



EPOS Implementation Phase: TCS Satellite Data

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EPOS IP: TCS Satellite Data

Two levels of products and services, mainly based on Satellite Radar data (SAR):

Standard: Earth surface displacement maps

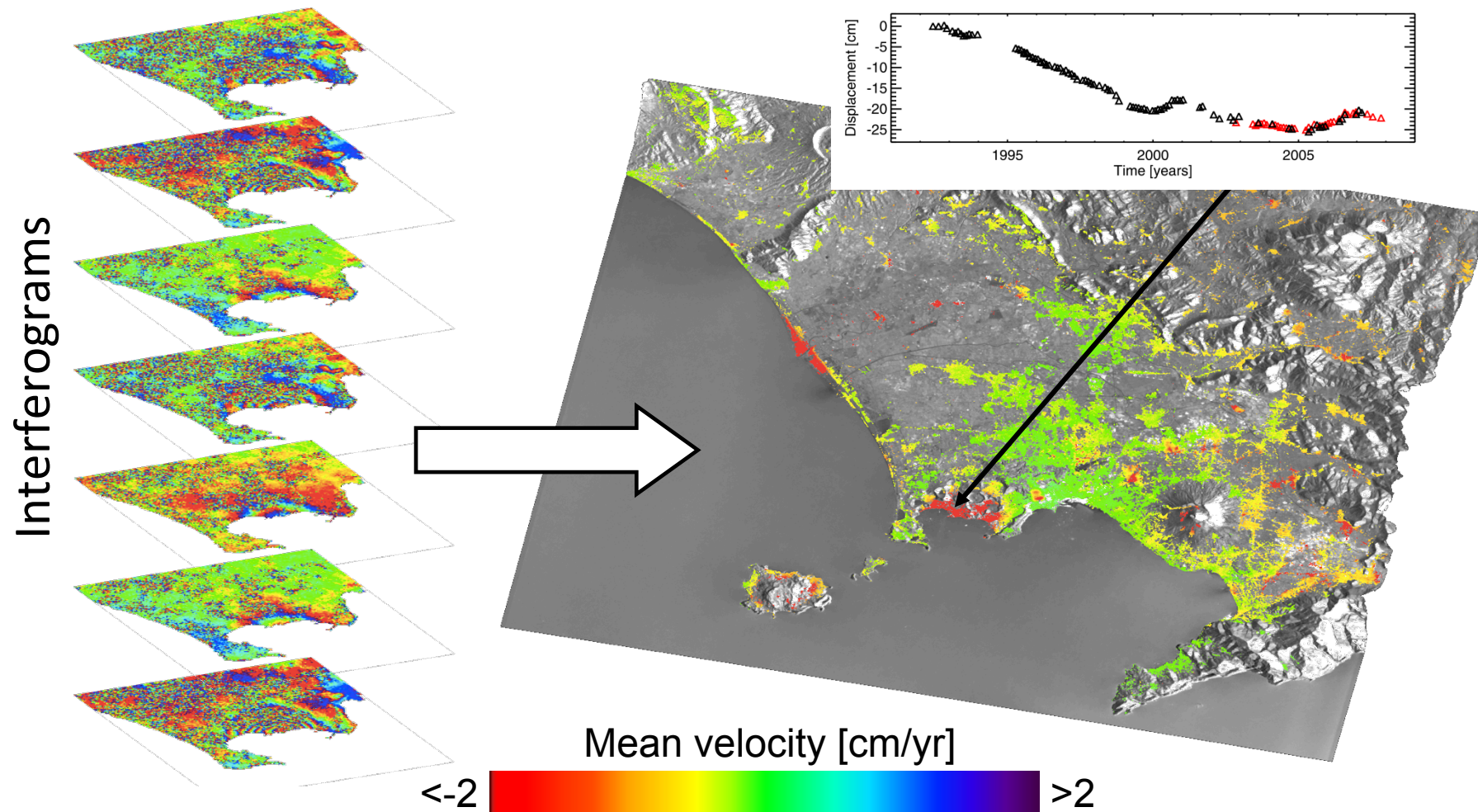
Value-added: geophysical parameters retrieval

- EPOSAR Italy Standard and Value-added
- GDM France Standard
- COMET UK Standard and Value-added
- 3D-Def Spain Value-added
- MOD Germany Value-added

