



# EPOS - European Plate Observing System

## The European distributed Research Infrastructure for solid Earth science

**Research Infrastructures** are facilities that provide resources and services for research communities to conduct research and foster innovation. They can be used beyond research e.g. for education or public services and they may be single-sited, distributed, or virtual.

*European Commission definition*

# Solid Earth Science is the key to decipher chemical and physical processes that trigger and control natural phenomena

*Natural processes do not respect national boundaries  
To be understood, they require cross-disciplinary approaches*

- Integrated, multidisciplinary research is mandatory**
- to understand the Earth's chemical and physical processes
- to forecast the events
- to assess the hazard and mitigate the risk
- to sustainably exploit geo-resources

The challenge is to make the enormous wealth of  
scientific data generated by many different scientific communities  
**universally and openly accessible**

*While politicians may be putting up borders,  
scientists are trying even harder to break down national barriers.*



# A long journey from conception to operation

EPOS has been designed and implemented as the only Research Infrastructure in Europe for solid Earth Science

## Vision

To ensure sustainable and universal use and re-use of multidisciplinary solid Earth science data and products fostering state-of-the-art research and innovation



**The EPOS Data Portal is now fully operational**  
a multi-domain portal that grants  
**open access to harmonized and interoperable  
scientific data and products** applying FAIR principles

**Mission** To establish a sustainable and long-term access to solid Earth science data and services integrating diverse European Research Infrastructures under a common federated framework

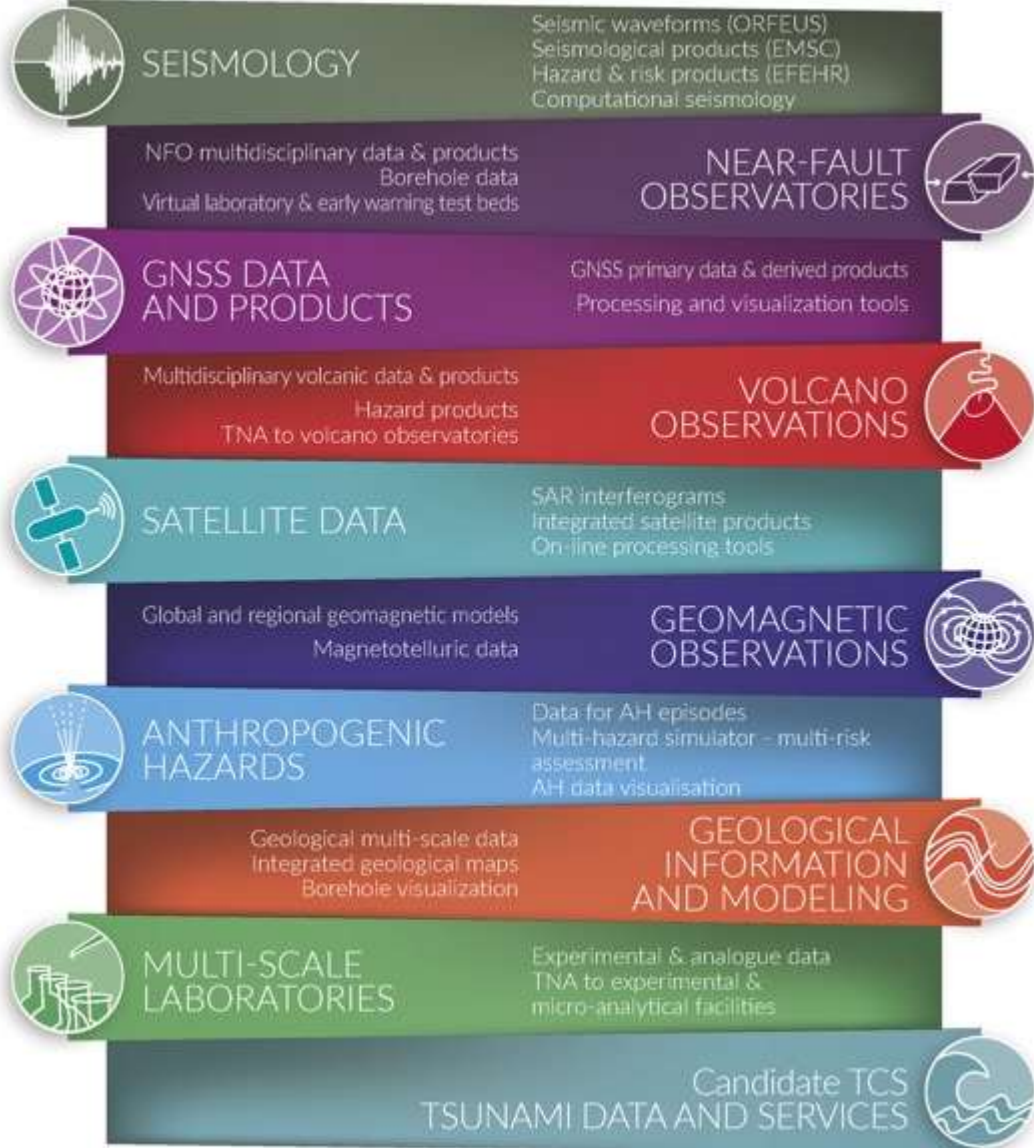
# The heterogenous EPOS landscape

Designed as the only Research Infrastructure for solid Earth science in Europe,  
EPOS is, by nature, characterised by a heterogeneous landscape



**EPOS brings together thematic disciplines, European nations and international organizations and combines hundreds of solid Earth science infrastructures and their capital of human expertise, scientific data and facilities into one integrated system**

<b>Thematic Disciplines</b>	<b>10</b>
<b>Countries contributing to EPOS with data and services</b>	<b>26</b>
<b>International research organisations</b>	<b>5</b>
<b>Research organisations providing data and services</b>	<b>256</b>

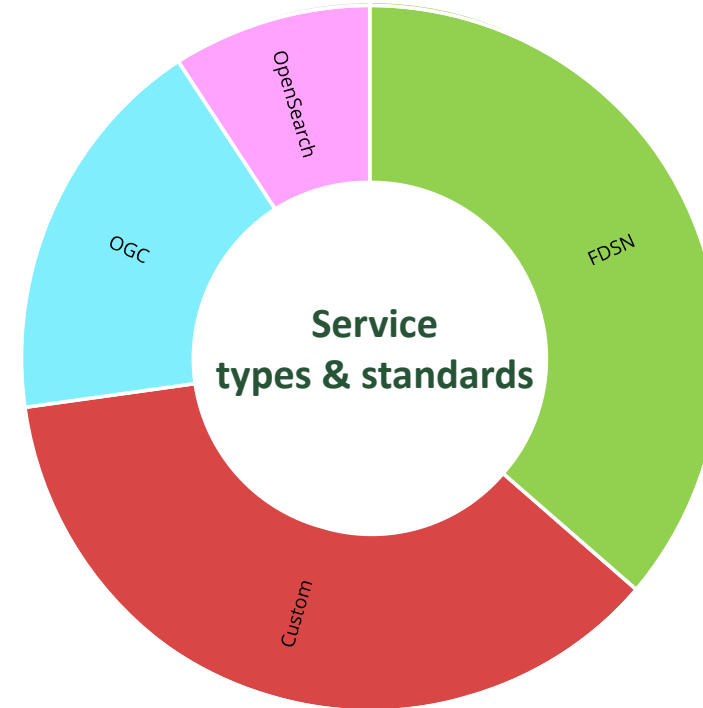
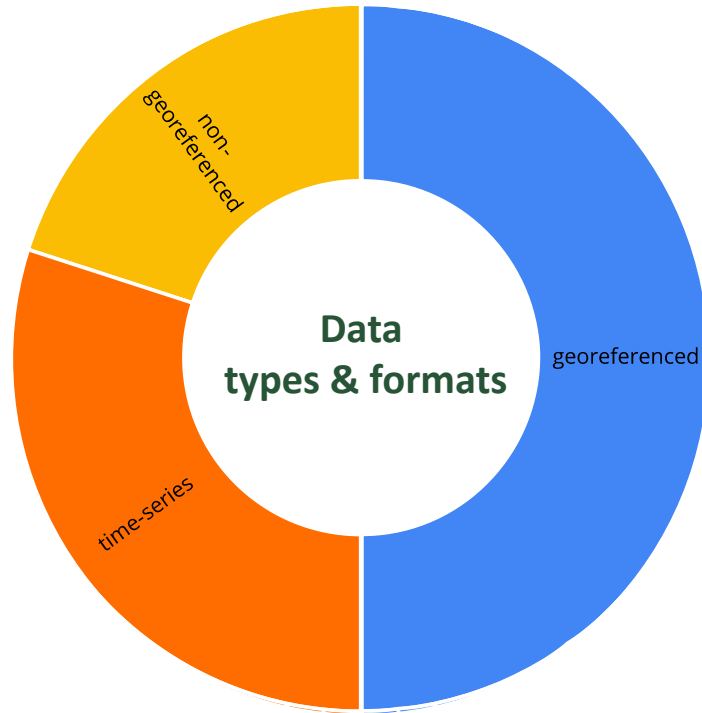


## The Thematic Communities drive the evolution of EPOS

- Currently, **10 different solid Earth science domains** are harmonized across EPOS into the **Thematic Core Services**.
- Each TCS is established as a Consortium of national research organisations (**Consortium Agreement**), with its own **governance**.
- TCS connote the **governance framework** to ensure the provision of multidisciplinary, high-quality, and standardized data and services.

