

Advancing European GNSS Infrastructure Through EPOS-GNSS and EUREF Collaboration

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EPOS-GNSS Members***

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* Consortium Members, Data Nodes, Analysis Centers, Data Providers,
European Geodetic Community

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BKG Bundesamt für Kartographie und Geodäsie, DE

CNRS-OCA Observatoire Cote d'Azur, FR

CNRS-UGA Université Grenoble Alpes, FR

INGV Istituto Nazionale di Geofisica e Vulcanologia IT

LM Lantmäteriet, SE

SGO Space Geodetic Observatory, HU

ROB Royal Observatory of Belgium, BE

UBI/C4G U. Beira Interior/Colaboratory for Geosciences, PT

WUT Warsaw University of Technology, PL

+ (since 2025)

IGN, Instituto Geografico Nacional, ES

NOA, National Observatory of Athens, GR

ULR, Université La Rochelle, FR

OGS, Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, IT

+

Node Repositories (National + PanEuropean)

Data Providers (National Research Infrastructures)

EUREF (Data, Data Products & Services)



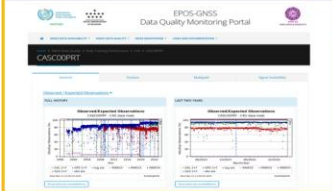
GNSS Data & Products Thematic Core Service

GNSS Data & Products Thematic Core Service (TCS) aims to:

- facilitate access, through EPOS, portals and web sites to relevant GNSS data, metadata, and data products;
- coordinate the archiving long-term storage of relevant GNSS data, metadata and data products;
- promote best practice for GNSS station operation, data quality, and metadata management;
- maintain and distribute GLASS, an open-source software for GNSS data, metadata, and data products discoverability;
- maintain and develop GNSS data products.

The EPOS-GNSS DQMS monitors the availability and quality of daily GNSS observation data that are discoverable through EPOS.

It collects the results of the quality-control carried out at each node (using software "Anubis") when a new RINEX file enters in the system and provides several Data Quality Indicators (DQI) about the station and files.



M3G validates the station metadata (site logs) and gathers other metadata related to networks, agencies, doi, etc.

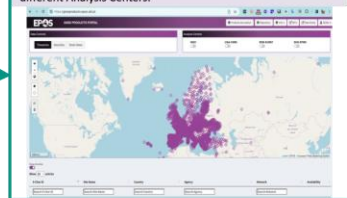
The GLASS framework is designed to cross-check the consistency between the station metadata and RINEX header and to alert data providers if necessary.

The GLASS system is integrated in the EPOS Platform. It also provides interoperability with the other TCS (in particular, Volcanology and Near Fault Observatories) and allow users to queries the services of all TCS at the same time.

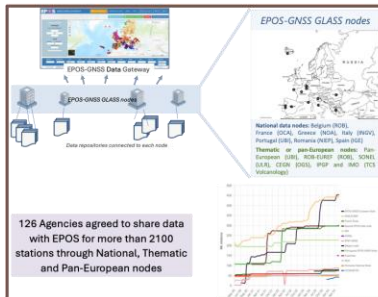
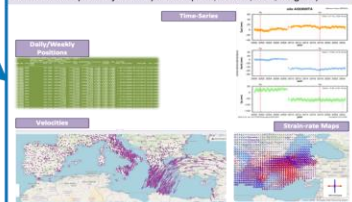


EPOS-GNSS is fully integrated in the EPOS Platform by providing 16 Services (3 implemented in 2024) to access Metadata, Data, and Products:

The EPOS-GNSS Product Portal is the gateway for the EPOS-GNSS Products. It disseminates the products computed by different Analysis Centers.



There are four dedicated EPOS Analysis Centers (CNRS-UGA, France; ING, Italy; SGO, Hungary; LM, Sweden). In addition, EPOS also disseminates solutions computed by EUREF partners (WUT, Poland; ROB, Belgium).



126 Agencies agreed to share data with EPOS for more than 2100 stations through National, Thematic and Pan-European nodes

The EPOS-GNSS DGW is designed to be the gateway for accessing the data and metadata of more than 2000 stations from different regional, national and Pan-European data centers. The DGW hosts the centralized station and file metadata.

