



The Contribution of EPOS-GNSS to Improve the Dissemination of Quality-controlled GNSS Data and Products



GNSS DATA and PRODUCTS

Rui Fernandes¹, Carine Bruyninx², Luis Carvalho¹, Paul Crocker¹, Gael Janex³, Juliette Legrand², Jean-Luc Menut⁴, Anne Socquet³, Mathilde Vergnolle⁴

¹University of Beira Interior, Portugal ²Royal Observatory of Belgium, Belgium ³University of Grenoble, France ⁴Observatory of Cote d'Azur, France

EPOS-GNSS Team:

Antonio Avallone, Duarte Arribas, Fikri Bamahry, Gabriela Batti, Rui Cardoso, Nathalie Cotte, Nicola D'Agostino, Aline Deprez, Andras Fabian, Jeff Freymueller, Athanassios Ganas, Fernando Geraldès, Vassilis Kapetanidis, Ambrus Kenyeres, Oleg Khoda, Martin Lidberg, Tomasz Liwosz, Anna Miglio, Nuno Pedro, Patrizia Pizzulo, Daniele Randazzo, José Sobrino, Wolfgang Soehne, Holger Steffen, Sandor Toth, Diogo Ventura

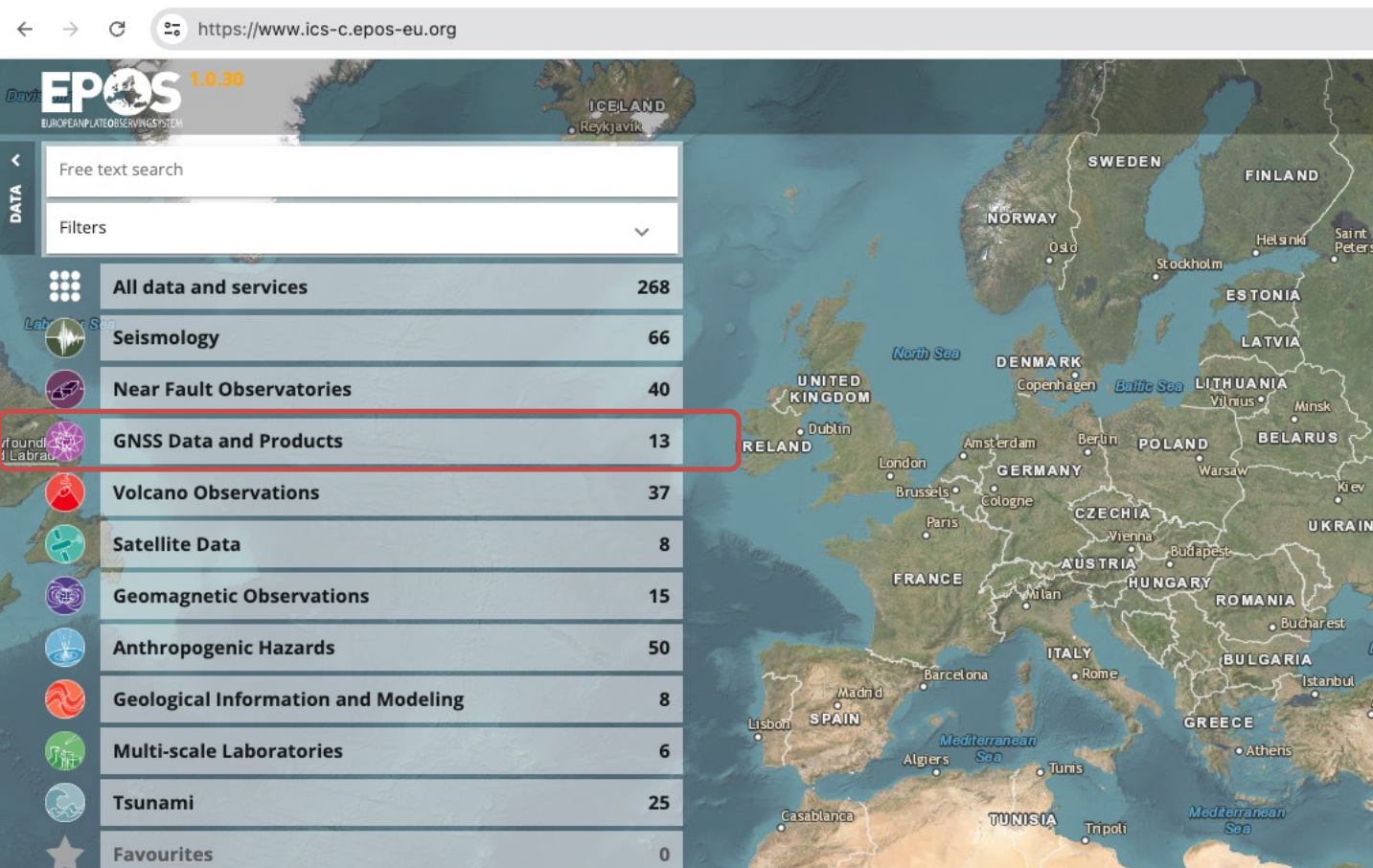
ABSTRACT

The European Plate Observing System (EPOS) is a large-scale research multi-disciplinary infrastructure dedicated to integrating data, facilities, and expertise across the field of Solid Earth science. Within EPOS, the GNSS Thematic Core Service, or EPOS-GNSS, disseminates quality-controlled GNSS data and products for Solid Earth research and other scientific and technical applications. Currently, more than 2000 GNSS stations agreed to share their daily RINEX data with EPOS, with 1700+ of them already providing data through EPOS. The access to GNSS data and products is achieved through the GLASS software package, developed in a coordinated effort by EPOS-GNSS members. GLASS facilitates the data dissemination through 12 distributed data nodes and a central data gateway where the adoption of the FAIR principles (Findable, Accessible, Interoperable, Reusable) is an important objective. GLASS has been designed to apply rigorous quality control (QC) procedures to enhance the reliability and scientific integrity of the information accessed through dedicated APIs. EPOS-GNSS supports the scientific community through four user-friendly web portals. These portals, developed and maintained by EPOS-GNSS members, allow access to GNSS station metadata, GNSS data, derived products (coordinate time series, velocities, and strain rate maps) as well as results of the long-term monitoring of the stations. This presentation will detail the current status of the EPOS-GNSS infrastructure, the GLASS software, and community portals. We will also describe the technologies that are used and the resulting API's for integration into the centralized EPOS platform.

