DSO contribution to EUREF densification; status and future steps

Xanthos Papanikolaou, Demitris Anastasiou, Demitris Paradissis

National Technical University of Athens,
School of Rural & Surveying Engineering
Dionysos Satellite Observatory

Higher Geodesy Laboratory

 http://dionysos.survey.ntua.gr/   xanthos@mail.ntua.gr

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About Dionysos Satellite Observatory

Dionysos Satellite Observatory (DSO) and Higher Geodesy Laboratory of the National Technical University of Athens, have been actively involved in GPS data processing since the late 80's.

Due to the exceptional geodynamic and tectonic setting of Greece, the main region of focus has mainly been inland. Campaigns were the only means of data collection up untill mid 2000. Since then, campaign data have been largely superseded by permanent GPS stations.

For the last few years, DSO has been routinely processing GPS/GNSS data from a list of GPS/GNSS networks, installed and maintained by various institutes.
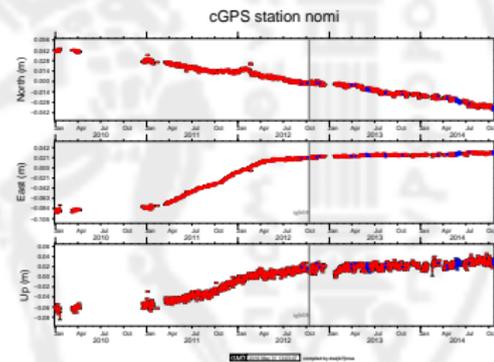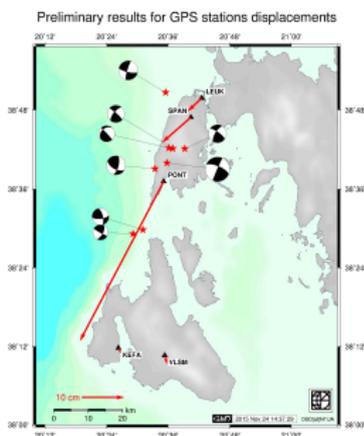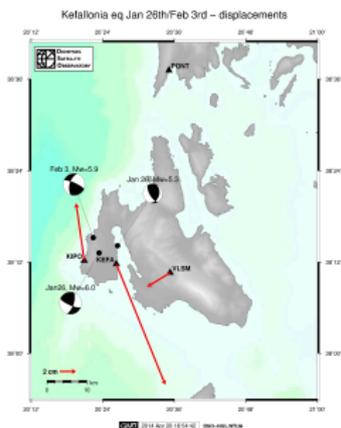
A Complicated Setting

Still, our main focus is the complicated setting of Greece ...
earthquakes, volcanic activity, large and inhomogenous tectonic velocities.

Kephalonia Earthquake,
January 2014

Lefkada Earthquake,
November 2015

Santorini inflation episode, 2011 - 2012

Planning the contribution

Contributing to EUREF Densification, posed a serious challenge: *establishing a credible network!*

This has been rather challenging, as various institutes have installed GPS/GNSS stations throughout the last years, thus resulting in an inhomogenous set of sites. There were hardly any log files, the mainteners used different acquisition methods, with different acquisition times, a wide variety of equipment (not always included in `atx` files) and had different data policies.

DSO has made up a network of **58** GPS/GNSS sites throughout Greece, including as many of the aforementioned sites as possible, for its contribution to EUREF. During the last couple of years, we have reprocessed the network, publishing the `SINEX` files to EUREF.

