

GNSS processing at DSO: recent activity and current status



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Introduction

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

This daily analysis process, is implemented for the last two years, yielding results which help us further understand the complicated tectonic setting of Greece and nearby regions.

In the past few months, several modules (including a dedicated website) were updated, to facilitate the growing scientific research activities of the laboratories. This ongoing effort, is part of the *South Aegean Geodynamic And Tsunami Monitoring Platform* (SEISMO) project, which aims at the establishment of a multi-parametric/multi-method platform to accomodate an in-depth study of the South Aegean region ([?]).

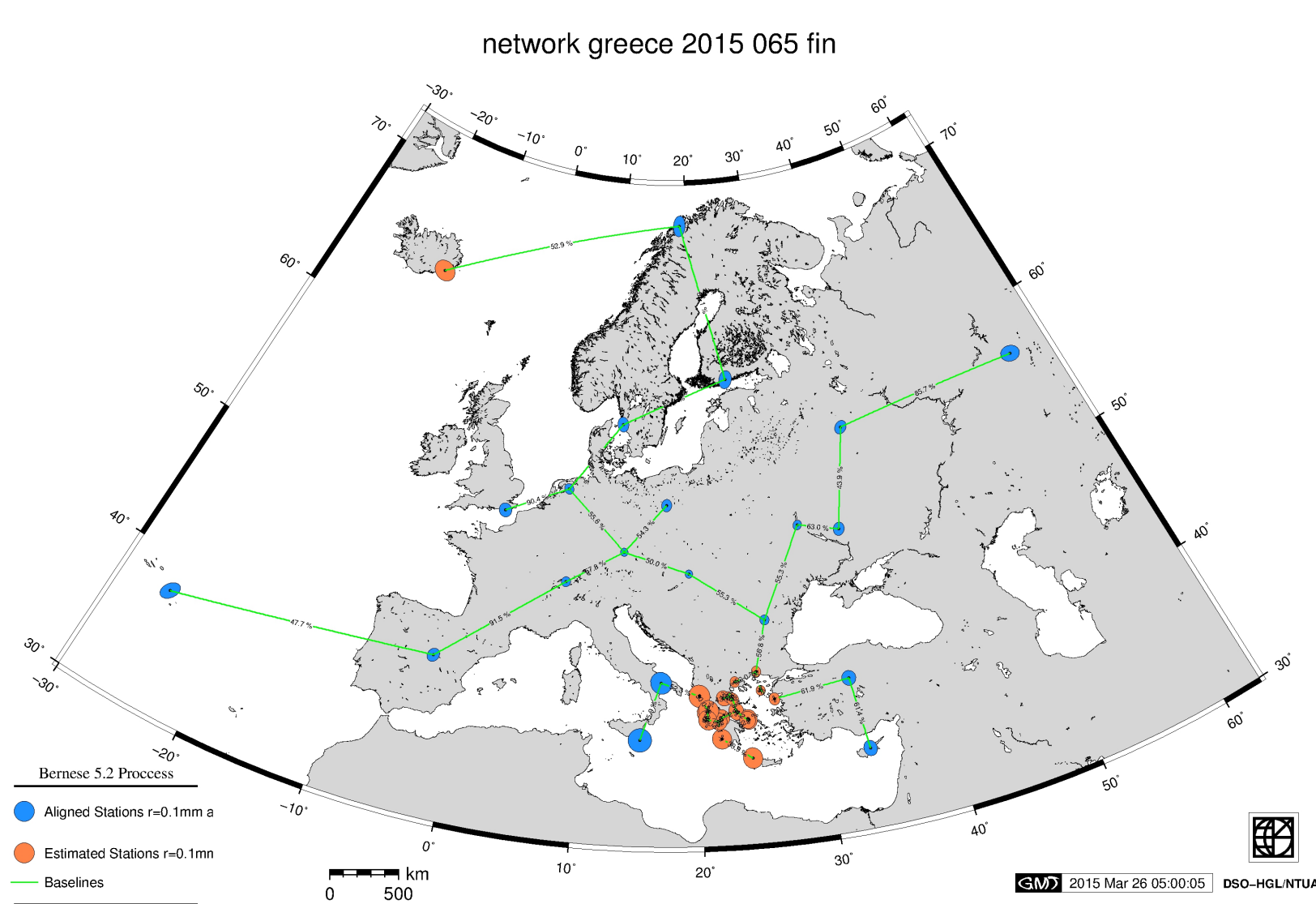


Figure 1: Processed stations and baselines for a typical run of the processing scheme.