EPOS - GNSS DATA AND PRODUCTS (THEMATIC CORE SERVICE)

EPOS (European Plate Observing System) is the European Research Infrastructure serving Solid Earth science.

EPOS is a multidisciplinary research platform to provide access to quality-controlled data from diverse Earth science disciplines, together with tools for their use in analysis and modelling.



EPOS is a key infrastructure identified by **ESFRI (European Strategy Forum on Research Infrastructures)**.

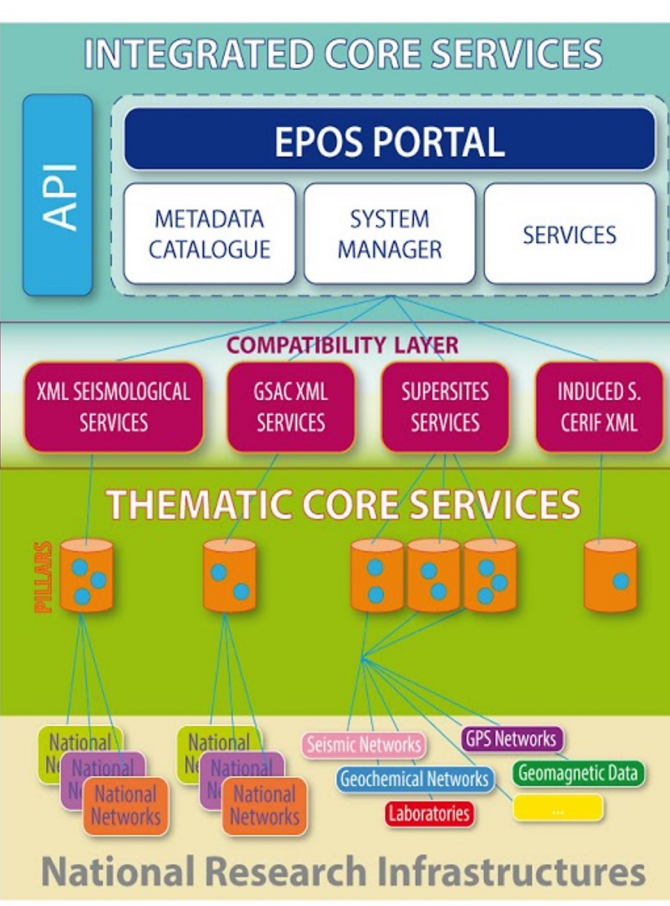
On October 30th, 2018, the European Commission granted the legal status of European Research Infrastructure Consortium (ERIC) to EPOS.

ERIC provides EPOS with a legal framework recognized in all EU Member States.

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 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.

