EPOS TCS GNSS

Thematic Core Service @ European Plate Observing System

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8. BFKH, Budapest, Hungary
9. IMO, Reykjavik, Iceland
10. KOERI, Istanbul, Turkey
11. CNRS-OCA, Nice, France,
12. LM, Gävle, Sweden
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What is EPOS?

EPOS is a **long-term project for the integration**

of research infrastructures for Solid Earth Science in Europe

One of the three priority projects of European Commission within ESFRI

EPOS integrates the **existing (and future)** advanced European facilities into **a single, distributed, sustainable infrastructure** taking full advantage of new **e-science opportunities**

25 COUNTRIES

Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Grecee, Hungary, Iceland, Ireland, Italy, Netherland, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom

4 INTERNATIONAL ORGANIZATIONS

Orfeus, Emsc, Euref, Intermagnet

256 NATIONAL RESEARCH INFRASTRUCTURES

4939 SEISMIC STATIONS

2272 GPS RECEIVERS

464 TB SEISMIC DATA

118 LABORATORIES

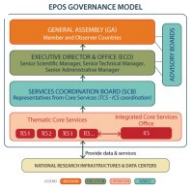
828 INSTRUMENTS

Several PetaBytes of solid Earth Science data will be available

Several thousands of users expected to access the infrastructure

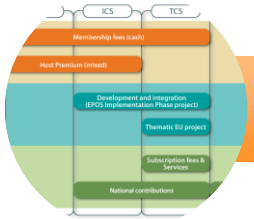
How will EPOS work?

Architecture



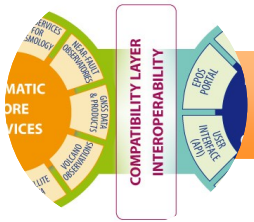
Legal & Governance

The ERIC (European Research Infrastructure Consortium) has been chosen as the legal model for EPOS



Financial

A financial plan has been adopted to guarantee the long-term sustainability of infrastructure – the countries will pay for it



Technical

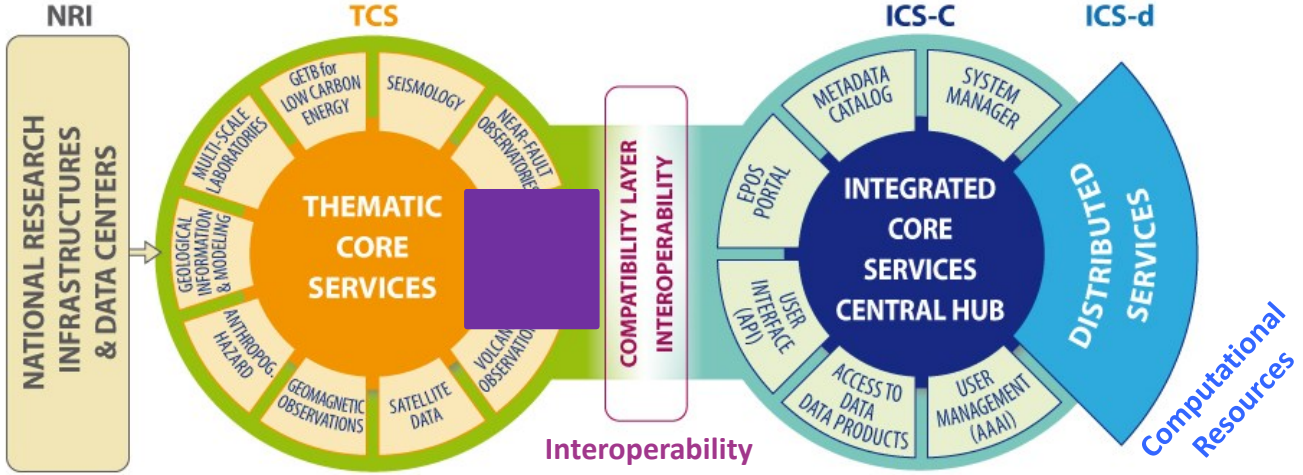
Technical solutions designed and adopted to implement the access to data and services

National Research Infrastructures (**NRI**)
Thematic Core Services (**TCS**)
Integrated Core Services (**ICS**)

How will EPOS work?

Functional Architecture

community-specific integration | **novel e-infrastructure**



- **Data generation & standardization**
- **Sustainability and operation**
- **Quality checked repositories**

- **Thematic integration**
- **Engagement of communities**
- **Community service provision**

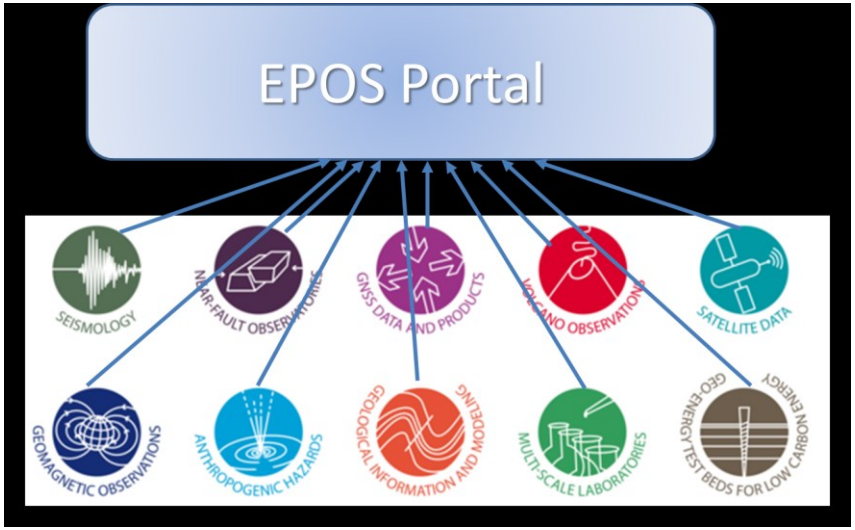
Interoperability Brokerage

- **Metadata registry**
- **Processing**
- **Aggregation**
- **Integrated analyses**
- **Visualization**

EPOS Timeline

- The preparatory phase ended by November 2014 with the participation of 23 countries.
- 19 of which have already signed a letter of intent (LoI) for joining the EPOS-ERIC to be hosted in Italy (Rome);
- At the completion of the Implementation Phase (started in October 2015), it is expected that most of the EU28 countries will be involved in EPOS.

