

What is going on in ESA:

GRID, space technologies and environmental applications

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<http://esagrid.esa.int>

ESAGRID workshop - ESTEC, 25 October 2002



Summary

- ESA, space applications and GRID potential
- Specific Earth Observation actions

New European Space Applications Missions

ENVISAT 2002

**ARTEMIS
2001**

Ariane 5

MSG 2002

SPOT 5 2002

METOP

EGNOS & GALILEO

Strategy for space application

◆ Integrated and multi-discipline approach e.g.

- Earth Observation missions, GALILEO and Communication for precise location and timely access to information (e.g. disaster management)
- Modeling, simulation and Decision Support Systems

◆ Convergence of Applications for defined user communities

- Environmental Monitoring institutional and science community

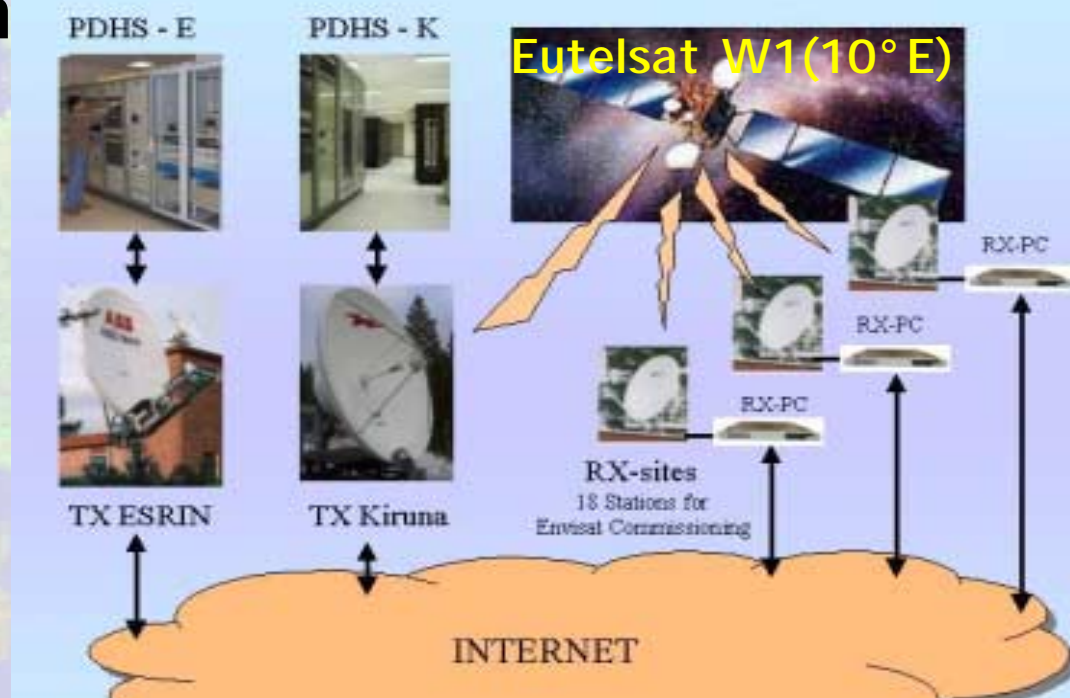
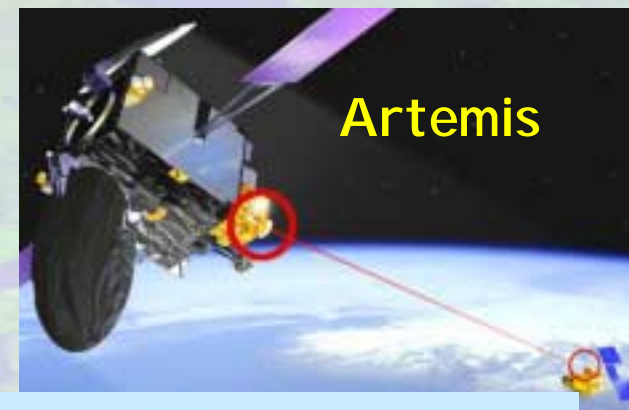
Emerging technologies complementing space

- ◆ Fast access to networks and data, interoperability
- ◆ Distributed and Massive Processing Systems (GRID)
- ◆ Mobile computing
- ◆ Internet services
- ◆ Real time processing
- ◆ ...

Satellite communication capabilities

Extending ground high speed capacity

- Data relay
- Data dissemination
 - DVB broadcasting
 - Difficult sites
- Multi-media
 - New generation



Telemedicine: ESA funded activities

Interactivity level

Simmetric

One way

*Emergency
Consultation*



Teleconsultation



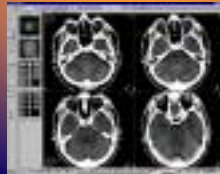
Medical Simul.



