

Use Cases TCS GNSS Data & Products

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Use case name/topic: A GNSS network manager wants to add /remove a station to/from his GNSS network contributing to EPOS

Use case domain This use case is: discipline-oriented, namely focusing on the discipline of geodesy

Use case description:

As a <station manager> I want to <add/remove a station to my network contributing to EPOS>.

Actors involved in the use case

- GNSS Network manager
- Station Manager

Pre-conditions

1. The GNSS network is registered with the information of the network manager to the site log submission center (M3G).
2. GNSS network manager get an authentication token.

Flow of events – user view

1. The < Station Manager > logs into the <Site log submission center>.
2. The < Station Manager > propose stations to the <GNSS network>.
3. < GNSS network manager > receives confirmation of responsibility for the list of stations entered to the <Site log submission center>.

System workflow - system view

1. The user interface receives login information.
2. The user interface receives the list of stations proposed to the network.
3. The user input is validated at the < Site log submission center >.
4. The < Site log submission center > send the notification to the < GNSS network manager >.
5. The < Site log submission center > receive the acceptance from the < GNSS network manager >.

Use case name/topic: Vertical GNSS velocities in the Alps

Use case domain: This use case is: discipline-oriented, namely focusing on the discipline of geophysics.

Use case description:

A search for all GNSS derived velocities on the vertical component in the Alps.

Actors involved in the use case

- Scientists interested in Alps tectonic
- WP10 Product gateway
- WP10 analysis centres who compute GNSS positions and the associated velocities

Pre-conditions

User should be logged in with some EPOS authentication system

Flow of events – user view

4. User selects a polygon on a geographic region for which GNSS data and products are required on GNSS product gateway.
5. User refines search to limit results for the vertical component of velocities.
6. A list of URL's to files with velocity solutions for the stations is returned.

System workflow - system view

6. The user interface receives the input of the geographic region
7. It connects to the WP10 Product Gateway preforms a search on the required data
8. A script is produced containing the URL's to files with velocity solutions.
9. The user runs the script (inside the work-flow or independently).

Use case name/topic: *Iberia GNSS velocity field*

Use case domain This use case is: *Multi-discipline-oriented, namely focusing on the discipline of Geodynamics*

Use case description

A search for all computed GNSS derived velocities in Iberia based only on high quality GNSS time series longer than 3 years

Actors involved in the use case

- *Scientists interested in plate tectonics in Iberia*
- GNSS data providers,
- WP10 Product gateway
- WP10 analysis centres who compute GNSS positions and the associated velocities

Priority *High*

Pre-conditions

User should be logged in with some EPOS authentication system (shibboleth, eduroam, google etc..)

Flow of events – user view

1. User selects rectangle to define geographic region for which GNSS data and products are required on GNSS product gateway.
2. User refines search to limit results for stations that have time span longer than 3 years and also stations which provide high quality daily solutions - hence this search combines GNSS data availability and GNSS products.
3. A list of URL's to files with velocity solutions for the stations is returned.

System workflow - system view

1. The user interface receives the input of the geographic region and quality metrics
2. It connects to the WP10 Product Gateway preforms a search on the required data
3. A script is produced containing the URL's to files with velocity solutions.
4. The user runs the script (inside the work-flow or independently)

Post-conditions The Request should be logged so that the user can retrieve and rerun the workflow - possibly with different conditions.

Other Requirements Data Should be Flagged as Public

Data should be retrieved within a pre-defined (user configurable) time period
else search is cancelled on sub-node

Use case name/topic: Compute the velocity of a station using external information to detect co-seismic offsets

Use case domain This use case is: *Multi-discipline-oriented, namely in the area of Velocity computations*

Use case description

As a <time-series analyst> I want to <compute the secular motion of the stations> so that I can <compute strain rates>.

Actors involved in the use case

- *Time-series analyst*
- GNSS data providers,
- Seismic catalogue providers (e.g., WP08)
- WP10 Product Gateway
- WP10 analysis centres who compute GNSS positions

Priority *Medium*

Pre-conditions

User must have logged in.

Flow of events – user view

1. User selects rectangle to define geographic region for GNSS stations of interest.
2. User retrieves daily coordinates for the GNSS stations of interest from the WP10 Product Gateway
3. User retrieves seismic catalogue with seismic events nearby the region of interest.
4. User computes the offsets for the epoch of the events.
5. User provides updated information on the co-seismic offsets and secular velocities to the WP10 Product Gateway.

