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!

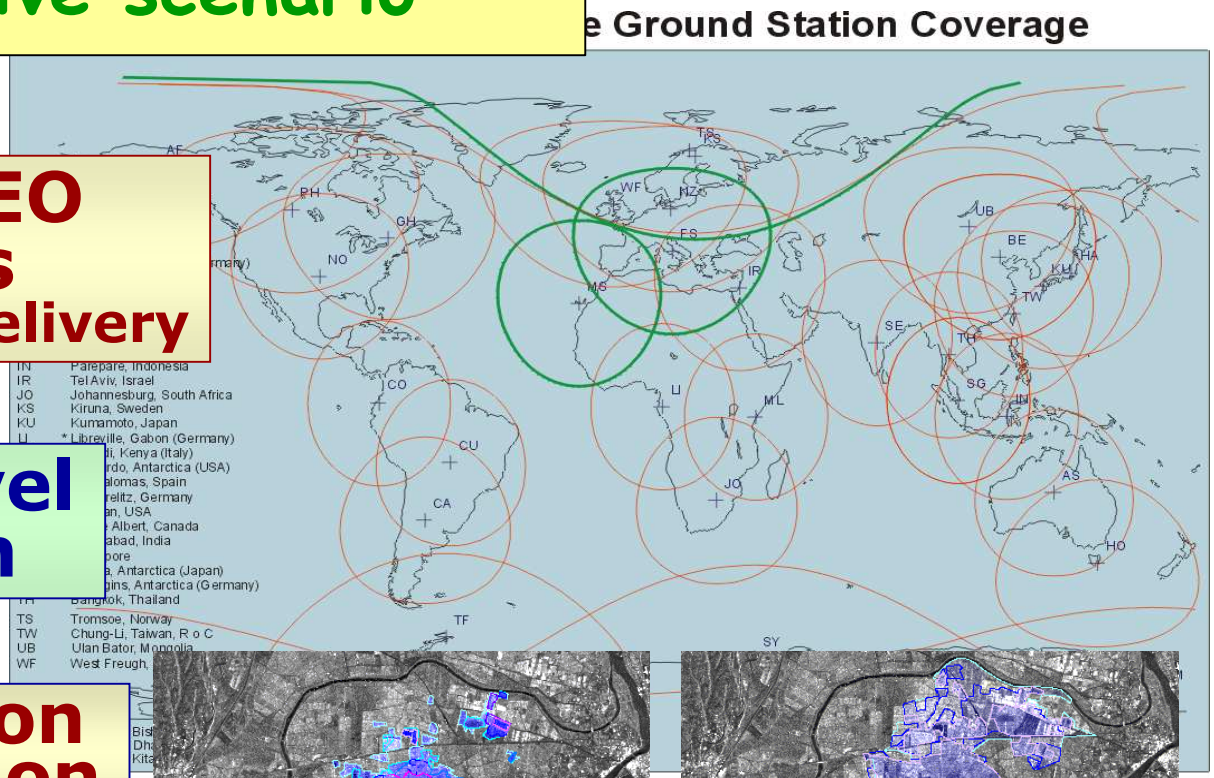
Data GRID

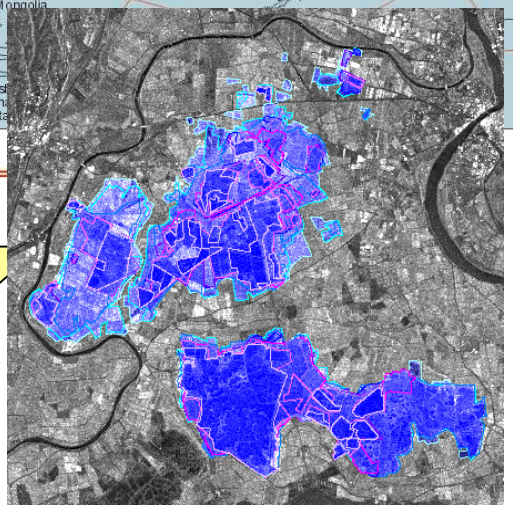
Common access to EO missions catalogues
Acquisition plan, order, delivery