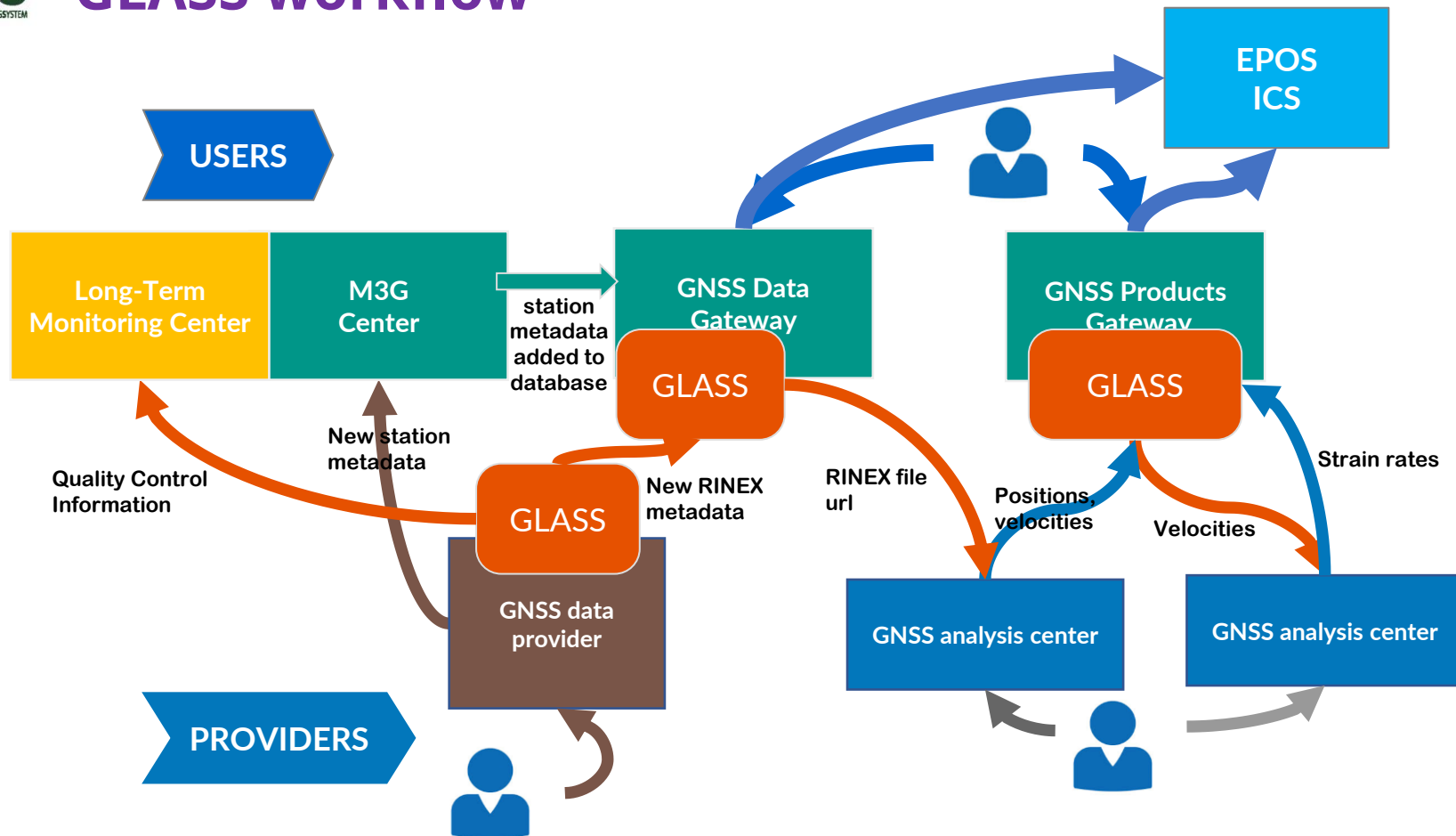


GNSS Data & Products – Objectives