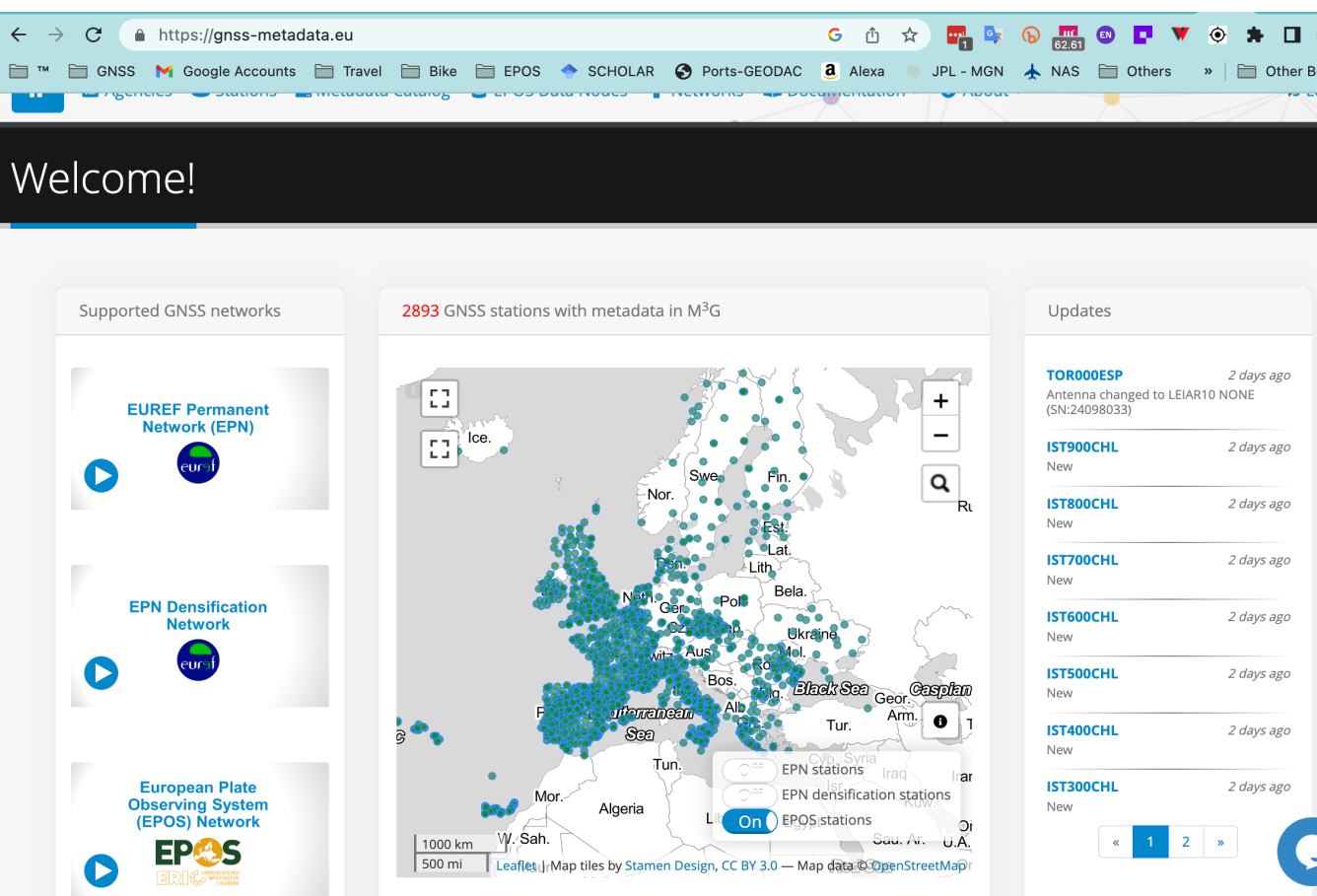


M3G – Metadata Management (<https://gnss-metadata.eu/>)

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

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

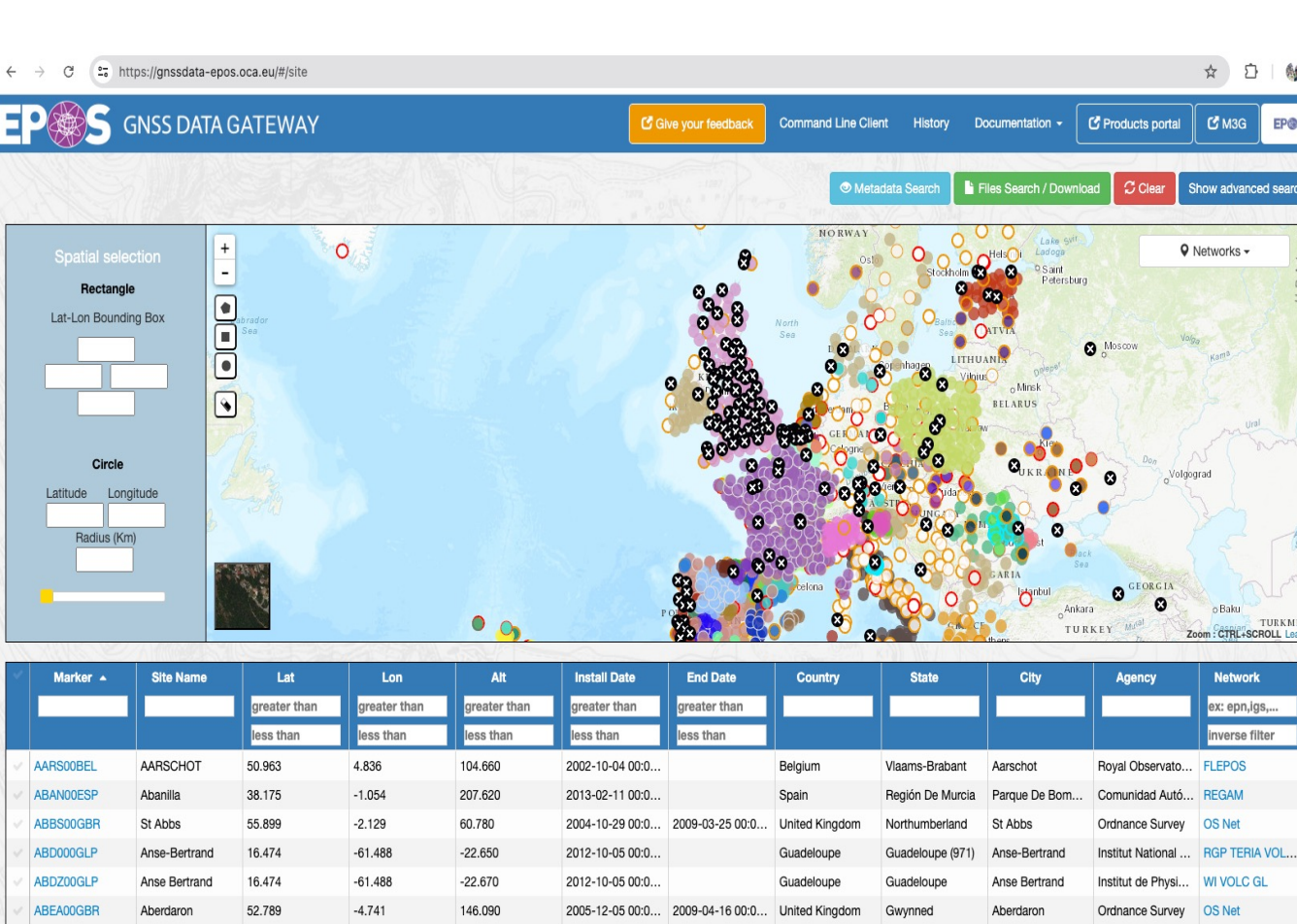
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DGW – GNSS Data Gateway (<https://gnssdata-epos.oca.eu/>)

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.

Station metadata provide information about the GNSS stations and are received from the M3G portal and then synchronized from the Data Portal to the relevant GLASS nodes. File metadata provide information about the files, allow to download data, and are synchronized from the local GLASS nodes to the DGW.