*Medical
Education*



*Access to
MM DBs*



*Monitoring
@Home*



CME



All of GRID
Interest...



*Hi-End:
large
processing
interest*

Communication speed

10 kbit/s

100 kbit/s

500 kbit/s

2 Mbit/s

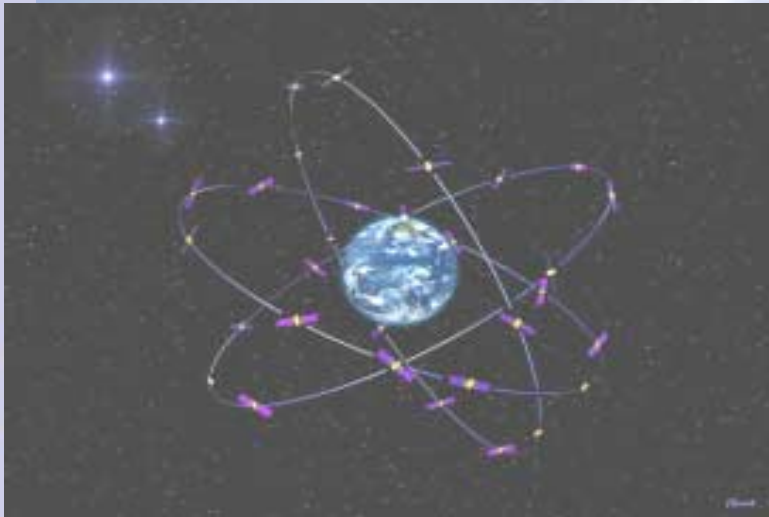
8 Mbit/s

50 Mbit/s

The European Galileo programme

Galileo is a EC-ESA joint initiative to provide Europe with a civil satellite navigation infrastructure

Satellite navigation will enable the development of a large number of applications in several transport and non-transport domains



