



2. WP9 - Earth Observation Applications

1. Welcome and introduction (15m)
2. WP9 - Earth Observation Applications (50m)
3. ESA and WP9: infrastr, appl, TB 0/1 (50m)
4. Demonstration of EO applications (45m)
5. ESA and WP9: scale up, effort, recovery plan (50m)
6. Side ESA actions related to GRID (30m)
7. Reviewer separate meeting (60m)
8. Conclusions (30m)

**ESA DataGrid Review
Frascati, 10 June 2002**



Summary item 2

- ◆ WP9 - Earth Observation Applications (50m)
 - DataGrid EO requirement (LF, 15m)
 - DataGrid WP9 tasks, WP9 Plan (JL, 15m)

Earth Observation Community GRID interactive scenario

Review!



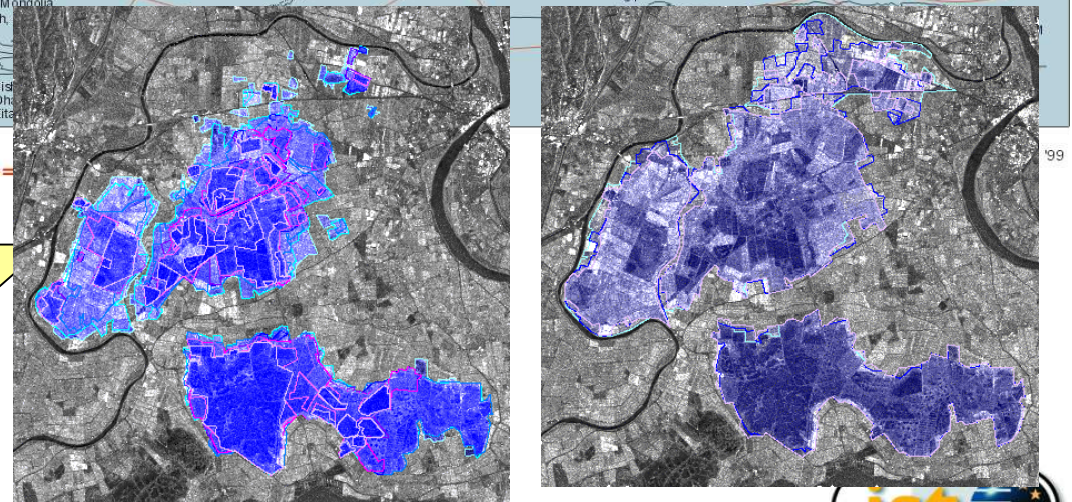
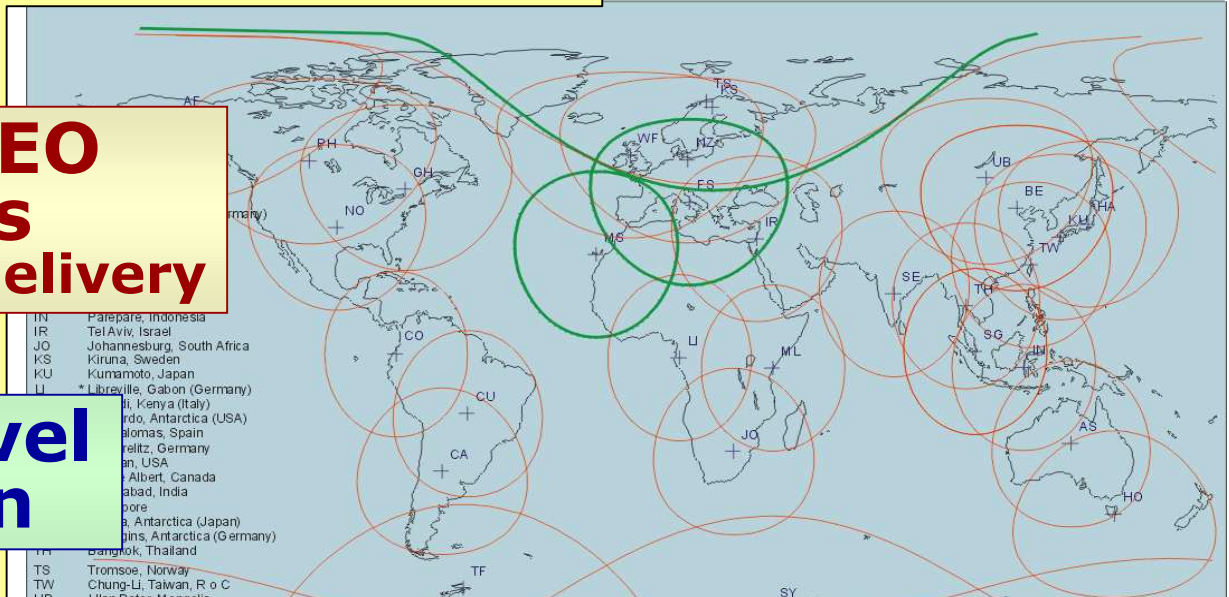
Ground Station Coverage