Unfortunately, a small portion of these 58 sites does not transmit data and in-situ collection is required. This is due to a firmware bug after Feb 2014.
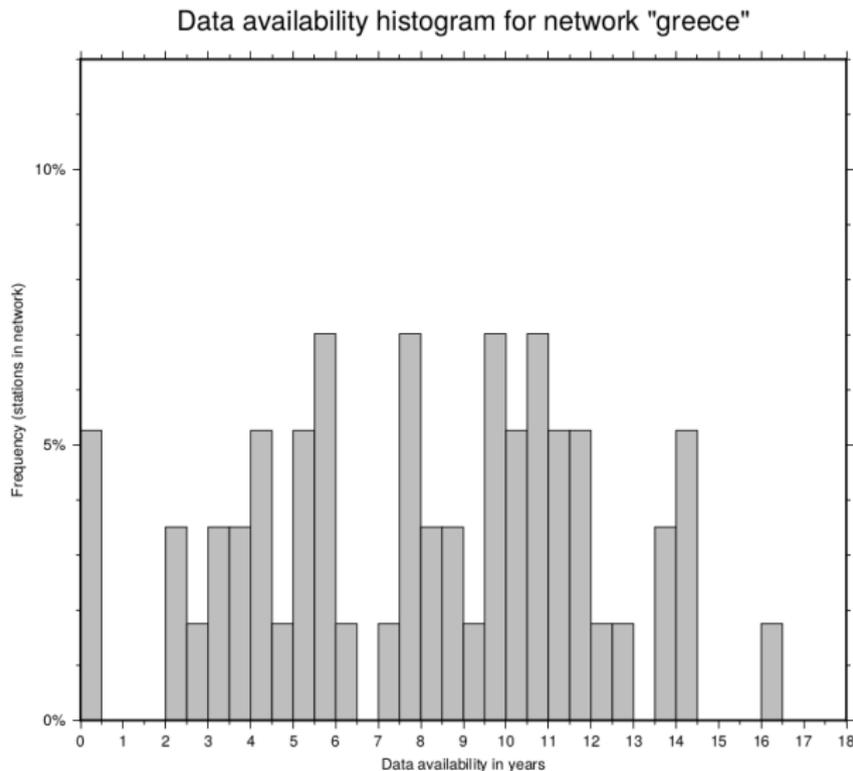
The network

The network DSO contributes to EUREF Densification.
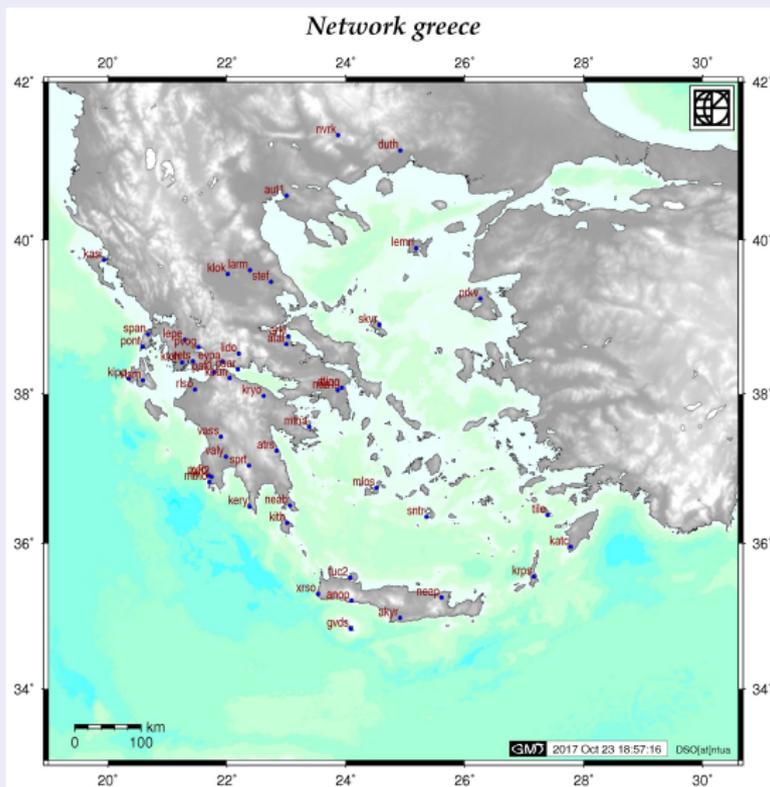
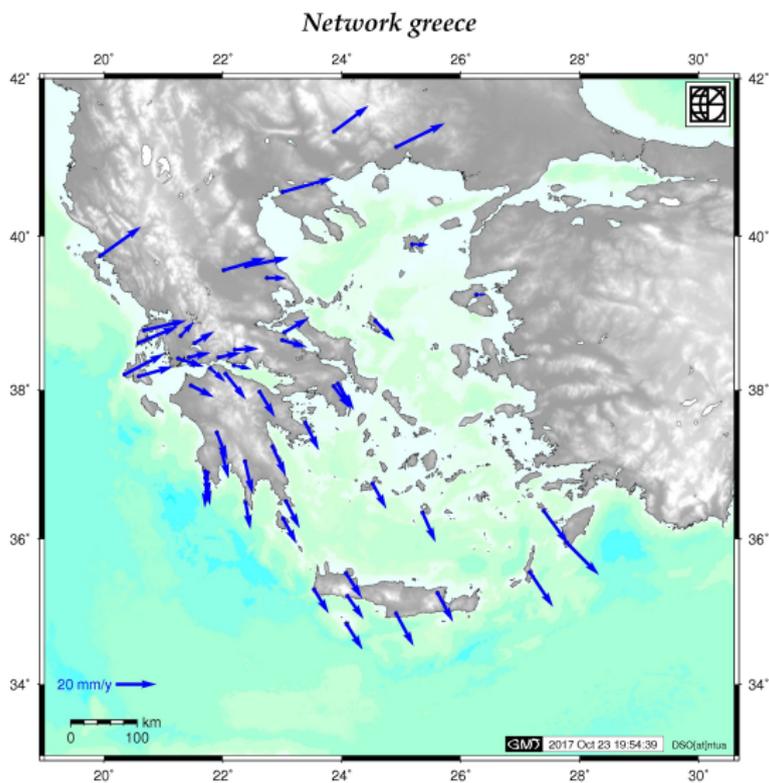# Data Availability up to Jan 2017 (per station)