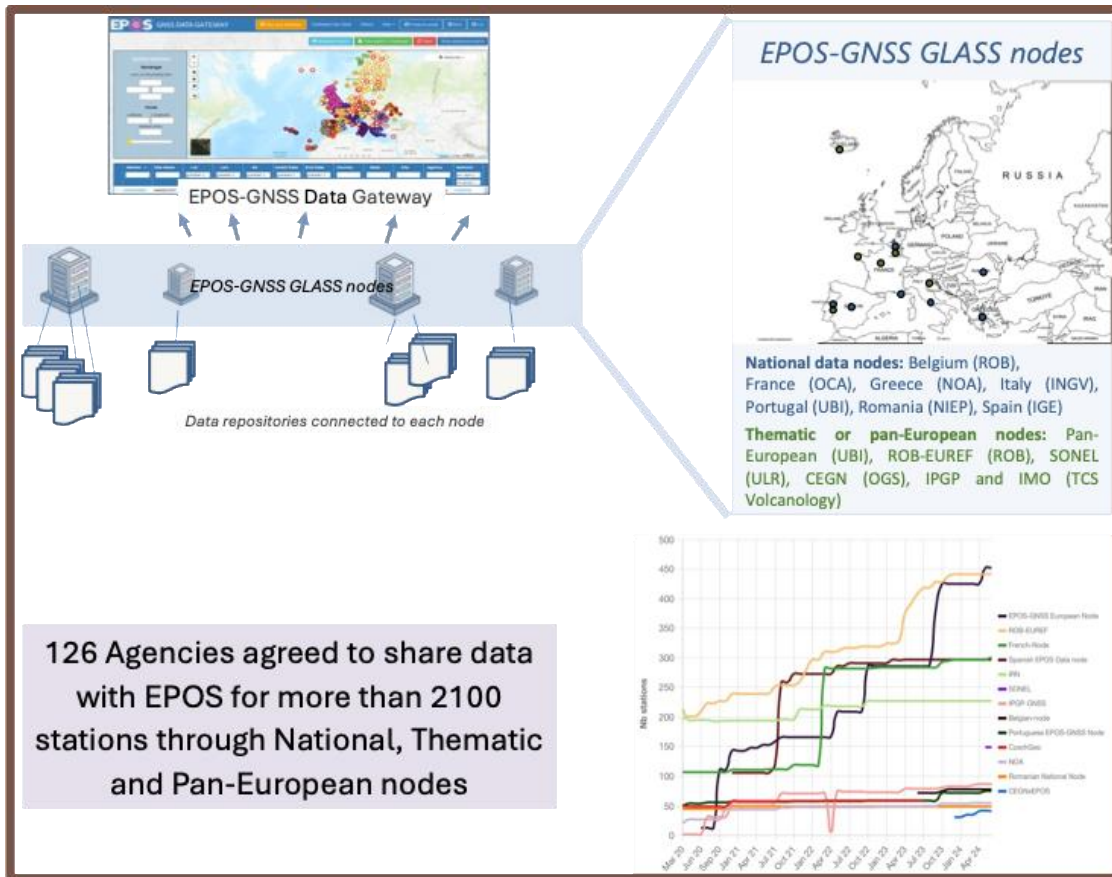
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GLASS workflow



