GNSS Data and Products

Rui Fernandes & EPOS-GNSS TCS*
*** TCS – Thematic Core Service**

EPOS
EUROPEANPLATEOBSERVINGSYSTEM

The EPOS SP project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 871121

Outline

- EPOS – GNSS Community
- High quality GNSS Data and Products for Solid Earth sciences
- Flow of Data & Products
- e-Infrastructure:
  - Portals / Nodes / Repositories
- Connection with other projects/efforts:
  - EPN-Densification, EPOS National Projects, EarthScope Consortium
  - Africa, Latin America

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Objectives TCS GNSS Data & Products

- **Maintain the governance of TCS GNSS Data & Products in EPOS;**
- **Interact with the geodetic community in Europe, at national and Pan-European (EUREF) levels;**
- **Ensure interoperability between EPOS GNSS services (data and products) and EPOS ICS* ;**
- **Promote multidisciplinary interoperability with other disciplines within EPOS;**
- **Implement distributed dissemination of file-based GNSS data (currently for ~1500 stations), and derived Products: CRD, VEL, STR (currently ~2700 stations).**

**Integrated Core Service*

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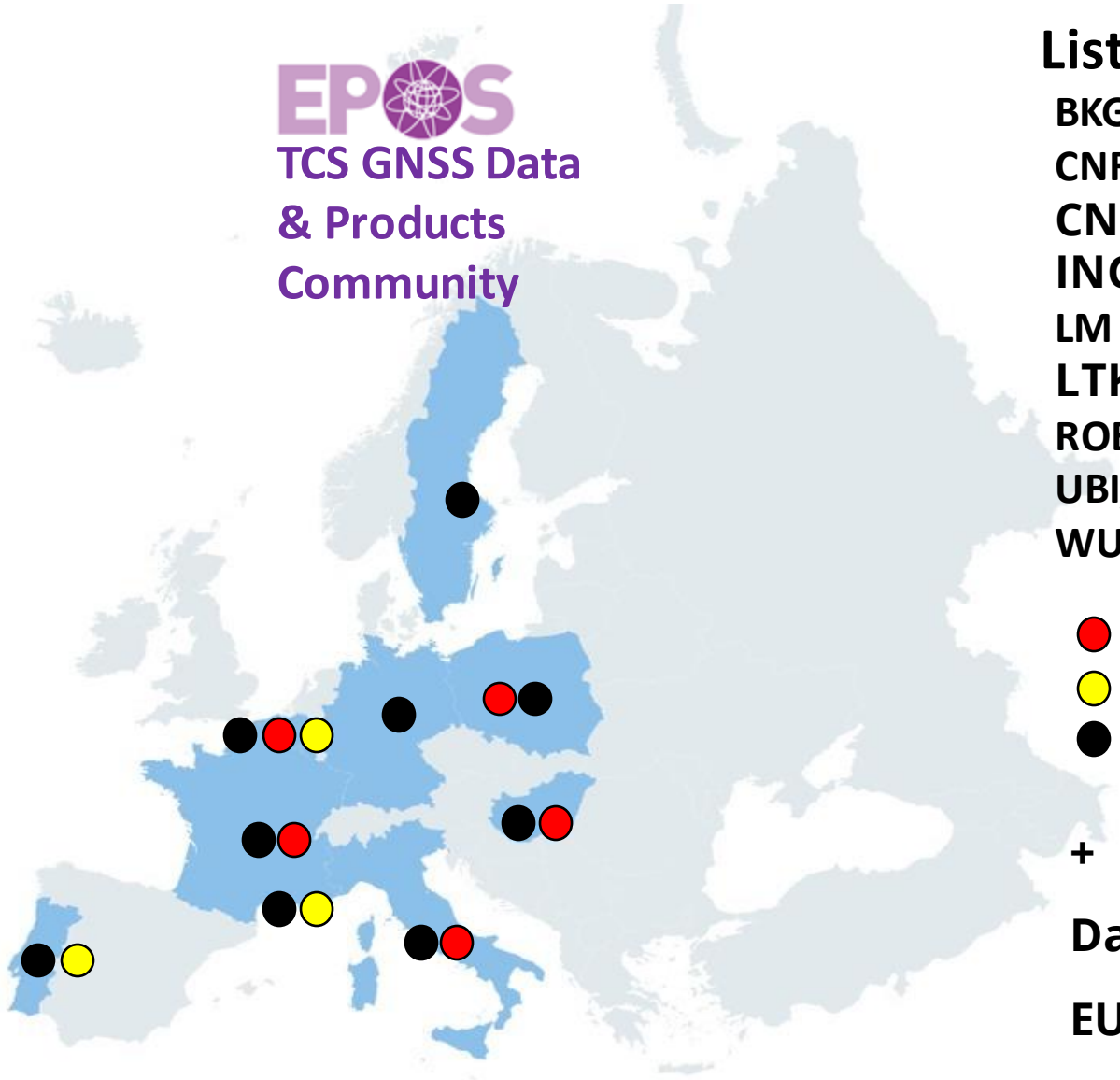
EPOS-GNSS