J. Huart

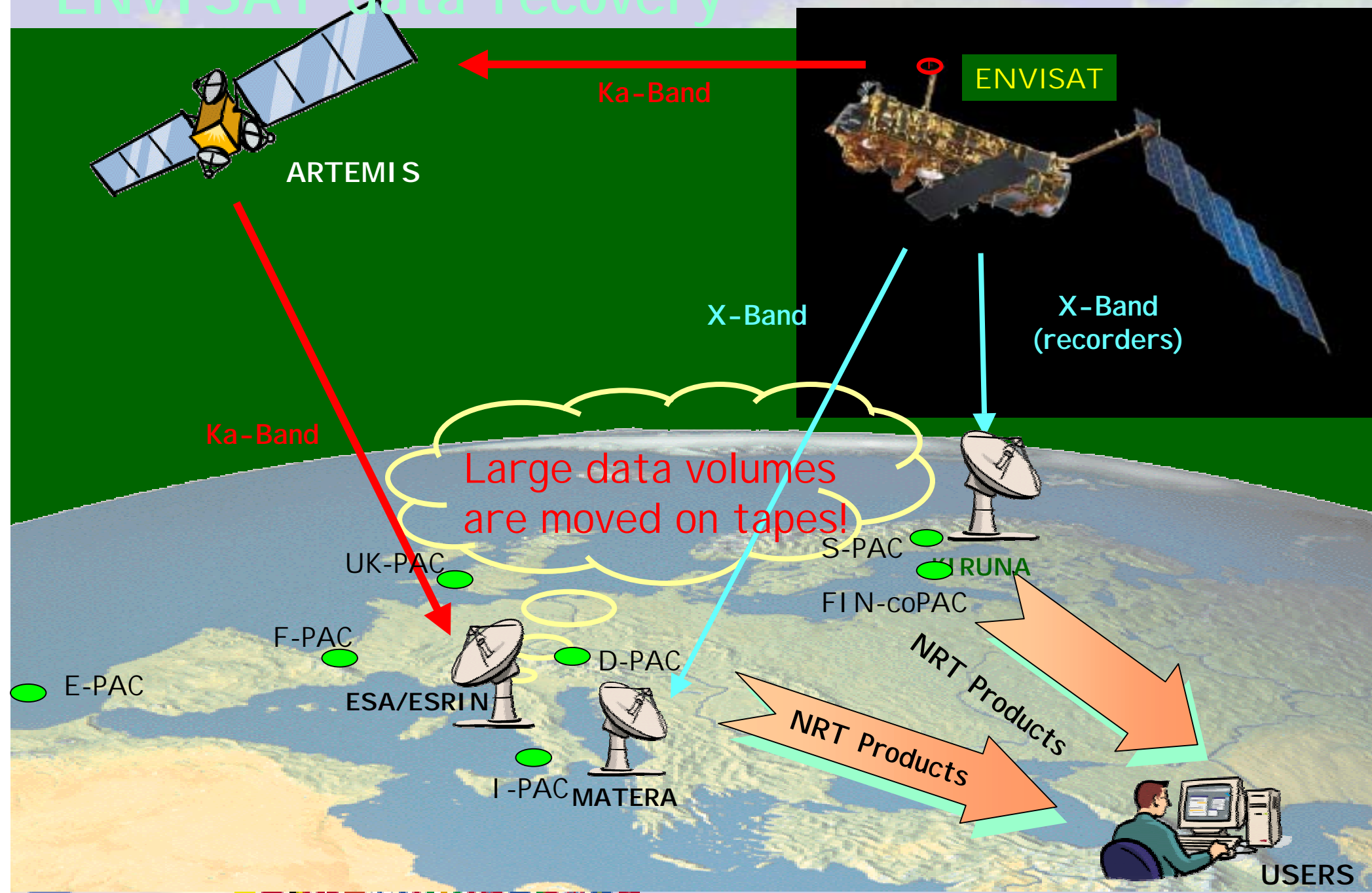
Galileo professional applications

- ◆ Agriculture
- ◆ Fisheries
- ◆ Forestry
- ◆ Civil Engineering, Mining, Oil ...
- ◆ Surveying and Mapping
- ◆ Emergency application
- ◆