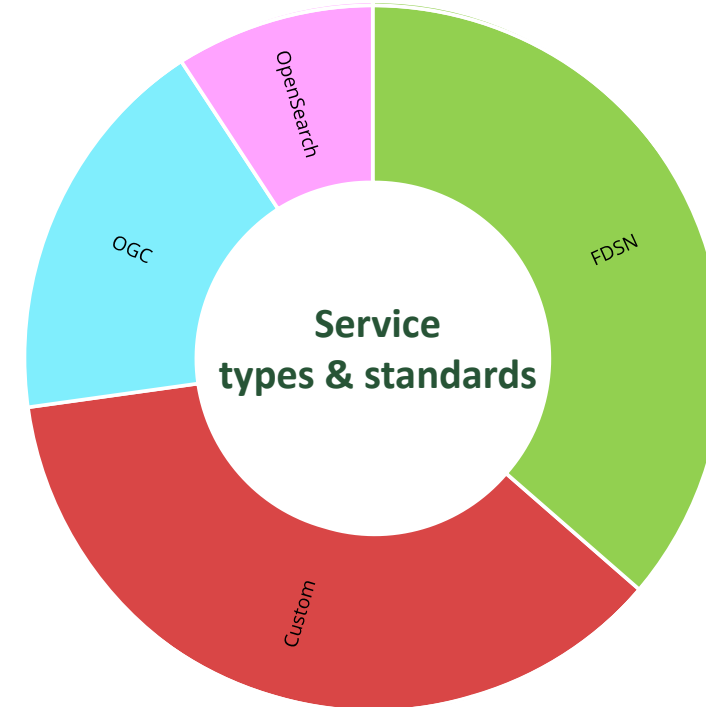
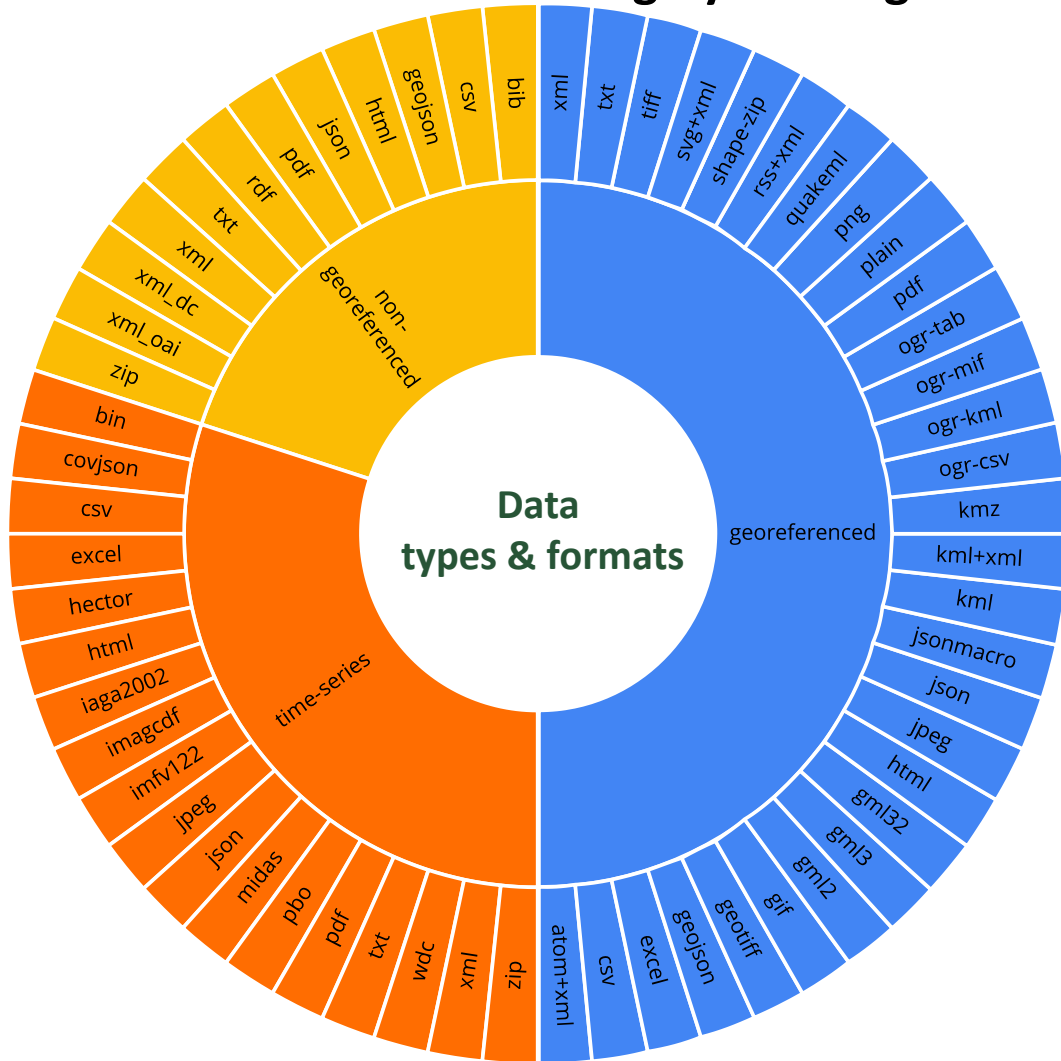
# The heterogenous EPOS landscape (II): scientific data and services

Data and services highly heterogeneous in terms of formats, vocabularies, standards and protocols