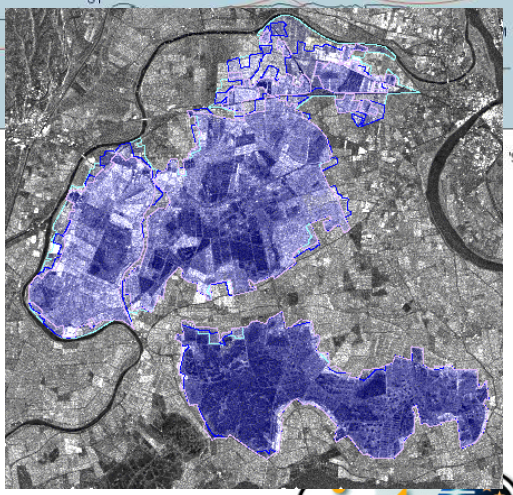
On demand high level products generation

Parametric data fusion and models integration

Collaborative publishing of results

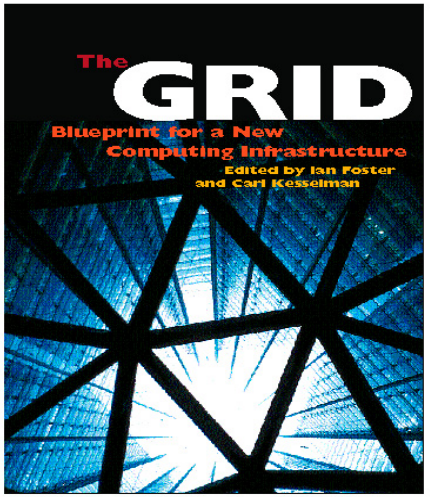






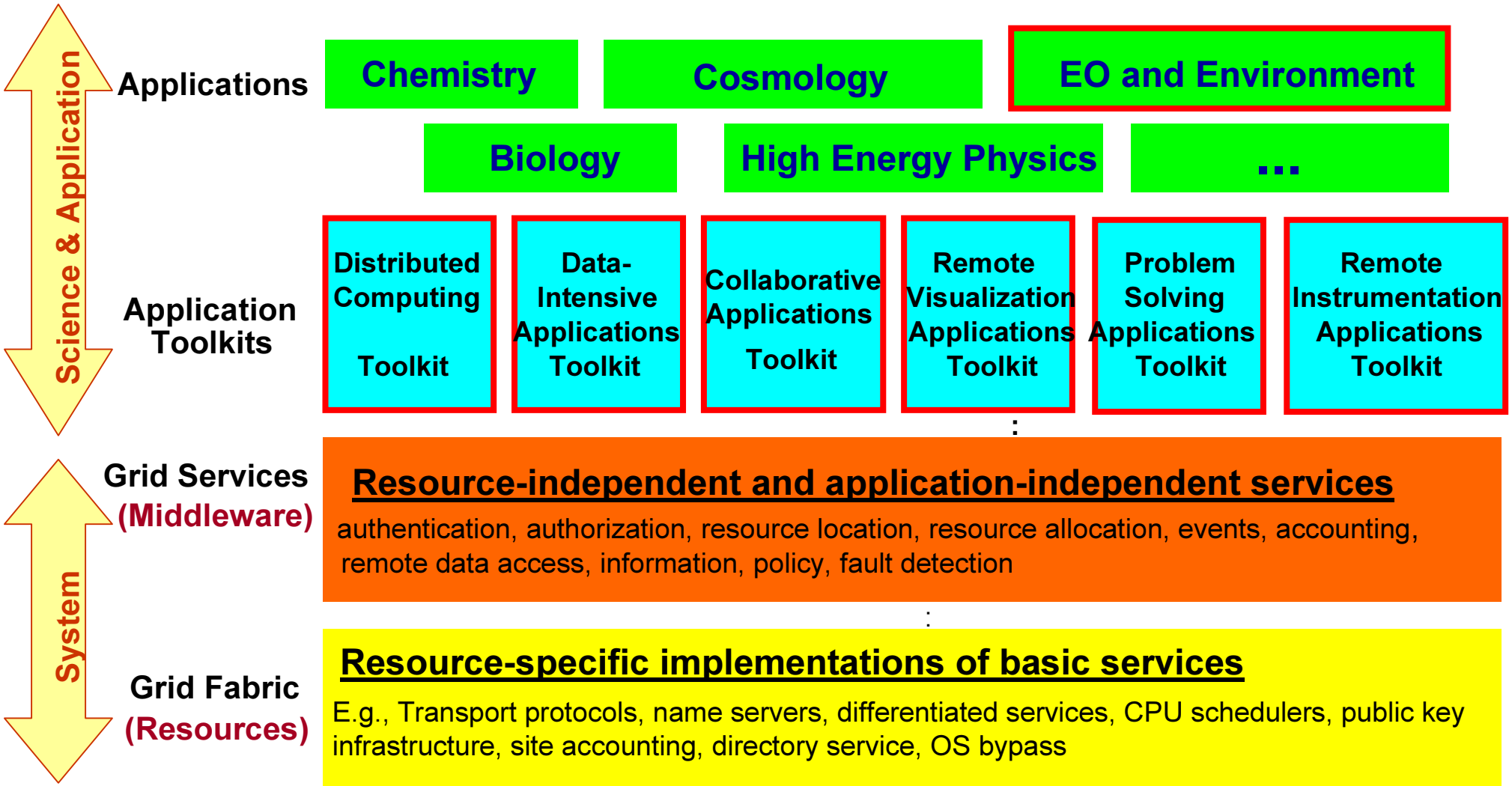
EO and Network Computing data models: EO is more than "parallel task execution"!!