Time span for network "greece"

Data Availability up to Jan 2017 (histogram)

Data availability histogram for network "greece"
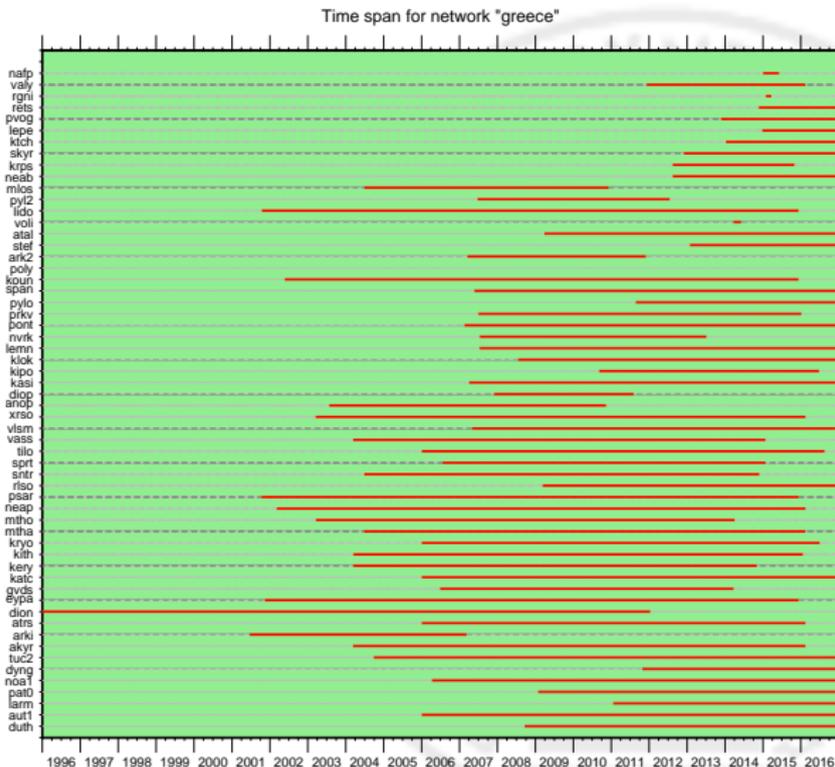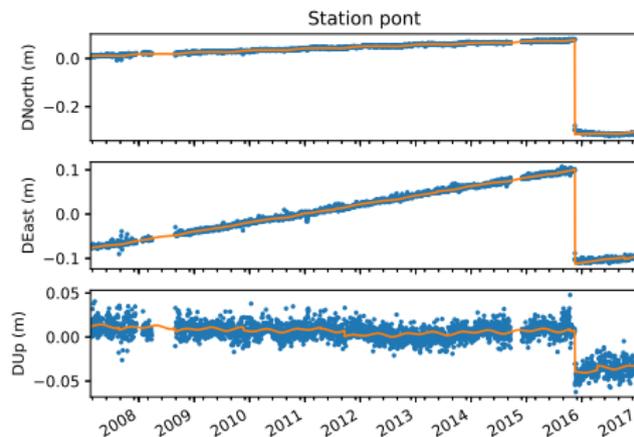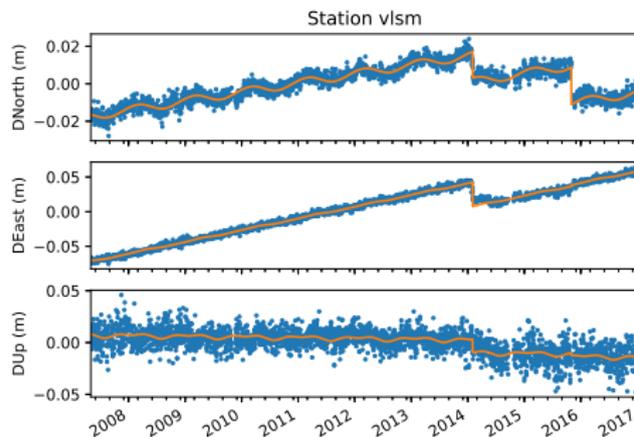
Contribution