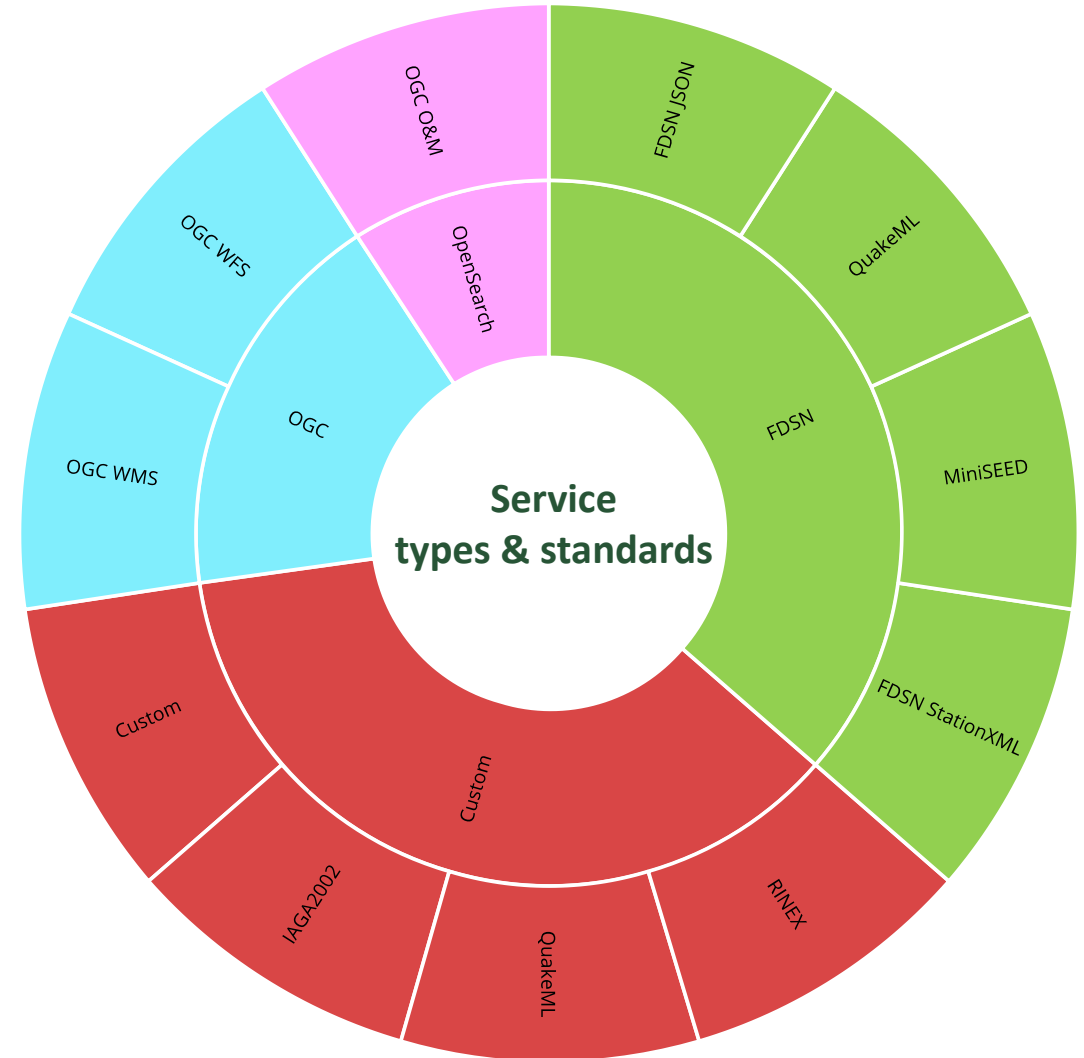
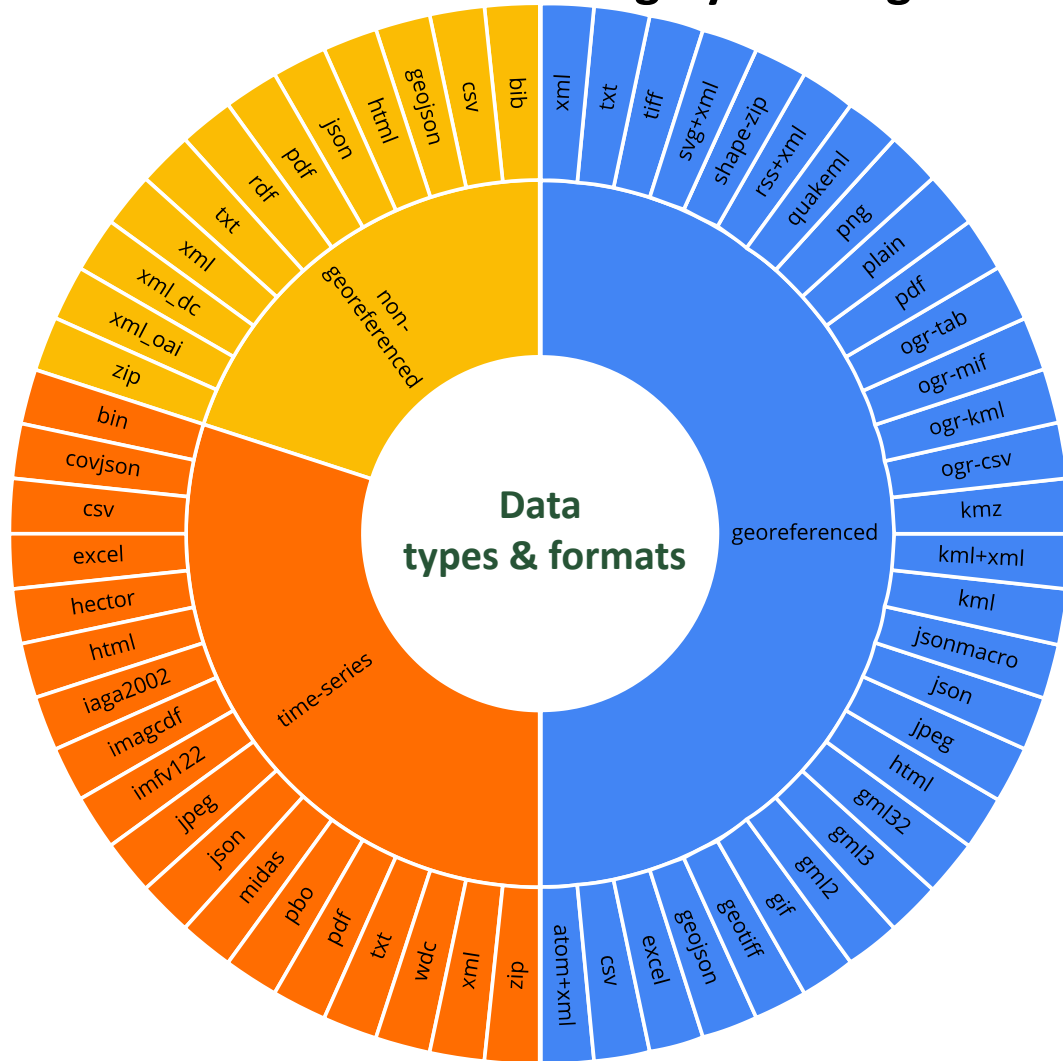
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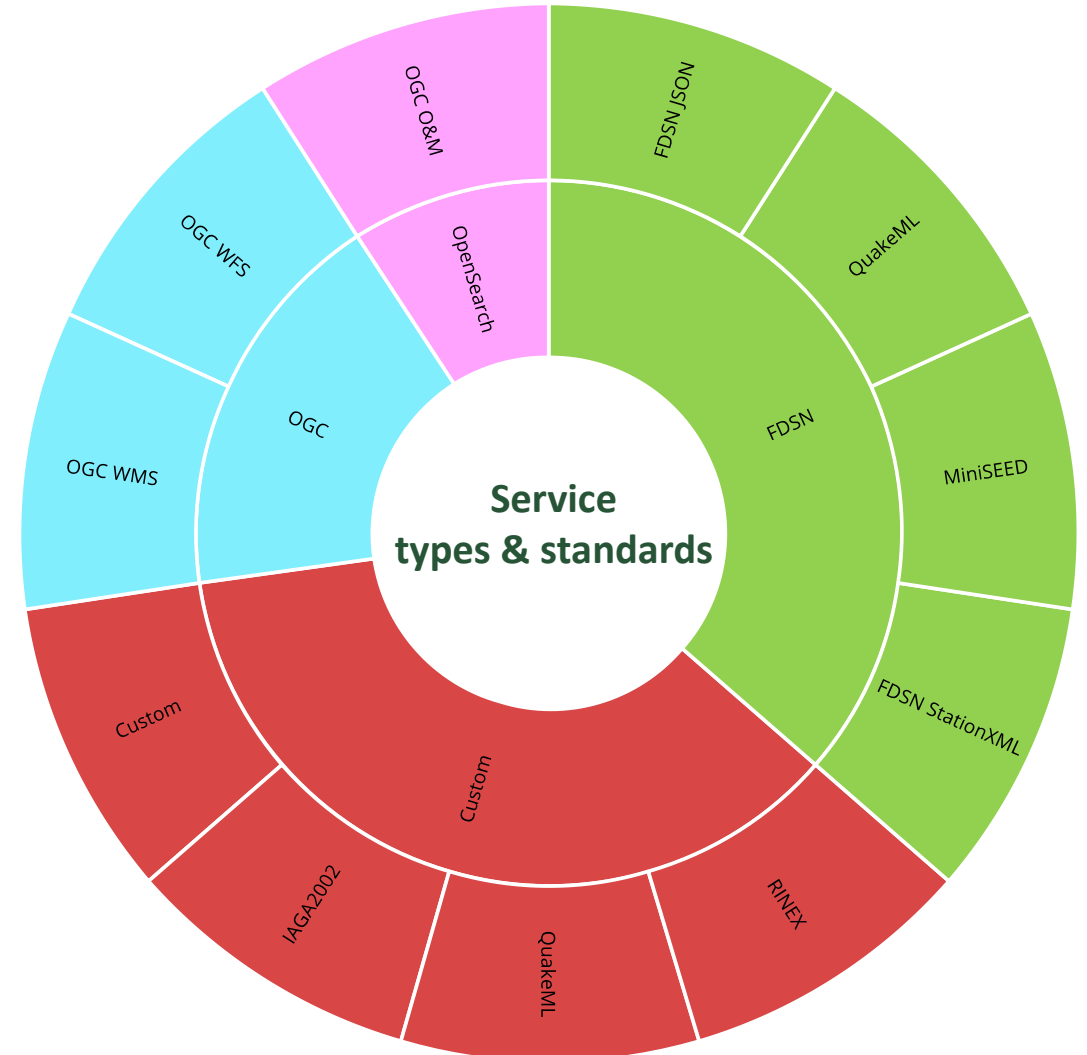
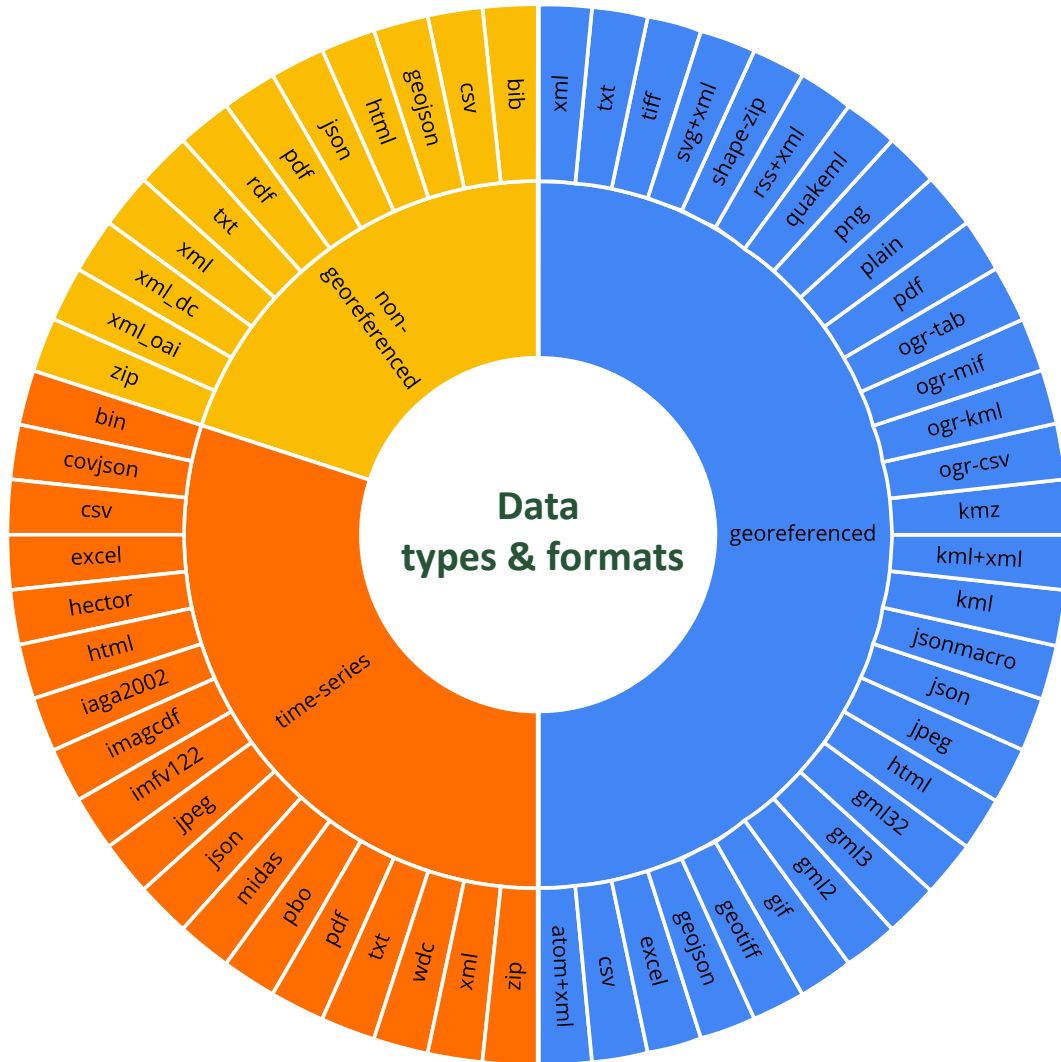
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# The heterogenous EPOS landscape (II): scientific data and services