- 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

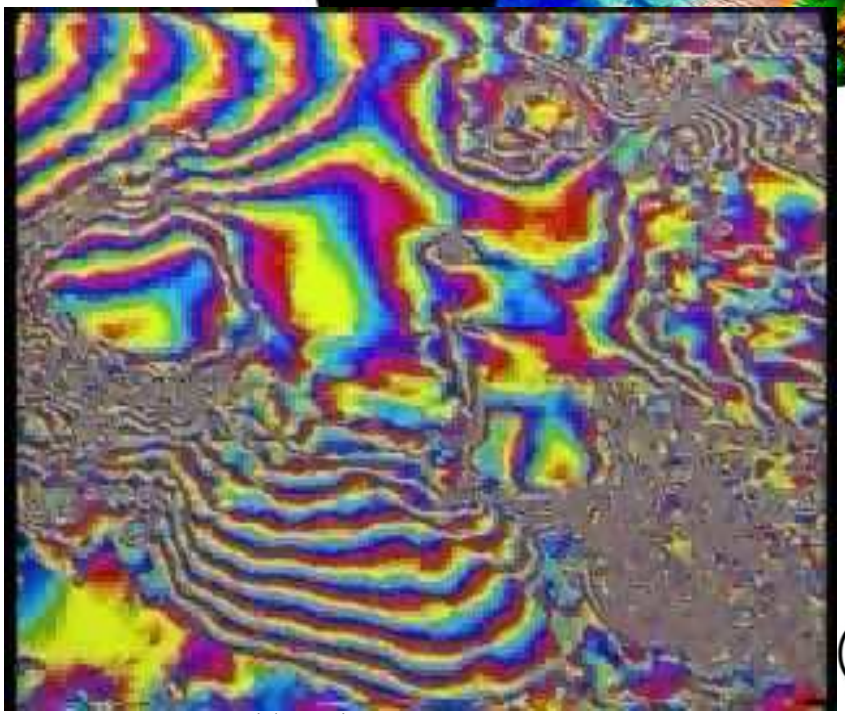
The Grid from a Services View



Number crunching: interferometry, subsidence, DEM generation

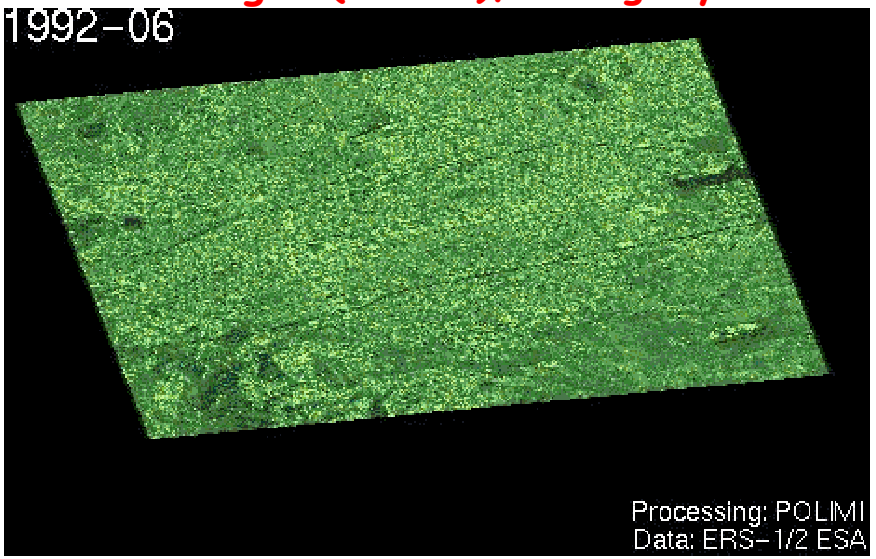
Review!