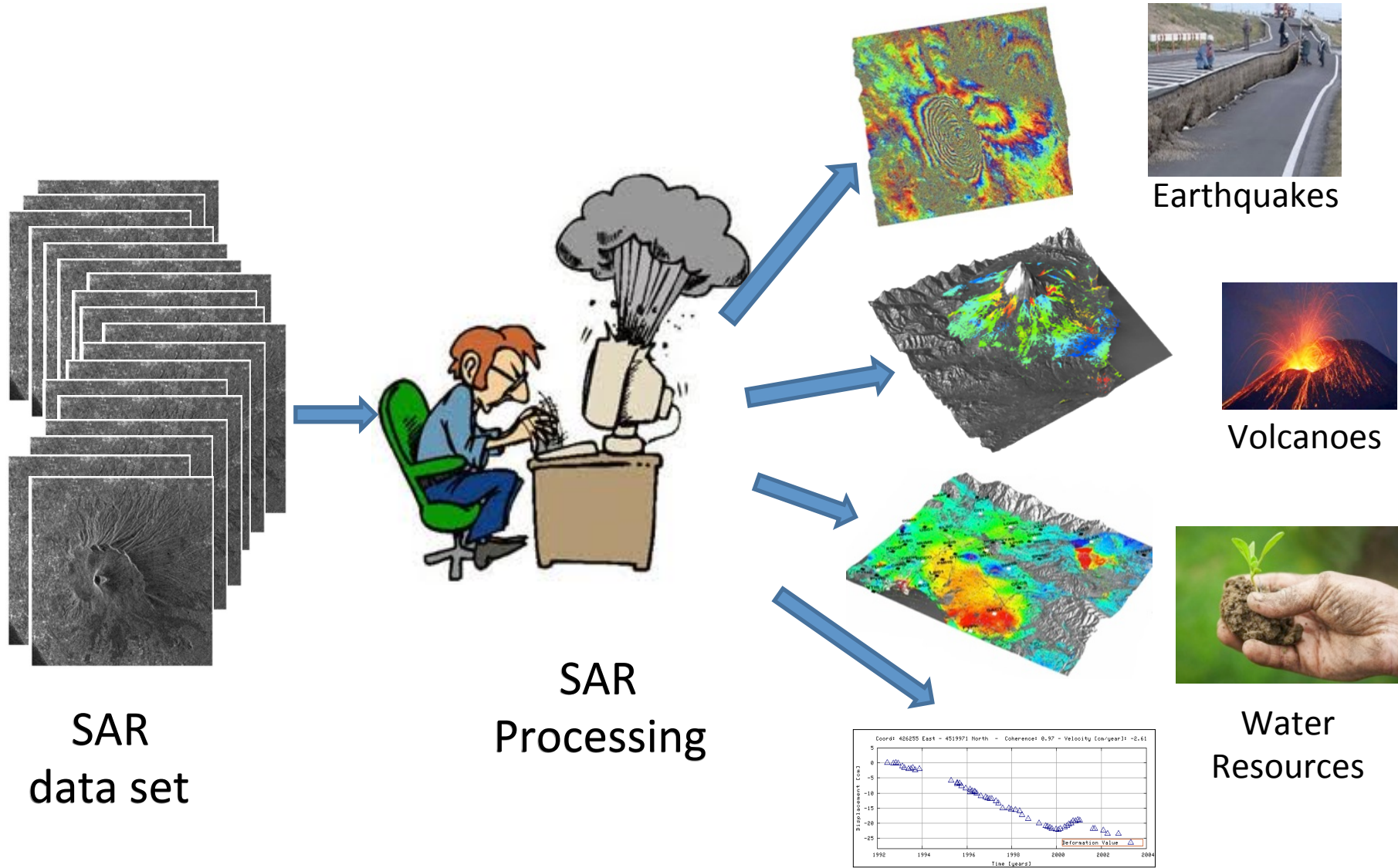
Each service requires an appropriate infrastructure

EPOSAR service (Italy)