System workflow - system view

1. The user interface receives the input of the geographic region and quality metrics
2. It connects to the EPOS ICS Gateway to preform a search on the required data
3. A script is produced containing the URL's to files with time-series and catalogue of seismic events.
4. The user runs the script (inside the work-flow or independently)
5. The user uploads new solutions to the EPOS Product Gateway.

Post-conditions

The Request should be logged so that the user can retrieve and rerun the workflow - possibly with different conditions.

Use case name/topic: *Obtaining GNSS data for the estimation of Volcano deformation*

Use case domain This use case is: *Multi-discipline-oriented, namely focusing on the discipline of volcanology.*

Use case description

As a <researcher of volcanology> I want to <access GNSS data> so that I can <estimate short-term deformations pre-, co- and/or volcanic eruptions> using high-rate (1Hz) data.

Actors involved in the use case

- System user - Researchers (e.g., WP11)
- GNSS data providers (e.g., WP11 networks)
- WP10 Data Gateway

Priority *Medium*

Pre-conditions

User should be logged in with some EPOS authentication system (shibboleth, eduroam, google etc..)

Flow of events – user view

1. *<volcanologic researcher> chooses location to study*
2. *<volcanologic researcher> chooses the GNSS stations and time interval of the record*
3. *<volcanologic researcher> downloads the desired data (hourly files at 1Hz) for deformation calculation*

System workflow - system view

1. *The user interfaces receives the input: location (coordinates) and time interval*
2. *It connects to the database and searches records on station located on the coordinates for the specified time period*
3. *The user interface delivers a list of stations with the desired data*

Post-conditions

The Request should be logged so that the user can retrieve and rerun the workflow - possibly with different conditions.

Use case name/topic: Volcano velocity/deformation field estimation for multidisciplinary modelling

Use case domain This use case is: *discipline-oriented, namely focusing on volcano monitoring*

Use case description

For < volcano monitoring> I want to <access GNSS deformation/velocity estimates> so that I can < use long/medium term deformation around a volcano for multidisciplinary modelling of volcanic processes (comping with InSAR, seismic ...)> derived from 30 s data.

Actors involved in the use case

1. System user – Researchers/monitoring agency (e.g. WP11)
2. GNSS data providers (e.g. WP11 networks)
3. WP10 Data Gateway
4. other WP TCS's
5. WP10 analysis centres who compute GNSS positions and the associated velocities
6. possibly other EPOS software and computing facilities

Priority Medium

Pre-conditions User should be logged in with some EPOS authentication system

Flow of events – user view

- User selects rectangle to define geographic region for which GNSS data and products are required on GNSS product gateway.
- User refines search to limit results for stations to fit the appropriate time spans (possibly more than one)
- A list of URL's to files with velocity solutions for each time window for the stations selected is returned to be joint with other data types for further processing
- joint source modeling of multidisciplinary data for a particular volcanic system

System workflow - system view

- The user interface receives the input of the geographic region
- It connects to the WP10 Product Gateway preforms a search on the required data
- A script is produced containing the URL's to files with velocity solutions.
- The user runs the script (inside the work-flow or independently)

Post-conditions Request should be logged so the user can retrieve and rerun the workflow (with different conditions).

Use case name/topic: *co-seismic displacements associated with a Mw7 earthquake in Greece*

Use case domain This use case is: *Multi-discipline-oriented, namely focusing on the discipline of geophysics.*

Use case description

A search for all computed GNSS derived position time series that include the date of the earthquake within a circle of 300km around the epicenter

Actors involved in the use case

- *Scientists interested in active tectonics studies*
- GNSS data providers,
- WP10 Product gateway
- WP10 analysis centres who compute GNSS positions time series

Priority *High*

Pre-conditions User should be logged in with some authentication system (shibboleth, eduroam, google etc..)

Flow of events – user view

1. User selects a circle on a geographic region for which GNSS data and products are required on GNSS product gateway.
2. User refines search to limit results for stations that spans the day of the earthquake - hence this search combines GNSS data availability and GNSS products.
3. A list of URL's to files with daily solutions for the stations is returned.

System workflow - system view

1. The user interface receives the input of the geographic region and quality metrics
2. It connects to the WP10 Product Gateway performs a search on the required data
3. A script is produced containing the URL's to files with daily solutions.
4. The user runs the script (inside the work-flow or independently)

Post-conditions The Request should be logged so that the user can retrieve and rerun the workflow - possibly with different conditions.