GALILEO Added – value : higher accuracy, service guarantee, integrity

ENVISAT data recovery



Envisat science community: Announcement of Opportunity

Countries

No Projects
1-25 Projects
26-50
51-100
100+ Projects

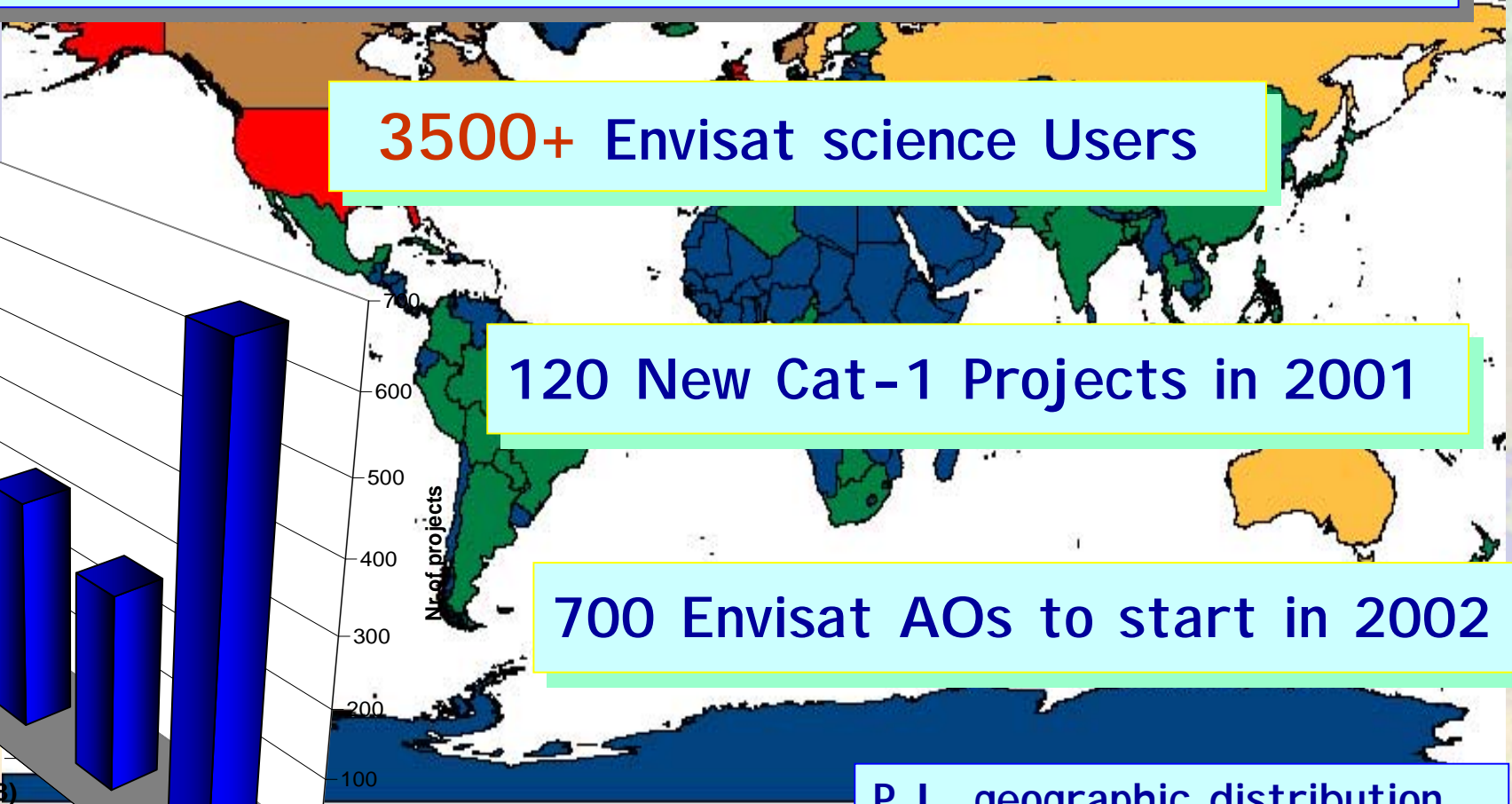
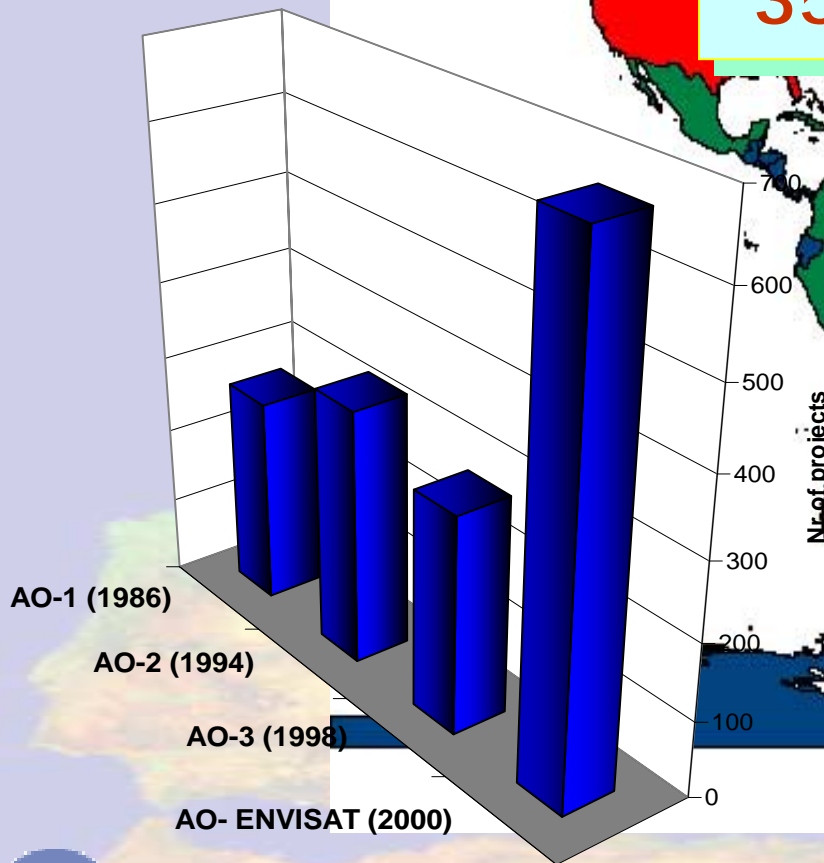
AOs: Stimulating scientific research world-wide