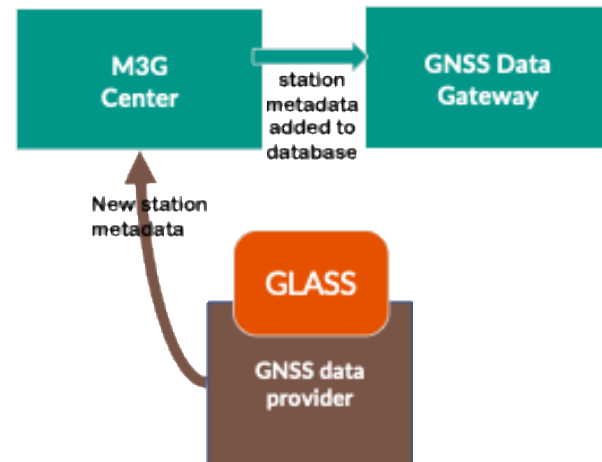
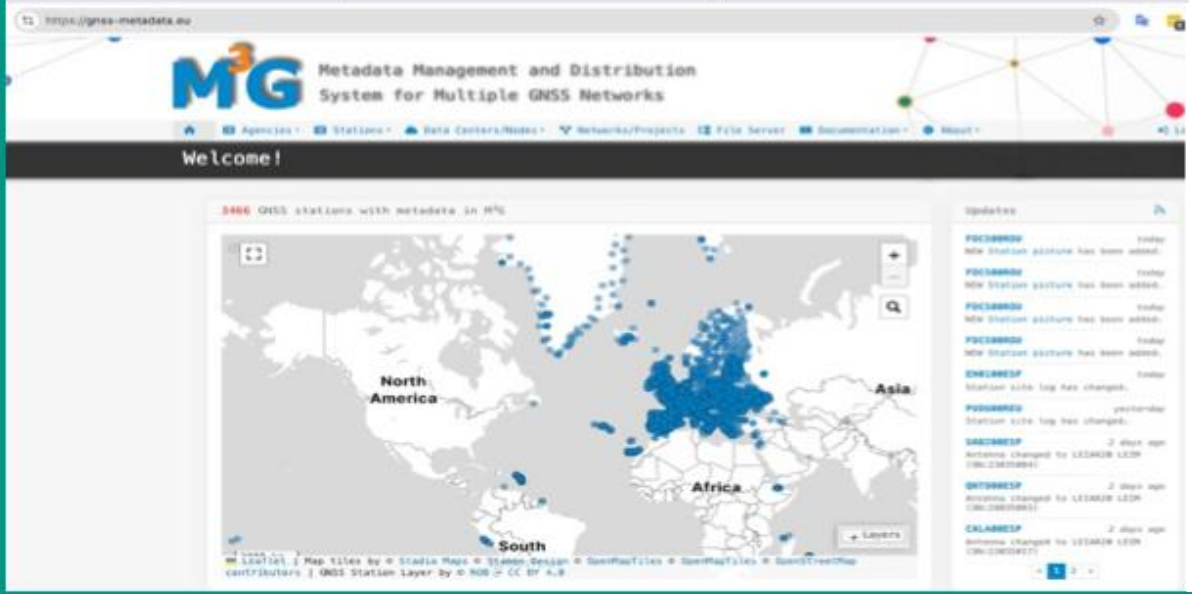
Data Providers and GLASS Nodes



GNSS data
provider

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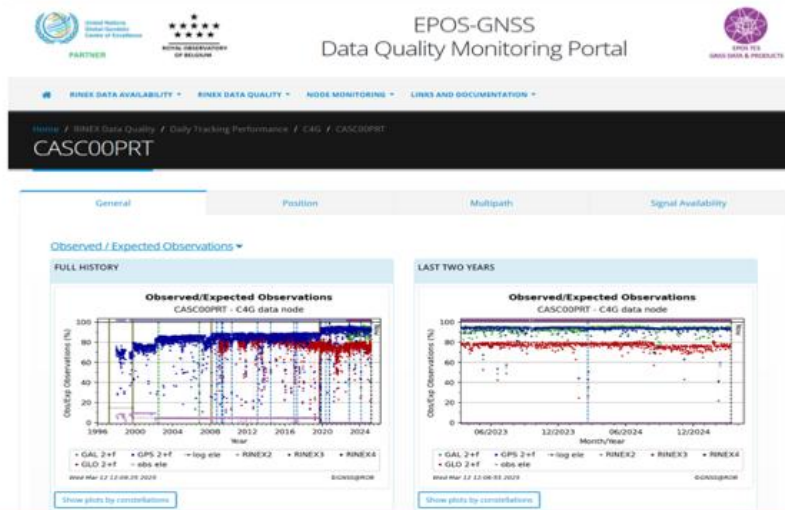
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DQMS – Data Quality Monitoring Portal

The EPOS-GNSS DQMS monitors the availability and quality of daily GNSS observation data that are discoverable through EPOS.

It collects the results of the quality-control carried out at each node (using software “Anubis”) when a new RINEX file enters in the system and provides several Data Quality Indicators (DQI) about the station and files.