Use case name/topic: *GNSS time series at the Eurasia-Nubia plate boundary in Italy*

Use case domain This use case is: *Multi-discipline-oriented, namely focusing on the discipline of geophysics.*

Use case description

A search for all computed GNSS derived position time series longer than 3 years in Italy

Actors involved in the use case

- *Scientists interested in active tectonics studies*
- GNSS data providers,
- WP10 Product gateway
- WP10 analysis centres who compute GNSS positions time series

Priority *High*

Pre-conditions

User should be logged in with some EPOS authentication system (shibboleth, eduroam, google etc..)

Flow of events – user view

1. User selects a box on a geographic region for which GNSS data and products are required on GNSS product gateway.
2. User refines search to limit results for stations that have time span longer than 3 years and also stations which provide high quality daily solutions - hence this search combines GNSS data availability and GNSS products.
3. A list of URL's to files with daily solutions for the stations is returned.

System workflow - system view

1. The user interface receives the input of the geographic region and quality metrics
2. It connects to the WP10 Product Gateway performs a search on the required data
3. A script is produced containing the URL's to files with daily solutions.
4. The user runs the script (inside the work-flow or independently)

Post-conditions

The Request should be logged so that the user can retrieve and rerun the workflow - possibly with different conditions.

Use case name/topic: *GNSS metadata download for GNSS data analysis*

Use case domain This use case is: *Multi-discipline-oriented, namely focusing on the discipline of geodesy.*

Use case description

A search for the metadata (e.g. site logs, a priori station information) for each scientific GNSS analysis software.

Actors involved in the use case

- *Scientists interested in GNSS data analysis*
- GNSS data providers,
- WP10 data gateway
- WP10 analysis centres who compute GNSS positions time series

Priority *Medium*

Pre-conditions

User should be logged in with some EPOS authentication system (shibboleth, eduroam, google etc..)

Flow of events – user view

1. User selects a box on a geographic region or a list for which GNSS metadata are required on GNSS data gateway.
2. A list of URL's to files with site logs for the stations is returned.

System workflow - system view

1. The user interface receives the input of the geographic region and/or of the input list
2. It connects to the WP10 Product Gateway performs a search on the required data
3. A script is produced containing the URL's to files with site logs.
4. The user runs the script (inside the work-flow or independently)

Post-conditions

The Request should be logged so that the user can retrieve and rerun the workflow - possibly with different conditions.

Use case name/topic: Compute the velocity of a station to detect post-seismic motion

Use case domain This use case is: *Multi-discipline-oriented, namely in the area of Velocity computations*

Use case description *As time-series analysts we want to compute the motion of GNSS stations before/after large earthquakes so that we can measure post-seismic motion. The stations are located in the central Ionian region, Greece. This area has been repeatedly subjected to strong ground shaking due to the proximity of the islands to the 140-km long CTF (Cephalonia Transform Fault). The 100-km long NNE-SSW fault zone accommodates the relative motion of the Apulia (Africa) and Aegean (Eurasia) lithospheric plates, and has a GPS slip-rate bracketed between 10 and 25 mm/yr. During the last 15 years this fault system generated 4 strong events that caused ground deformation of the order of 1-40 cm.*

Actors involved in the use case

- *Time-series analysts (NOA, NKUA, NTUA, AUTH)*
- GNSS data providers (NOA, NKUA, CRL-WP09)
- Seismic catalogue providers (e.g., WP08)
- WP10 Product Gateway
- WP10 analysis centres who compute GNSS positions
- *Scientists interested in active tectonics studies*

Priority *Medium*

Pre-conditions *User must have logged in.*

Flow of events – user view

1. User selects rectangle to define geographic region for GNSS stations of interest.
2. User retrieves daily coordinates for the GNSS stations of interest from the WP10 Product Gateway
3. User retrieves seismic catalogue with seismic events nearby the region of interest.
4. User computes the co-seismic offsets for the epoch of the events.
5. User estimates the station velocities before / after for the epoch of the events.
6. User provides updated information on the secular velocities to the WP10 Product Gateway.

System workflow - system view

1. The user interface receives the input of the geographic region and quality metrics
2. It connects to the EPOS ICS Gateway to perform a search on the required data
3. A script is produced containing the URL's to files with time-series and catalogue of seismic events.
4. The user runs the script (inside the work-flow or independently)
5. The user uploads new solutions to the EPOS Product Gateway.

Post-conditions The Request should be logged so that the user can retrieve and rerun the workflow - possibly with different conditions.

Use case name/topic: Access to GNSS data quality results for monitoring purposes

Use case domain This use case is discipline-oriented, namely focusing on the discipline of geodesy.