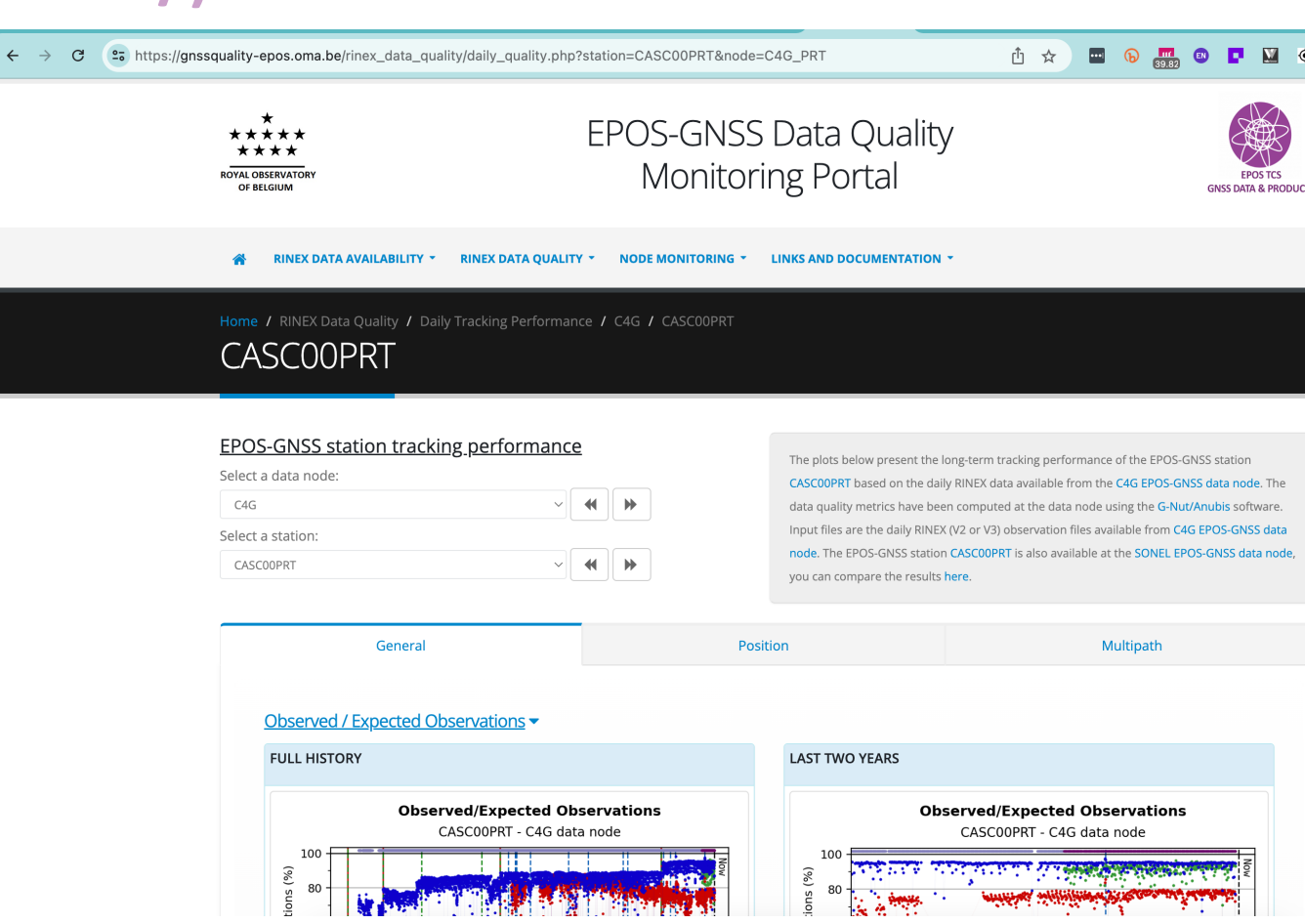


DQM – Data Quality Monitoring Portal (<https://gnssquality-epos.oma.be/>)

DQM 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 Anubis) when a new RINEX file enters in the system and provides several Data Quality Indicators (DQI) about the station and files.