Digital Elevation Model



Pomona (Cal): subsidence velocity fields

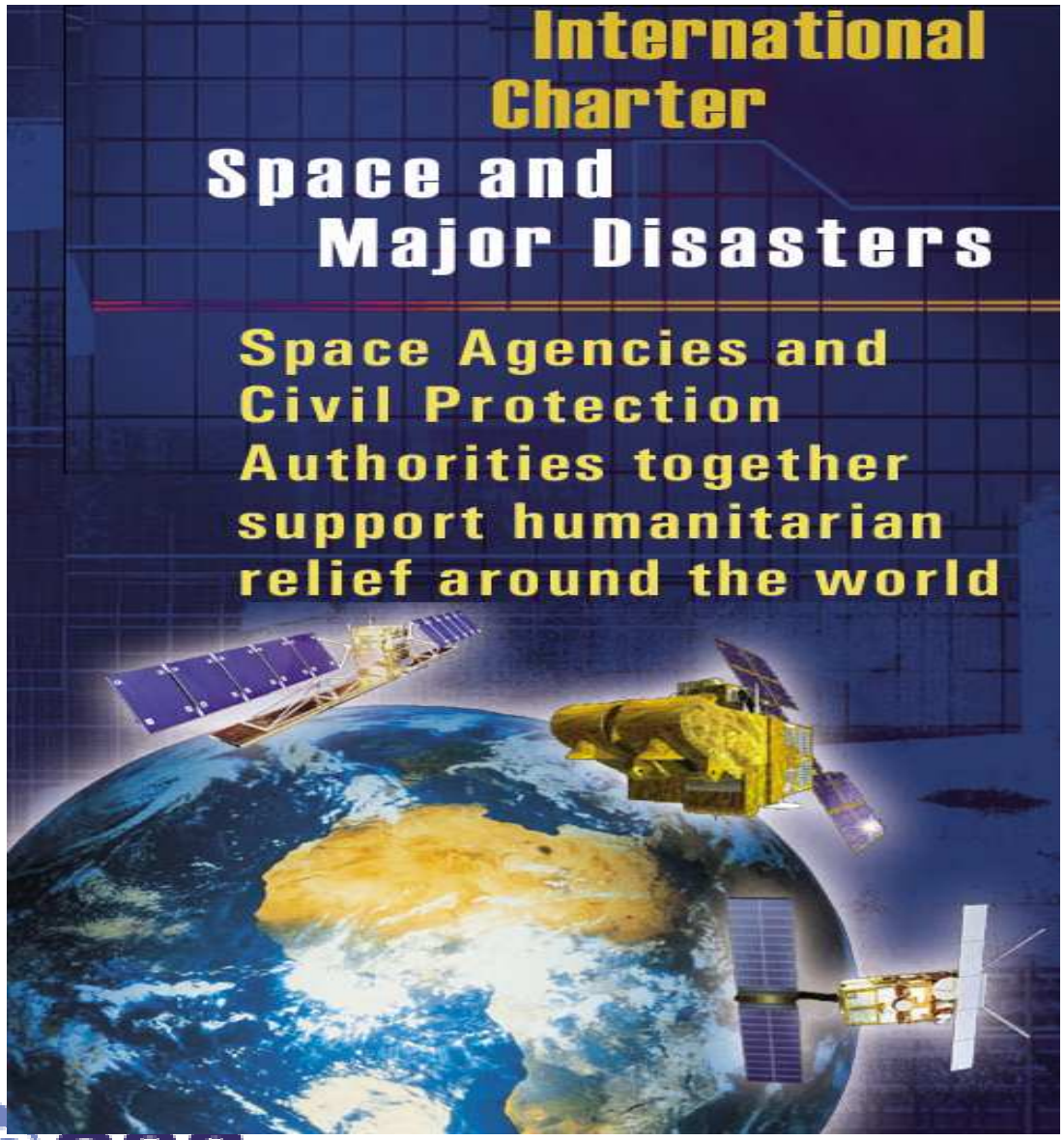
40 ERS1/2 images (92-99), Ambiguity: 28 mm