EPOS Today



Each of the communities (e.g. GNSS) gets organized:

- Set up their governance (to speak with 'one voice' in EPOS)
- Define the data and data products to provide to the EPOS portal
- Construct the (IT) interfaces between their community and the EPOS portal

GNSS

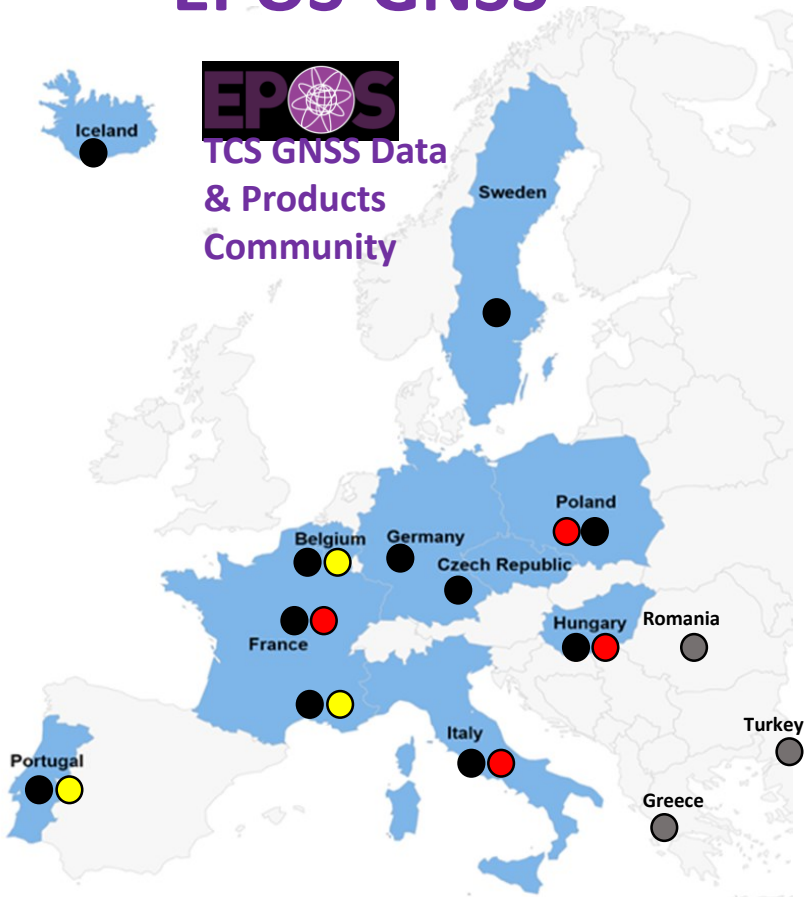
Contribution based on collaboration between the geodetic/geophysical community where the EUREF community is an essential player

Easy-to-find data and data products (open access) as well as tools for visualization, processing and analysis through the EPOS portal

Focus on Solid Earth science the internal structure and dynamics of planet Earth, from the inner core to the surface

EPOS-GNSS

GNSS TCS (EPOS-OP) Partners



TCS GNSS Data & Products Community

List of core stakeholders:

BKG Bundesamt für Kartographie und Geodäsie, DE
BFKH Government Office of Capital City Budapest, HU
INGV Istituto Nazionale di Geofisica e Vulcanologia IT
GOP Geodetic Observatory Pecný, CZ
CNRS-UGA Université Grenoble Alpes, FR
CNRS-OCA Observatoire Cote d'Azur, FR
IMO Icelandic Meteorological Office, IS
LM Lantmäteriet, SW
ROB Royal Observatory of Belgium, BE
UBI/C4G Univ. Beira Interior/Colaboratory for Geosciences, PT
WUT Warsaw University of Technology, PL

- 5 Analysis Center's
- 3 Portals (M3G, Data, Products)
- 11 DDSS* Providers
  - 3 NOA (GR), KOERI (TR), INCDFP RA (RM)

DDSS* - Data, Data Products, Services & Software

Added value of EPOS TCS GNSS Data & Products for GNSS community

- **Sustainability within EPOS:**
  - **Countries that join EPOS-ERIC commit to maintain their GNSS infrastructure integrated in EPOS (stations, operation).**
  - **DDSS Providers chosen based on the commitment of the countries to sustain them on long-term (EPOS-ERIC operation).**

- **Provision of software tools (GLASS):**
  - **Standardized data quality check and visualization**
  - **Standardized exchange of metadata**
  - **Seamless data access**
  - **To be made globally available**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 676564

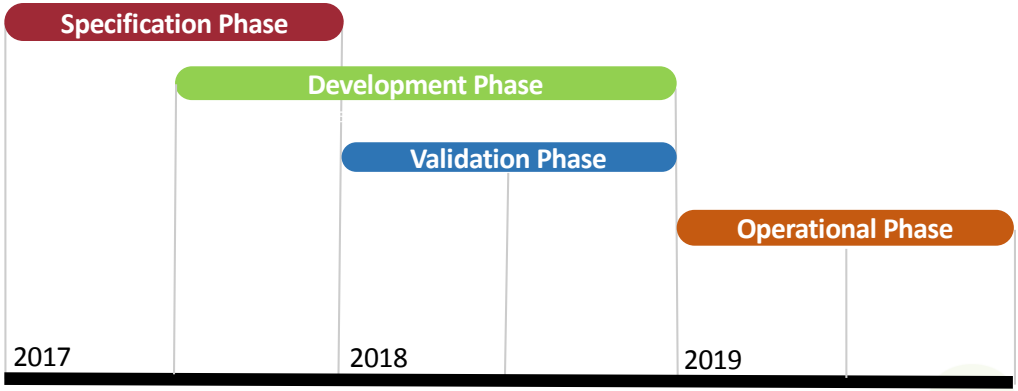
GLASS – What and Why?