- Untill now, DSO has already submitted `SINEX` files spanning the years *1996 - 2016*; processing is perfomed with `Bernese v5.2`.

- DSO has also compiled (or helped compile) log files for most of the stations for which we submit results for. At this point, only a small portion of the network does not have (IGS-conforming) log files.

- `DOMES` identifiers have been requested and acquired, for all the sites which DSO maintains or helps be maintained.

The velocity field (w.r.t. IGb08)

Network greece

Challenging time-series modeling

Currently a PhD under development at DSO.

Expanding the contribution - URANUS network

DSO also processes a "comercial" GNSS network, installed and maintained by *Tree-Company* Greece (Topcon). The network is installed for surveying purposes.
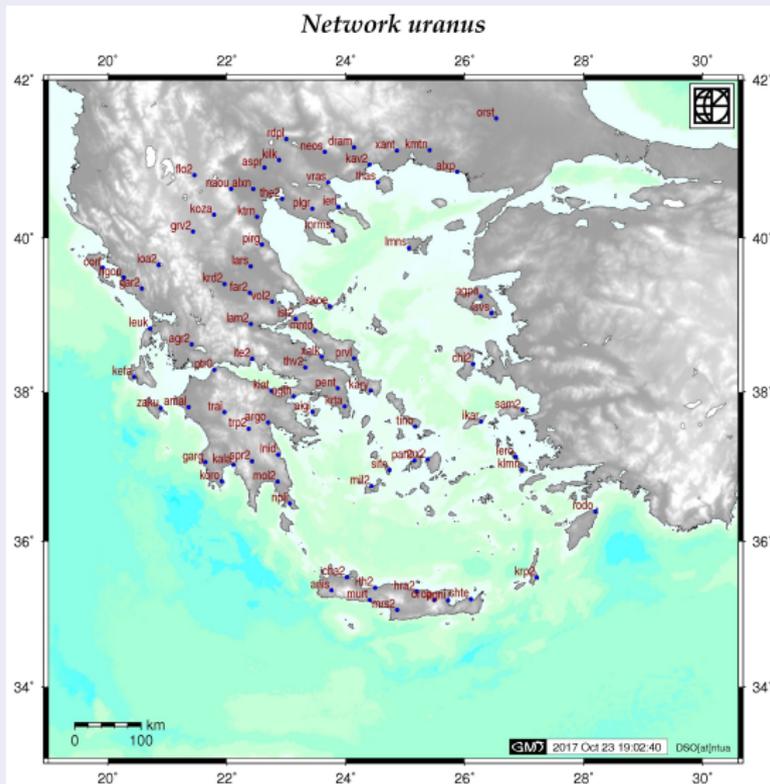
Drawbacks:

- no log files,
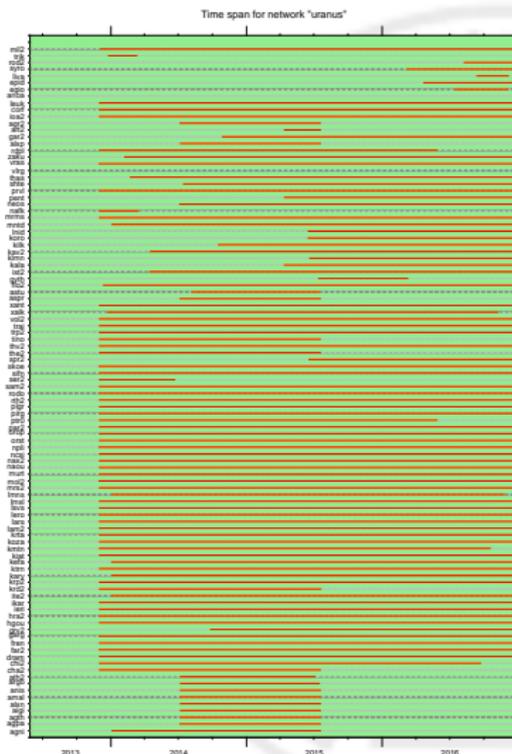- comercial usage oriented,
- limited time span

Yet the network (or selected sites of it) could be contributed to EUREF Densification, or used as validation (e.g. for velocity estimation).
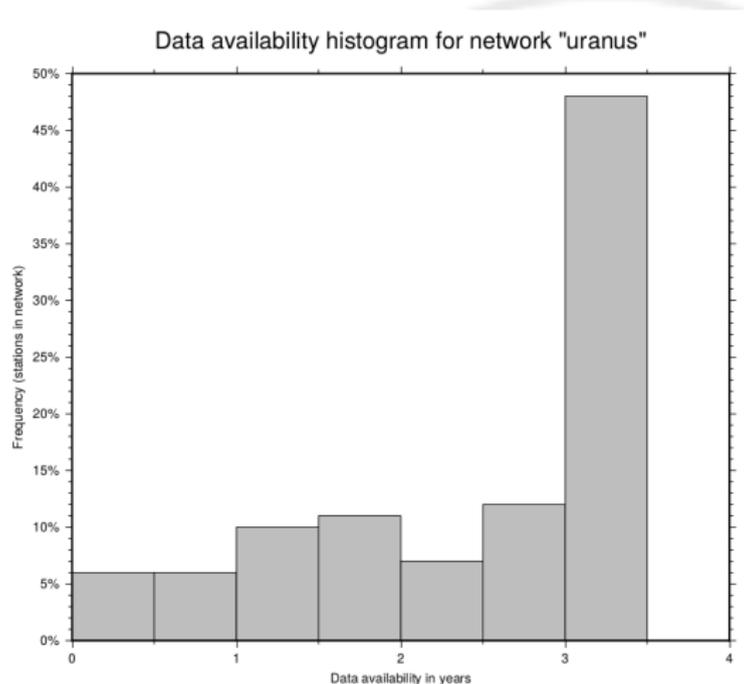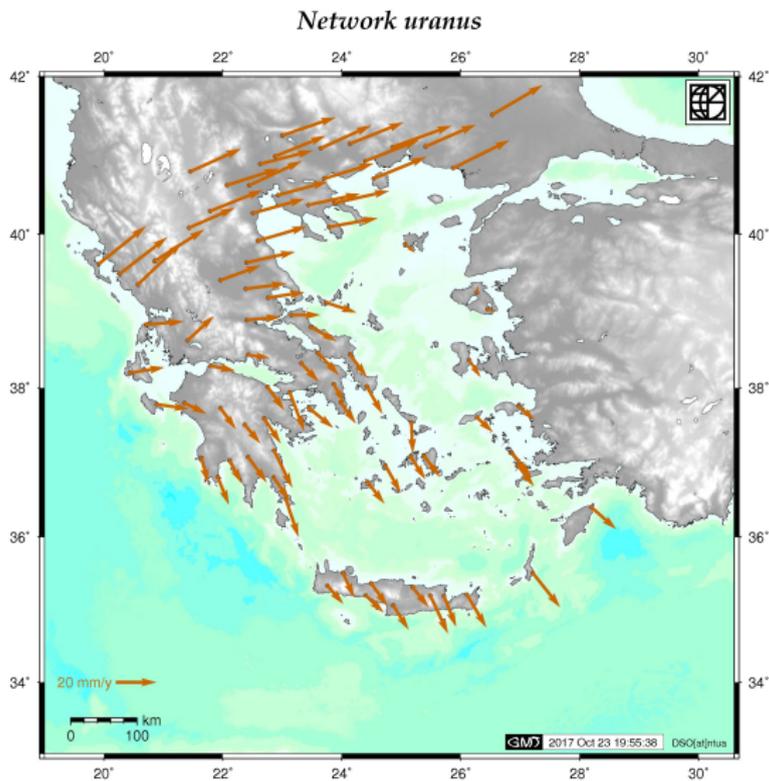
The network