GRID requirements:

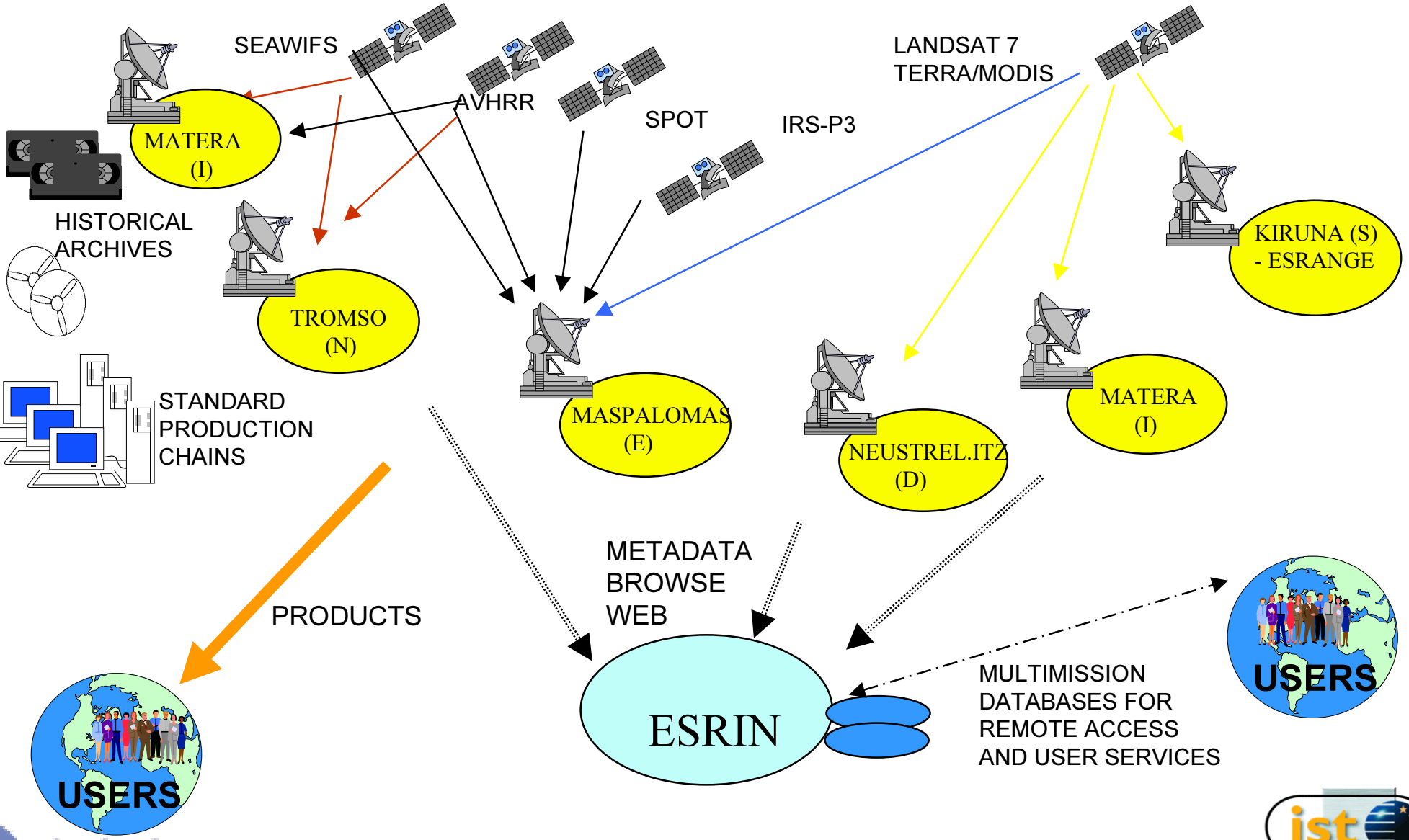
- large data files (10+ GB)
- stages with intensive processing
- science driven value adding