3500+ Envisat science Users

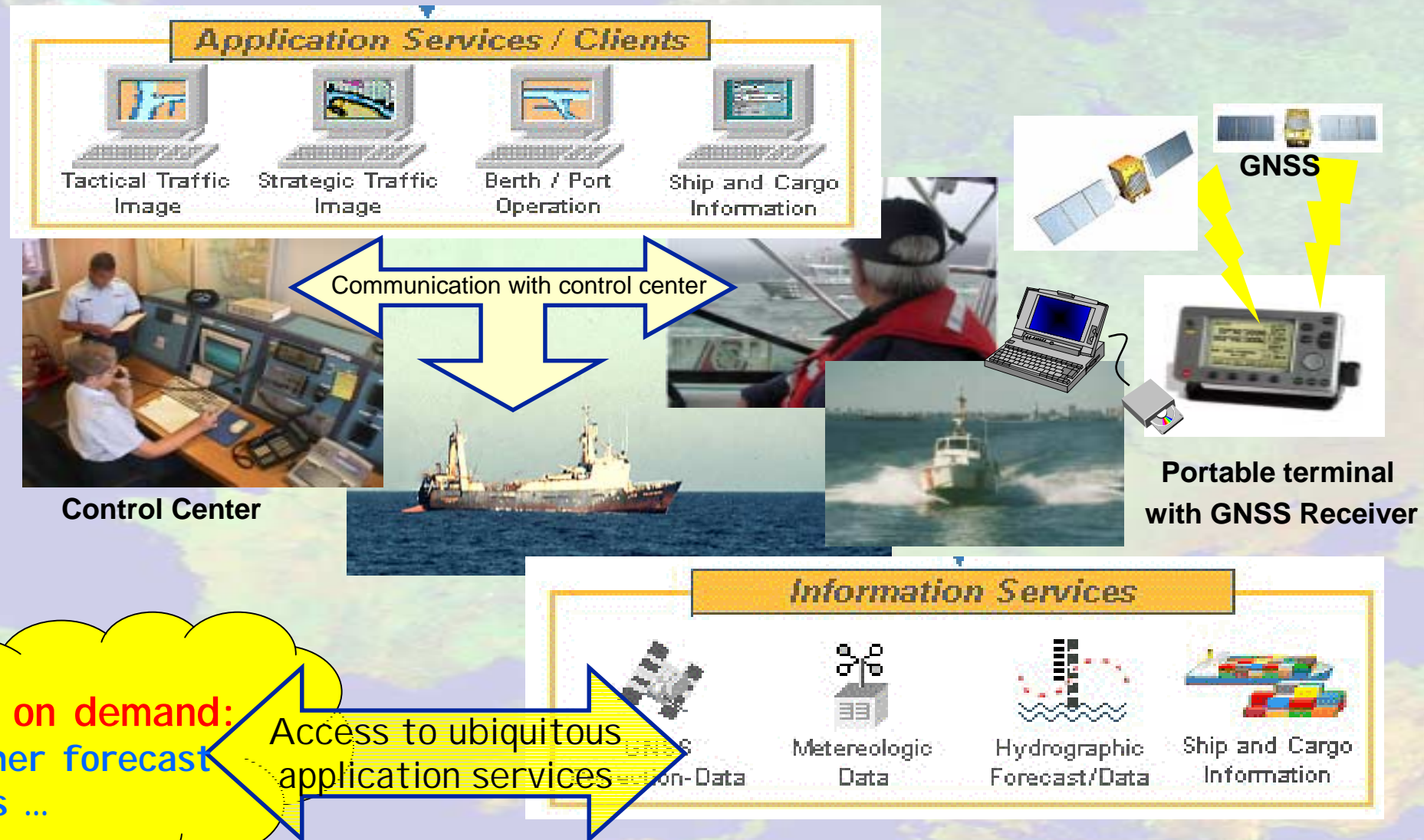
120 New Cat-1 Projects in 2001

700 Envisat AOs to start in 2002

P.I. geographic distribution



Integration of emerging space and Grid technologies: marine application



Why GRID?

- ◆ Space and Earth Science approach based on **Progressive refinement** of products from many data sources
- ◆ Product generation chain involve **distributed organisations**
- ◆ Large **international cooperation**
- ◆ **Interoperability** of data handling tools
- ◆ **Value adding industry** can take full advantage

ESAGRID Interest Group

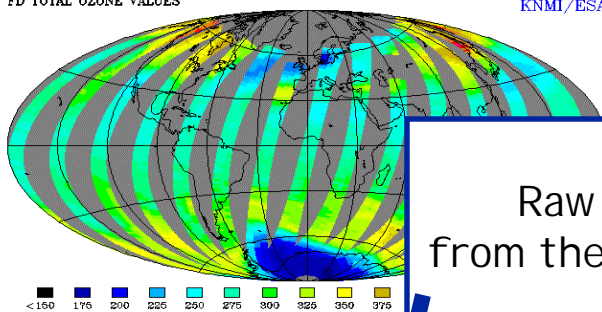
- Started as follow-on of ESA participation to **DataGrid**
- Industrial multi-discipline requirement study – **SpaceGrid** (funded by General Study Programme)
- Discussion group for formulating internal **plans for a space application GRID infrastructure**
 - ◆ **Improve access** to European Research Infrastructures
 - ◆ Promote **International Cooperation** in Space related applications: EIROFORUM, CEOS, ...
 - ◆ Involve of user communities and **Space industry**
 - ◆ Internal **lobbying for funding**

Summary

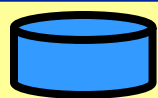
- ESA, space applications and GRID potential
- Specific Earth Observation actions
 - ◆ DataGrid EO Testbed (with KNMI , IPSL)
 - ◆ Integrating EO operational user services in DataGrid
 - ◆ Promoting DataGrid in CEOS (NASA, USGS, NOAA...)