GNSS **L**inkage **A**dvanced **S**oftware **S**ystem

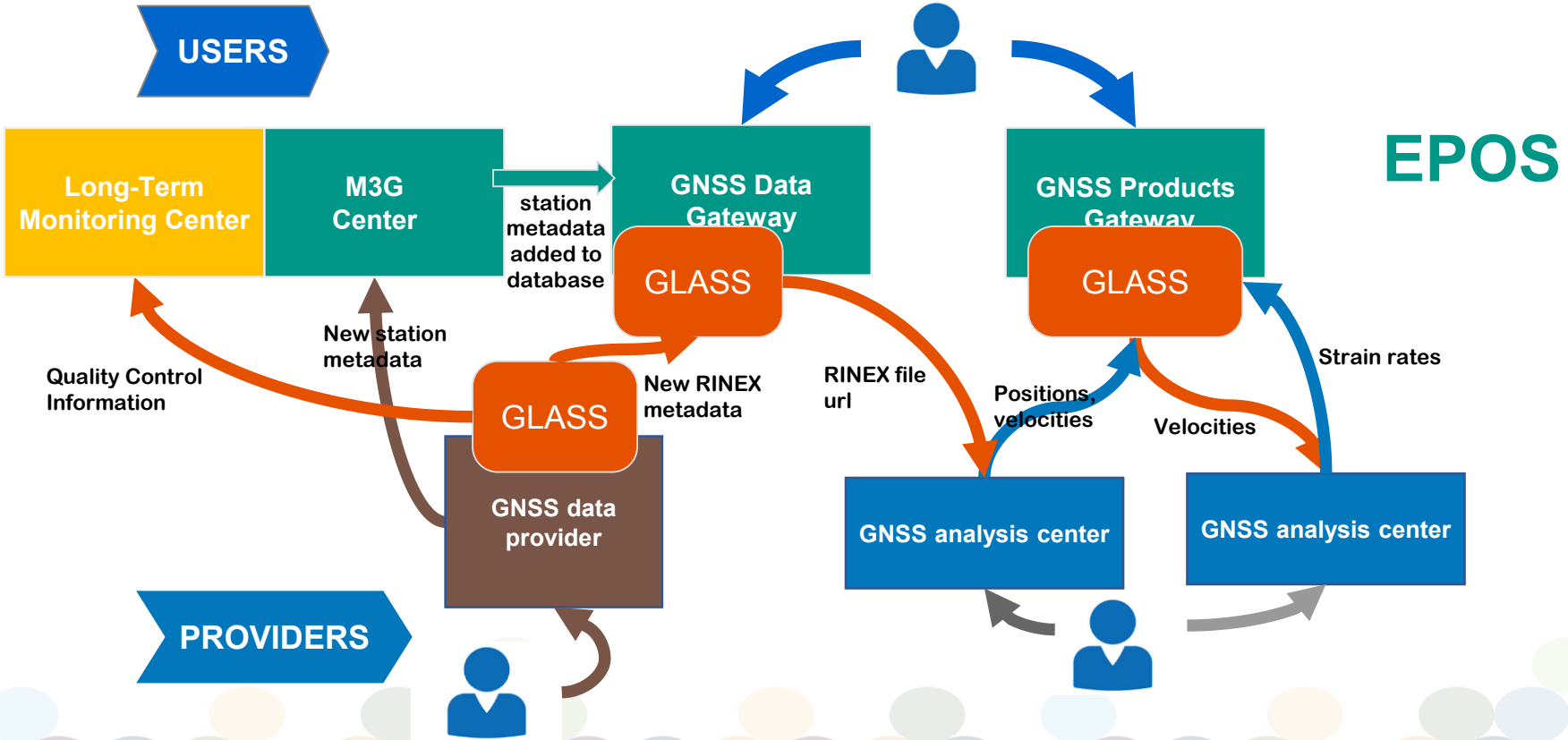
GLASS intends to be an integrated software package to be deployed in a GNSS infrastructure to:

- **Manage GNSS data (RINEX & metadata) from distributed repositories/data centers:**
  - Collect data
  - Validate data
  - Disseminate data

- **Provide GNSS products:**
  - Coordinate Daily and Time Series
  - Velocity Fields
  - Strain Rate Fields



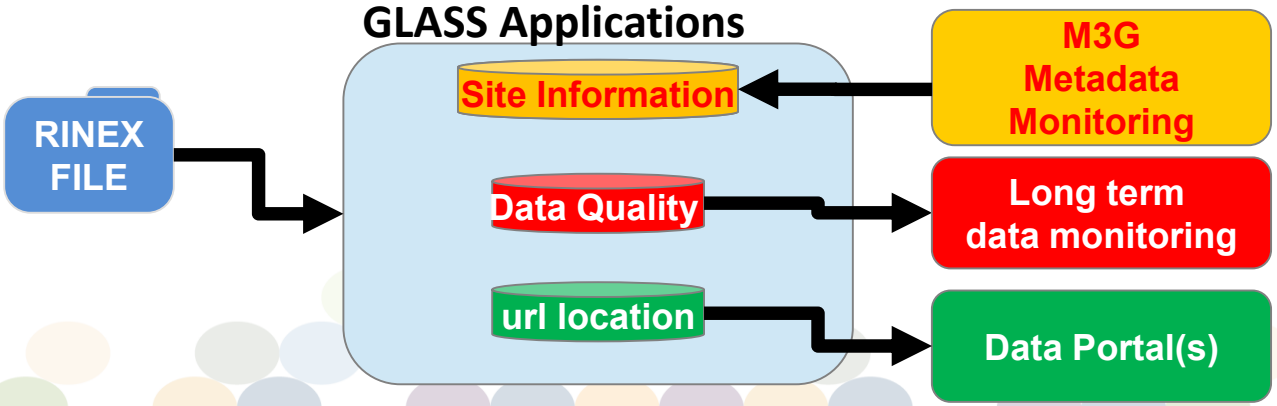
GLASS work flow



RINEX Repositories / Data Centers

RINEX Data: need to be available (local or external – url link) and GLASS will run on top of it (no need to adapt directory structure).