TCS GNSS Data & Products Community



GNSS TCS (EPOS-ERIC) Partners

List of Pan-European Service Providers:

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, SW
LTK Lechner Knowledge Center, HU
ROB Royal Observatory of Belgium, BE
UBI/C4G U. Beira Interior/Colaboratory for Geosciences, PT
WUT Warsaw University of Technology, PL

5 Product Centers
3 Portals (M3G, Data, Products)
11 Service Providers

+

Data Providers (National Research Infrastructures)

EUREF (Data, Data Products & Services)

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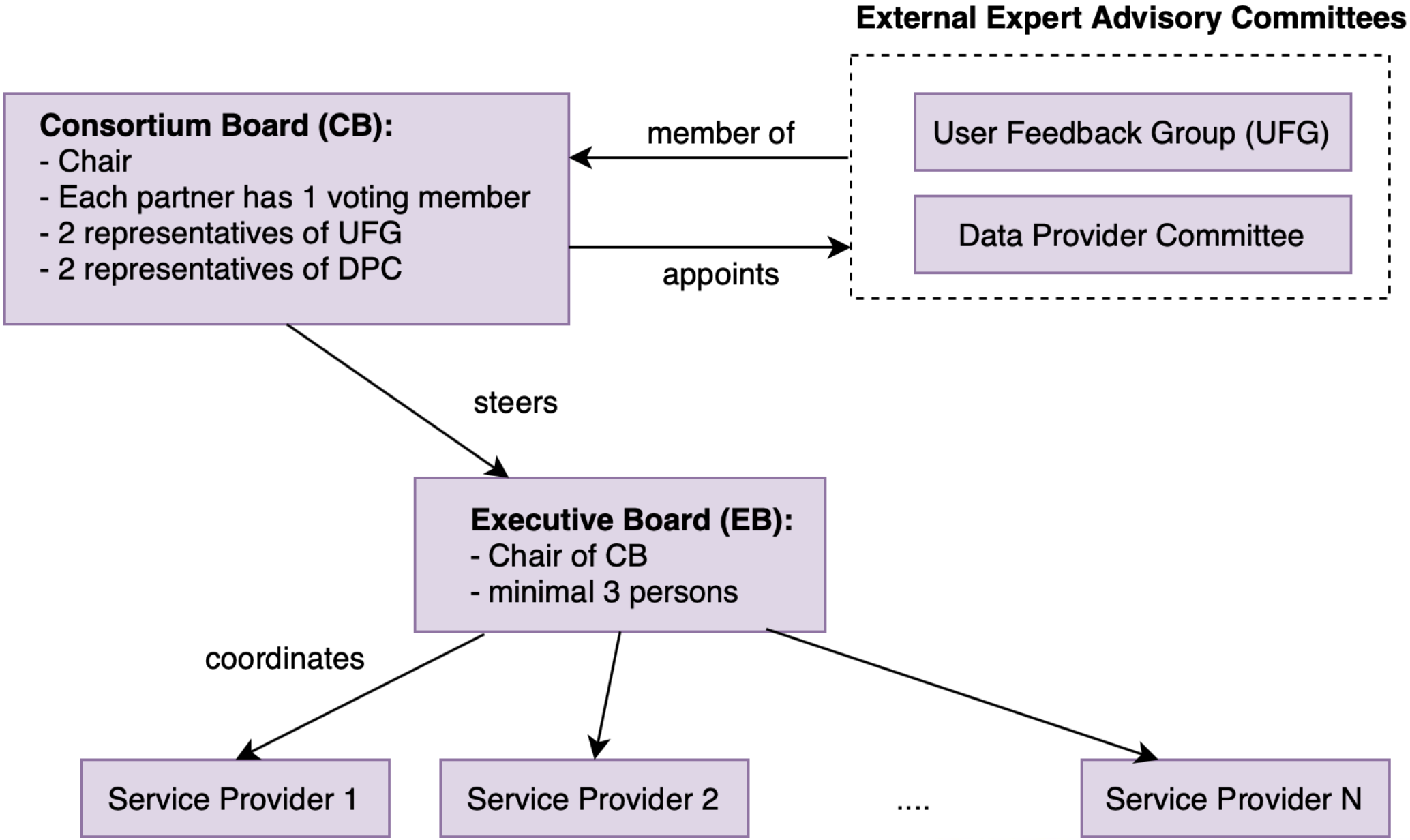
Governance Structure



