 "standard" products
• 10+ dedicated facilities in Europe
•700 + approved science user projects

WP9 Objectives

- Specification of EO requirements
- Bringing Grid-aware application concepts into the Earth Science environment
- Adaptation of existing systems and selected EO applications to use the DataGrid infrastructure
- Testbed validation through prototyping activity
- Activities handled in coordination and synchronisation with other related and relevant work packages

Achievements (1)

- Gathering of EO Requirements, State-of-the-Art Survey (see D9.1, D9.2)
- Wide promotion in the Earth Science and Space community
  - ESA grid initiative, SpaceGRID, CEOS
- Experiences with Testbed0
  - Testing and evaluation of GLOBUS in own environment
  - Demonstrated processing of GOME Data from operational environment, job execution at ENEA, results back at ESRIN

Achievements (2)

- Grid Interface Platform
  - Procurement of dedicated infrastructure (cluster, network)
  - Installation & testing of middleware (Network Monitoring, UI, LDAP). Others to follow (CE, SE, etc.)
  - Setting up the Virtual Organisation for EO
  - Experience gained with OpenPBS and (SGI) farms
  - Packaging IDL environment into RPM for grid-wide deployment. IDL Licensing Issues partially solved

Achievements (3)

- Adaptation of EO Applications
  - Porting the OPERA code to make it 'grid aware' and working on Linux machines
  - Porting the Ozone data validation application on the GRID
  - Adaptation of ESA GOME algorithm for GRID deployment
  - Demonstration of distributed processing chain: IPSL validation of KNMI products, visualisation of results using grid-enabled IDL
- Testbed1 Validation Plans & follow through

Issues and actions

- Execution of EO Validation / Test plans dependent on Testbed1 availability + good documentation
  - **Important feedback was given to the Integration Team**
  - **Have been able to construct EO demonstration**
  - **Rapid improvements expected once basic problems solved**
- Wide range of EO Applications and user community
  - **Some requirements may not be supported by DataGrid Architecture**
  - **Need more experience using DataGrid middleware and infrastructure**
  - **Need experience of other applications**
  - **Develop EO Application components for interfacing to DataGrid**
- Lack of GRID awareness in EO
  - **More feedback and contribution from EO users outside**
  - **Power of the grid concept needs to be demonstrated**

Plan for the year

- Completion of TB1 Validation Tests
- Installation of TB1 – high bandwidth across few sites
- EO Application Demonstration and Prototypes
- Milestone for success will be the processing and validation of 1+ year of GOME data using the DataGrid
- Continue to channel EO Requirements into the Architecture Design
- More promotion in the EO community: Bring other EO applications to the DataGrid
- Continue GRID promotion throughout Earth- and Space-Science Community (e.g. CEOS GRID meeting in May)

Summary

- Application of GRID in EO:
  - Enormous, non-stop data voulmes
  - Complex number crunching algorithms
  - Progressive refinement of data to produce higher quality products
  - Near real time turnover
  - Product generation chain involving different organisations and users
  - Collaborative: distributed users and data