Long-Term
Monitoring Center

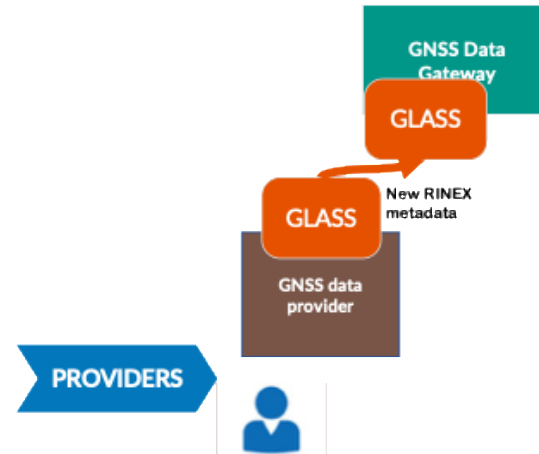
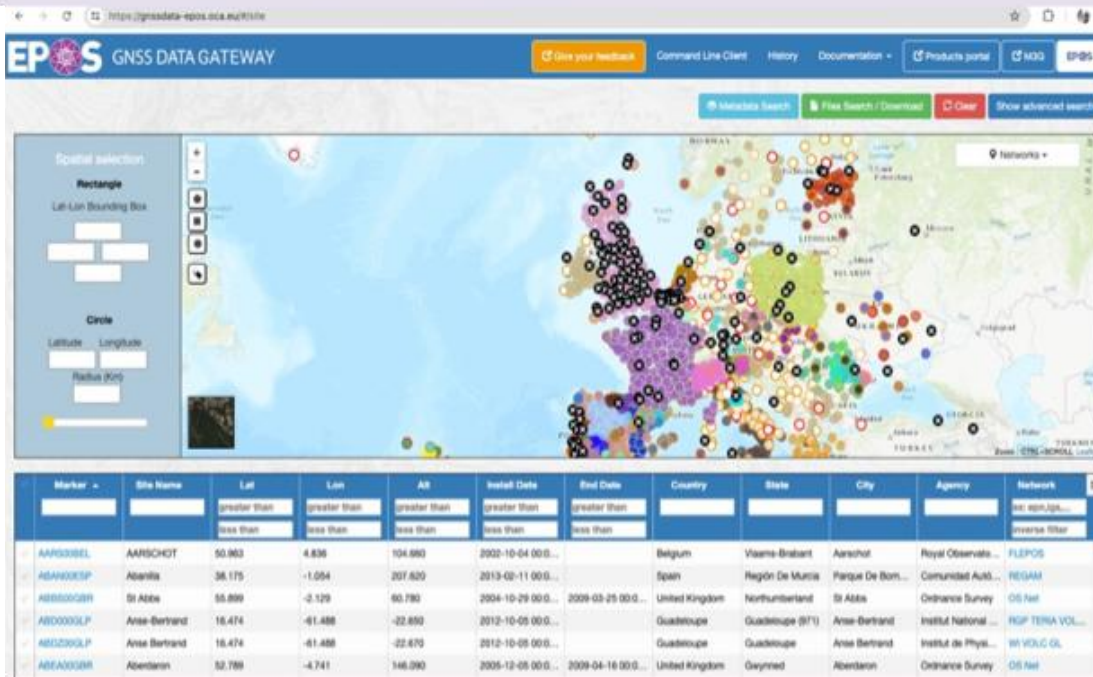
Quality Control
Information

GLASS

GNSS data
provider

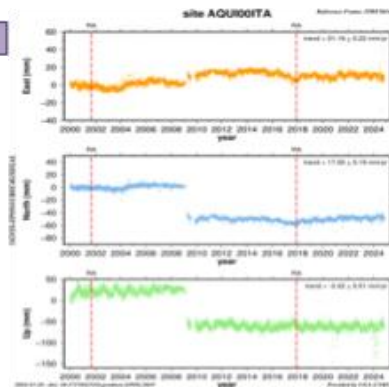
EPOS-GNSS DGW – Data Gateway

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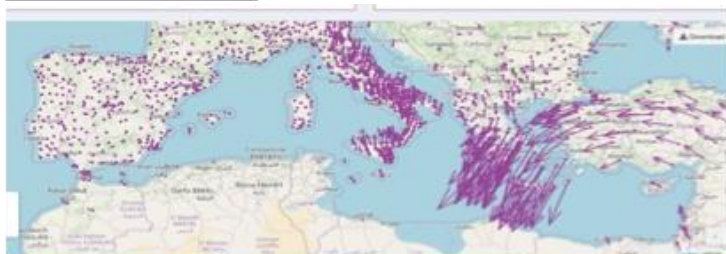
Time-Series