DDSS – Data, Data Products, Services, Software

TYPE	SERVICE NAME	SERVICE DESCRIPTION	PROVIDER	COUNTRY
Governance				
GOV	**TCS Governance**	**Secretariat, Consortium board activities**	**UBI/C4G**	**PT**
SERVICE	**TCS Harmonisation**	**Harmonisation with GNSS Federated Data Providers**	**ROB**	**BE**
SERVICE	**TCS Outreach**	**Promotion of TCS data and products**	**UBI/C4G**	**PT**
Data Dissemination				
SERVICE	**Management of data services**	**Management of Node Infrastructure**	**CNRS-OCA**	**FR**
SERVICE	M3G	M3G GNSS Station metadata management service	ROB	BE
SERVICE	Data Gateway	Maintenance & Operation of GNSS Data Gateway	CNRS-OCA	FR
SERVICE	GNSS data validation	Long-term data quality monitoring	ROB	BE
Product Dissemination				
SERVICE	**Management of product services**	**Management of Product Services**	**CNRS-UGA**	**FR**
SERVICE	Products Portal	M&O of GNSS Products Gateway; Internal validation of GNSS-derived products	UBI/C4G	PT
SERVICE	PP Products	Daily solutions for EPOS stations using PP approach; Velocity Field from Combined EPOS Solutions	INGV	IT
SERVICE	DD Products	Daily solutions for EPOS stations using DD approach	CNRS-UGA	FR
SERVICE	Combined Products	Daily Combined time-series solutions using EPOS and EUREF solutions; Velocity Field from Combined (EPOS + EUREF) Solutions	LTK	HU
SERVICE	Strain Rates	Strain rates derived from velocity fields	LM	SE
Software Provision				
SERVICE	**Management of software services**	**Management of Software Services**	**UBI/C4G**	**PT**
SERVICE	GLASS @ UBI	M&O of GLASS databases, tools & webservices	UBI/C4G	PT
SERVICE	GLASS @ INGV	M&O of GLASS tools	INGV	IT
SERVICE	GLASS @ OCA	M&O of GLASS tools	CNRS-OCA	FR
EUREF				
SERVICE	EUREF Permanent Network Central Bureau	EUREF Permanent Network Central Bureau	ROB	BE
SERVICE	EUREF-ROB data node	EUREF-ROB GNSS data archive	ROB	BE
SERVICE	EUREF-WUT Products	Weekly combined positions of EUREF stations	WUT	PL
SERVICE	EUREF Reference Frame	Positions, velocities, and time series of EPN stations	ROB	BE
SERVICE	EUREF-LTK Products	Velocity field from combined EUREF densified solutions	LTK	HU
SERVICE	EUREF-BKG data node	EUREF-BKG GNSS data archive	BKG	DE

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Added value of GNSS Data & Products for the GNSS community

- **Sustainability within EPOS:**
  - **Countries that join EPOS-ERIC commit to maintain their GNSS infrastructure integrated in EPOS (stations, operation).**
  - **Pan-European Service Providers needed the commitment of their 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**

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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

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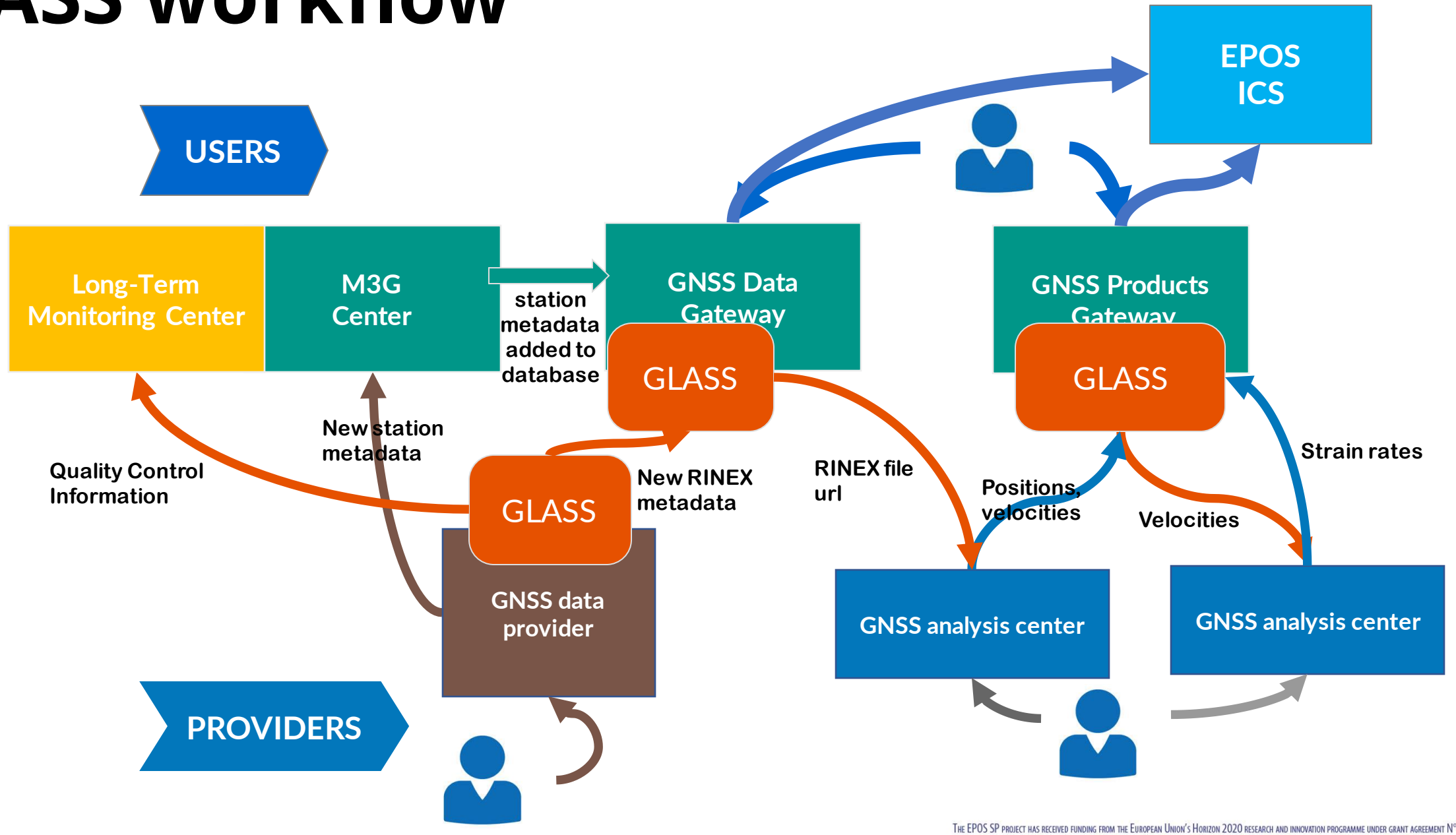
GLASS workflow