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. This accounts for a more homogenous spatial distribution and computational efficiency. One of these subnetworks, includes all GNSS stations installed on the island of Santorini (South Aegean), which is of great geodynamic and volcanic interest. All subnetworks, incorporate GNSS sites established in the South Aegean, a region of special tectonic interest, including the so-called *Hellenic Arc*. The four subnetworks are *Greece*, *Uranus*, *Santorini* and *Other*.

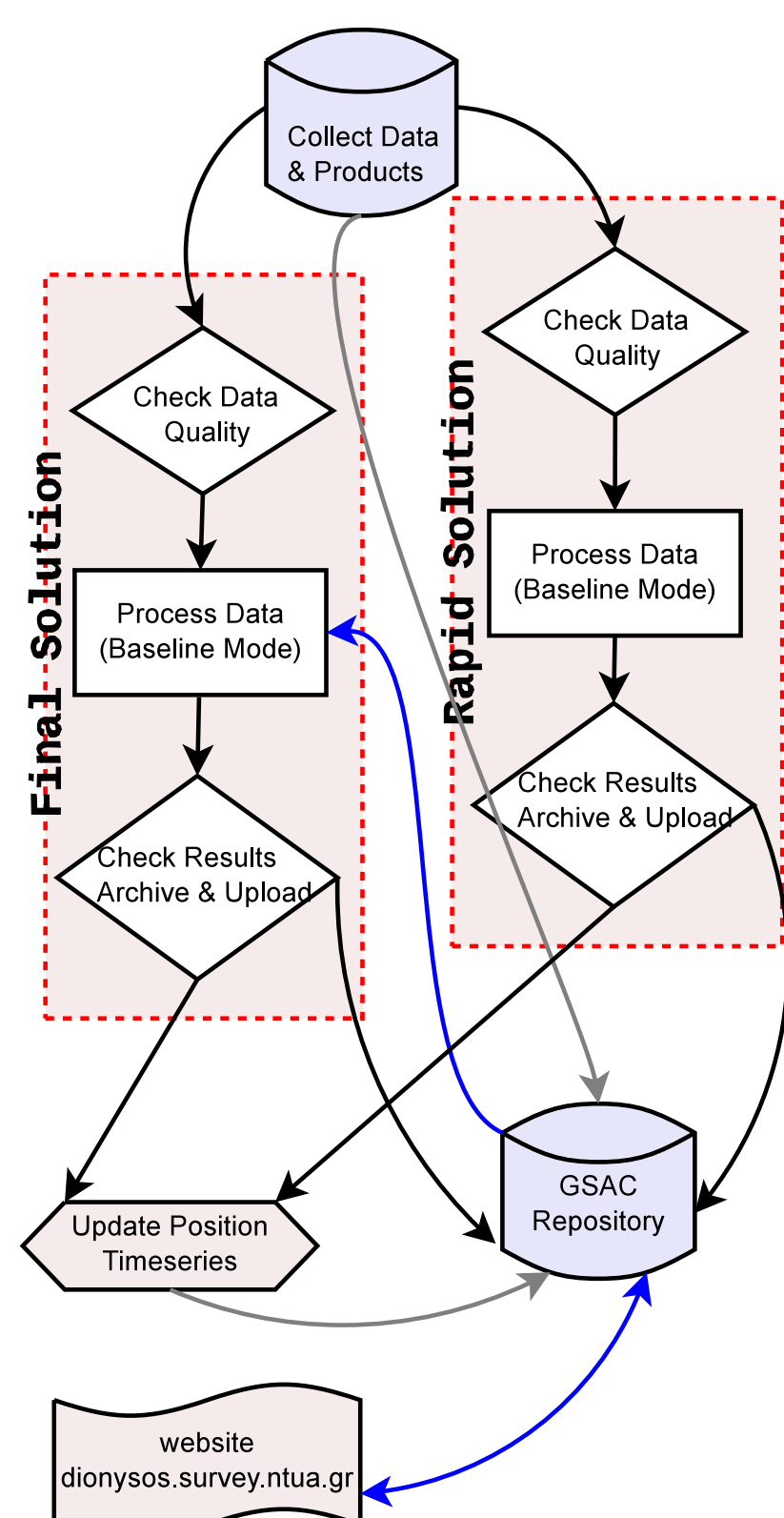


Figure 2: Flowchart of the processing scheme.