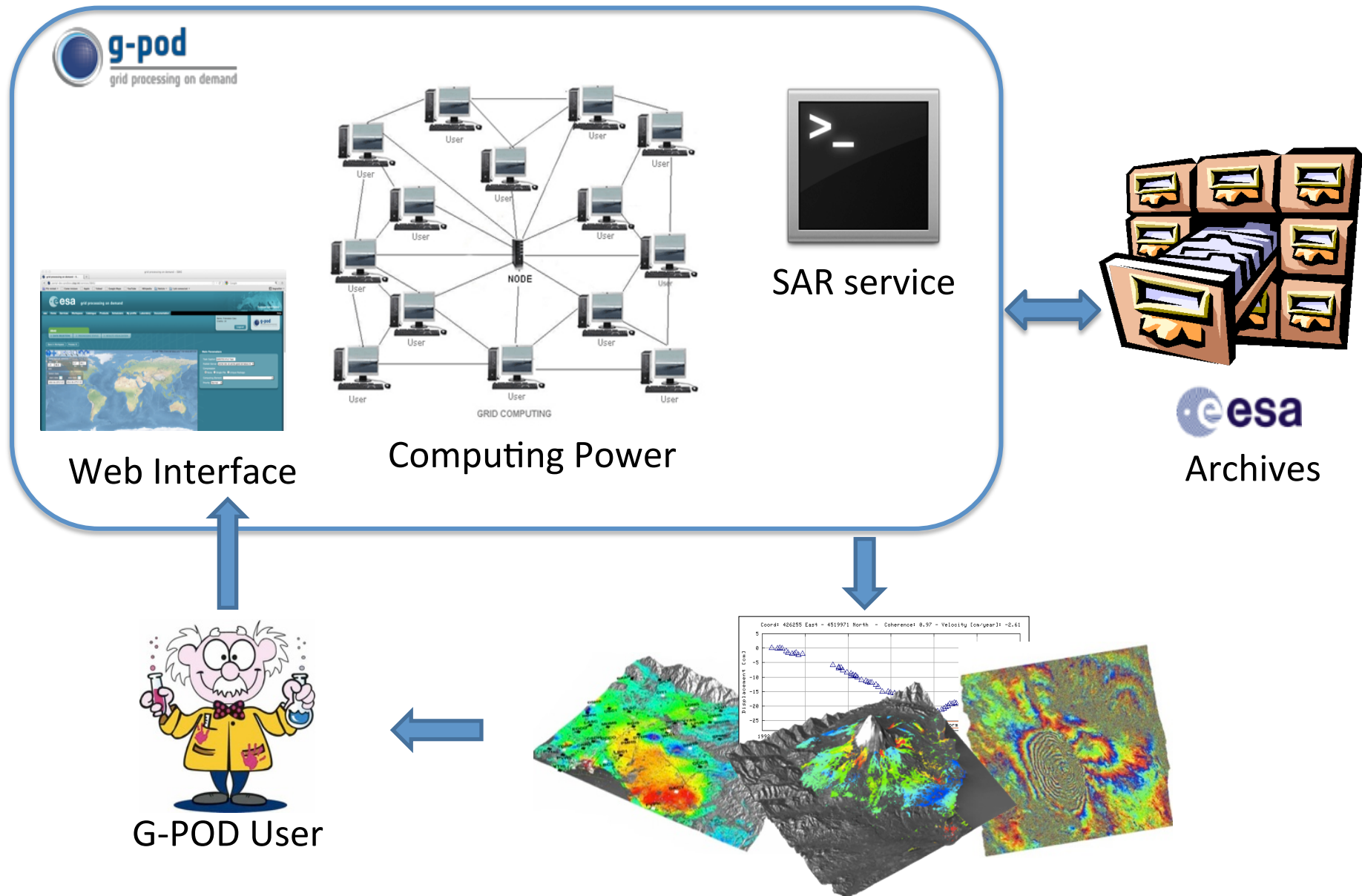
- Generation of **displacement time-series** by exploiting the existing huge SAR data archives (since 1992)