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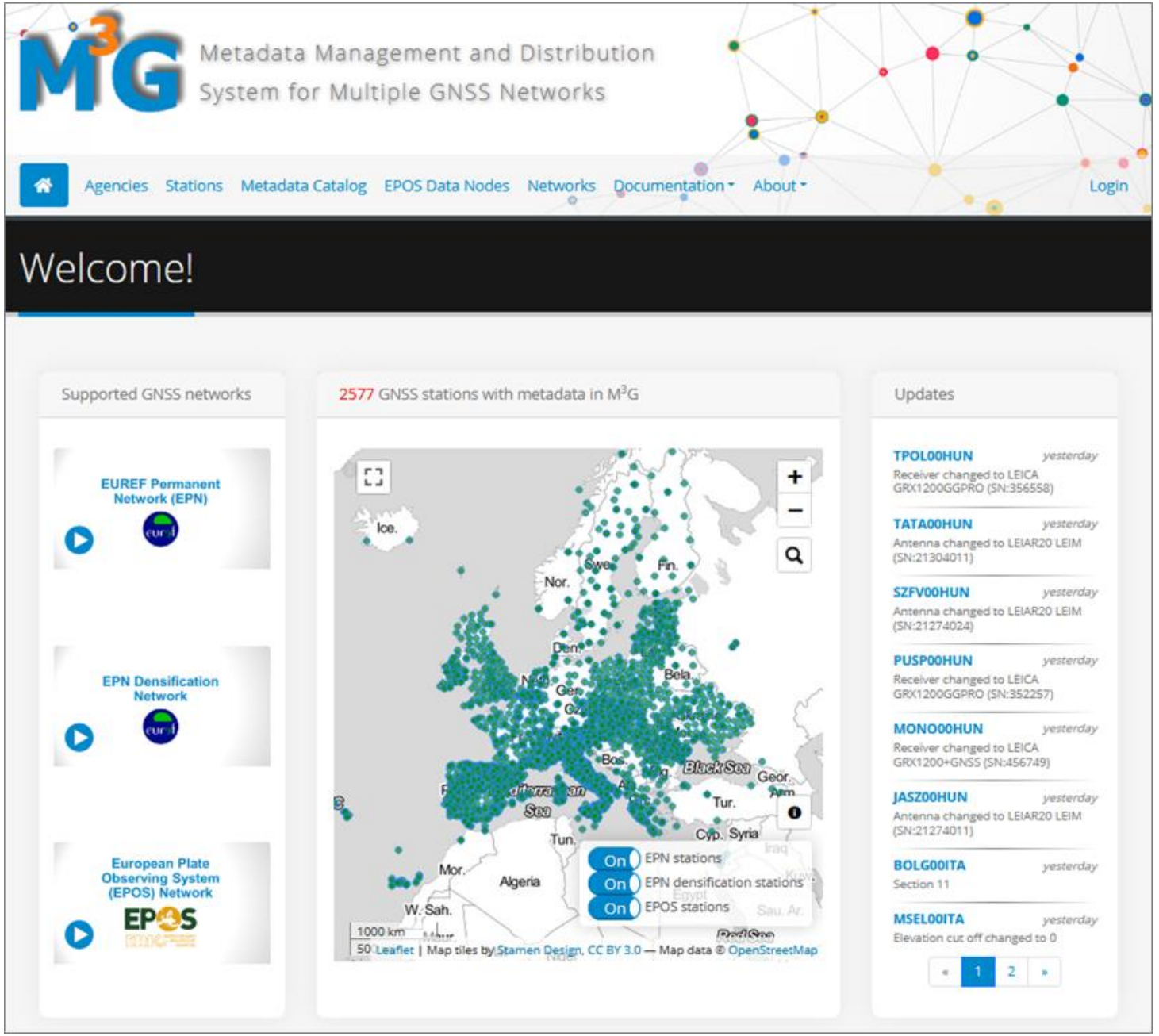
M³G Center