**EPOS addressed the challenge of making this enormous wealth of scattered, scientific data interoperable, and universally and openly accessible**

- The ERIC, is the tool chosen by the Community to govern and operate EPOS.
- Currently EPOS ERIC is joined by 18 countries.
- The EPOS ERIC decision body is the **General Assembly**, composed of ministry representatives by all Members.
- The EPOS ERIC **legal seat** is in Italy (INGV, Rome), where the Executive Coordination Office is set.
- Overall, EPOS ERIC **ensures joint strategies** to achieve **scientific and technological innovation** across all stakeholders involved, and tackles the **sustainability** challenge with harmonized approaches.

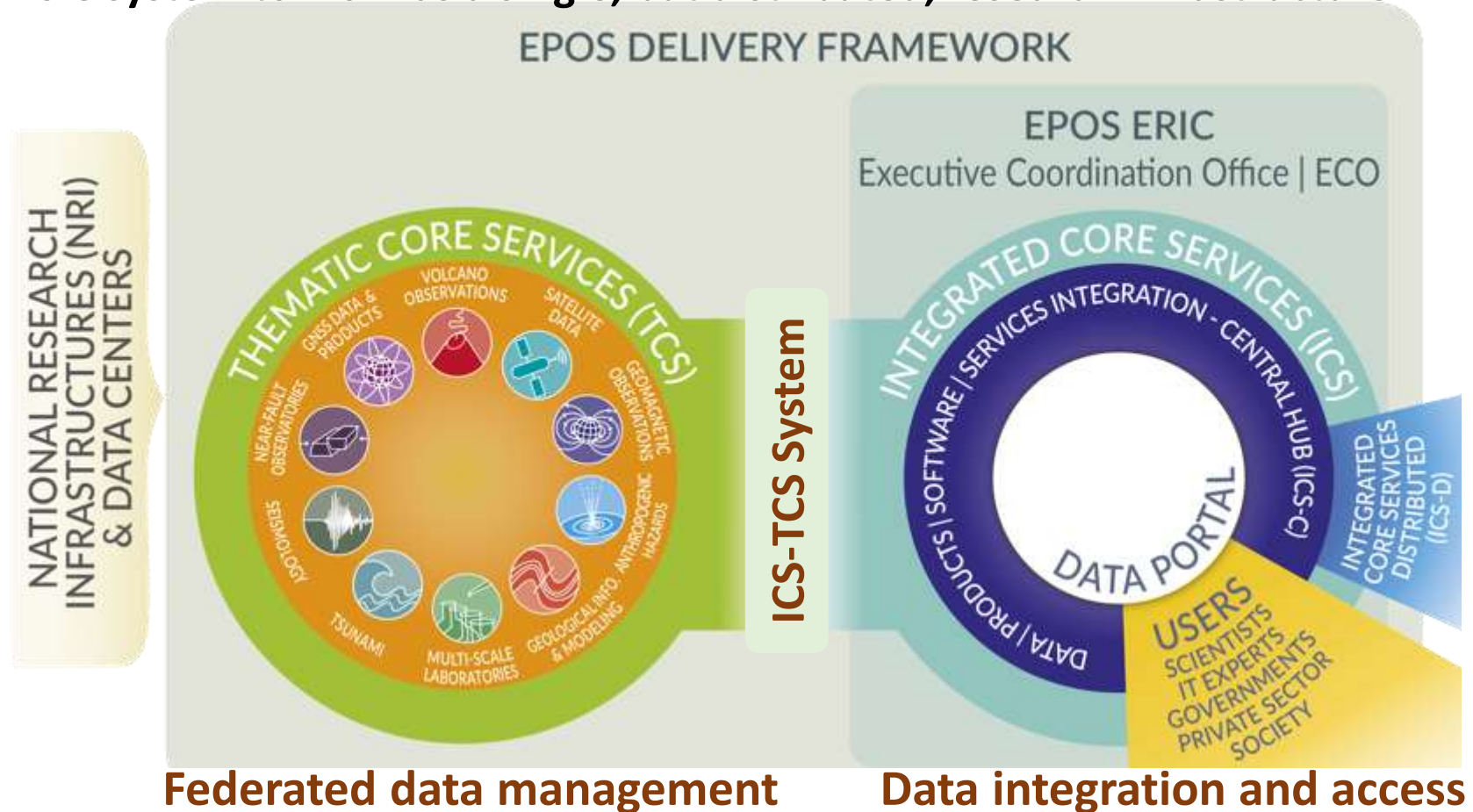


In green country members (dark) and observers (light) of the ERIC  
 In red, countries not in the ERIC, but still participating to the EPOS Delivery Framework  
**CROATIA and BULGARIA WILL JOIN EPOS ERIC IN 2024**

# The EPOS architecture

EPOS has been designed and built by assembling distinctive elements to allow the whole system to work as a single, but distributed, research infrastructure

## Data generation



This peculiar architecture guarantees the effective engagement of all actors and stakeholders

