Development of a monitoring platform for permanent GNSS stations analysis in the region of the EnCeladus Hellenic Supersite, preliminary results.

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Introduction

Dionysos Satellite Observatory of National Technical University of Athens have developed an automated processing scheme to accommodate the daily analysis of all available continuous GNSS stations in Greece.

As part of the operation of the EnCeladus Hellenic Supersite, DSO undertook the monitoring of the Corinth Gulf area through GPS/GNSS stations and the development of a multidisciplinary platform.

Currently, we have focused our efforts in reprocessing all the available GNSS data up to date, via Bernese GNSS Software v5.2[**?**].

In this paper, data from 36 permanent GNSS stations, installed in the Gulf of Corinth, were analyzed. All available station data freely available from the providers have been used. Also, data from private organizations made available for the specific project have been used, for better coverage of the region and distribution of the stations.

Finally, the results are available on the web portal that has been developed as part of the DSO website.

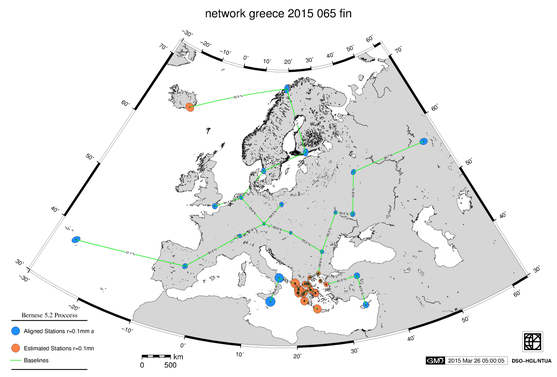

Figure 1:Processed stations and baselines for a typical run of the processing scheme.

Data

In our daily processing scheme, we incorporate all GPS/GNSS stations placed in Greece, for which the data are made available. These stations, are established and maintained by various institutions thus varying in quality, spatial distribution, hardware and data aquisition methods and rates.

At the moment, we analyze data from over 150 stations in Greece, divided in 4 subnetworks (Figure 2). This accounts for a more homogenous spatial distribution and computational efficiency.

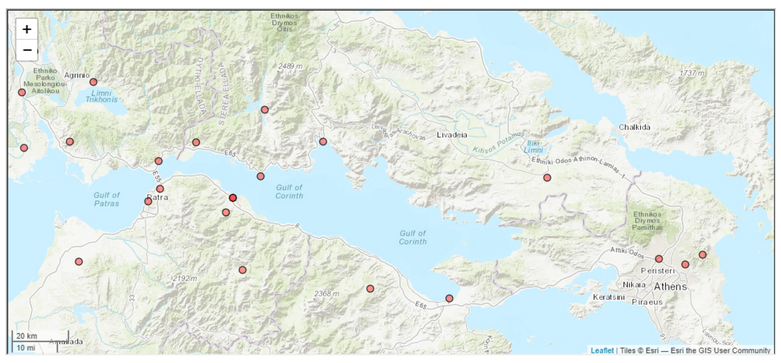

Figure 2:GNSS stations prosseced at DSO.

Processing & Analysis

The processing routine (Figure 3) starts a few hours after the end of day (typically at 3 am). All available data are collected and quality checks are performed. The required products are retreived from CODE Analysis Center [**?**]. All networks are processed sequentially, using the Bernese GNSS Software Version 5.2 [**?**], in baseline mode, using a double-difference approach. In a last step, the networks are alligned to IGb08 [**?**].

The processing of each network is performed twice for each day; first using ultra-rapid/rapid products and then, with a time lag of approximately 20 days, using final products.

Coordinate estimates are inserted in respective time-series files, which are then processed to estimate tectonic velocities, offsets and annual and semi-annual harmonic coefficients (see Figure 6).

Specialities in each network are introduced; *Santorini* network is aligned to IGb08 implicitely, using a subnetwork of *Greece*'s stations, while for the *Uranus* network we process both GPS and GLONASS observations.

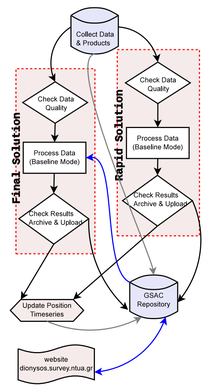

Figure 3:Processing scheme.

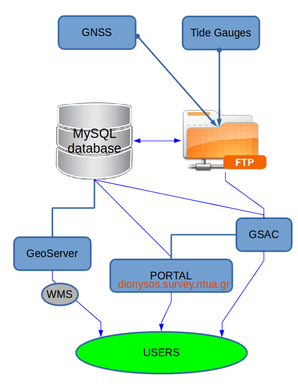

Figure 4:Individual platform modules.