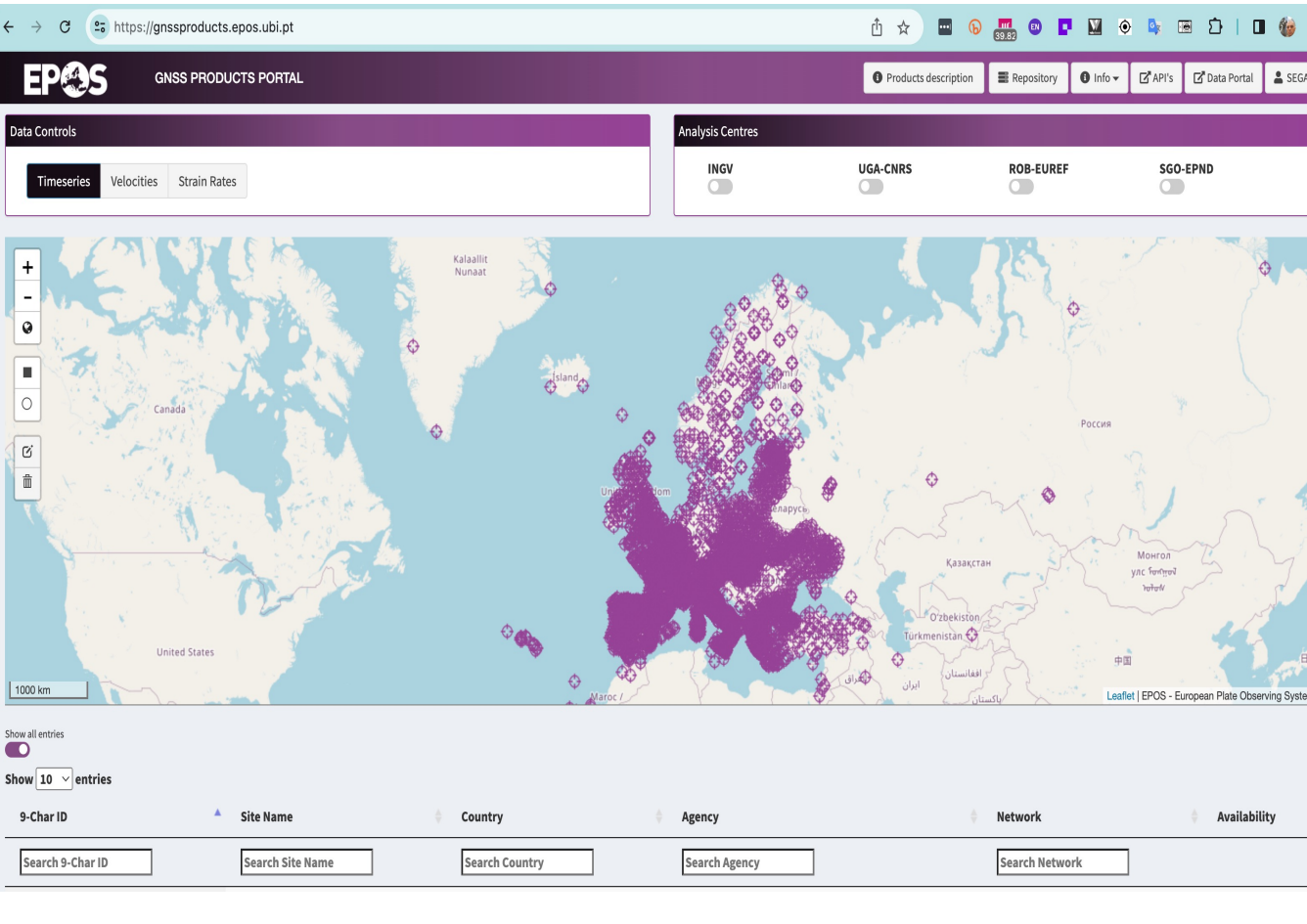
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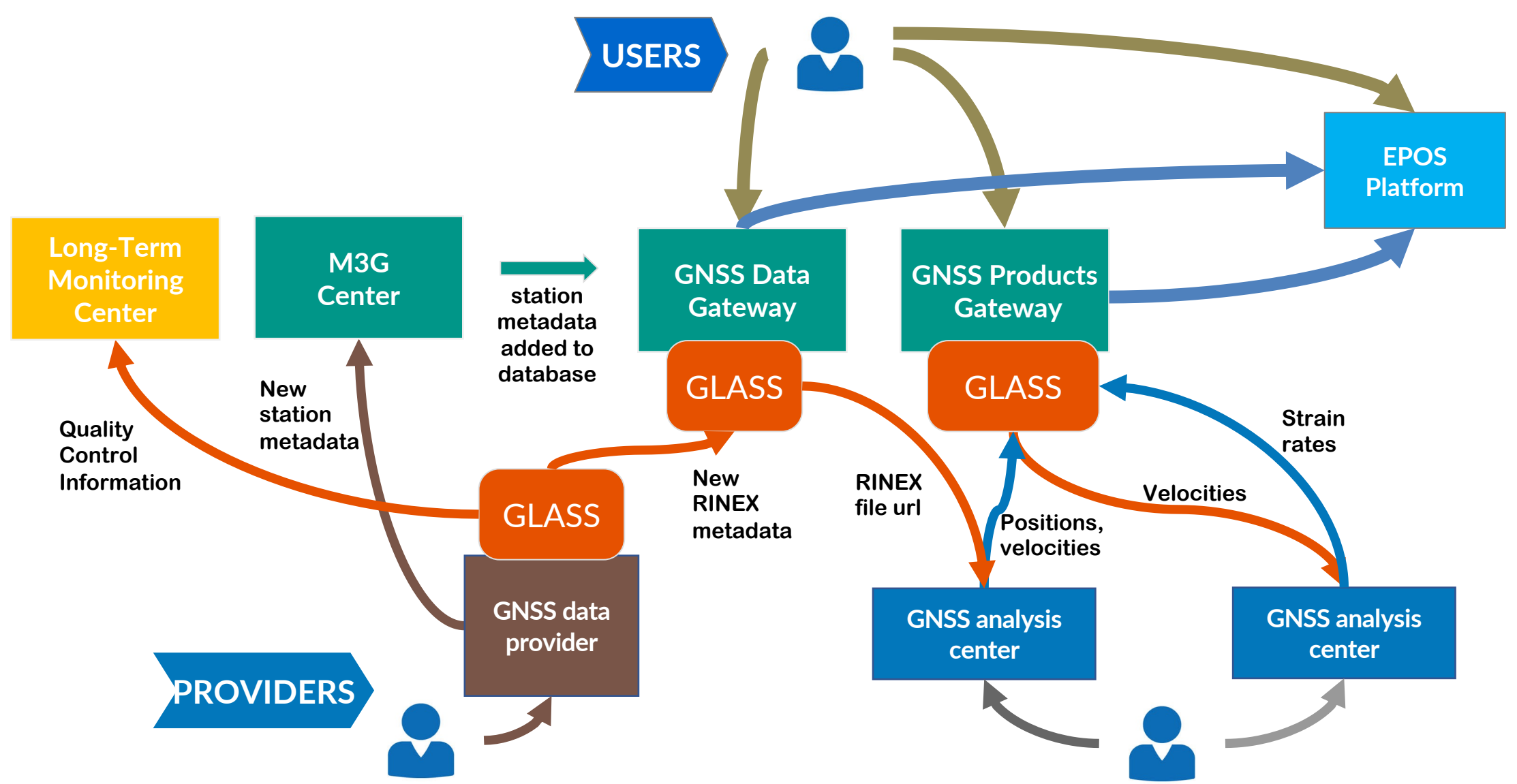
PP – GNSS Product Portal (<https://gnssproducts.epos.ubi.pt/>)

The European EPOS GNSS Product Portal is the gateway for the EPOS-GNSS Products. It disseminates products computed in four dedicated EPOS Analysis Centers (CNRS-UGA, France; INGV, Italy; SGO, Hungary; LM, Sweden). In addition, it provides solutions computed by EUREF partners: WUT, Poland; ROB, Belgium).

