

Elements for CRL – GEP meeting of March 30, 2017 in Athens

P. B., version 3 (20170330)

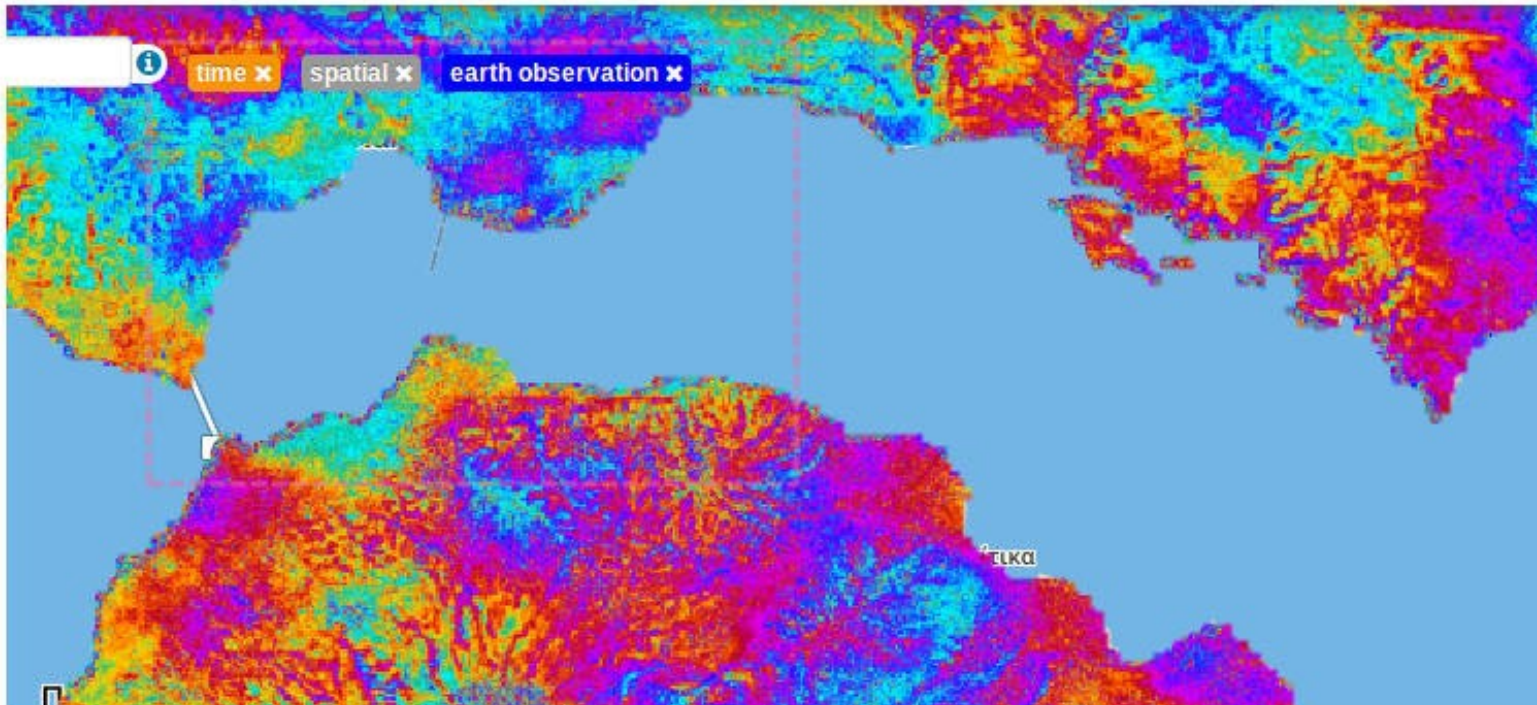
The CRL NFO and InSAR

- CRL is one of the NFOs (Near fault observatory) of EPOS
- It is the most advanced of the NFOs in terms of
 - Collaborative background (25+ years of international collaboration)
 - Availability of data and products (see <http://crlab.eu>)
- InSAR is a crucial component of the Observatory