Use case description *As a <Data-monitoring-center> collect quality monitoring information so that I can monitor the quality of disseminated GNSS data and prepare a feedback to the data providers and support for data users.*

Actors involved in the use case.

- GNSS data monitoring center
- GNSS data dissemination system (in particular data gateway providing access to T3 metadata)
- GNSS data providers (local node operators, preparation of T3 metadata)

Priority High

Pre-conditions GNSS data providers (local node operators) generate and populate T3 metadata for all RINEX files in their repositories using standard tools. T1 metadata are correct and synchronized.

Flow of events – user view

1. <Data-monitoring-center> updates the list of available stations (T1 metadata).
2. <Data-monitoring-center> collects T3 metadata for all available stations and requested recent period. The collection is foreseen using data dissemination system (via data gateway or intermediate gateway)
3. <Data-monitoring-center> performs a visualization of data quality and, alternatively, another actions.

System workflow - system view

1. <Data-gateway or intermediate-gateway> receives requests for T3 metadata collection for each station (in sequence or simultaneously, depends on both temporal and spatial domains of the request)
2. <Data-gateway> connects to local repository nodes in order to provide requested T3 metadata. The results will be provided to the <Data-monitoring-center> in requested format (JSON, XML, ..)

Post-conditions : The concept of flexible data redundancy is adopted.

« Used » Use Cases

- Specific or subset of T3 data queries and search can be re-used by any user searching a minimum quality for GNSS stations – e.g. Multi-GNSS system (GPS, GLONASS, Galileo, BeiDou, SBAS or QZSS), type of observations or frequencies, etc.
- Remote file comparison in support of a file redundancy with a smart selection

Use case name/topic: *Remote file comparison in support of a file redundancy with a smart selection*

Use case domain This use case is: *Discipline-oriented, namely focusing on the discipline of geodesy.*

Use case description *As a <GNSS-user> I want to download data optimal to my request. As a <GNSS-data-gateway> I want to support data download in a smart way using automated decision.*

Actors involved in the use case

- *Data user*
- *Data providers*
- *Data gateway*

Priority: *Medium*

Pre-conditions:

Flow of events – user view

1. *<Data-user> selects a subset of GNSS data files for his analysis using GNSS data gateway.*
2. *<Data-user> requests data download in a smart (predefined options) or in an interactive way.*
3. *<Data-user> obtains optimally selected files automatically or is asked shown indication on basic file characteristics (tbd, e.g. number of observations, number/list of observation types, number/list of GNSS*

System workflow - system view

1. *<Data-gateway> gets the user request on data selection.*
2. *<Data-gateway> communicates with local repositories and requests specific T3 metadata*
3. *<Data-gateway> gives automatically selected files (using predefined options) or provide an interactive selection for data download to the user*

Use case name/topic: Compute Eurasian strain rates from EPOS stations velocities

Use case domain: *Multi-discipline-oriented, namely in the area of strain-rate computations*

Use case description : *The user will produce strain-rate maps for Eurasia (principal strain axes – dilatation rate – shear strain rate - rotation rate) using a) the VISR and STIB algorithms recommended by EPOS or b) their own algorithm.*

Actors involved in the use case

- *Strain rate analysts (NOA, NKUA, NTUA, AUTH, INGV, LM etc.)*
- *GNSS data providers (NOA, NKUA, CRL-WP09, INGV, UBI etc.)*
- *WP10 Product Gateway*
- *WP10 analysis centres who compute GNSS positions and velocities*

Priority *Medium*

Pre-conditions *User must have logged in.*

Flow of events – user view

1. User selects rectangle to define geographic region for GNSS stations of interest.
2. User retrieves horizontal velocities for GNSS stations of interest from the Product Gateway
3. User computes the strain-rates on his computer or on-line using the EPOS tools.
4. User provides updated information on the strain-rates to the WP10 Product Gateway.

System workflow - system view

1. The user interface receives the input of the geographic region and quality metrics
2. It connects to the EPOS ICS Gateway to perform a search on the required data
3. A script is produced containing the URL's to files with station velocities.
4. The user runs the script (inside the work-flow or independently)
5. The user uploads new solutions to the EPOS Product Gateway.

Post-conditions : *The Request should be logged so that the user can retrieve and rerun the workflow - possibly with different conditions.*

Other Requirements : *The Request depends on data availability so that the result is scientifically meaningful. For example, the user will use velocity data from >200 stations in Italian Peninsula (which will be available sometime in the future).*