Charter for Disaster Management

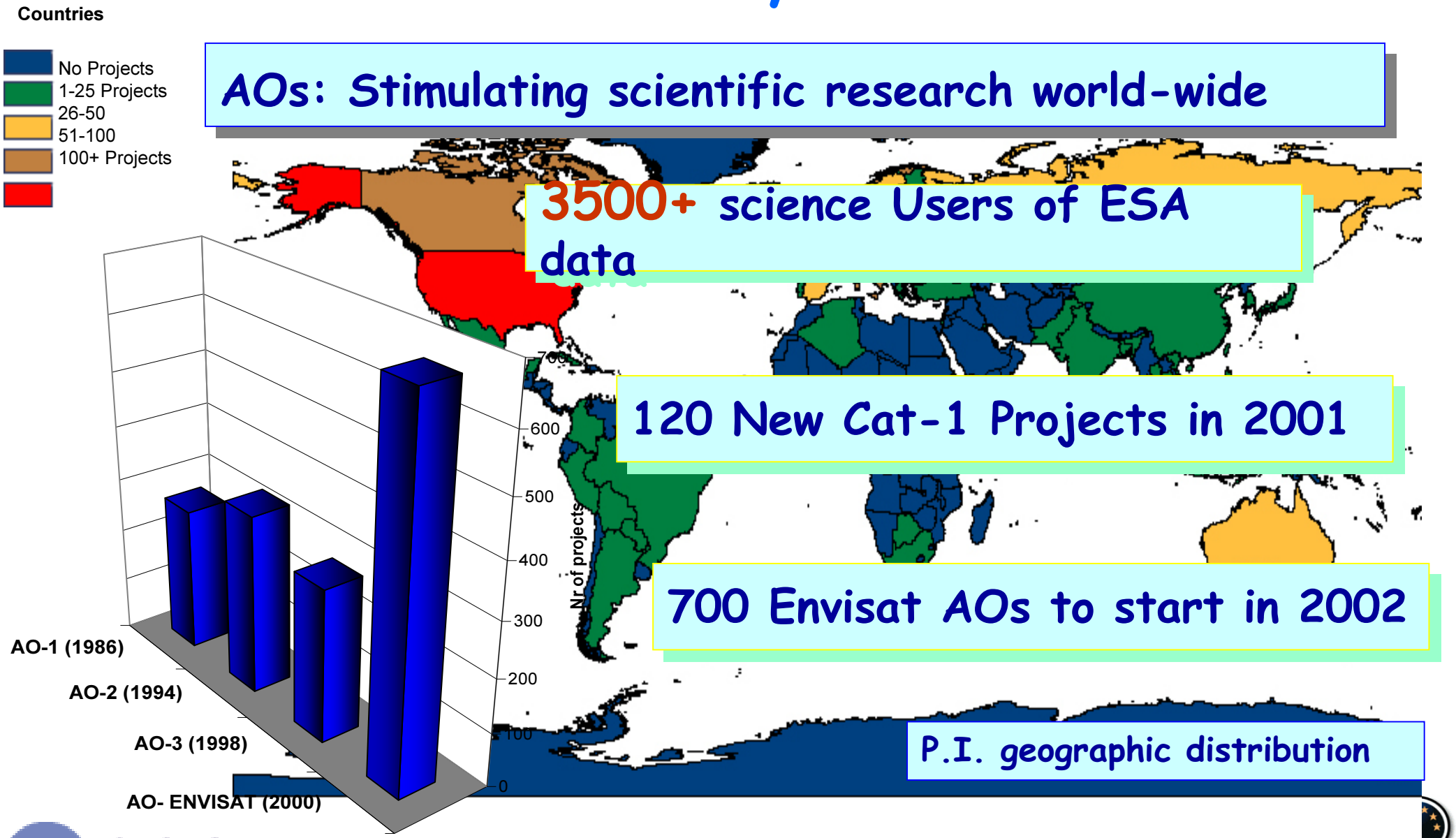


- Provide a single access point to space systems to emergency & rescue organisations in case of disasters
- Participating Space Agencies: CNES, CSA, ESA, ISRO, NOAA, …
- Missions: RADARSAT; ERS, (Envisat); SPOT; IRS; NOAA, …