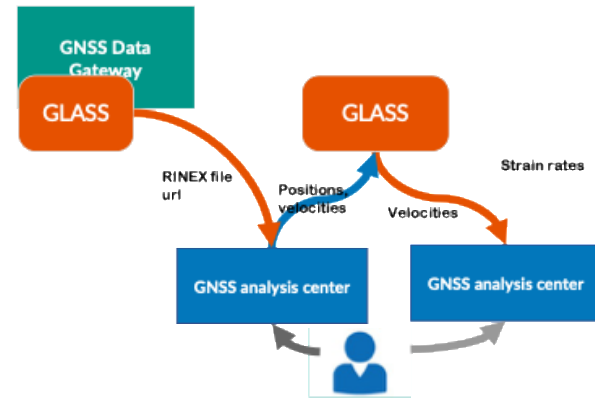
Daily/Weekly Positions

Station	Year	Day	East (mm)	North (mm)	Up (mm)
AQUINOITA	2000	1	10.0	10.0	10.0
AQUINOITA	2000	2	10.0	10.0	10.0
AQUINOITA	2000	3	10.0	10.0	10.0
AQUINOITA	2000	4	10.0	10.0	10.0
AQUINOITA	2000	5	10.0	10.0	10.0
AQUINOITA	2000	6	10.0	10.0	10.0
AQUINOITA	2000	7	10.0	10.0	10.0
AQUINOITA	2000	8	10.0	10.0	10.0
AQUINOITA	2000	9	10.0	10.0	10.0
AQUINOITA	2000	10	10.0	10.0	10.0
AQUINOITA	2000	11	10.0	10.0	10.0
AQUINOITA	2000	12	10.0	10.0	10.0
AQUINOITA	2000	13	10.0	10.0	10.0
AQUINOITA	2000	14	10.0	10.0	10.0
AQUINOITA	2000	15	10.0	10.0	10.0
AQUINOITA	2000	16	10.0	10.0	10.0
AQUINOITA	2000	17	10.0	10.0	10.0
AQUINOITA	2000	18	10.0	10.0	10.0
AQUINOITA	2000	19	10.0	10.0	10.0
AQUINOITA	2000	20	10.0	10.0	10.0
AQUINOITA	2000	21	10.0	10.0	10.0
AQUINOITA	2000	22	10.0	10.0	10.0
AQUINOITA	2000	23	10.0	10.0	10.0
AQUINOITA	2000	24	10.0	10.0	10.0
AQUINOITA	2000	25	10.0	10.0	10.0
AQUINOITA	2000	26	10.0	10.0	10.0
AQUINOITA	2000	27	10.0	10.0	10.0
AQUINOITA	2000	28	10.0	10.0	10.0
AQUINOITA	2000	29	10.0	10.0	10.0
AQUINOITA	2000	30	10.0	10.0	10.0
AQUINOITA	2000	31	10.0	10.0	10.0