- **GLASS software will act when a new file become available by:**
  - **Checking the file metadata (Header) against the the Site metadata (Anubis)**
  - **Run additional checks on file contents (Anubis)**
  - **Provides the url location to the data portal (local and externals)**



M3G CENTER

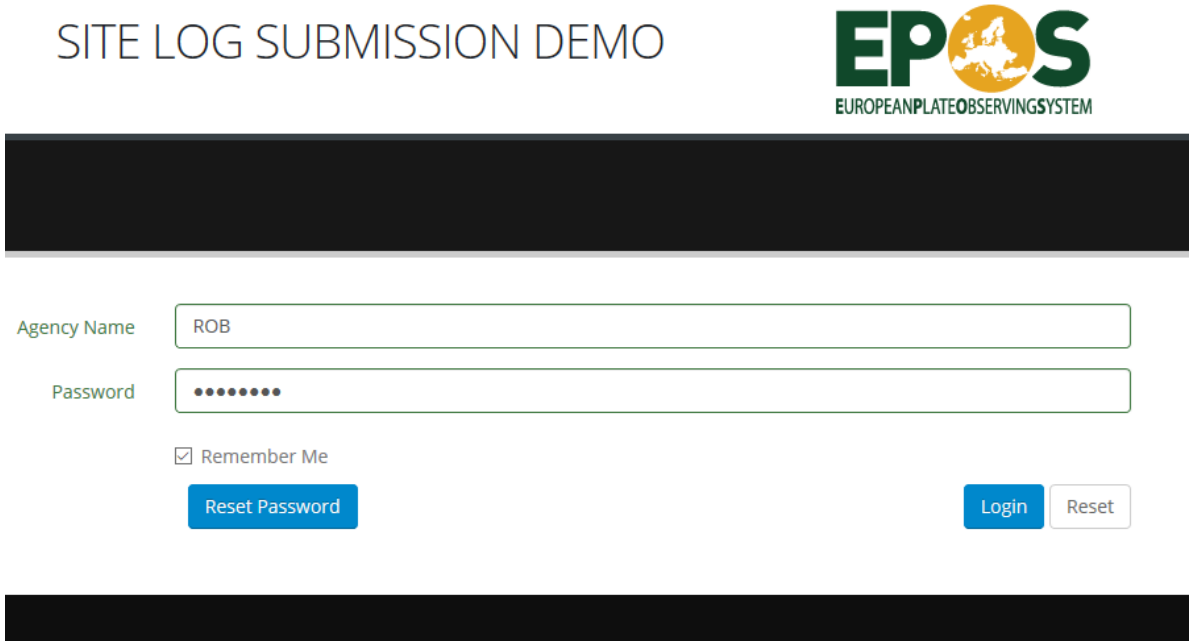
PORTAL (Metadata Management and distribution system for Multiple GNSS Networks)

- The system allows upload, validate, and distribute GNSS station metadata (e.g. site logs)
- Its main purpose is to serve to submit and validate metadata and contribute to the densification of GNSS networks.

Requirements for usage

- EPOS-GNSS Supplier Letter from the Data Supplier, including the information on the Operational Centre responsible for maintaining the station metadata in M3G.
- This Operational Centre will then receive a login account on the M3G web site.

M3G CENTER



https://gnss-metadata.eu/

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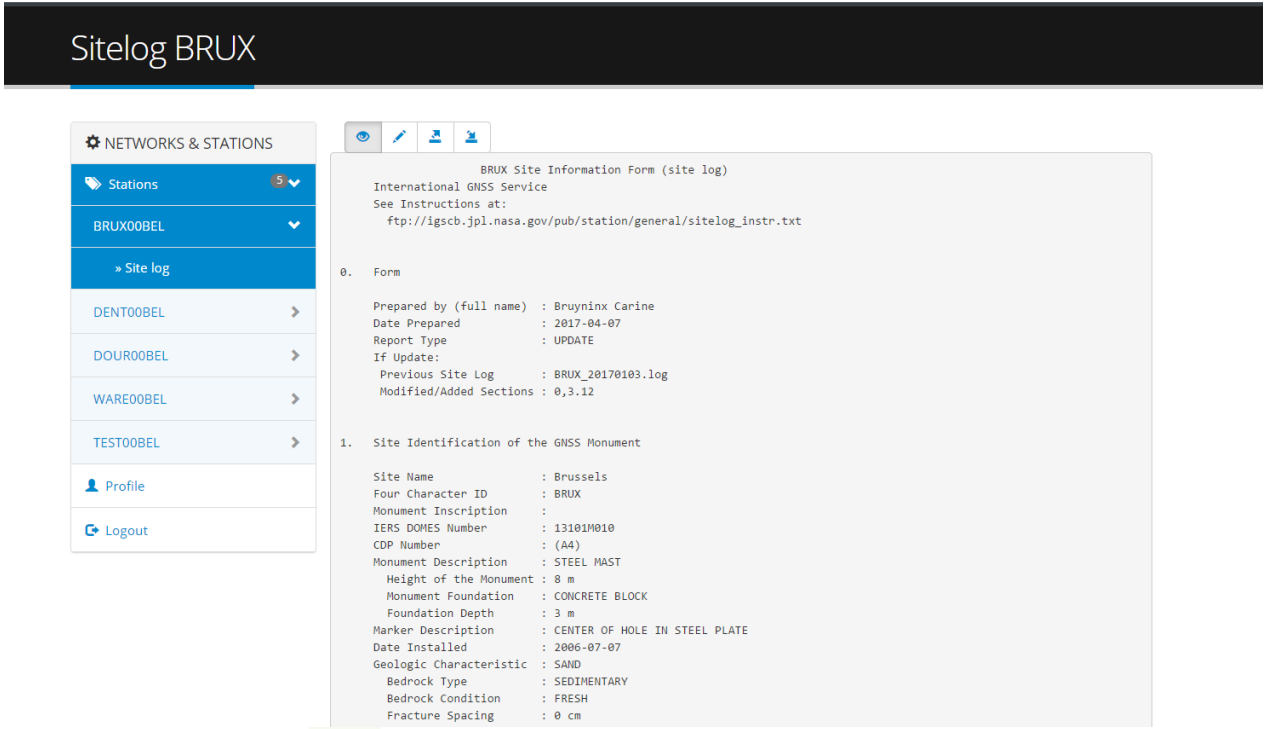
M3G CENTER