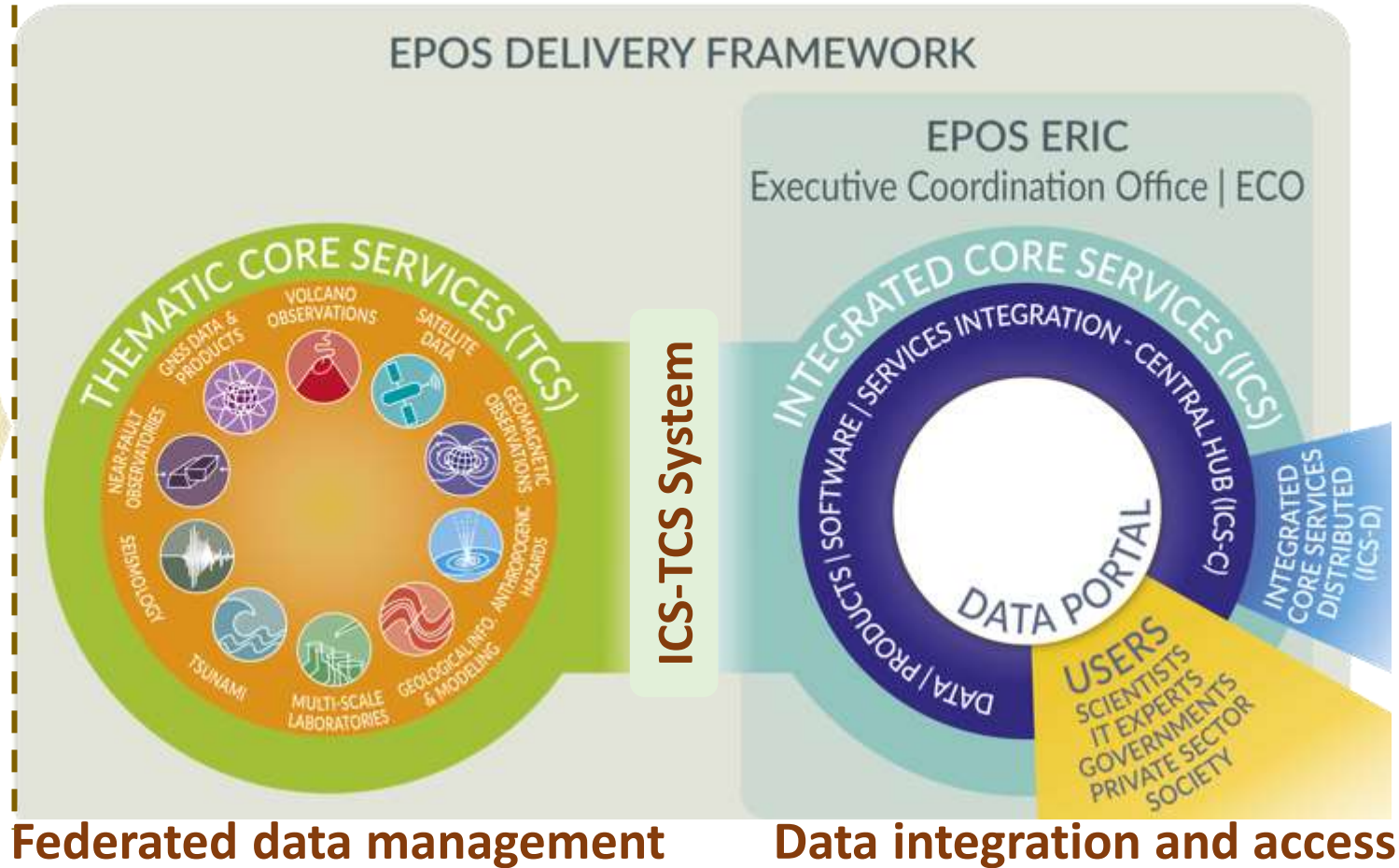
# The EPOS architecture

## Data generation

### National Research Infrastructures

- generate and manage data
- guarantee access to them
- supported at national level

NATIONAL RESEARCH INFRASTRUCTURES (NRI) & DATA CENTERS



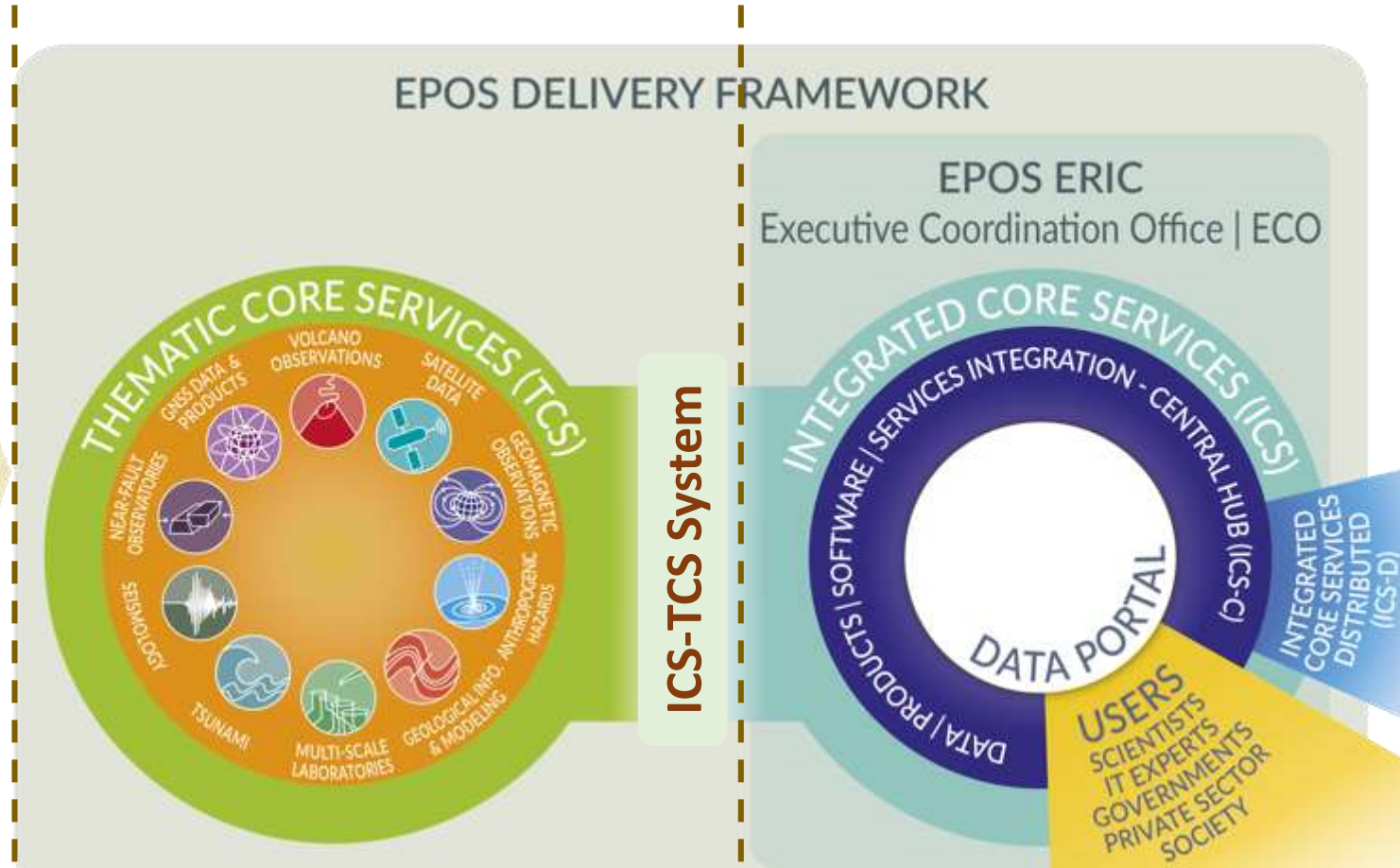
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## Thematic Core Service (TCS)

- the community governance-layer necessary to ensure effective management of community-specific data and services for their integration and provision within EPOS
- mostly supported in kind, partially through EPOS ERIC fees