https://gnss-metadata.eu/



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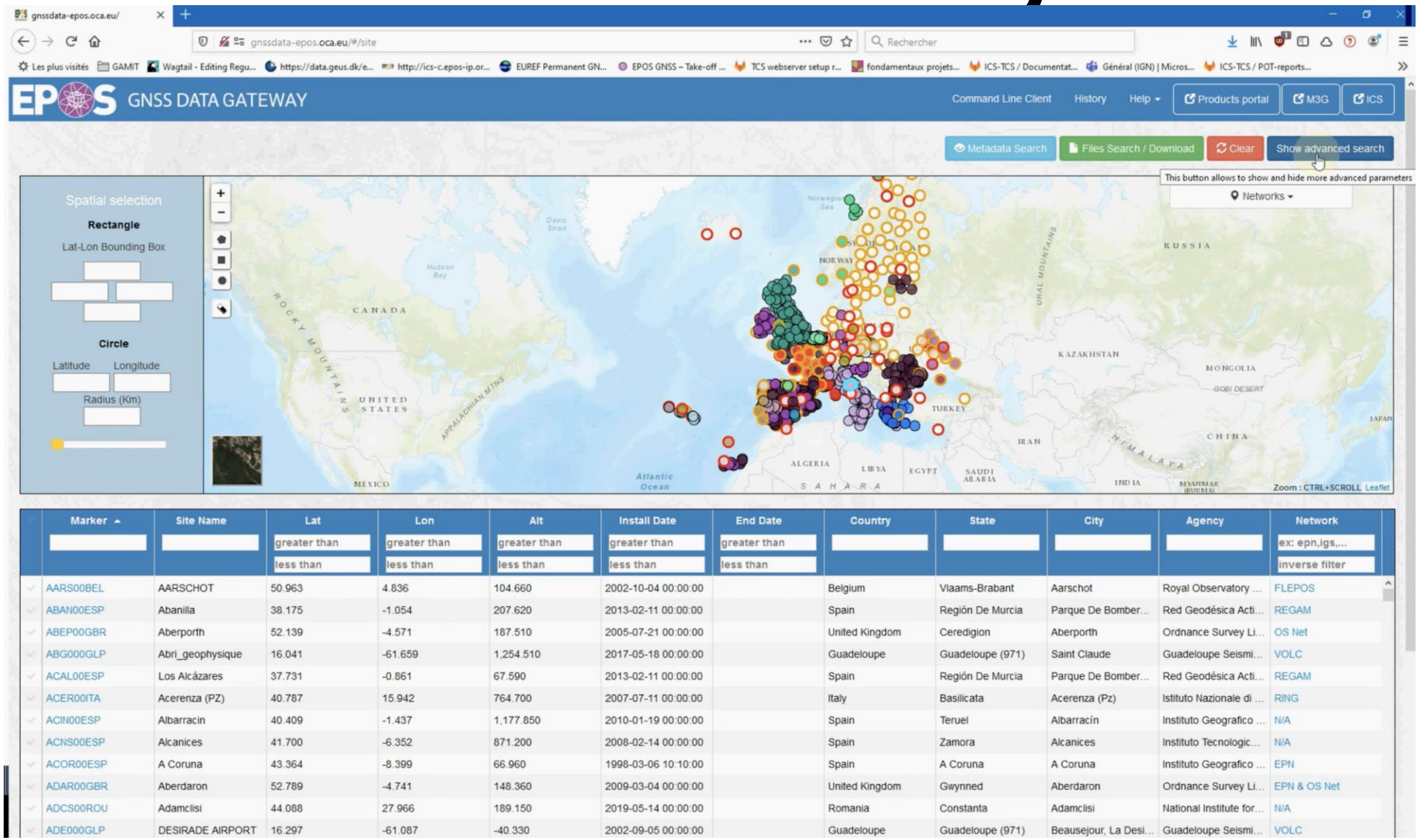
EPOS-GNSS Data Gateway