SITE LOG SUBMISSION DEMO



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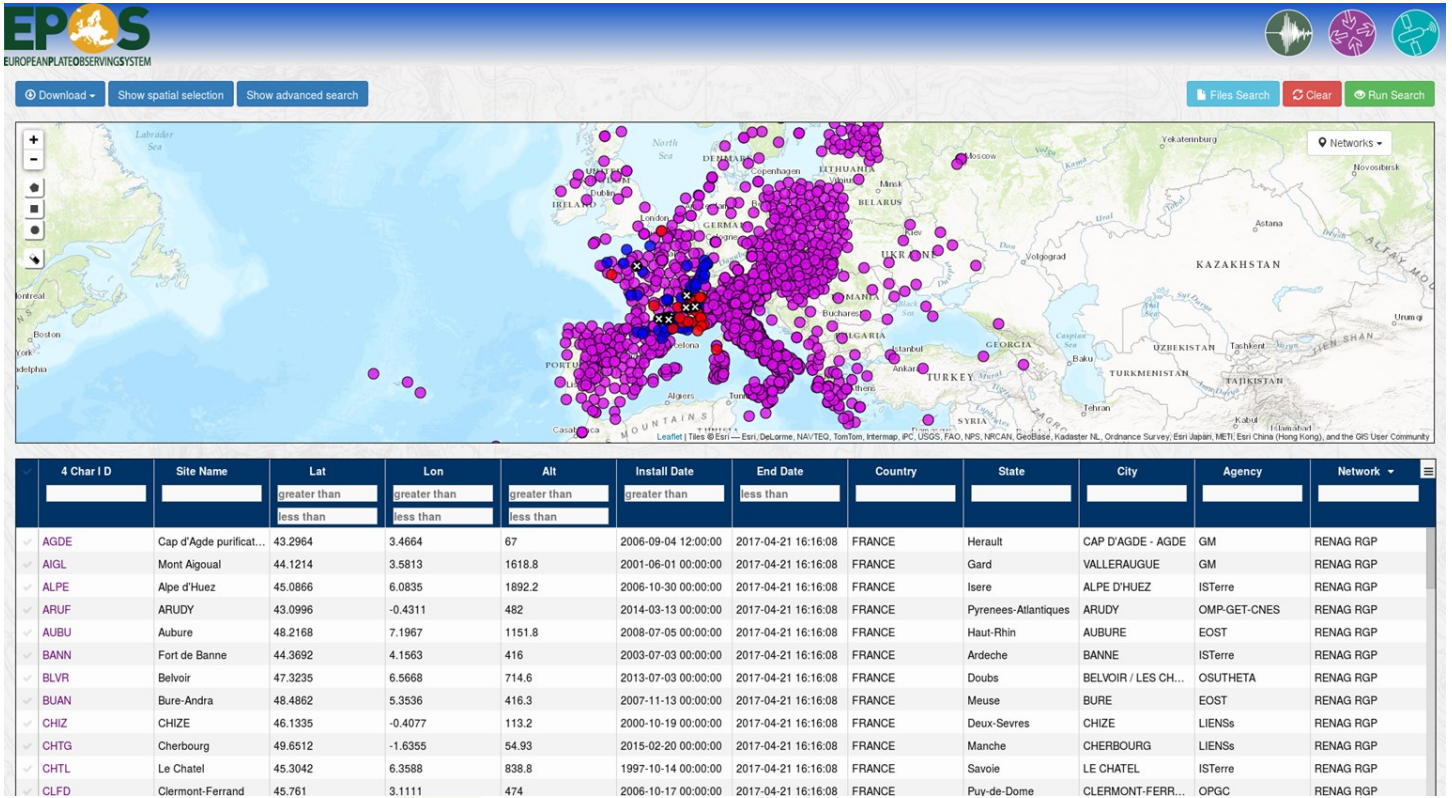
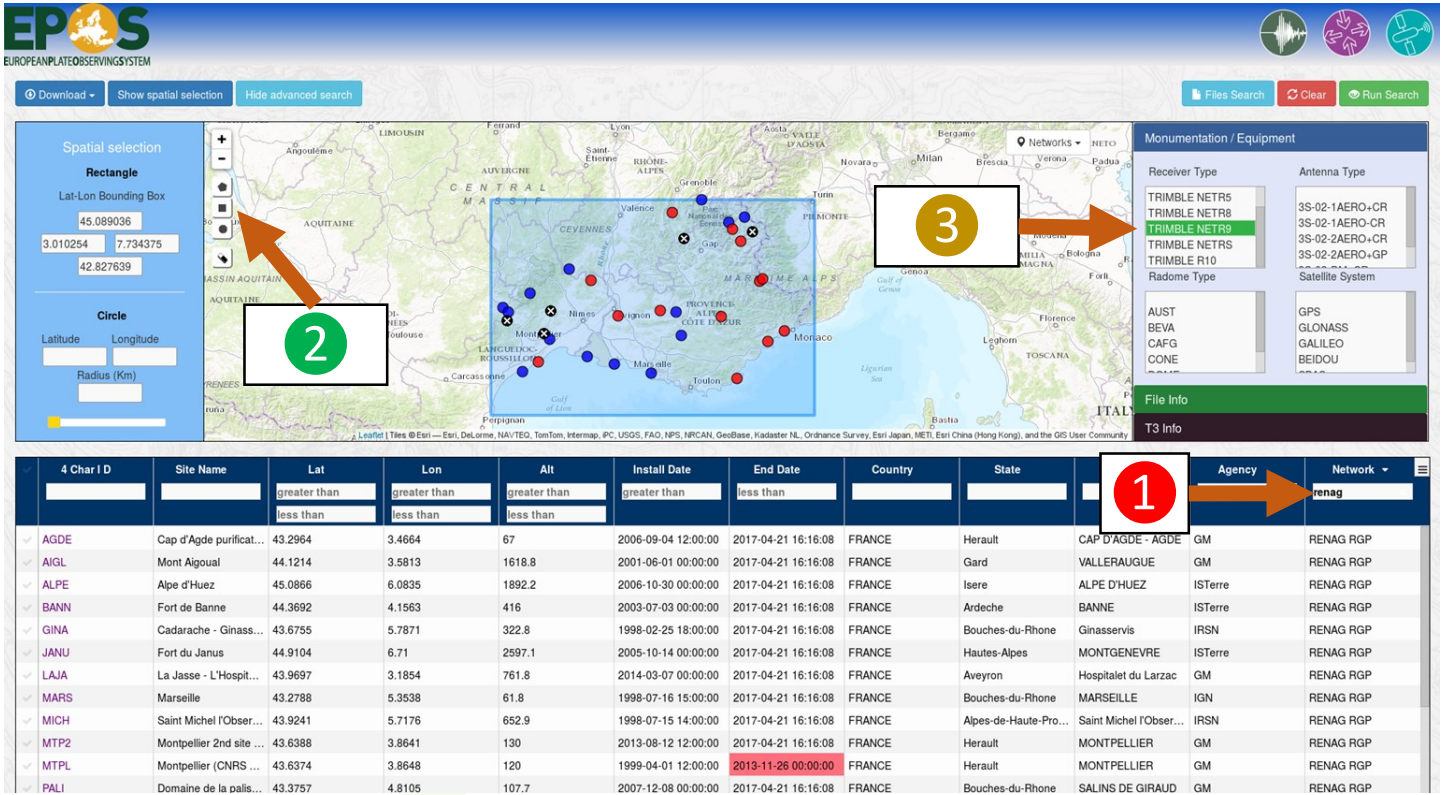
DATA PORTAL