## Federated data management

## Data integration and access

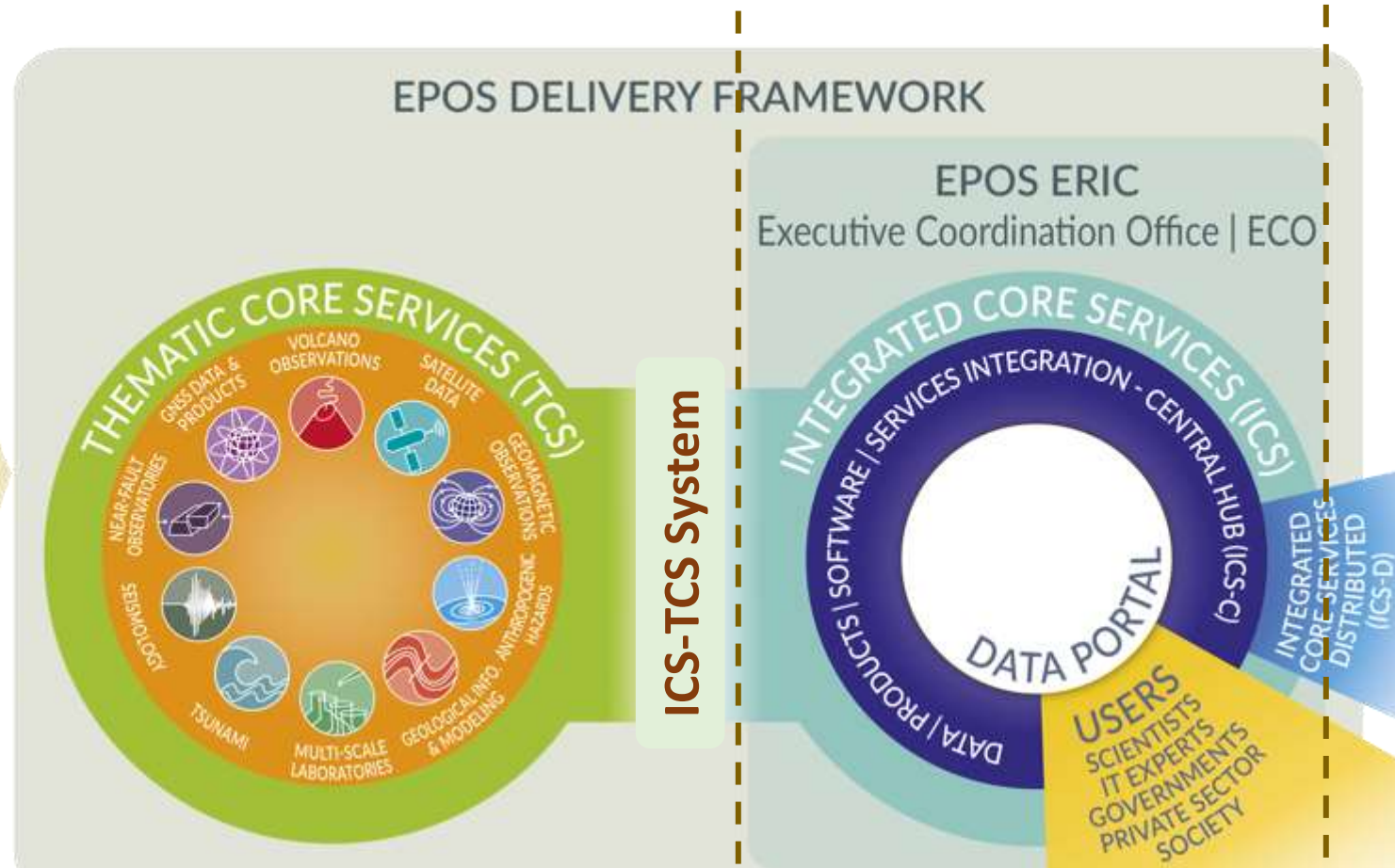
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## Data integration and access

- **Integrated Core Services (ICS) made of ICS-C and ICS-D**
  - e-infrastructure for data and services integration and accessibility through the EPOS Data Portal
- supported by hosting contributions and EPOS ERIC fees

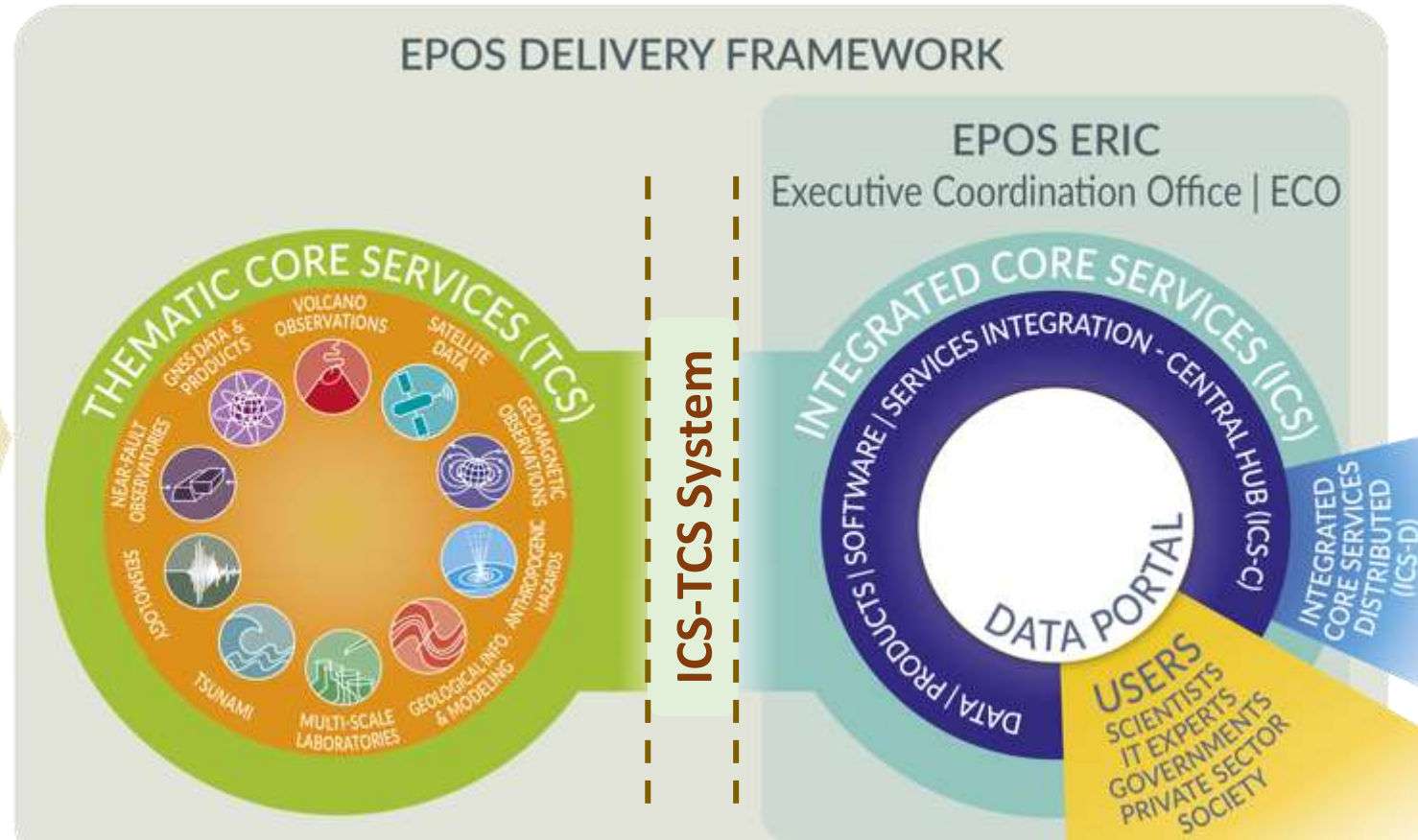
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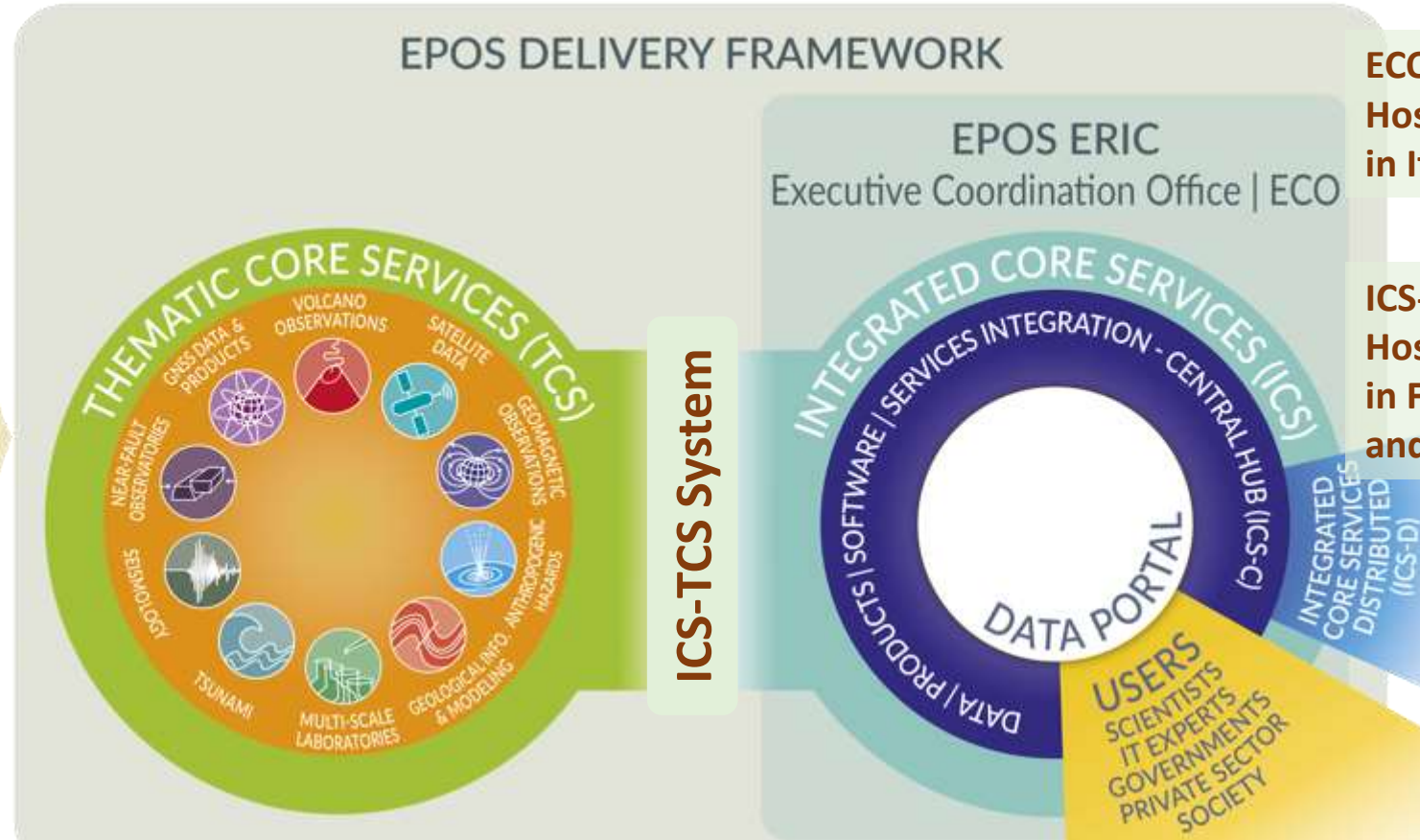
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NATIONAL RESEARCH  
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ECO  
Hosted and operated  
in Italy (INGV)