Marker	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	greater than / less than					ex: epn,igs,... / inverse filter
AARS00BEL	AARSCHOT	50.963	4.836	104.660	2002-10-04 00:00:00		Belgium	Vlaams-Brabant	Aarschot	Royal Observatory ...	FLEPOS
ABAN00ESP	Abanilla	38.175	-1.054	207.620	2013-02-11 00:00:00		Spain	Región De Murcia	Parque De Bomber...	Red Geodésica Acti...	REGAM
ABEP00GBR	Aberporth	52.139	-4.571	187.510	2005-07-21 00:00:00		United Kingdom	Ceredigion	Aberporth	Ordnance Survey Li...	OS Net
ABG000GLP	Abri_geophysique	16.041	-61.659	1,254.510	2017-05-18 00:00:00		Guadeloupe	Guadeloupe (971)	Saint Claude	Guadeloupe Seismi...	VOLC
ACAL00ESP	Los Alcázares	37.731	-0.861	67.590	2013-02-11 00:00:00		Spain	Región De Murcia	Parque De Bomber...	Red Geodésica Acti...	REGAM
ACER00ITA	Acerenza (PZ)	40.787	15.942	764.700	2007-07-11 00:00:00		Italy	Basilicata	Acerenza (Pz)	Istituto Nazionale di ...	RING
ACIN00ESP	Albarracin	40.409	-1.437	1,177.850	2010-01-19 00:00:00		Spain	Teruel	Albarracín	Instituto Geografico ...	N/A
ACNS00ESP	Alcanices	41.700	-6.352	871.200	2008-02-14 00:00:00		Spain	Zamora	Alcanices	Instituto Tecnologic...	N/A
ACOR00ESP	A Coruna	43.364	-8.399	66.960	1998-03-06 10:10:00		Spain	A Coruna	A Coruna	Instituto Geografico ...	EPN
ADAR00GBR	Aberdaron	52.789	-4.741	148.360	2009-03-04 00:00:00		United Kingdom	Gwynned	Aberdaron	Ordnance Survey Li...	EPN & OS Net
ADCS00ROU	Adamclisi	44.088	27.966	189.150	2019-05-14 00:00:00		Romania	Constanta	Adamclisi	National Institute for...	N/A
ADE000GLP	DESIRADE AIRPORT	16.297	-61.087	-40.330	2002-09-05 00:00:00		Guadeloupe	Guadeloupe (971)	Beausejour, La Desi...	Guadeloupe Seismi...	VOLC

http://gnssdata-epos.oca.eu/

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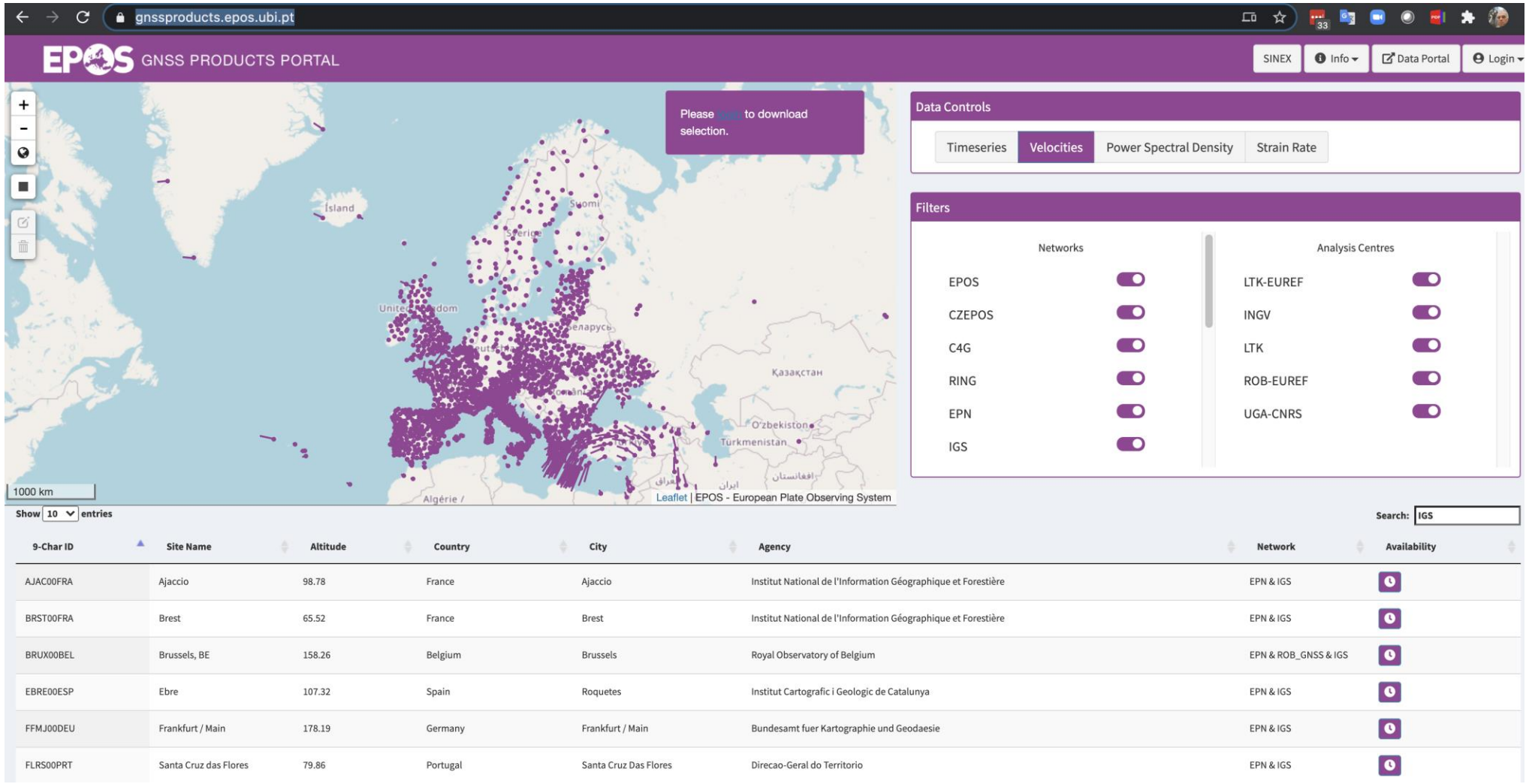
EPOS-GNSS Products Portal