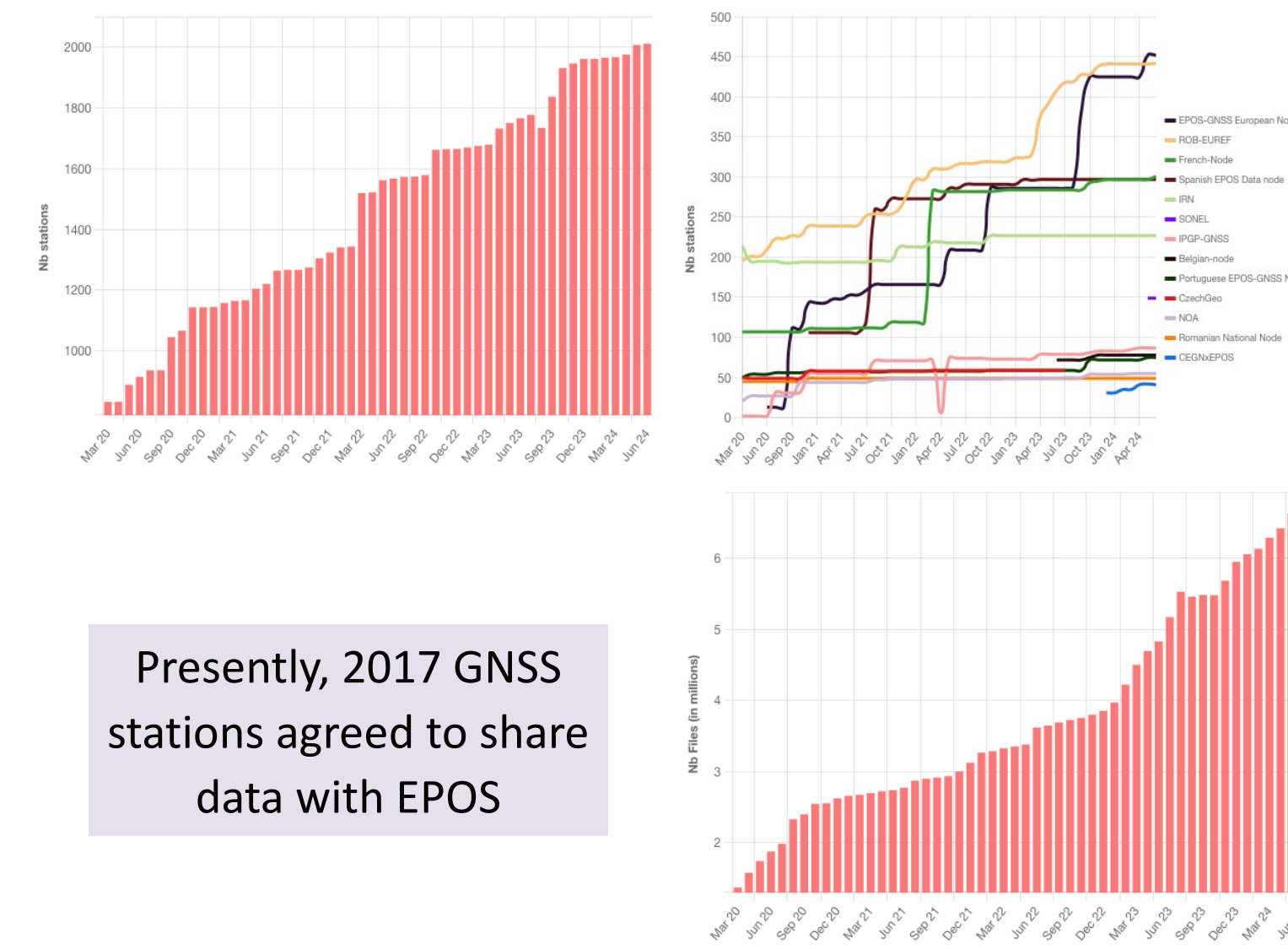
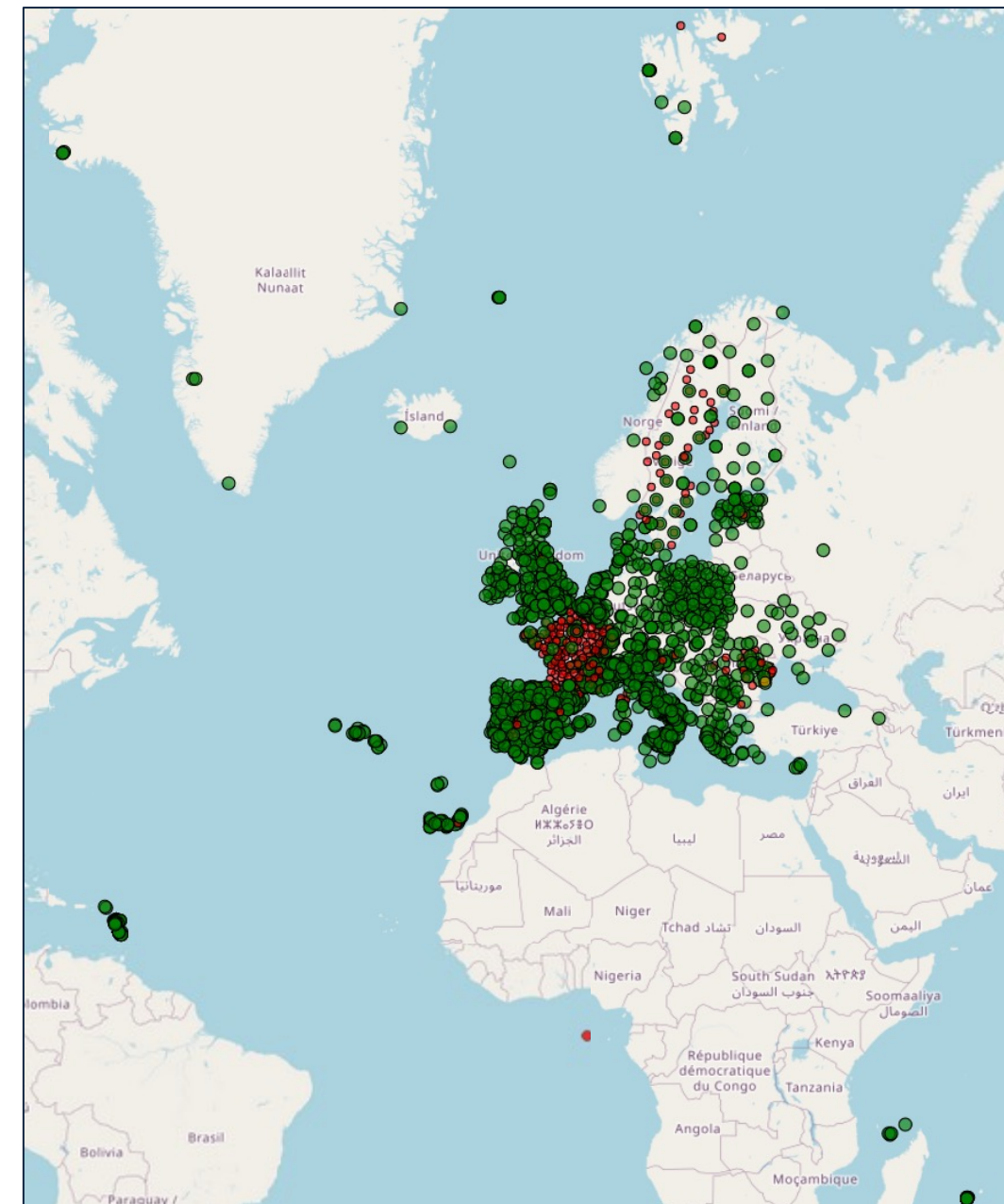
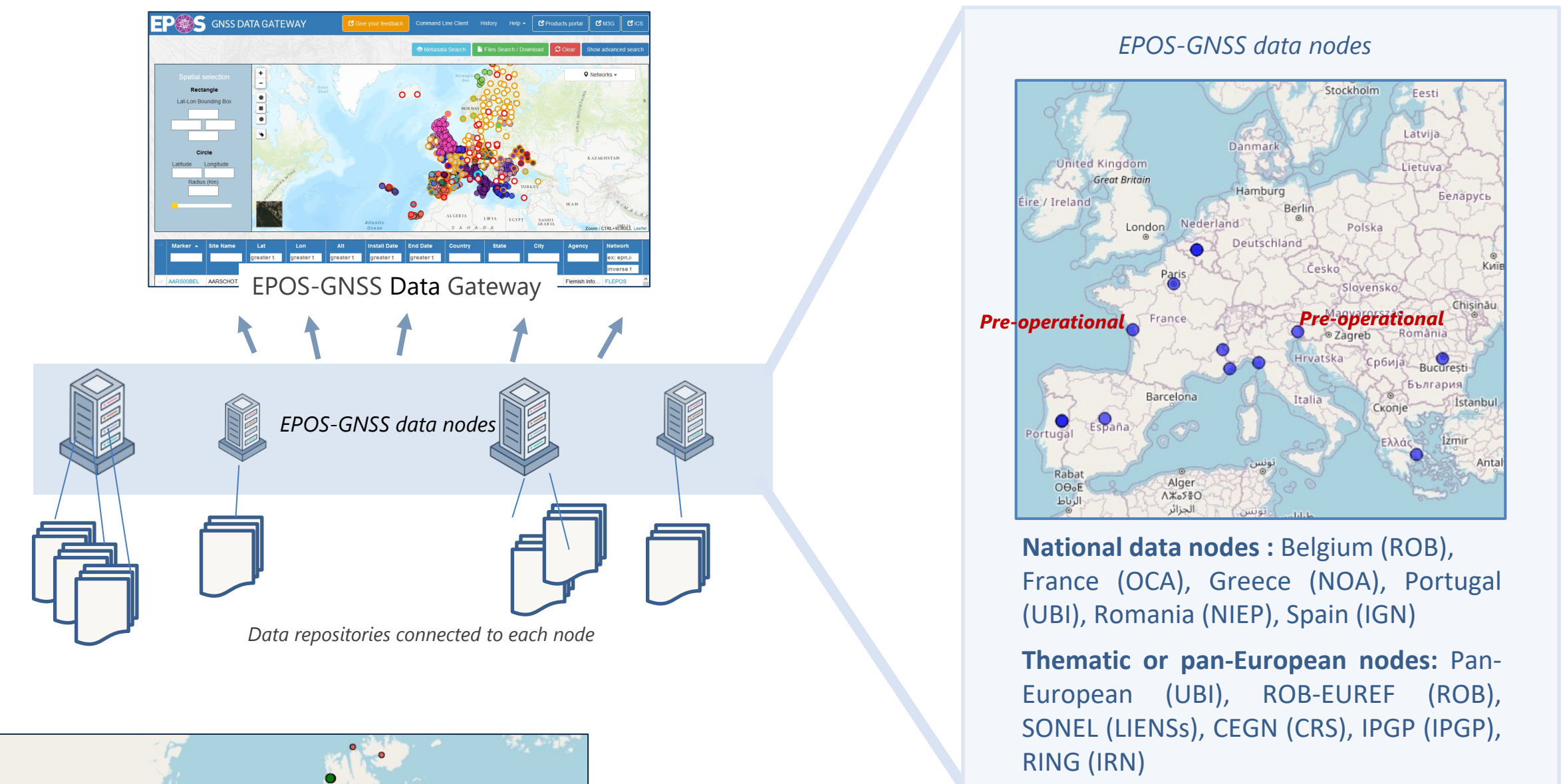
The Product Portal provides (a) coordinate time series and velocity solutions based on DD or PPP processing; (b) time series and velocity combined solutions that also include EUREF solutions and other external solutions (for which station metadata are provided); and (c) strain rates.