4 Char I D	Site Name	Lat	Lon	Alt	Install Date	End Date	Country	State	City	Agency	Network
		greater than / less than	greater than / less than	greater than / less than	greater than	less than					
AGDE	Cap d'Agde purificat…	43.2964	3.4664	67	2006-09-04 12:00:00	2017-04-21 16:16:08	FRANCE	Herault	CAP D'AGDE - AGDE	GM	RENAG RGP
AIGL	Mont Aigoual	44.1214	3.5813	1618.8	2001-06-01 00:00:00	2017-04-21 16:16:08	FRANCE	Gard	VALLERAUGUE	GM	RENAG RGP
ALPE	Alpe d'Huez	45.0866	6.0835	1892.2	2006-10-30 00:00:00	2017-04-21 16:16:08	FRANCE	Isere	ALPE D'HUEZ	ISTerre	RENAG RGP
ARUF	ARUDY	43.0996	-0.4311	482	2014-03-13 00:00:00	2017-04-21 16:16:08	FRANCE	Pyrenees-Atlantiques	ARUDY	OMP-GET-CNES	RENAG RGP
AUBU	Aubure	48.2168	7.1967	1151.8	2008-07-05 00:00:00	2017-04-21 16:16:08	FRANCE	Haut-Rhin	AUBURE	EOST	RENAG RGP
BANN	Fort de Banne	44.3692	4.1563	416	2003-07-03 00:00:00	2017-04-21 16:16:08	FRANCE	Ardeche	BANNE	ISTerre	RENAG RGP
BLVR	Belvoir	47.3235	6.5668	714.6	2013-07-03 00:00:00	2017-04-21 16:16:08	FRANCE	Doubs	BELVOIR / LES CH…	OSUTHETA	RENAG RGP
BUAN	Bure-Andra	48.4862	5.3536	416.3	2007-11-13 00:00:00	2017-04-21 16:16:08	FRANCE	Meuse	BURE	EOST	RENAG RGP
CHIZ	CHIZE	46.1335	-0.4077	113.2	2000-10-19 00:00:00	2017-04-21 16:16:08	FRANCE	Deux-Sevres	CHIZE	LIENSs	RENAG RGP
CHTG	Cherbourg	49.6512	-1.6355	54.93	2015-02-20 00:00:00	2017-04-21 16:16:08	FRANCE	Manche	CHERBOURG	LIENSs	RENAG RGP
CHTL	Le Chatel	45.3042	6.3588	838.8	1997-10-14 00:00:00	2017-04-21 16:16:08	FRANCE	Savoie	LE CHATEL	ISTerre	RENAG RGP
CLFD	Clermont-Ferrand	45.761	3.1111	474	2006-10-17 00:00:00	2017-04-21 16:16:08	FRANCE	Puy-de-Dome	CLERMONT-FERR…	OPGC	RENAG RGP