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

**On demand high level
products generation**

**Parametric data fusion
and models integration**

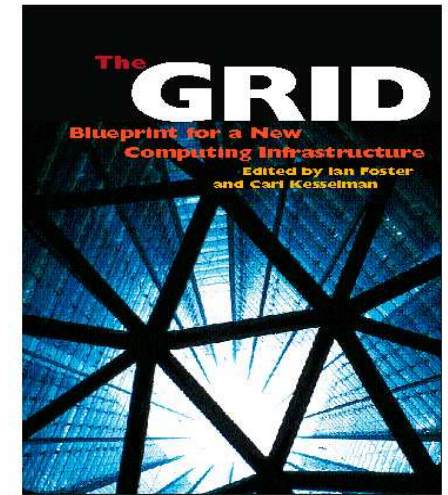
**Collaborative
publishing of results**



EO and Network Computing data models: EO is more than “parallel task execution”!!



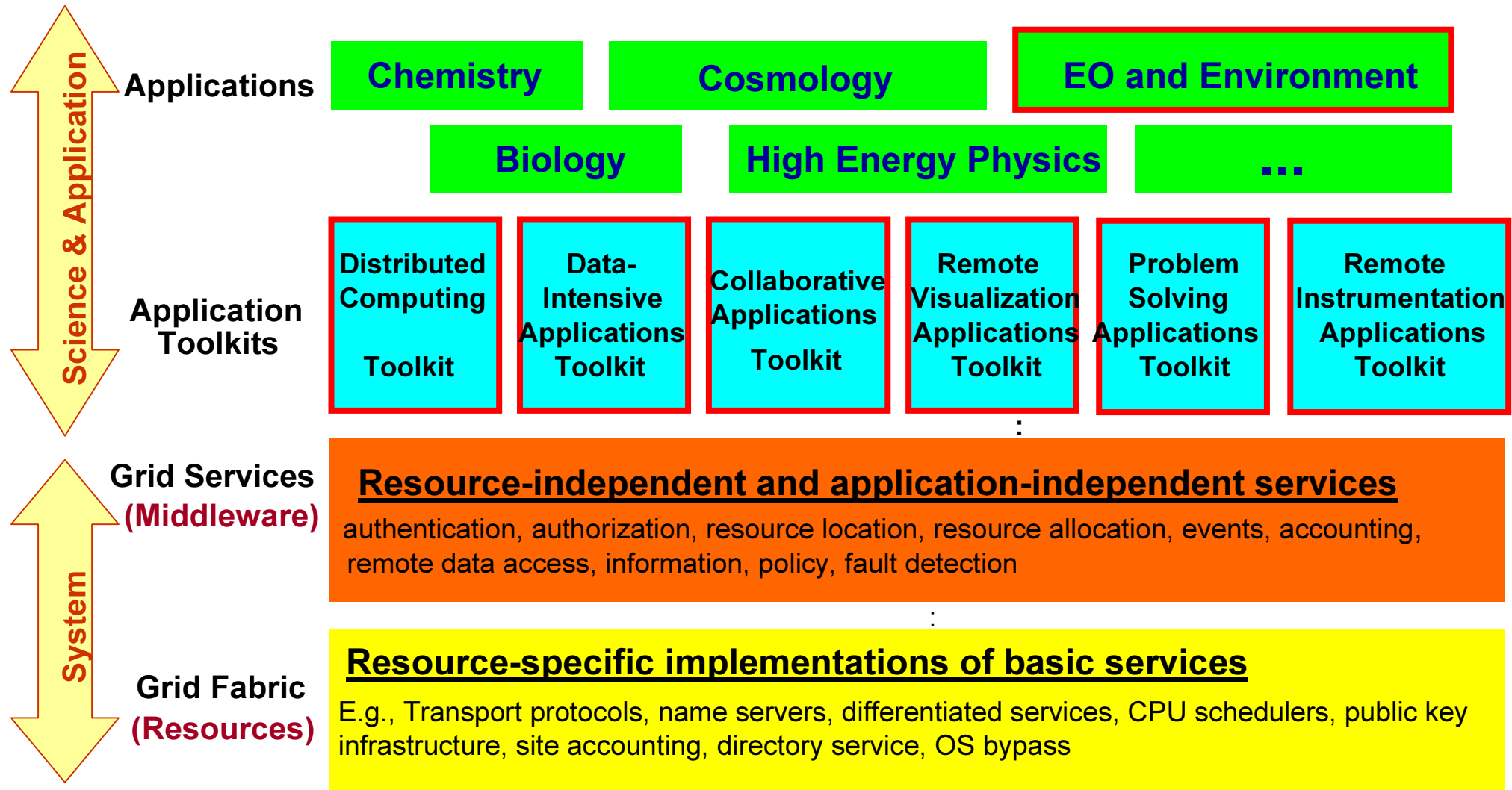
- ◆ **Distributed Computing**
 - Integration of data from various instruments and missions
- ◆ **High-Throughput Computing**
 - Interferometry ...
- ◆ **On-Demand Computing**
 - Generation of EO user products...
- ◆ **Data-Intensive Computing**
 - Archive data re-processing, climate modeling...
- ◆ **Collaborative Computing**
 - Scientists application interactions, Instrument cal/val ...