9-Char ID	Site Name	Altitude	Country	City	Agency	Network	Availability
AJAC00FRA	Ajaccio	98.78	France	Ajaccio	Institut National de l'Information Géographique et Forestière	EPN & IGS	
BRST00FRA	Brest	65.52	France	Brest	Institut National de l'Information Géographique et Forestière	EPN & IGS	
BRUX00BEL	Brussels, BE	158.26	Belgium	Brussels	Royal Observatory of Belgium	EPN & ROB_GNSS & IGS	
EBRE00ESP	Ebre	107.32	Spain	Roquetes	Institut Cartografic i Geologic de Catalunya	EPN & IGS	
FFMJ00DEU	Frankfurt / Main	178.19	Germany	Frankfurt / Main	Bundesamt fuer Kartographie und Geodaesie	EPN & IGS	
FLRS00PRT	Santa Cruz das Flores	79.86	Portugal	Santa Cruz Das Flores	Direcao-Geral do Territorio	EPN & IGS	

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

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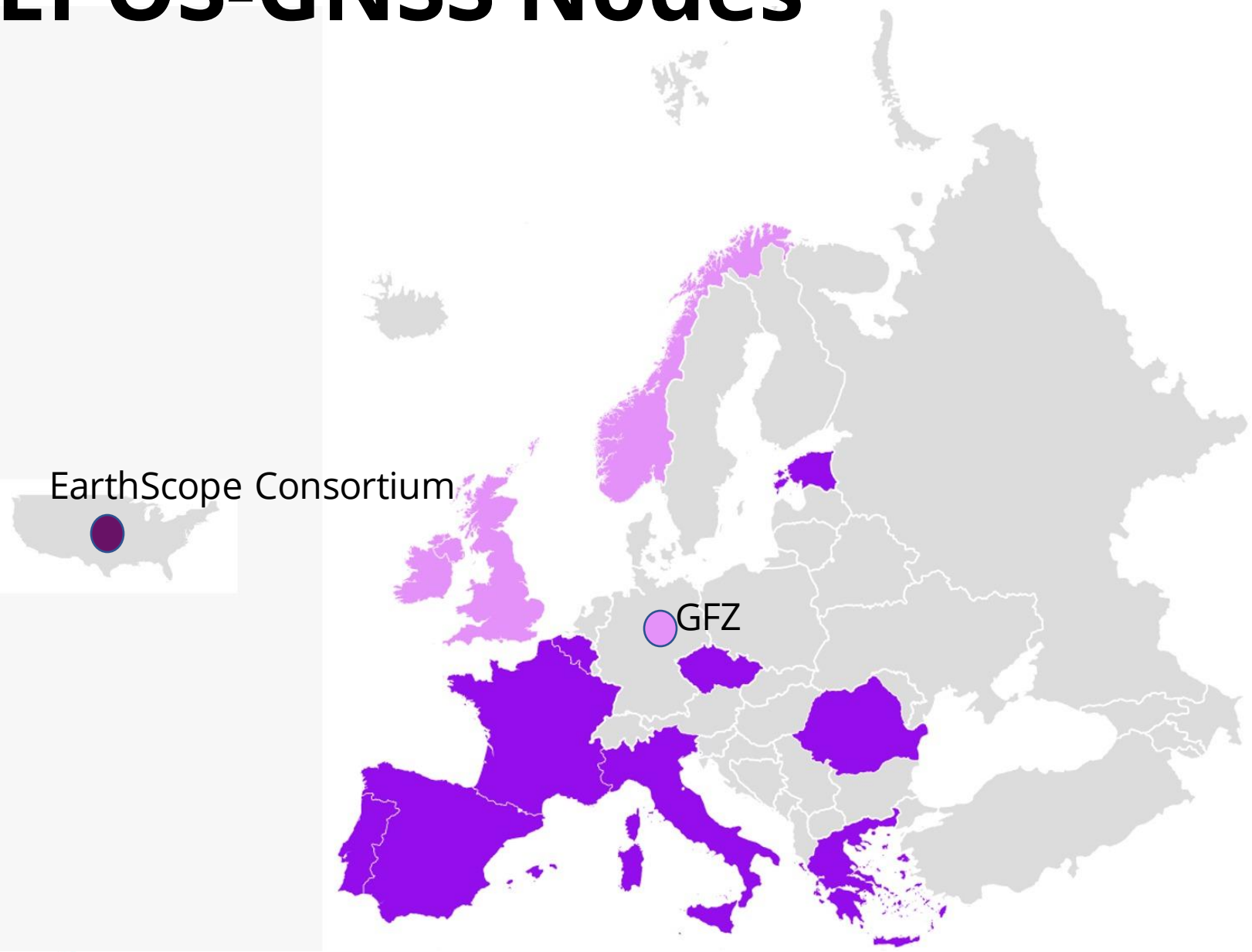
EPOS-GNSS Nodes



National Nodes

PanEuropean Node

International Collaboration

North Africa & Middle East in the future?