http://glass.unice.fr:8080/epos_validation/#/site

DATA PORTAL

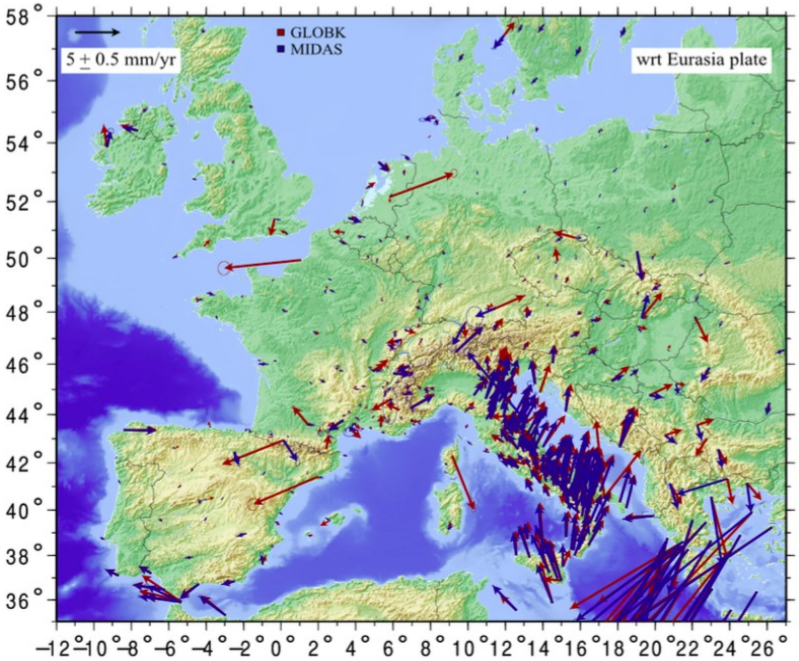


http://glass.unice.fr:8080/epos_validation/#/site

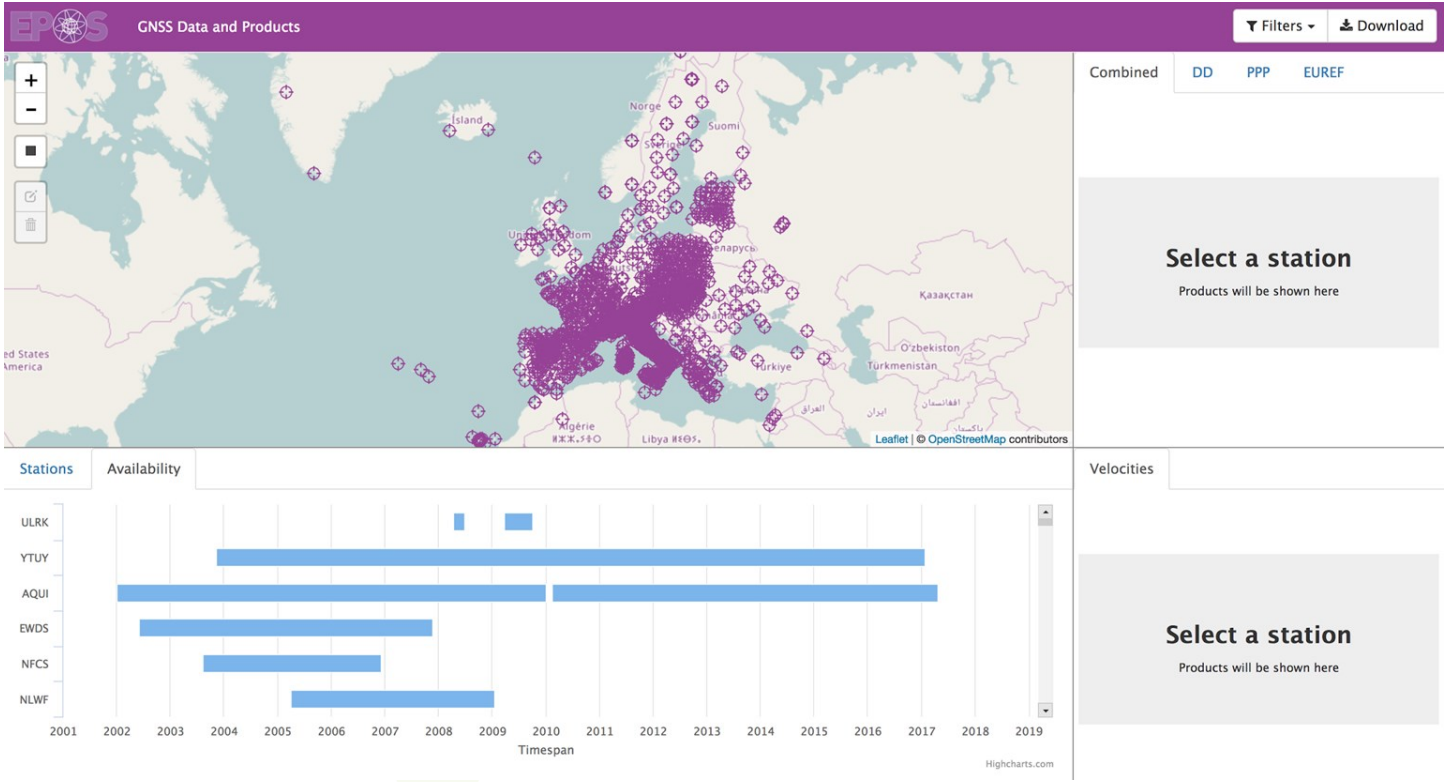
DEVELOPED PRODUCTS STATUS

Current status: Prototype Products already generated

- **Daily solutions + metadata**
  - 2 Pan-European processing centers (INGV, UGA-CNRS)
  - EUREF solutions (WUT)
  - Densified solution EPOS/EUREF (BFKH)
- **Daily time-series & velocity fields + metadata**
  - Single technique Solutions (INGV, UGA-CNRS)
  - Combined Solution (BFKH)
  - Validation (UBI)
- **Strain Rate maps + metadata**
  - Global + Regionals (LM)