Ian Foster and Carl Kesselman, editors,
“The Grid: Blueprint
for a New Computing
Infrastructure,”
Morgan Kaufmann,
1999

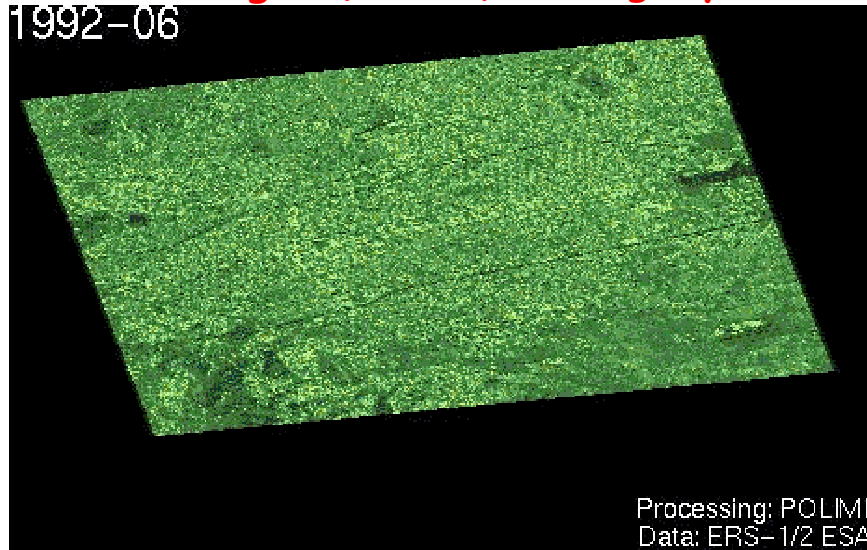


The Grid from a Services View

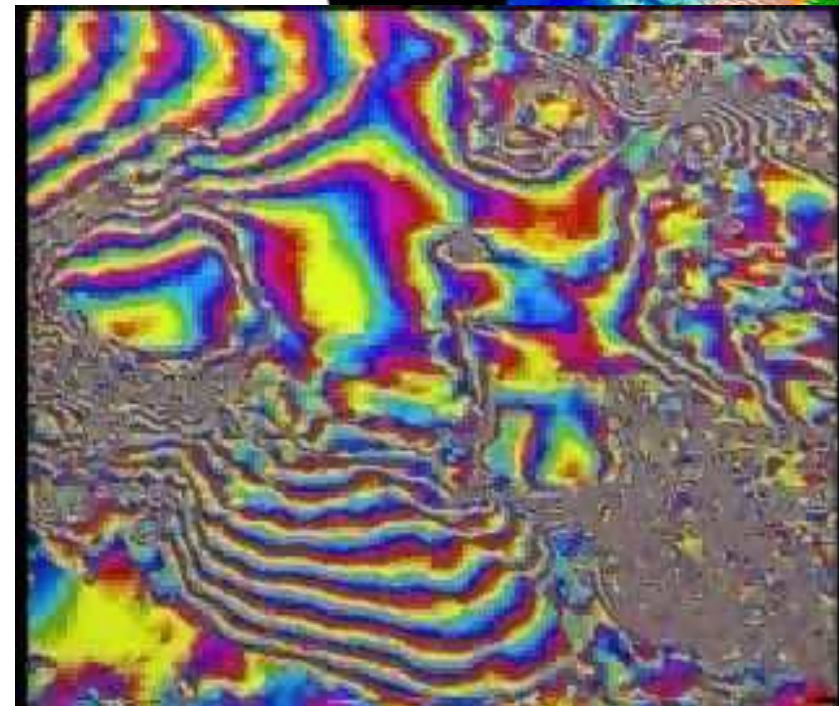
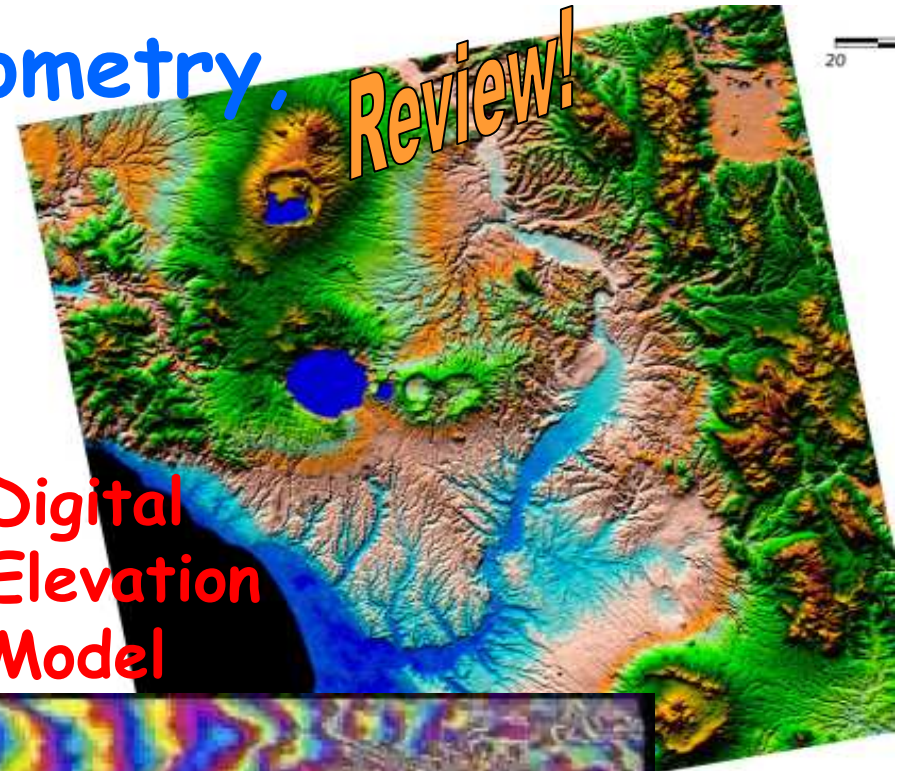


Number crunching: interferometry, subsidence, DEM generation

Pomona (Cal): subsidence velocity fields
40 ERS1/2 images (92-99), Ambiguity: 28 mm