ESA EO facilities real-time infrastructure



Envisat science community



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
  - Interoperabiltiy of catalogue and metadata already in operation
  - Web based data services

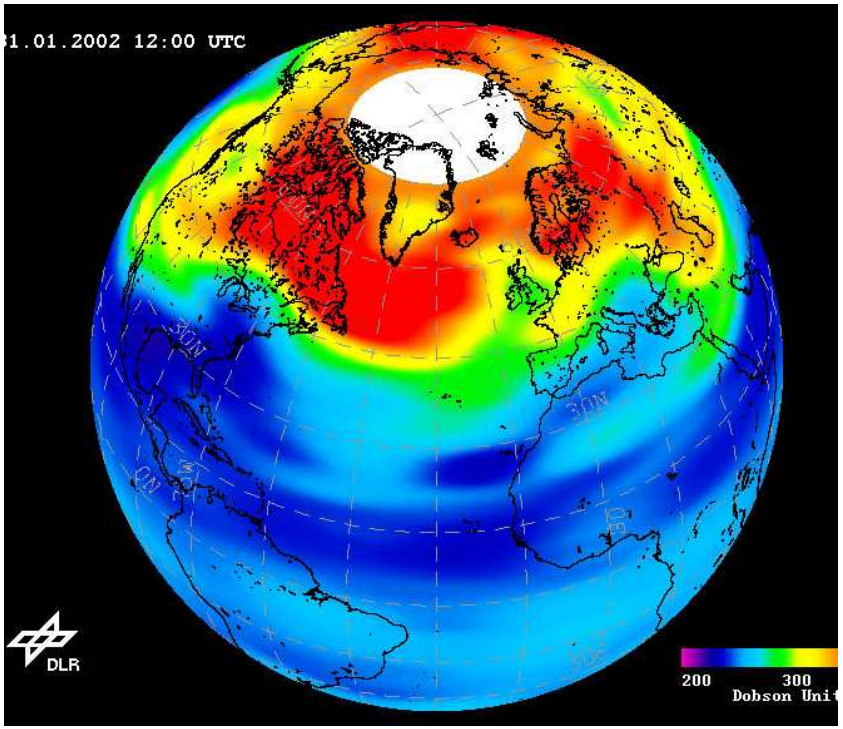
Why GRID in EO? (2)

- 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…

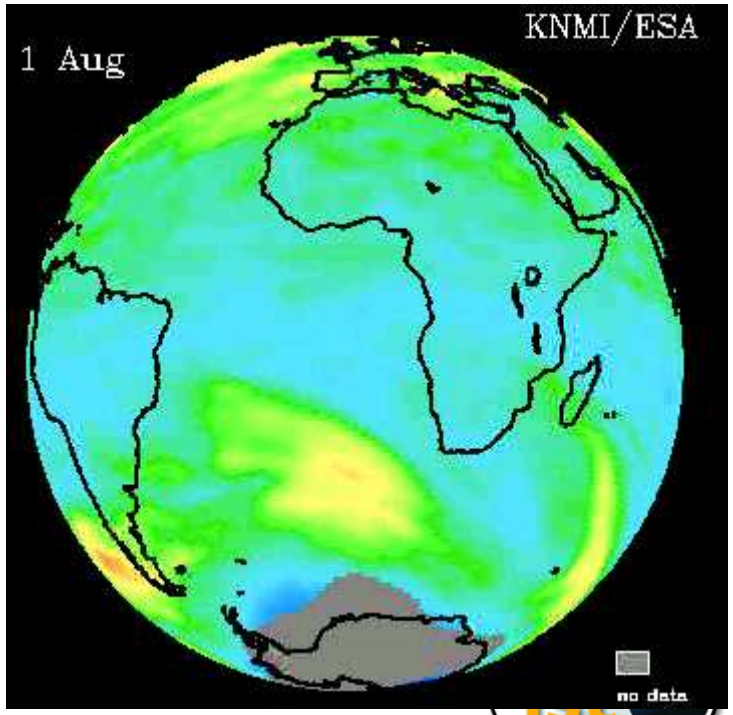
OZONE: a case of Global Environmental Monitoring



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 = 20 d processing
- Near real time deliv.



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