EPOS – Improving the infrastructure for
GNSS data and products in Europe

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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.
How will EPOS work?

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

• Data generation & standardization
• Sustainability and operation
• Quality checked repositories

• Thematic integration
• Engagement of communities
• Community service provision

• Metadata registry
• Processing
• Aggregation
• Integrated analyses
• Visualization

Interoperability Brokerage
• 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 in Practice

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 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 including EUREF
## Objectives EPOS-IP (Implementation Phase)  
**WP10 – GNSS Data & Products**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Status</th>
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<tbody>
<tr>
<td>construct the future governance of TCS GNSS Data &amp; Products in EPOS;</td>
<td>Agreement of Governance Structure</td>
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<td>interact with the geodetic community in Europe, at national and Pan-Eu</td>
<td>Communication channels with Geodetic Community established.</td>
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<td>ropean (EUREF) levels;</td>
<td></td>
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<td>ensure interoperability between EPOS GNSS services (data and products) a</td>
<td>Detailed DDSS to be implemented during the EPOS-IP phase defined.</td>
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<td>nd EPOS ICS;</td>
<td></td>
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<td>promote multidisciplinary interoperability with other disciplines within</td>
<td>Contacts with WP09 (Near-Fault) and WP11 (Volcanos) about GNSS data</td>
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<td>EPOS;</td>
<td>management</td>
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<td>implement distributed dissemination of file-based GNSS data for about 200</td>
<td>GLASS software (including Data &amp; Products Portal) being developed.</td>
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<td>00 stations (and and derived Products: CRD, VEL, STR) in the first 2</td>
<td>Prototype Products tested.</td>
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<td>years with the goal of reaching 3000 by the end of the EPOS-IP.</td>
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GLASS – What and Why?

GNSS Linkage Advanced Software System

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 – components

GLASS encompass the following key elements:

- **Physical components** – repositories/data centers
  - **Primary** - default repository, decided by the data provider
  - **Secondary** - alternative repository
  - **Mirror** - a repository that act as a mirror of another

- **Web services** – portals, monitoring tools, data and products mining solutions

- **Software applications** – managing interactions between repositories and services
GLASS work flow

- New station metadata
- New RINEX metadata
- RINEX files
- Positions, velocities
- Strain rates
- GNSS data provider
- GNSS analysis center
- GNSS analysis center
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 Site metadata (Anubis)
  - Run additional checks on file contents (Anubis)
  - Provides the url location to the data portal (local and externals)
M3G – Metadata Management system for Multiple GNSS Networks
to be maintained by ROB - Belgium
M3G – Metadata Management system for Multiple GNSS Networks
Observed phase data for all constellations. Input are the station daily RINEX 2/3 observation files. The graphs give a snapshot of the station tracking for a specific date.
Data Portal
to be maintained by CNRS - France
Data Portal
**EPOS-GNSS Products**

**Current status:** Prototype Products already generated

**Daily solutions + metadata**
- run by 2 Pan-European processing centers (INGV, UGA-CNRS)
- densified solution EUREF (BFKH)

**Daily time-series & velocity fields + metadata**
- Individual Solutions (INGV, UGA-CNRS)
- Combined Solution (BFKH)

**Strain Rate maps + metadata**
- Global + Regionals (LM)
Products Portal
to be maintained by UBI/C4G – Portugal
Products Portal
Added value of EPOS for GNSS community

• Sustainability within EPOS:
  • Countries that join EPOS-ERIC commit to maintain their GNSS infrastructure integrated in EPOS (stations, operation).
  • Data and Product Gateways chosen based on the commitment of France and Portugal 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

There are clearly synergies between EPOS-GNSS and FIG goals concerning the maintenance of the reference frames by continuously inspecting their materialization (CORS network) and evaluating internal deformations.
Thank you for attention