Digital
Elevation
Model

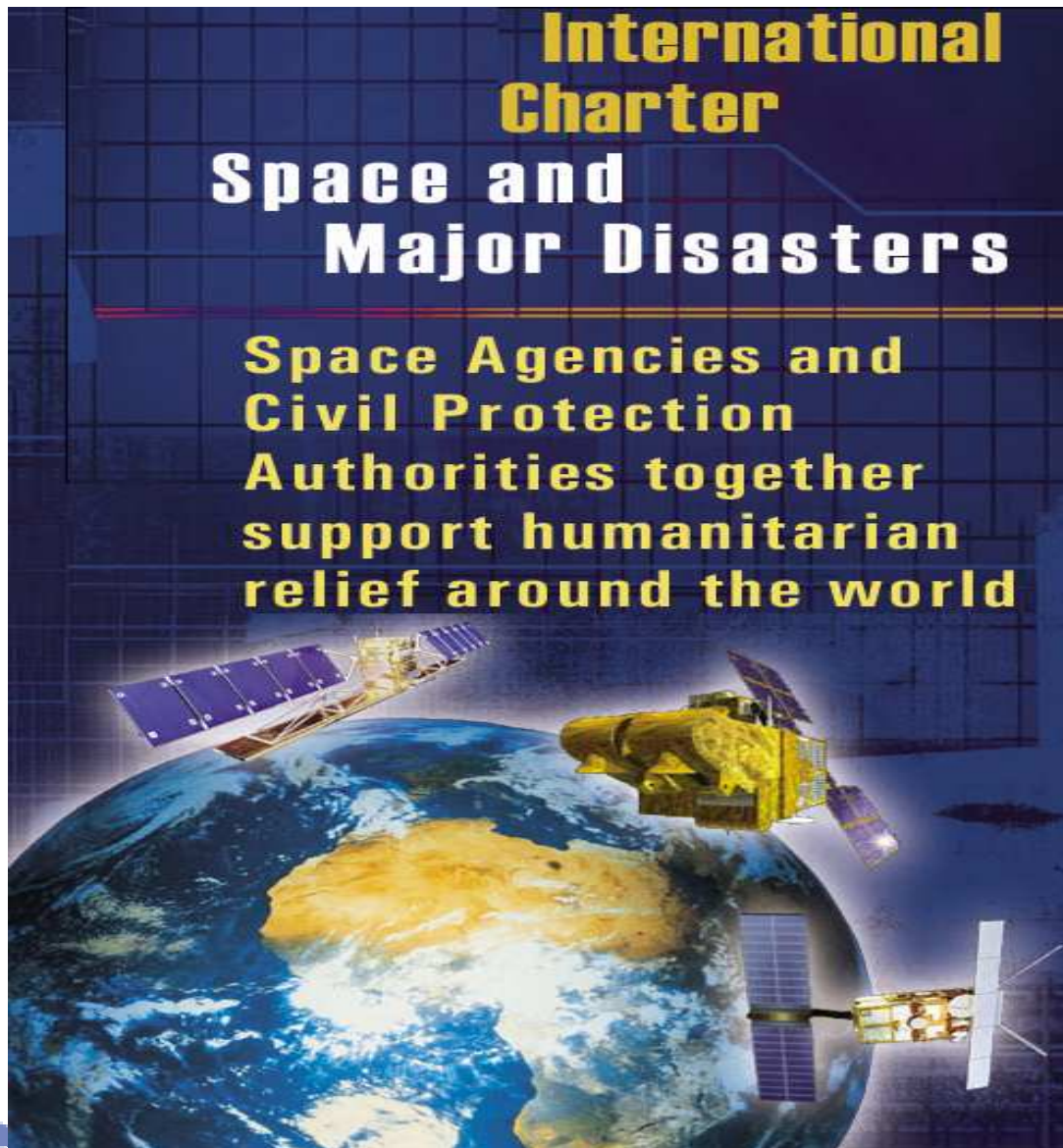


GRID requirements:

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



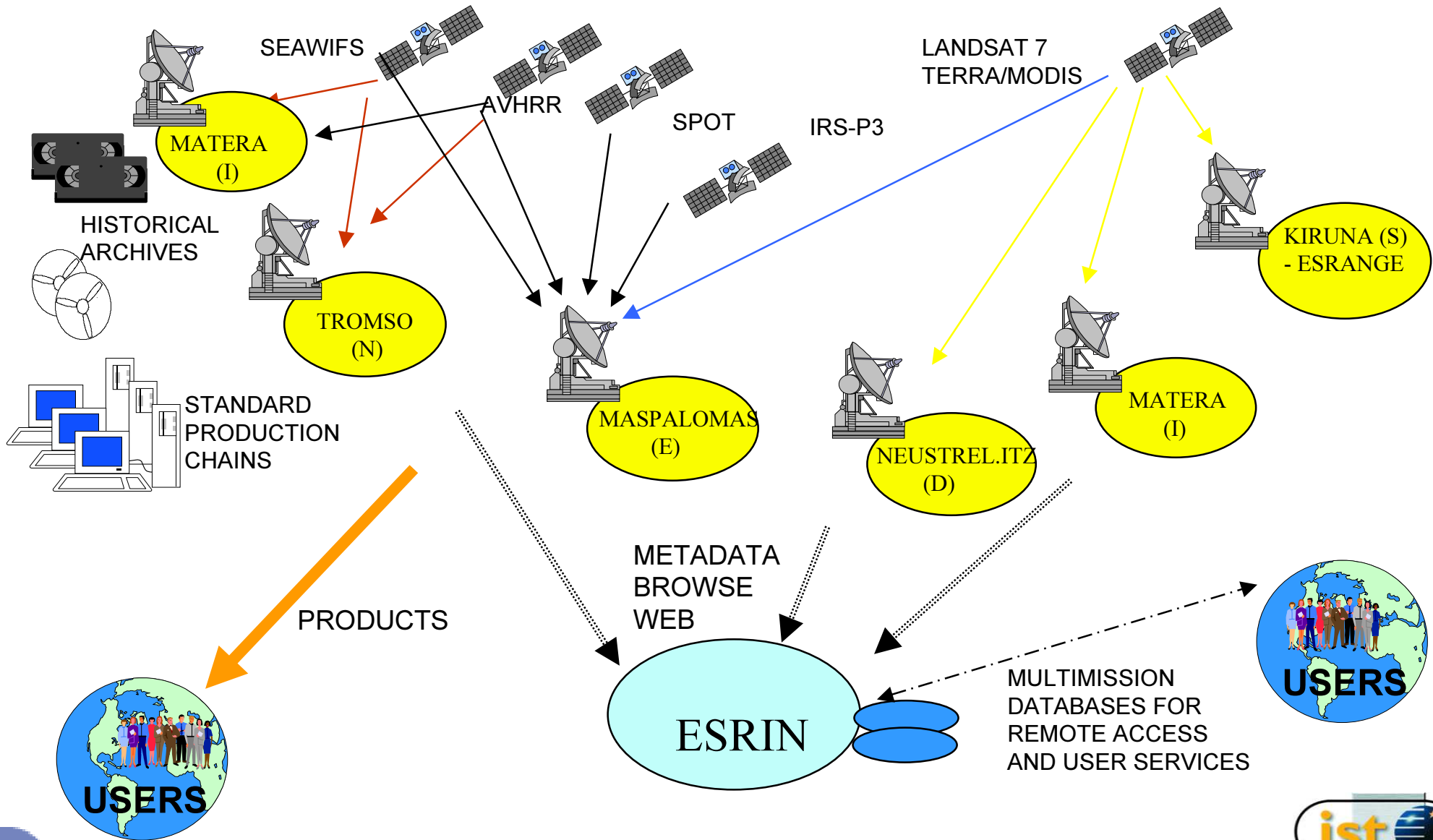
Charter for Disaster Management



- Provide a **single access point** to space systems to emergency & rescue organisations in case of disasters
- Participating Space Agencies: CNES, CSA, ESA, ISRO, NOAA, ...
- Missions: RADARSAT; ERS, (Envisat); SPOT; IRS; NOAA, ...