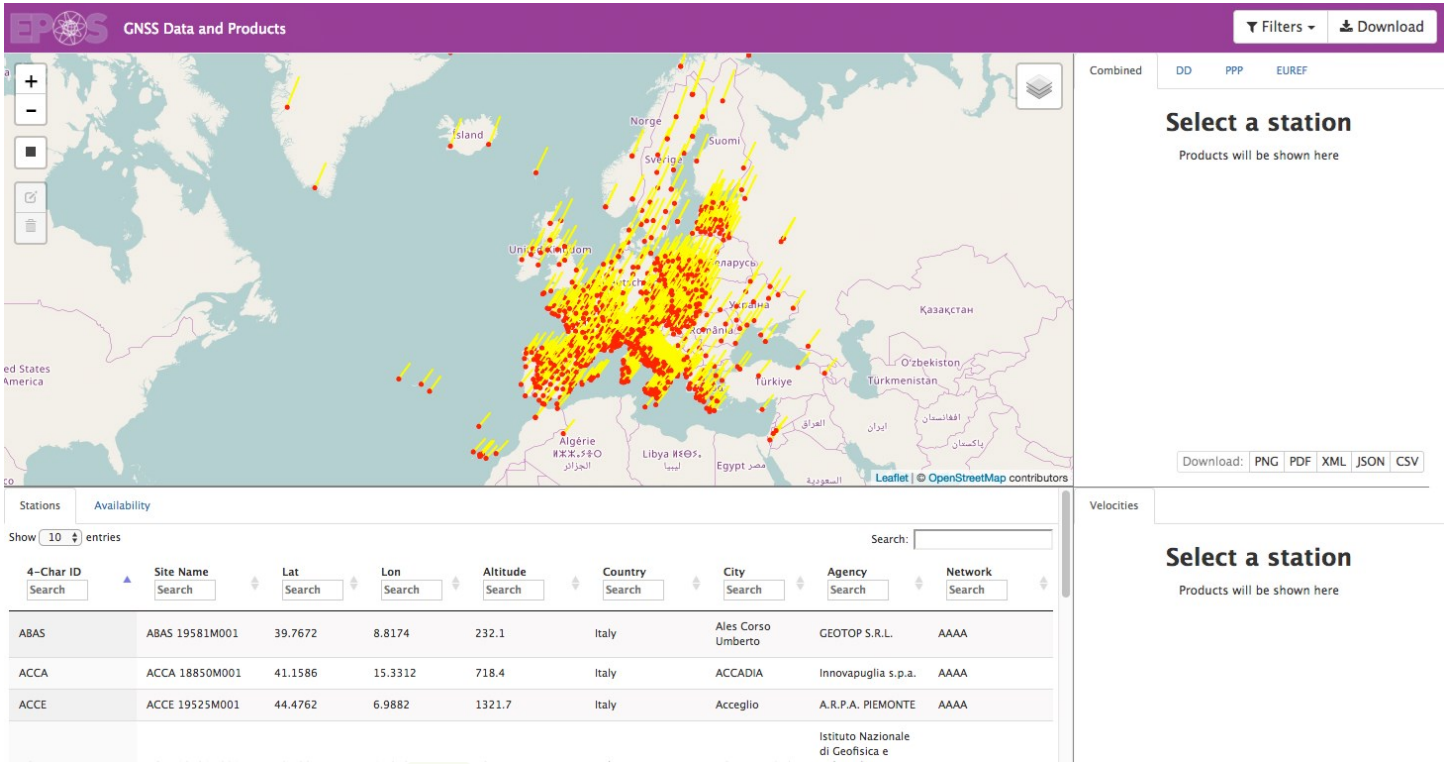


PRODUCTS PORTAL



http://gnssproducts.epos.ubi.pt/

PRODUCTS PORTAL



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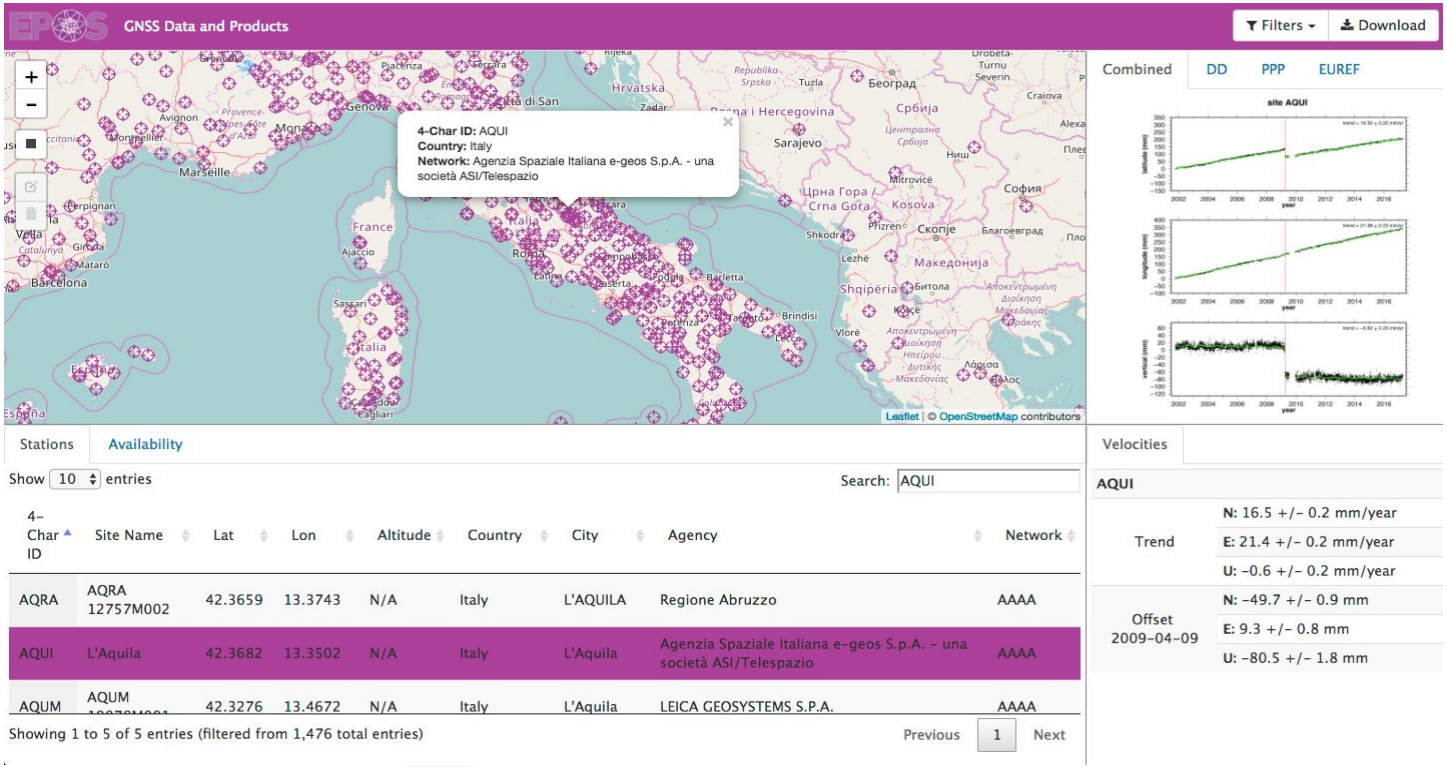
PRODUCTS PORTAL



http://gnssproducts.epos.ubi.pt/

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HORIZON 2020

SUMMARY

GLASS

- Software package to manage, validate, and distribute GNSS data & metadata and associated products.
- Implementation Phase, under development until 2019. First version available for testing in late Summer – interested? Please contact us: wp10@epos-ip.eu
- To be used in the Operational Phase, after 2019 as GNSS component of EPOS.
- We have shown GLASS four major components: Software repository , M3G software and Data & Products Portals
- All these components work together in a complete integrated package (can be installed as a stand-alone server but the goal is to facilitate the integration of individual repositories/data centers.
- By providing GNSS data through the EPOS ecosystem, using GLASS, the providers can enjoy quality control of their data and dissemination to a large group of users.
- The EPOS ecosystem will provide users easy access to GNSS data & products in Europe, provided in uniform formats.

GNSS TCS - MORE INFORMATION

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DOCUMENTATION:

GNSS TCS https://www.epos-ip.org/tcs/gnss-data-and-products

PORTALS:

M3G https://gnss-metadata.eu/

DATA http://glass.unice.fr:8080/epos_validation/#/site

PRODUCTS http://gnssproducts.epos.ubi.pt/

DISSEMINATION:

https://www.youtube.com/watch?v=PpJyfFfCSkQ

https://www.youtube.com/watch?v=f54nIliid5U

https://www.youtube.com/watch?v=NqlnMhkCgMI