EO DataGrid challenge: Processing and validation of 1 year of GOME data

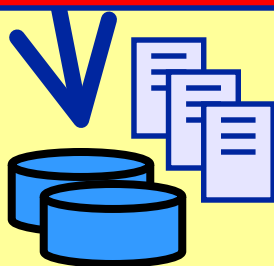


Raw satellite data
from the GOME instrument



Level 1

ESA - KNMI
Processing of raw GOME
data to ozone profiles
With alternative algos



Level 2

Lidar



LIDAR
data

IPSL

Validate GOME ozone profiles
With Ground Based measurements

DataGrid

Visualization



EO GRID Architecture Layers

Application

Problem Solving
Environments &
Frameworks

Desktop
Application
(GRID Surfer)

EO Web
Portal

EO Applications
Tools & Services

Open GIS
Web
Services

MUIS
Catalog

Processing
Algorithms

Validation
Algorithms

Data
Packaging

Grid Application
Interfacing

EO GRID
ENGINE

Web Interface
Services

JDL
Composition

Job
Execution

Data Transfer &
Replication

Metadata
Management

Archive
Management

Data Grid
Middleware
Services

User
Interface

Information
Index

Replica
Catalogue

VO
Directory

Grid
Security

Resource
Broker

Computing
Elements

Replica
Manager

Storage
Elements

GRID

Local
Resources

Computing
Cluster

Disk
Pools

Archive
Storage

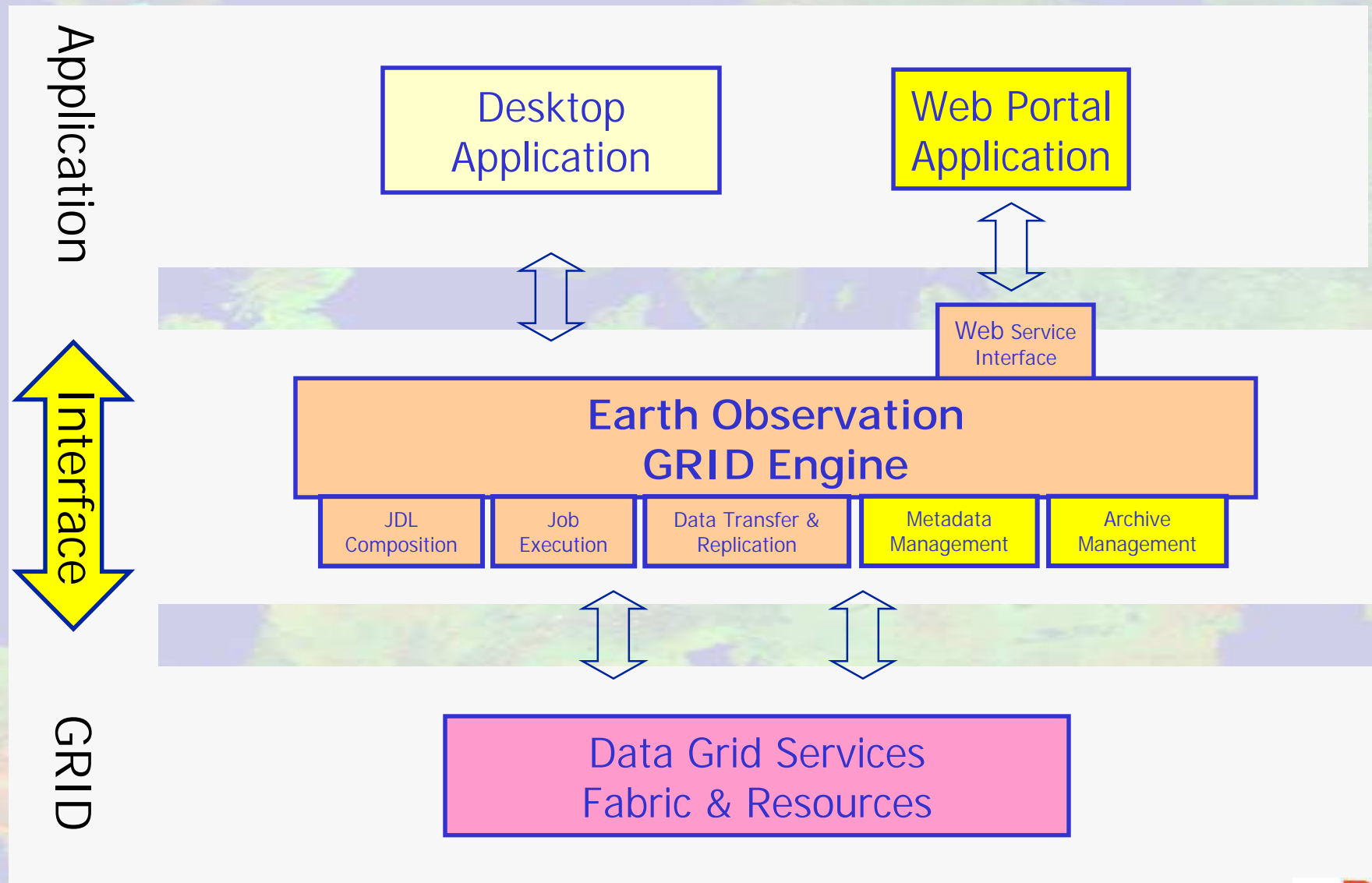
Grid
Gateway

Metadata
Catalogue

Network
Service

middleware
Data
GRID

Earth Observation Grid Engine



EO DataGrid web client user interface



NEW!