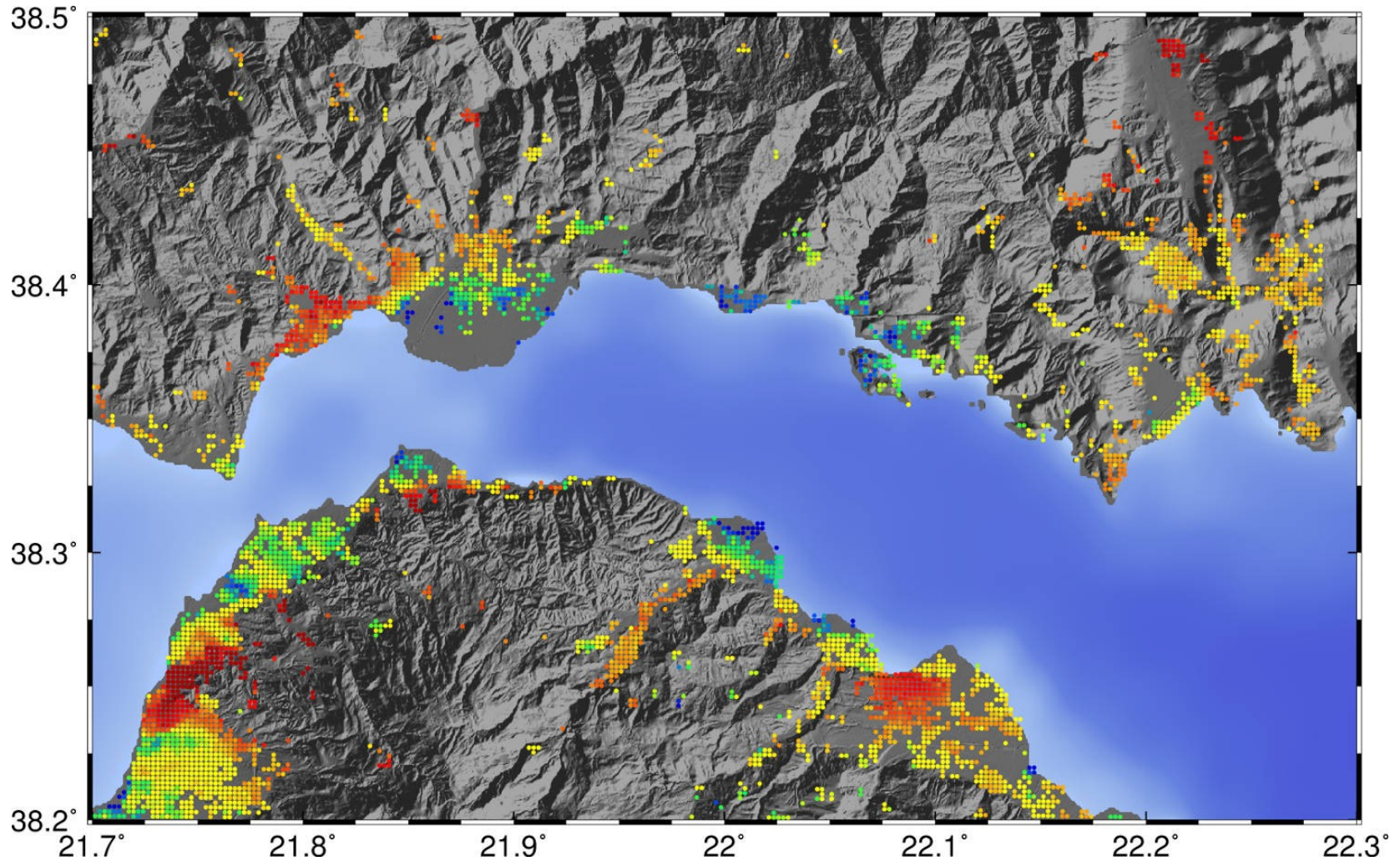
The CRL area

The screenshot displays the Geohazards TEP web application interface. At the top, the browser title is "Geohazards TEP - Geobrowser - Mozilla Firefox" and the address bar shows the URL "https://geohazards-tep.eo.esa.int/geobrowser/#!&context=InSAR_QL_HR". The application header includes the "geohazards tep" logo and navigation buttons for "EO data", "EO-based products", "Publications", and "Community". A search bar contains "EO Free Text Search" with filters for "time", "spatial", and "earth observation". The main map shows Greece with a highlighted area around Patras (Πάτρα) and Pylargos (Πύργος). The map includes labels for various cities like Catanzaro, Messina, Catania, Ιωάννινα, Αθήνα, Ερμούπολη, Καλαμάτα, Χίος, and Ιzmir. A date range of "2017-02-21" to "2017-03" is visible. The bottom section shows search results for "Result for OpenSearch query over typ..." with three entries for S-1 High-Resolution InSAR Browse Service. The "Features Basket" and "Data Packages" sections are empty, displaying "No results found."

The CRL area



Vertical velocities at CRL from ENVISAT SBAS/PS



Some InSAR results at CRL

- Detection and modelling of earthquakes (1992, 1995, 2008, 2010)
- Detection and mapping of the dynamics of the river deltas
- Detection and monitoring of fault creep in Rio and Aigion
- Detection of urban subsidence
- Detection and monitoring of landslides
- Monitoring of land deformation around dams

Towards a systematic use of InSAR at CRL

- The NFO team aims at using InSAR routinely in a systematic way
- This means
 - As close as possible to real time
 - Basic products first (raw interferograms, not filtered, not unwrapped)
 - Interoperability between the results of different software
 - Tie to the temporal evolution of the coordinates of the GNSS array
 - Measurement and correction of the tropospheric effects (and tropospheric products available for meteorological applications of the NFO)
- Advance products and reanalysis of the archive is also important

Inter-operability

- Crucial from the metrology point of view
- Warrants comparison and progress of software
- In practice:
 - Same and interoperable data formats and structure of products levels
 - Rigorous tie of all products to the same geographic system using the ITRF and a tie (at pixel scale) and the available GNSS time series (at motion scale)
 - Correct and well defined modelling of the troposphere

Advance products

- e.g. « SBAS » time series
- Important but not before validation of the strategy for basic products
- Requires also interoperability (data formats, ...)
- Definition(s) of the coherence

Implementation of routine InSAR at CRL

- We want to use and compare various software for
 - Important for reaching the highest accuracy and assessing uncertainties
 - An opportunity from the software side to test, compare and improve software is a very well known and monitored area
- We want to focus on the current generation of InSAR systems (e.g. Sentinel) and also to reanalyze all existing archive
- We want to understand what the software do and be able to improve them

CRL and the education

- The NFO CRL is also a melting pot for education of students from the EU (and others)
- Existence of CRL schools (started 2016 and then yearly in September) with focus on the link between space and field observation
- Existence of data, products, software, tutorials, available to students and the whole science community
- Actions of education also towards schools (through the EGU GIFT action)

Some practical aspects

- Research and education require a full understanding of the theories and algorithms used to process data, thus important to warrant on the long term the existence of open-source solutions (to be living together in harmonious and sustainable manner with non open-source)
- InSAR processing requires big computers and therefore computing on computing facilities and data centres located close to the data is useful
- Use open-source side software is important (Python, QGIS, GMT, ...)
- Importance of the synergy among the realisation of the various space agencies and their sustainability (e.g. ORFEO Toolbox of CNES and SNAP)