ICS-Central Hub  
Hosted and operated  
in France (BRGM)  
and UK (BGS)

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## Community Building

- **Bottom-up approach:** to ensure scientific and technological strategies are fully shared by the Community
- **Community-driven effort:** scientists, e-scientists, data practitioners, data managers and policy-makers participate in the co-design and co-development of the RI, including its Data Portal
- **Cooperative approach** to established data sharing communities and/or national infrastructures
- **Data and service providers** are an essential part of the user community

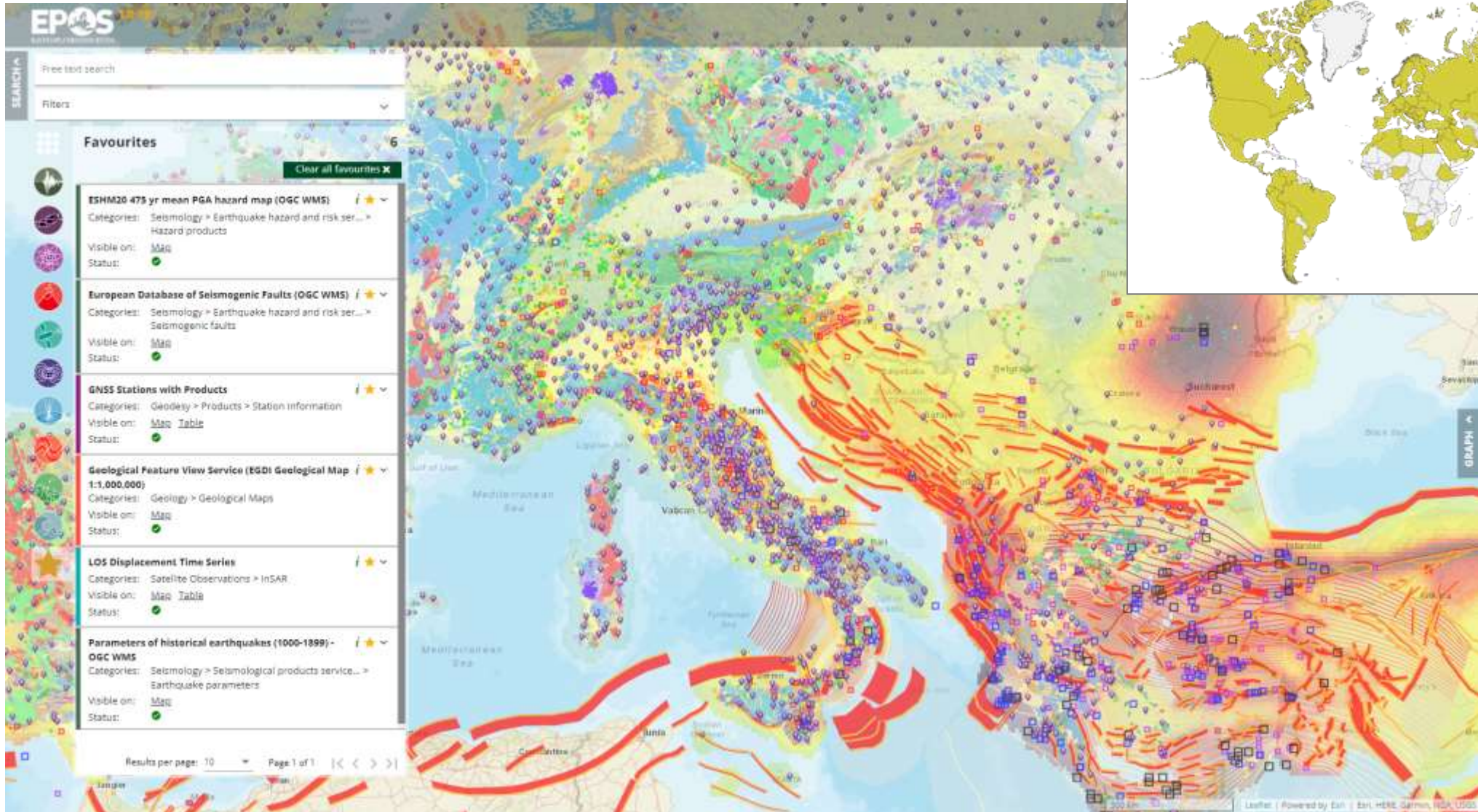
## Connecting communities to EPOS

- The TCS are organized in **Consortia for a transparent decision-process**
- Each Consortium has a **decision body where all partners seat** and it is advised by a Scientific User Board
- The TCS are represented in EPOS ERIC in the **Service Coordination Committee**

## Integrating data and services into EPOS

- **Open and accessibility of data** is a long tradition in solid Earth Science and at the basis of the EPOS approach
- Data Portal implemented by adopting a **service-based approach** that guarantees data remain where they are generated (NRIs)
- The source code of the Data Portal will be **released under a GPL3 license**

# The EPOS Data Portal is now fully operational



**EPOS**  
EUROPEAN PLATE OSCILLATION SYSTEM

Free text search

Filters

Favourites 6

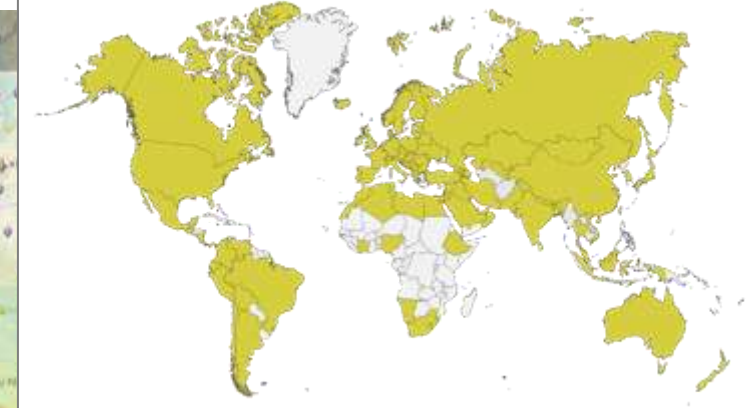
Clear all favourites ✕

- ESHM20 475 yr mean PGA hazard map (OGC WMS)**  
Categories: Seismology > Earthquake hazard and risk ser... > Hazard products  
Visible on: Map  
Status: ●
- European Database of Seismogenic Faults (OGC WMS)**  
Categories: Seismology > Earthquake hazard and risk ser... > Seismogenic faults  
Visible on: Map  
Status: ●
- GNSS Stations with Products**  
Categories: Geodesy > Products > Station information  
Visible on: Map Table  
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- Geological Feature View Service (ESDI Geological Map 1:1,000,000)**  
Categories: Geology > Geological Maps  
Visible on: Map  
Status: ●
- LOS Displacement Time Series**  
Categories: Satellite Observations > InSAR  
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Status: ●
- Parameters of historical earthquakes (1000-1899) - OGC WMS**  
Categories: Seismology > Seismological products service... > Earthquake parameters  
Visible on: Map  
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Results per page: 10 Page 1 of 1