Processing & Analysis

The processing routine 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 retrieved 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 aligned 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. Estimates for parameters of interest are archived and saved to be later made available via the GSAC platform, or to be used as a-priori input values for later processing.

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 5).

Specialities in each network are introduced; *Santorini* network is aligned to IGB08 implicitly, using a subnetwork of *Greece*'s stations, while for the *Uranus* network we process both GPS and GLONASS observations.

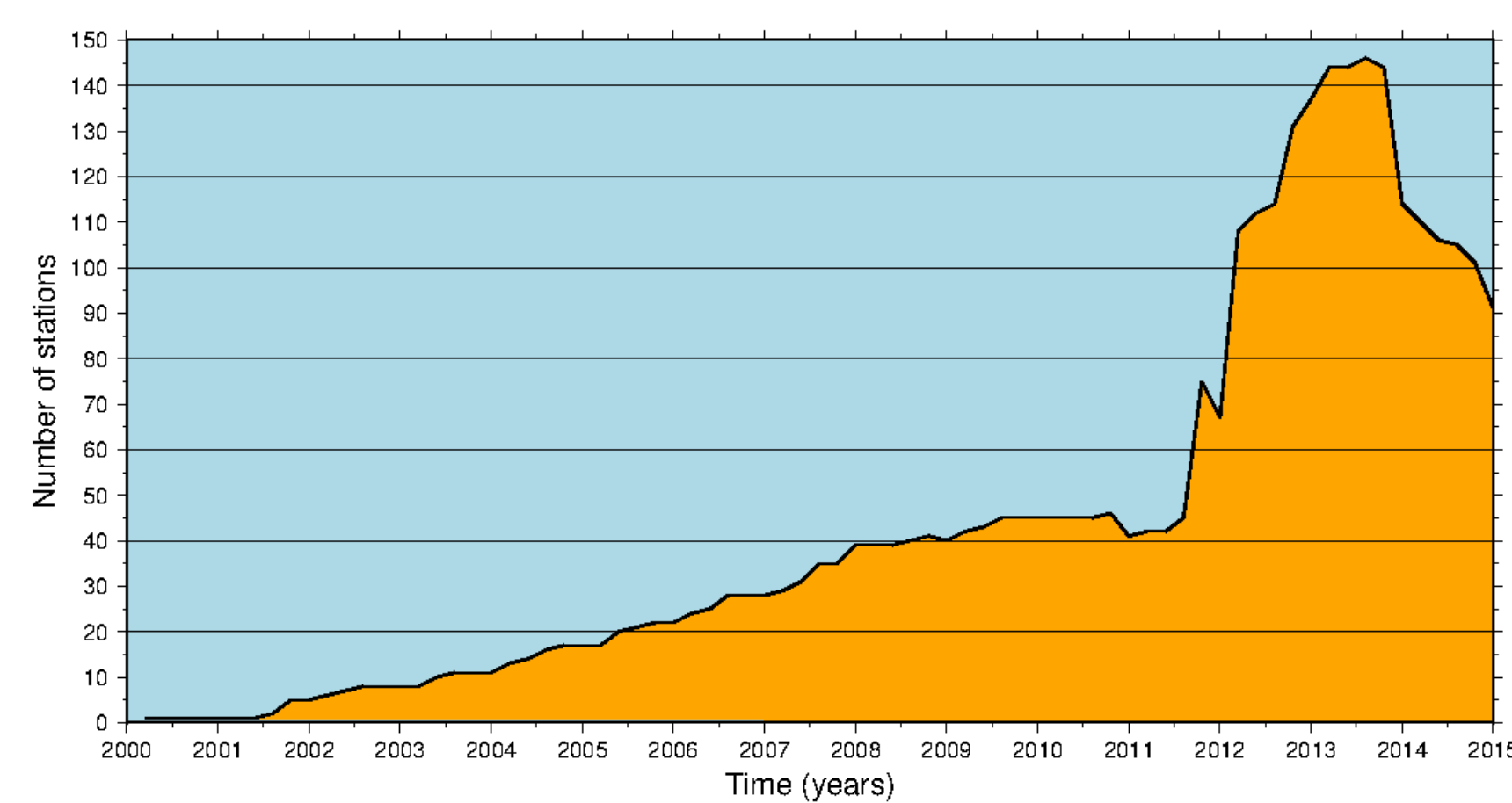


Figure 3: Number of processed stations.