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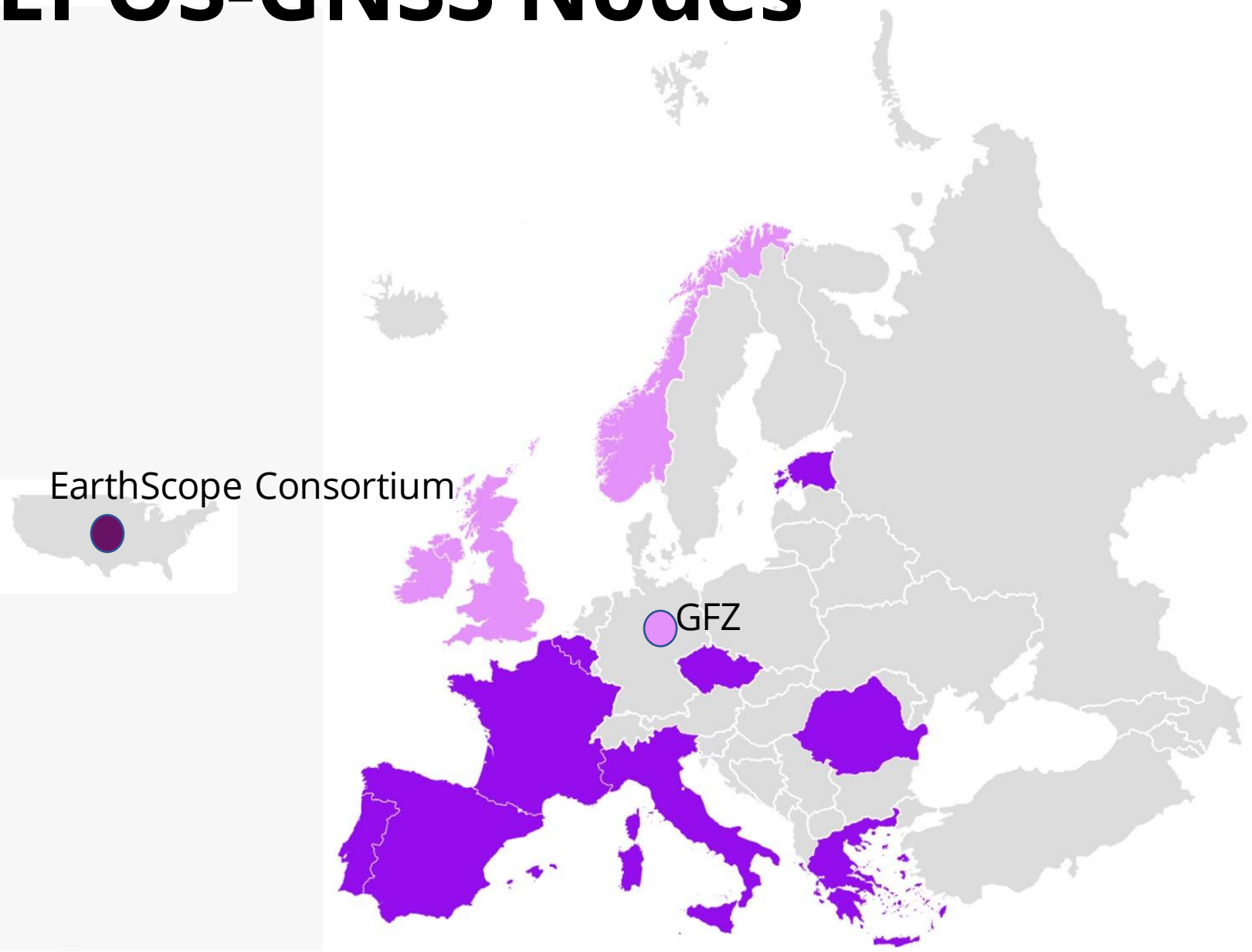
EPOS-GNSS Nodes



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GNSS TCS - MORE INFORMATION

LANDING PAGE: **EPOS** https://www.epos-eu.org/
GNSS https://gnss-epos.eu/

PORTALS:

M3G https://gnss-metadata.eu/
DATA http://gnssdata-epos.oca.eu/
PRODUCTS https://gnssproducts.epos.ubi.pt/

DISSEMINATION:

https://www.youtube.com/watch?v=NqInMhkCgMI
(GNSS-EPOS explained by children)

contact@gnss-epos.eu

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