Leaflet | Powered by Esri | Esri, HERE, Garmin, NSA, USGS

*EPOS Data Portal Access Worldwide*

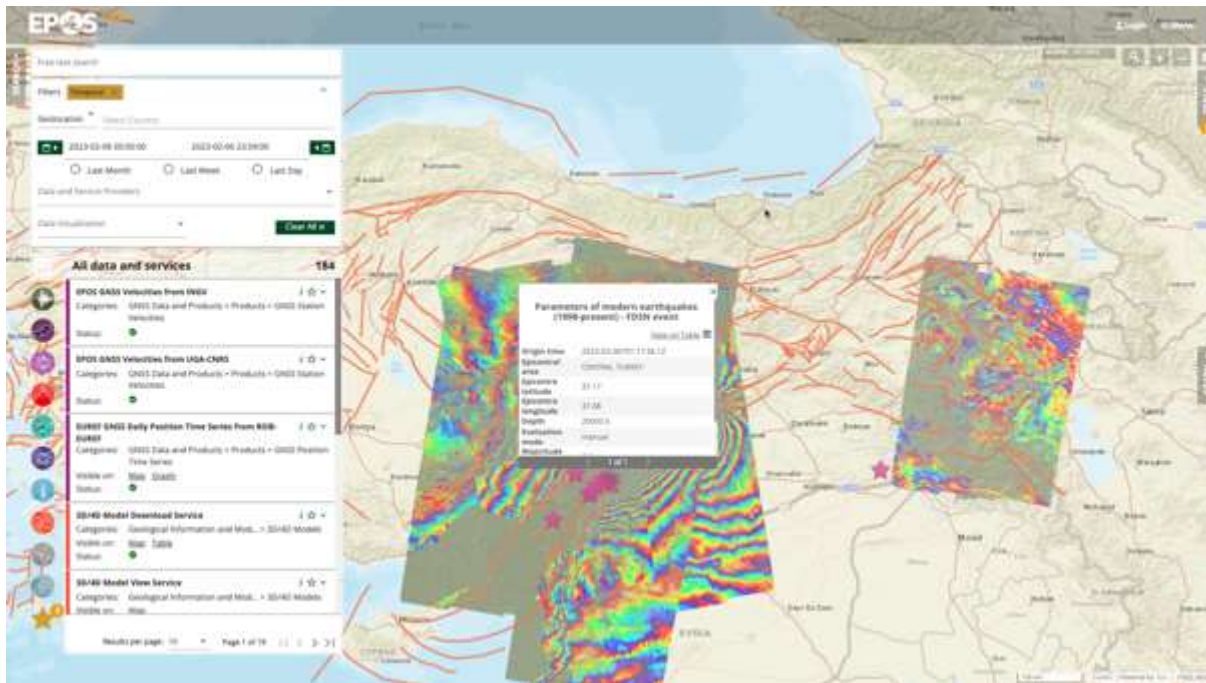


# Data and data products rapidly available to scientists

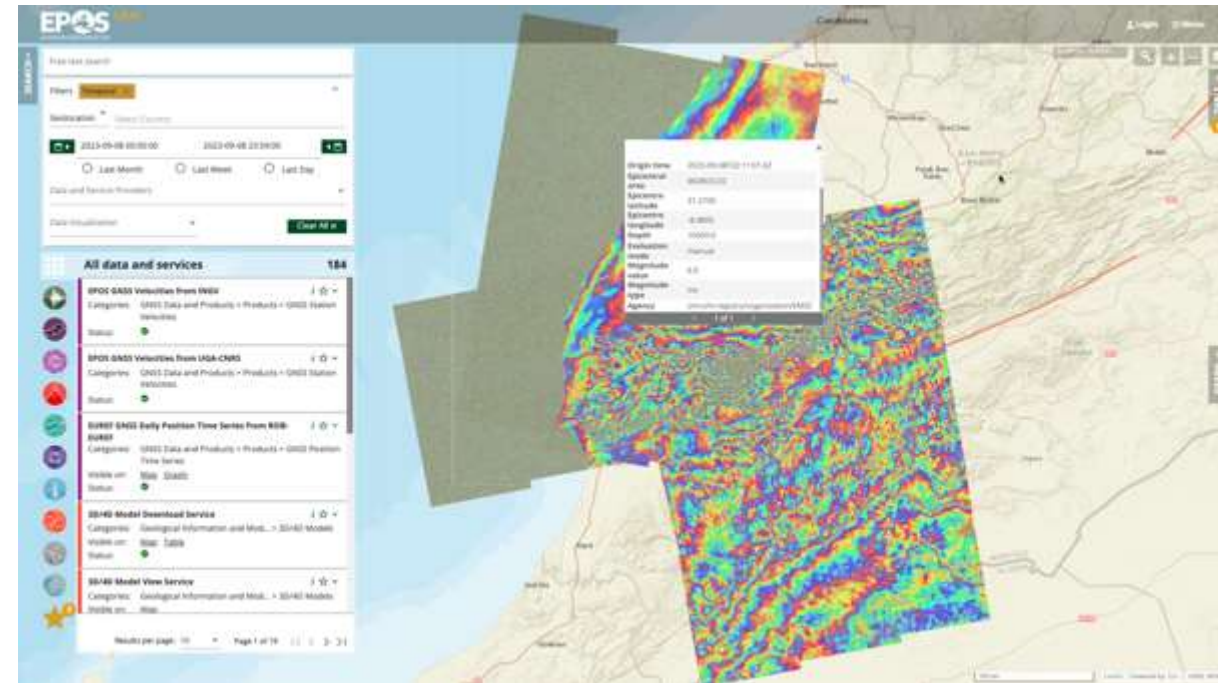
EPOS contributed to shed new light on dramatic phenomena like earthquakes that struck south-eastern Turkey on February the 6<sup>th</sup> and southern Morocco on September the 8<sup>th</sup>.

Maps of the surface displacement induced by the earthquakes were automatically generated and immediately made available to the scientific community through the EPOS Data Portal

## South-East Turkey – 6<sup>th</sup> February 2023



## Southern Morocco – 8<sup>th</sup> September 2023



# EPOS added value

## EPOS

- has been designed and implemented as the **only pan-European research Infrastructure focused on solid Earth Science**
- is based on **a federated approach to data integration**: data, generated and stored at National Research Infrastructure level, are made available via TCS services and made accessible through the EPOS Data Portal where they can be visualized, combined and downloaded upon user query
- is a **community-driven effort**: scientists, IT experts, users and decision-makers participate in the infrastructure **co-design** and **co-development** since the conception phase
- **continuously interacts with scientific users**
- allows **optimizing resources** for data provision at national and EU level, avoiding fragmentation and duplications of efforts and resources
- increases opportunities for **leveraging funds** for national research communities at European level
- **links existing data sharing initiatives** to many disciplines in solid Earth science and beyond
- increases the **impact of the data** by making them globally accessible

*“By making high-quality facilities, resources and services available to everyone, research infrastructures ensure that science is driven by excellence and not by the research capacity of individual countries, economic sectors, or institutions”*

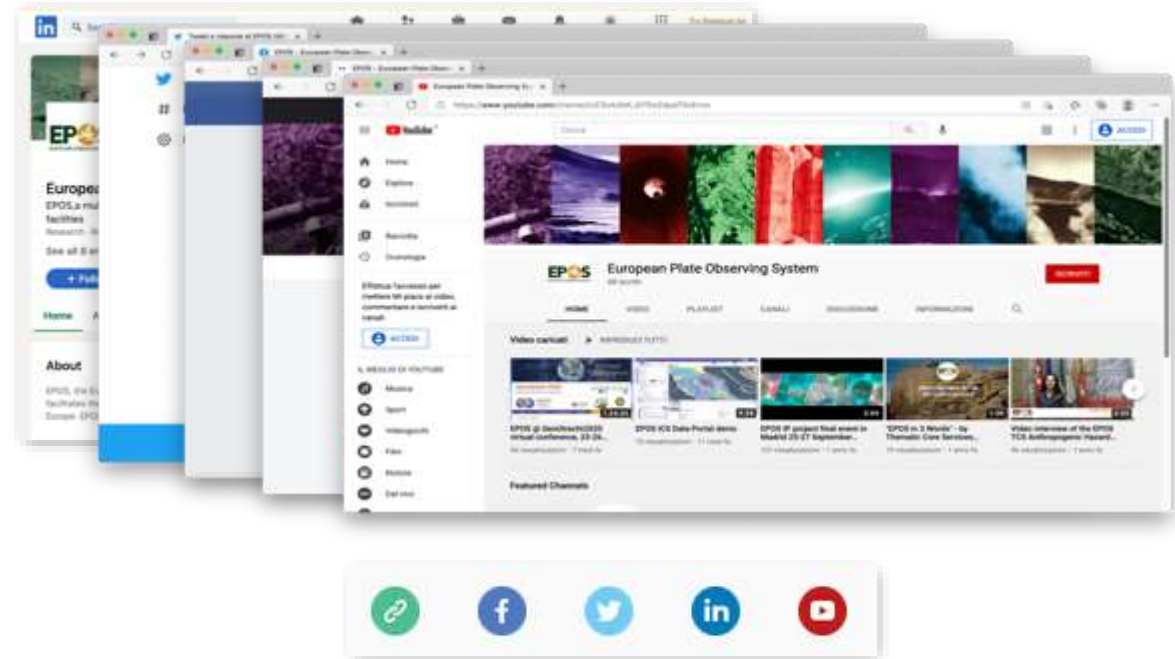
*Rita Costa Abecasis and Barbara Pintar*

### Web site



[www.epos-eu.org](http://www.epos-eu.org)

### Social media



**Thank You!**