Results, Products & Dissemination

Results of the processing include:

- Coordinate estimates and time-series files,
- SINEX and Normal Equation files,
- Tropospheric Sinex and Ionospheric TEC Maps (Figure 4),
- Tectonic velocities, offsets and annual and semi-annual harmonic coefficients

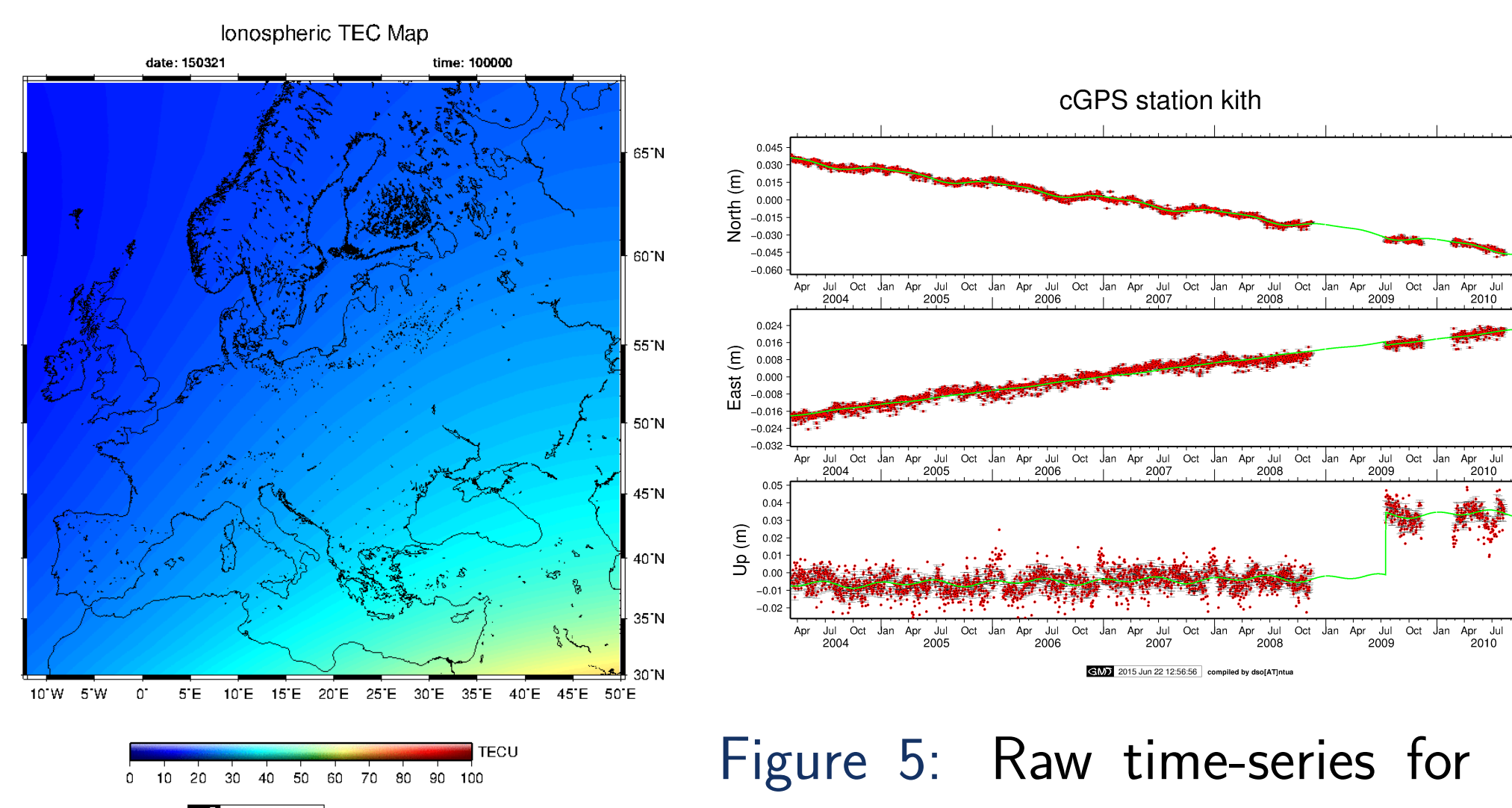


Figure 4: Snapshot of an ionospheric TEC map.

Some of the results are already accesible via our website, while others will soon be publicly available via NTUA's GSAC [?] repository (http://dionysos.survey.ntua.gr/dsoportal/_datacenter/gsacrepos.html).