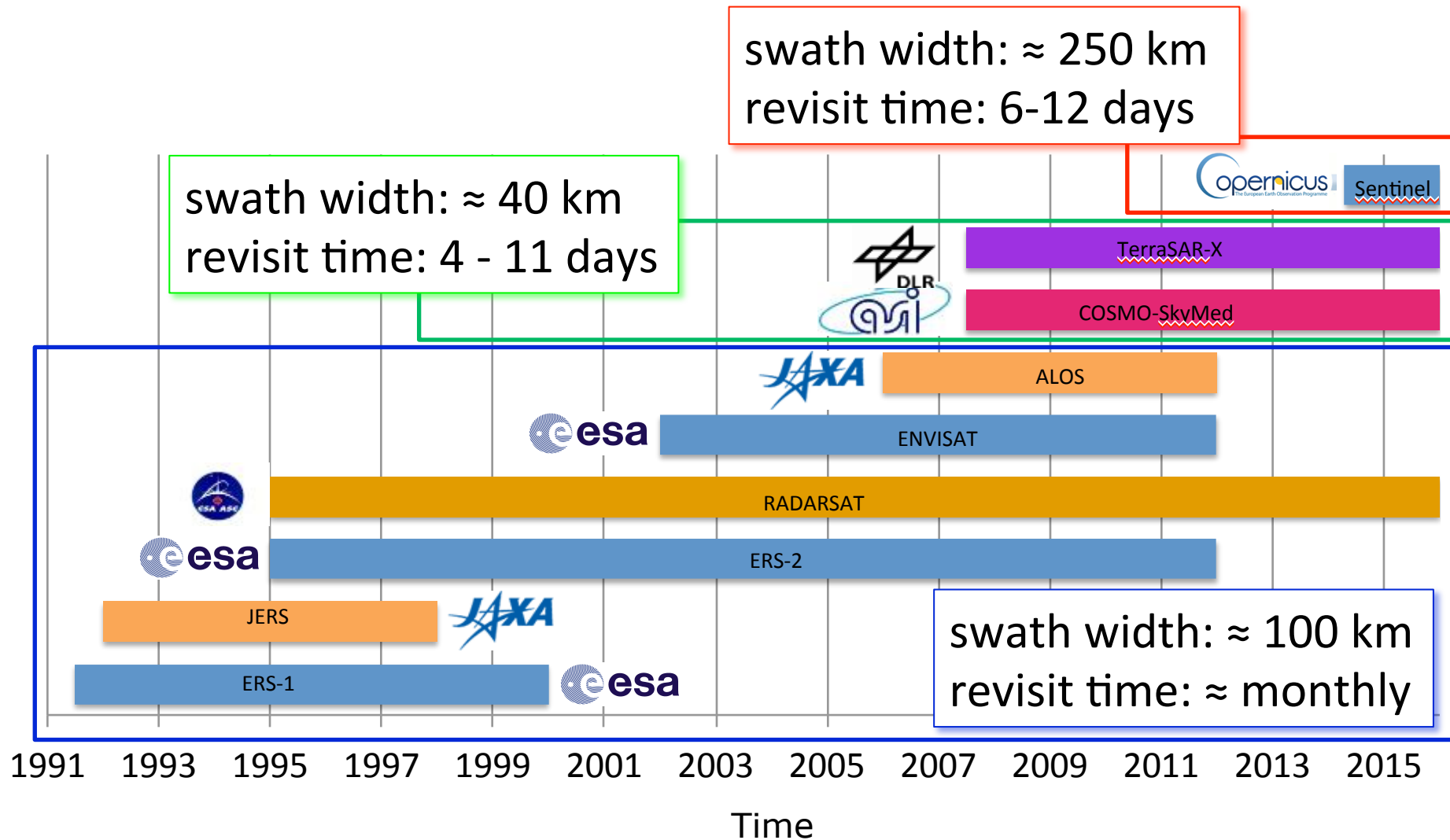
EPOSAR Application Scenario



EPOSAR: first example on ESA Grid Processing On Demand (G-POD) environment

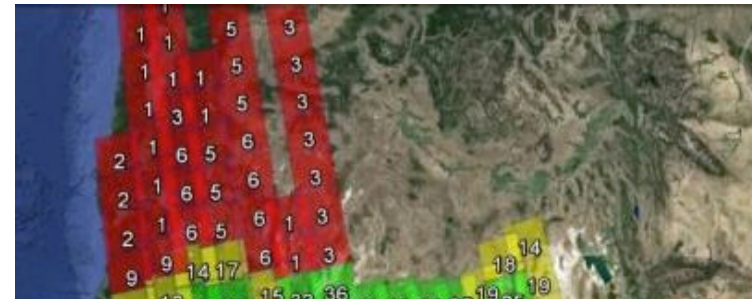
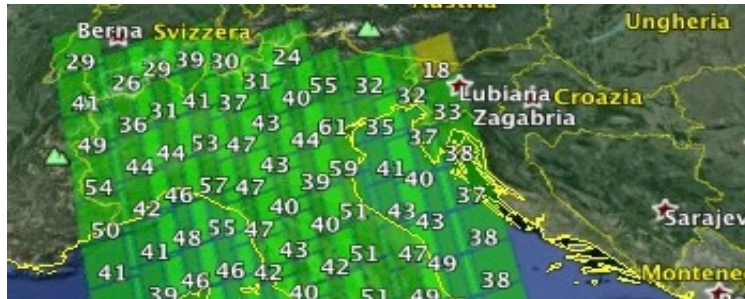


Satellite Distribution



Coming EPOSAR Application Scenario

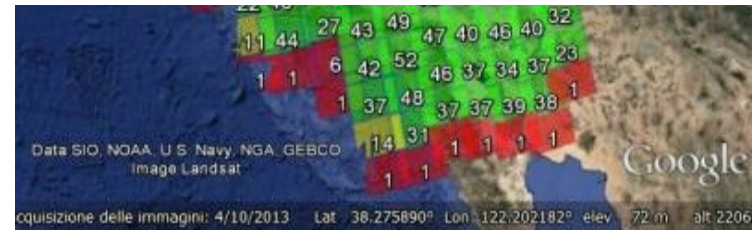
ESA archives have guaranteed large availability of SAR scenes



**≈ 150 Frames x 4 Working Nodes for frame ≈
600 Nodes
≈ 1 day processing**



ENVISAT coverage over Italy
2003-2010
~6500 SAR images



ENVISAT coverage over California
and Nevada 2003-2010
~4000 SAR images

TCS Satellite Data

- **Systematic** and **on-demand** generation of EO products on wide areas on Earth
- Users retrieve data **remotely** processed
- Managing **large** Satellite data **archives**
- Dealing with different User requirements
- **Federation** of computing resources, algorithms, tools, ..., among different partners
- Benefiting from ESA Thematic Exploitation Platform (TEP) initiatives: users concentrate on **data exploitation** instead of data procurement and processing

General Requirements

- Processing of **large data**: RAW (Input) data size can range from **150MB** up to **10GB** (for radar data), with a new acquisition every **12 days**
- Processing requires **long execution time (days)**: algorithms have to be modified/engineered to reduce the processing time and benefit of scalable infrastructures
- Such an effort has already been done for **EPOSAR** and is ongoing for the other services
- Working Nodes (WNs): **10-100** per processed area
- RAM > **32 GB**
- Network > **10Gbps** among WNs
- High speed connection between RAW data storage and processing facilities
- High number of CPUs per WNs: envisaged