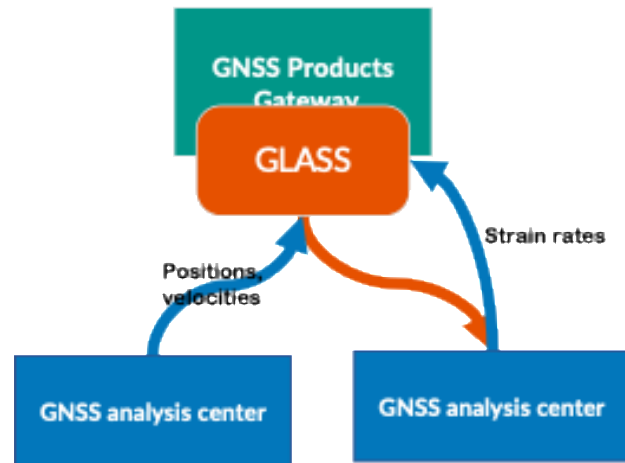
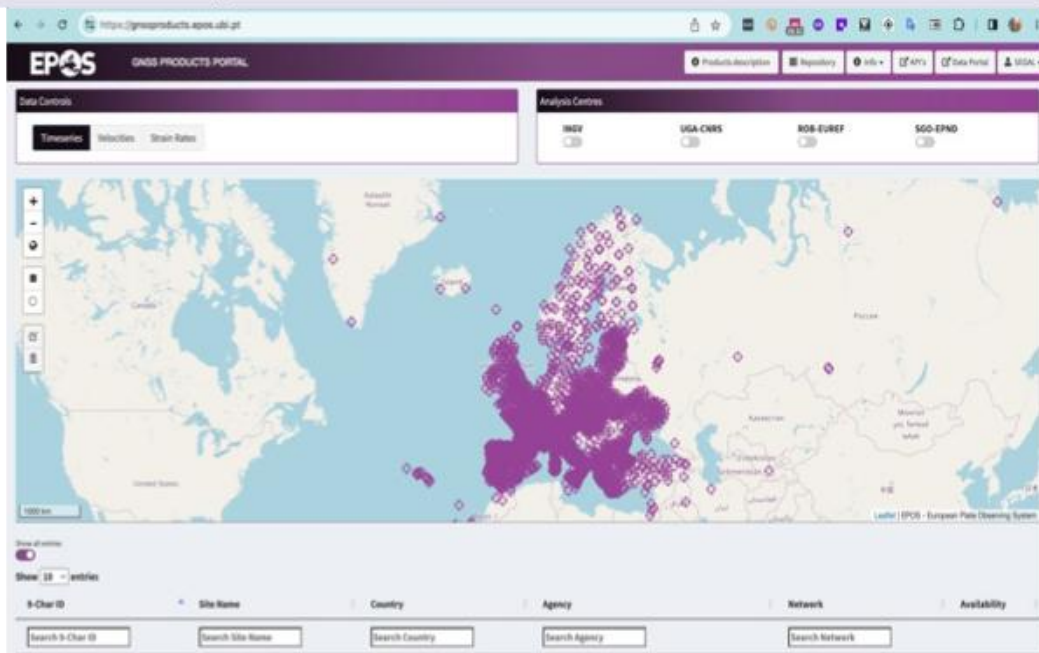
Velocities



Strain-rate Maps



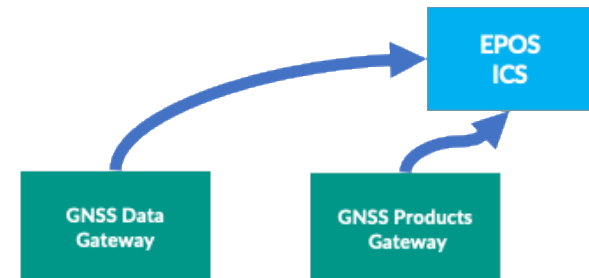
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GNSS Services @ EPOS Platform

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The screenshot shows the EPOS GNSS Data and Products interface. On the left, a sidebar lists various GNSS services, including 'EPOS GNSS Velocities from GNIF', 'EPOS GNSS Velocities from USA-CNRS', 'EPOS GNSS Daily Position Time Series from ROB-EUREF', 'EPOS GNSS Daily Position Time Series from IGS', and 'EPOS GNSS Daily Position Time Series from USA-CNRS'. The main area displays a map of Europe with numerous red dots representing GNSS stations. On the right, a diagram titled 'INTEGRATED CORE SERVICES' shows the 'EPOS PORTAL' architecture. The portal is divided into three main sections: 'API' (containing 'METADATA CATALOGUE', 'SYSTEM MANAGER', and 'SERVICES'), 'COMPATIBILITY LAYER' (containing 'XML SEISMOLOGICAL SERVICES', 'GSAC XML SERVICES', 'SUPERSETS SERVICES', and 'INDUCTED S. CERIF XML'), and 'THEMATIC CORE SERVICES' (containing 'National Research Infrastructures' and 'Geoscientific Data'). The diagram also shows connections to 'National Research Infrastructures' and 'Geoscientific Data'.



- **Main accomplishments:**
 - **GLASS** - unique software installed in the data and product nodes to make GNSS data & products available in harmonized way
 - **Monitoring tools**
- **Weakest Points (apart from funding):**
 - **GLASS** – because it is new and needs to be continuously improved
 - **Data Management.** Due to the Human Resources need to respond to the monitoring alerts
- **Plans for future:**
 - **Ensure FAIRness of Data & Products**
 - **Near real-time processing of the data**
 - **Real-time data (need more resources and more partners)**
 - **Bring more partners to the group**



EUREF

EPOS
GNSS

THEMATIC CORE SERVICE

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Strengthening European Geodetic Collaboration



By ChatGPT

Thank You - Obrigado