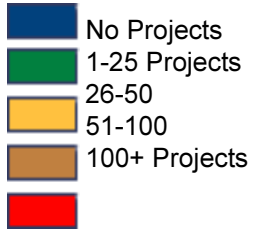


ESA EO facilities real-time infrastructure

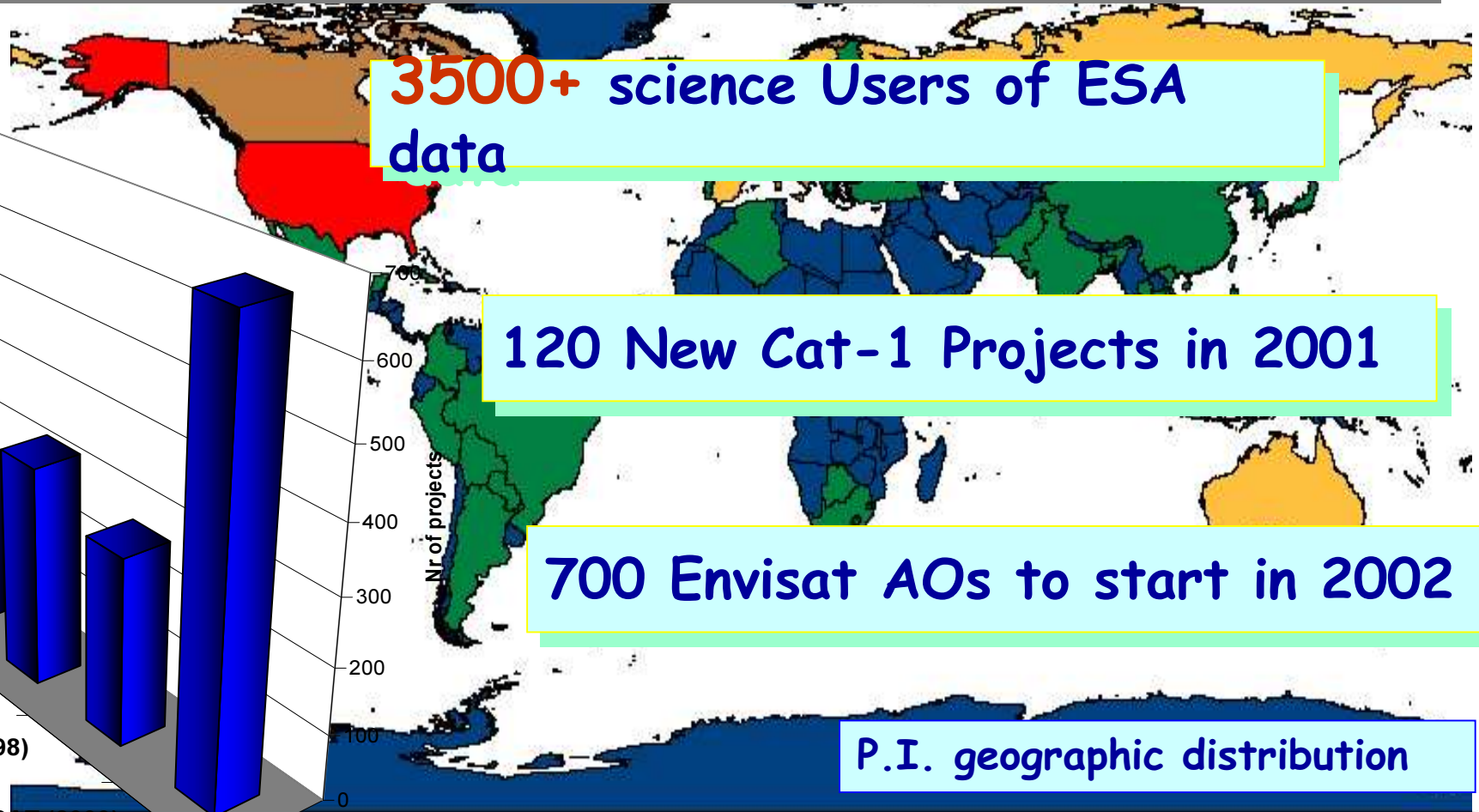


Envisat science community

Countries



AOs: Stimulating scientific research world-wide

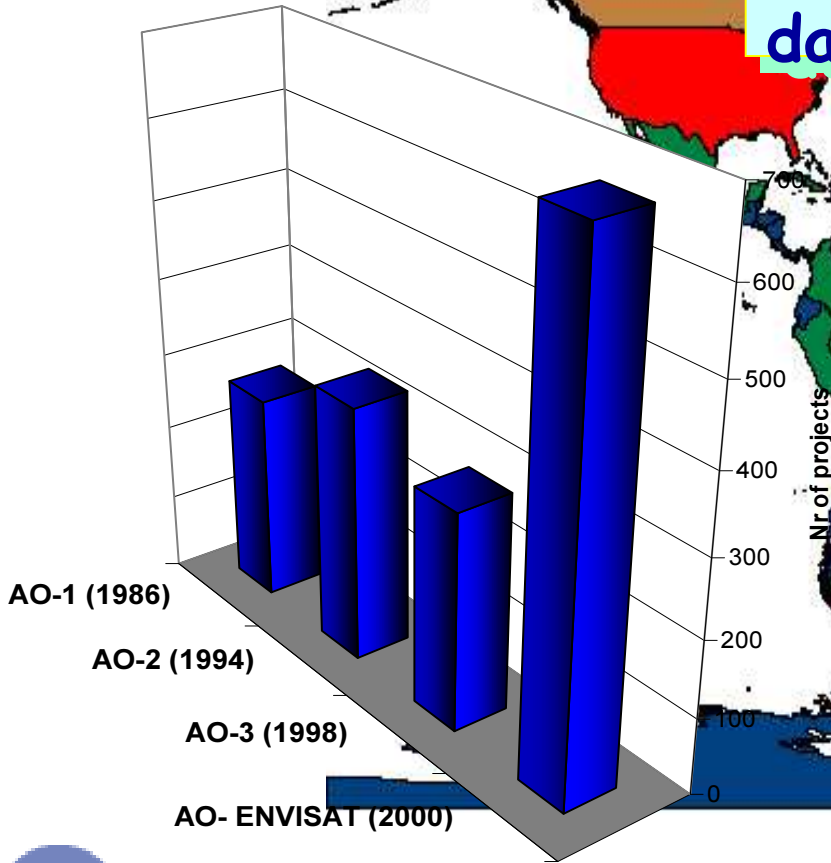


3500+ science Users of ESA data

120 New Cat-1 Projects in 2001

700 Envisat AOs to start in 2002

P.I. geographic distribution



Why GRID in EO? (1)

- ◆ EO Community: **Progressive refinement** of data from many data sources to **produce higher quality products**
 - Product generation chain involving **distributed organisations** and users
 - **Collaborative**: distributed users and data - large **international cooperation**
 - **Discovery**: **large numbers of products & resources**
 - **Interoperability** of catalogue and metadata already in operation
 - **Web based** data services

Why GRID in EO? (2)

- ◆ Massive, non-stop **data volumes**
 - **New** instruments, sensors & product types
 - Distributed **archives**
 - Historical dataset **reprocessing**
- ◆ **Complex** numerical processing algorithms
- ◆ Near **real-time** turnover