Preliminary Results

Results of the processing include:

- Cordinate estimates and time-series files,
- SINEX and Normal Equation files,
- Tropospheric Sinex and Ionospheric TEC Maps (Figure 5),
- Tectonic velocities, offsets and annual and semi-annual harmonic coefficients

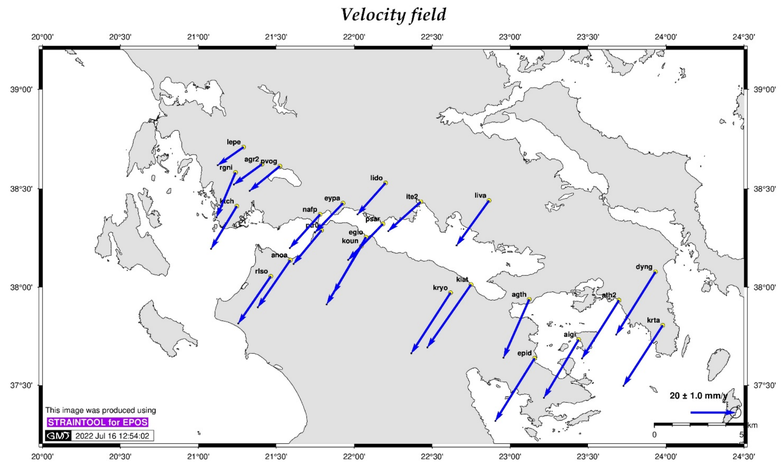

Figure 5:GNSS stations prosseced at DSO.

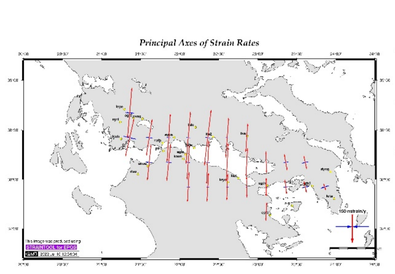

Figure 6:Snapshot of an ionospheric TEC map.

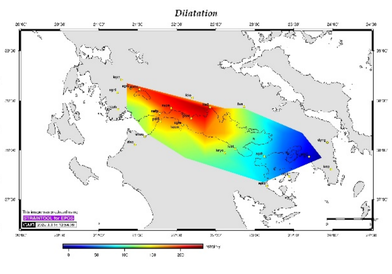

Figure 7:Raw time-series for GPS station kith; the fitted model is depicted in green.

Online Platform

testing

Figure 8:Times series analysis on platform.

Conclusion

The routine analysis of these stations has already provided crucial insight on various abrupt geophysical events in the recent past (e.g. [**?**]), but also for the long time period monitoring of such a tectonically active region such as Greece. We hope that in the near future, it will evolve into a node of knowledge and research, both for the scientific community and the public.

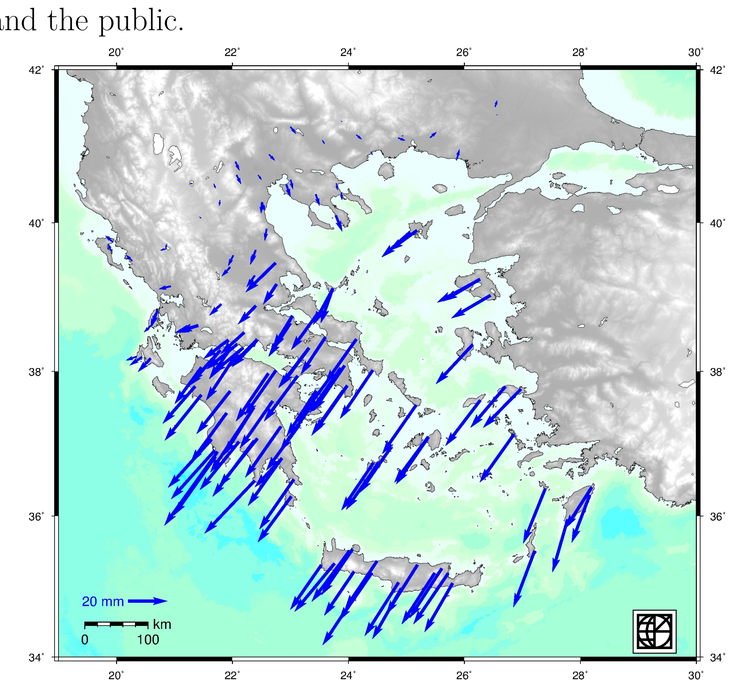

Figure 9:Tectonic velocities of all processed GNSS stations wrt fixed Europe.

References

Acknowledgments...

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All figures and maps produced using Generic Mapping Tools software (Wessel et al., 2019)

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