DATA & PRODUCTS FLOW (GLASS SYSTEM)



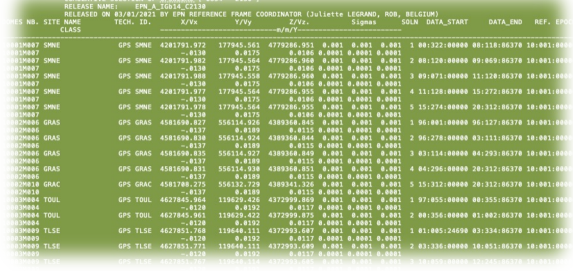
The GLASS system is designed to manage GNSS data and metadata from distributed repositories, to generate and validate metadata for data and products, to do quality control, to collect products and finally to disseminate the data, products and associated metadata to the GNSS community and beyond. It consists of a network of individual GLASS nodes, each based on a virtual layer managing metadata or products and on a physical layer storing GNSS data and data products.



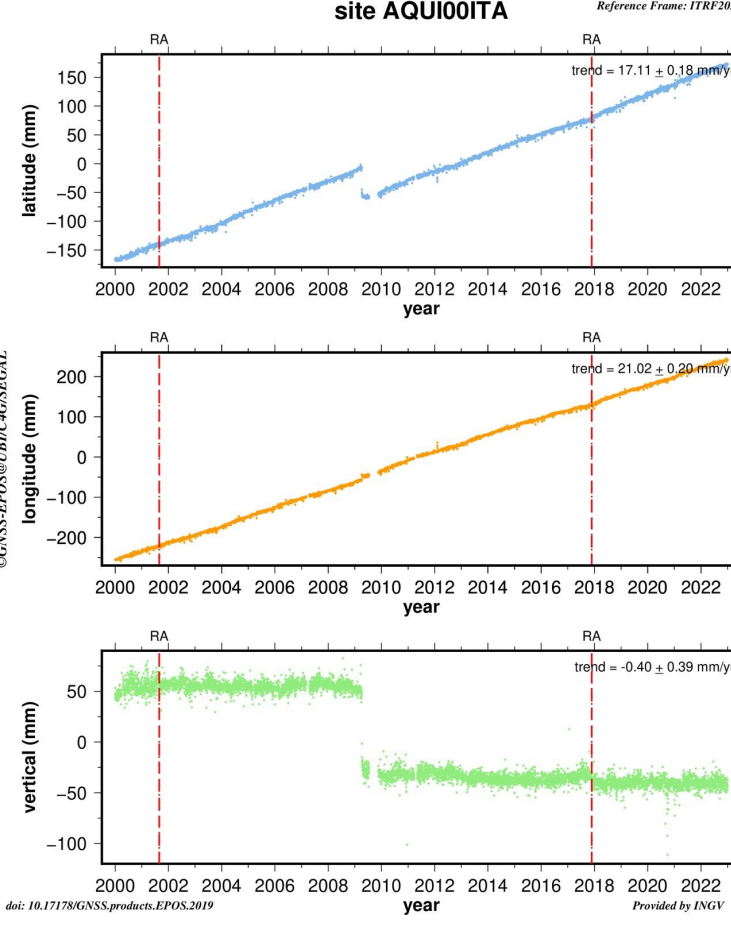
Presently, 2017 GNSS stations agreed to share data with EPOS

Products

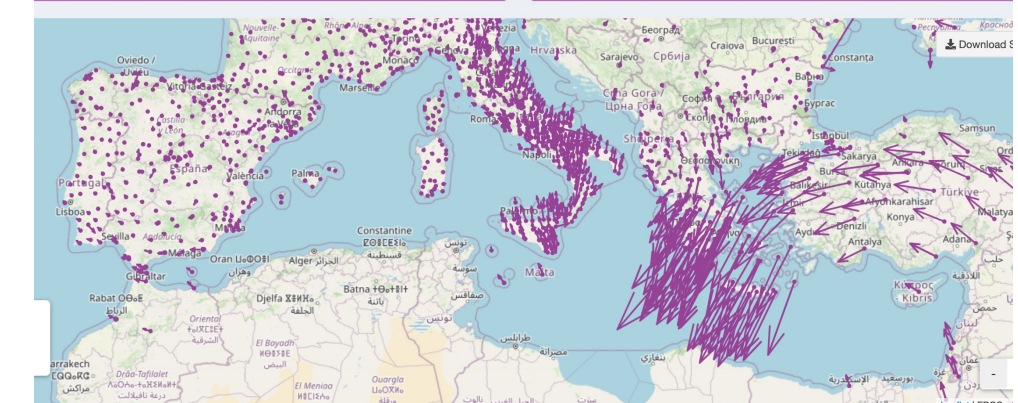
Daily/Weekly Positions
In SINEX format



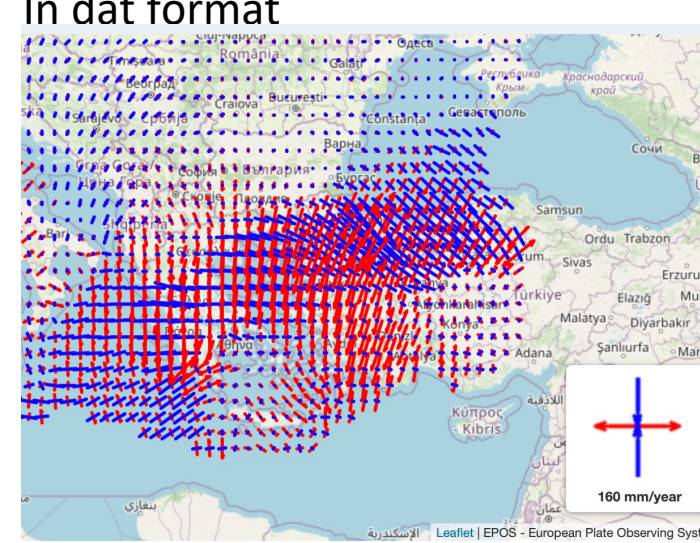
Time-Series
In PBO format



Velocities
In PBO format



Strain-rate Maps
In dat format



SOFTWARE AVAILABILITY

- Source Code <https://gitlab.com/gpseurope>

API'S AND INTEROPERABILITY (towards FAIR data)

- Site log – geodesy XML
- GLASS REST API – json, xml, geojson, csv
- GLASS REST API – Swagger Documentation
- EPOS Web Service Description – RDF – Turtle Triples
- Metadata Catalogue – EPOS uses CERIF (Common European Research Information Format)