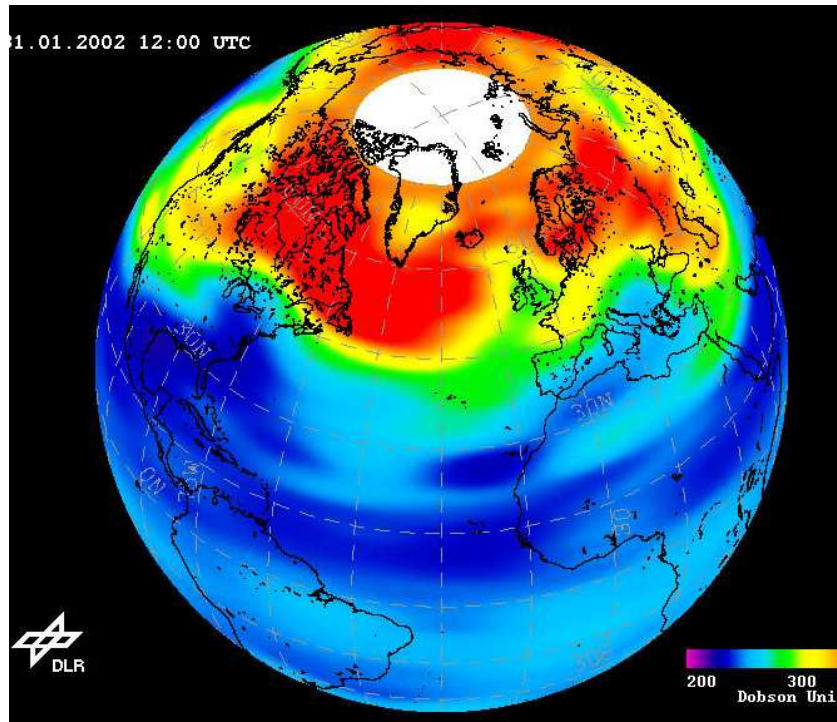
Needed GRID technologies

- ◆ **Resource-independent and application-independent services (middleware)**
 - authentication, authorization, resource location, resource allocation, remote data access,
 - accounting, security, quality of services, fault detection, real time services, ...
- ◆ **Specialized protocols, procedures, data standards, operational environments, interfaces to EO legacy systems...**
- ◆ **EO dedicated portal and user access...**

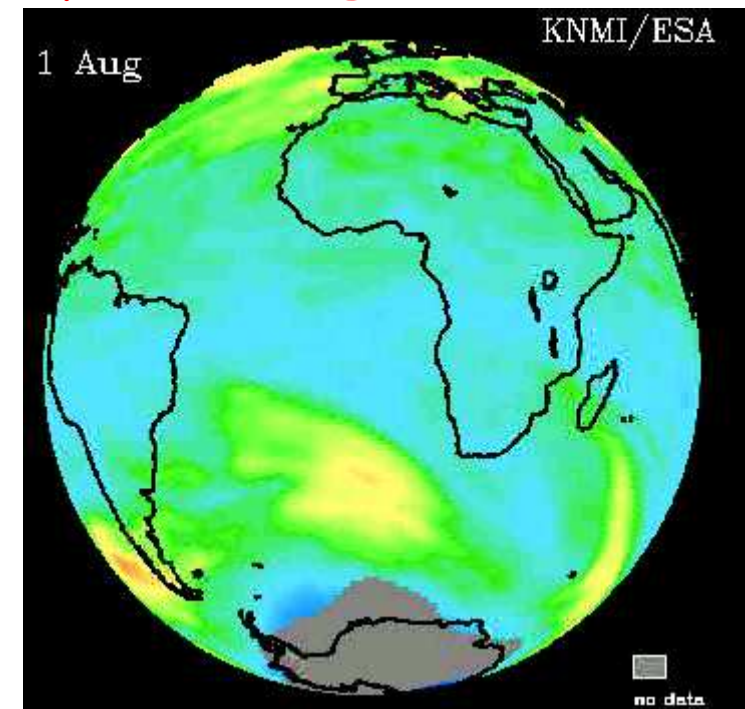
OZONE: a case of Global Environmental Monitoring

GRID requirements:

- Multi instrument **data fusion**
- **Distributed** data sources, science and institutional users
- **Complex data processing** (1d data = 20 d processing)
- **Near real time deliv.**



**GOME analysis detected ozone thinning over Europe
31 Jan 2002**



Application of DataGrid in EO



- ◆ **Focus on One EO application (Ozone) but explore:**
 - Collaborative environment, parallel data processing, ...
 - Interface to legacy and COTS systems
 - Develop generic components
 - Re-use components to add new applications
 - Integrate compatible technologies
 - Integrate other data types (new envisat instruments)
- ◆ **Testing in "controlled" GRID environment (ESRIN-ENEA) and in "wide-European" environment**
- ◆ **Feedback to DataGrid developers and Architecture Group**