Data Requirements

- **Data transfer is a critical aspect:** the transfer shall be limited to the actual needs only and possibly computing resources shall be close to the data storage.
 - In-house facilities: constrain on bulk download
 - Cloud environment: data transfer among different regions shall be very carefully considered.
- Results are several orders of magnitude less demanding in terms of storage than input data.

Collaboration Model

- 5 Countries (expected to increase)
- RAW data storage -> Space Agencies
- Processing and result storage -> National Partners
- Expected: federation of storage, processing and results
- Computing Infrastructure initially provided in-house. External provisioning at a later stage

Cloud Services

- Cloud services are currently under testing
- Not operatively used (yet).
- ESA platform is ready for exploiting Cloud resources (attached for peak requests).
- Use of Cloud services is envisaged in the future for answering the increase of user requests in terms of processing capacity.
- Data storage, access and processing on the Cloud is envisaged but has to be discussed with Space Agencies.

Identity Management and Access Control

- Free and open access:
 - Data: already done, at least for Sentinel and ESA missions
 - Results: to be discussed and defined
- Access is open but User identification is needed
- Users are mainly from European public research institutions
- Interest can arise also from foreign Countries and private sector
- Properly recognize IPR
- Data, results and processing tools shall be fully compliant with European law and shall be managed by European National entities
- European e-infrastructures exploitation is envisaged

Thanks for your attention