Note that each site has a dedicated webpage, depicting its time-series analysis information; additionally, phenomena of special insterest are analyzed with minimin latency, and results are published on the web (e.g. [?]).

Conclusion

A validated and efficient processing scheme is established, to closely monitor the tectonically active region of Greece. This routine analysis has already provided crucial insight on various abrupt geophysical events in the recent past (e.g. [?]). 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.

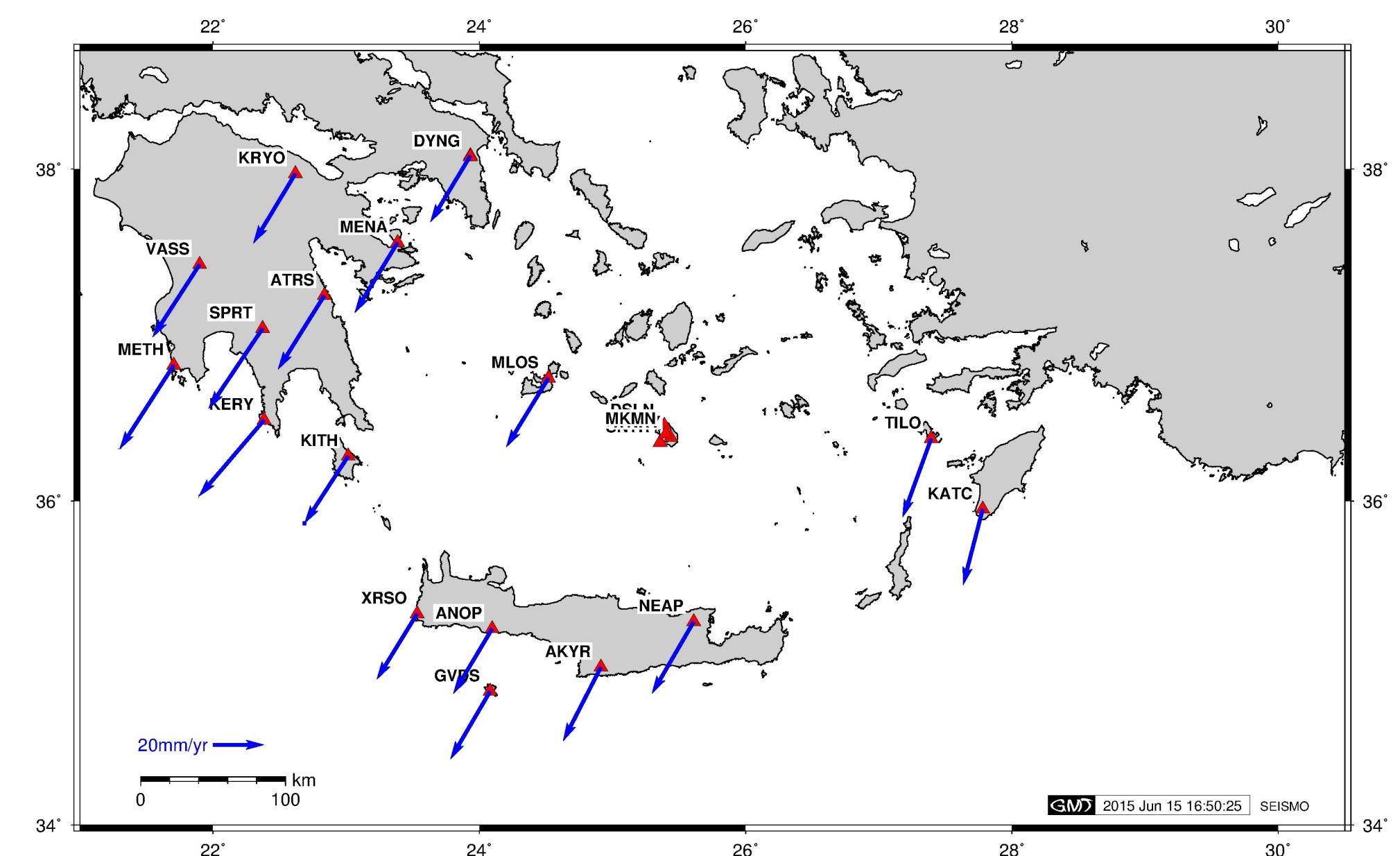


Figure 6: Tectonic velocities at the South Aegean wrt fixed Europe.

References

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- Web: dionysos.survey.ntua.gr
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