esa GRID on-Demand
European Space Agency

General Parameters:

Date: 1997-10-02
Dataset: ERSIDOME LVL11

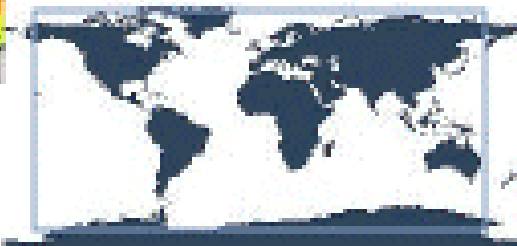
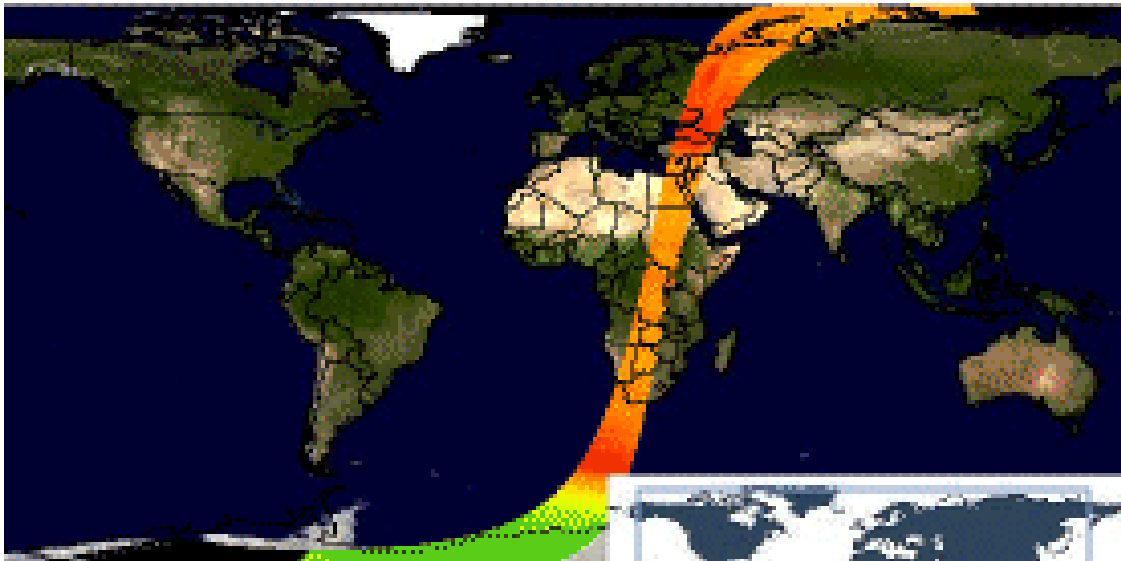
Functions available:

- Layers*
- Presentation Styles*
- Query Catalogue
- Restart

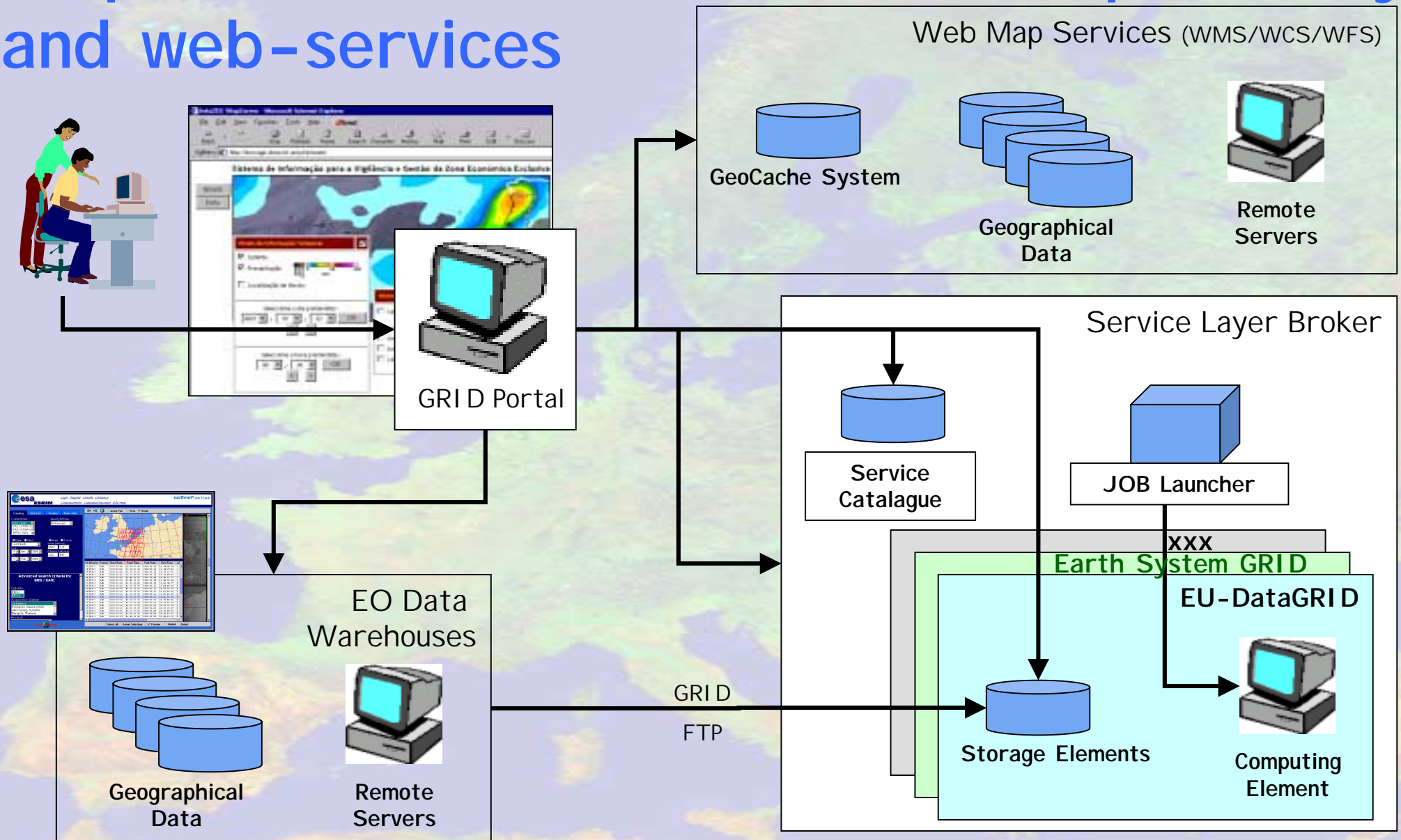
* not available in this version

Process Schema

- 1** MRS Catalogue
71002114 LV1
71002095 LV1
71002081 LV1
Retrieve or Preview (ATSR2)
- 2** Storage Element
71002081 LV1
Process file using the GRID
- 3** GRID
71002081
View Resulting File



Proposed EO GRID testbed: inteoperability and web-services



Catalogue interoperability

<http://odisseo.esrin.esa.it>

Earthnet On-Line Interactive (EOLI) - Netscape

File Edit View Go Communicator Help

esa **ODISSEO**
Open Distributed Information & Services for Earth Observation
European Space Agency

Login Logout Register ContactUs OdisseoHome CataloguePopulation EOLI Help You are not logged in

Catalogue Shop Cart Orders User Set ESA Sets

Collections:
ERS / SAR
ERS / SWM
ERS / WSC
ERS / ALT

Query Mode:
Standard

Date:
User Defined Date:

Area:
Center (Lat/Long):
39.67 2.88
Extension (Lat/Long):
1.36 1.59

From:
14 May 2001

To:
21 May 2002

1 record selected

Id	Product	Mission	Sensor	Start Date
1	RAW	Landsat-5	TM	2001-06-02
2	RAW	Landsat-5	TM	2001-06-02
3	RAW	Landsat-5	TM	2001-06-18
4	RAW	Landsat-5	TM	2001-06-18
5	RAW	Landsat-5	TM	2001-07-04
6	RAW	Landsat-5	TM	2001-07-04
7	RAW	Landsat-5	TM	2001-07-20

Display

CEOS

Document: Done

Access to catalogue-systems and direct ordering of data. With high-speed networks even the data can be sent via the network!

GAF - IONIC Geographical Application Framework - Netscape

File Edit View Go Communicator Help

Bookmarks Location: <http://mapserv2.esrin.esa.it/map/wtf/> What's Related

esa **Web map server** European Space Agency

<http://mapserv2.esrin.esa.it/map/wtf/>

scale 25629535
X -136.25
Y -127.3
scale 25428574

ABOUT IONIC ESRIN

Data from 1999-01-01 to 2000-12-07

Search by

- Country
- Date

Oil spill monitoring near the Suez canal (ESA).
On the background 1x1 km² MODIS (NASA).

X 32.39
Y 31.53
Scale 2768961

GML

CEOS

Document: Done



Thank you!