URANUS network

Network uranus

Data Availability up to Jan 2017 (per station)

Time span for network "uranus"

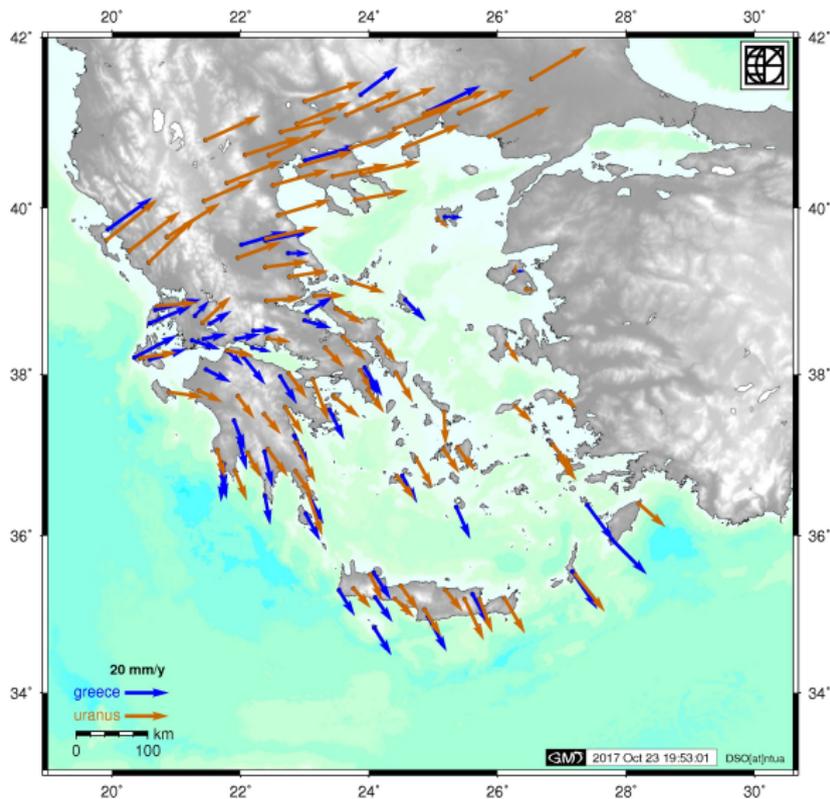# Data Availability up to Jan 2017 (histogram)

The velocity field (w.r.t. IGb08)

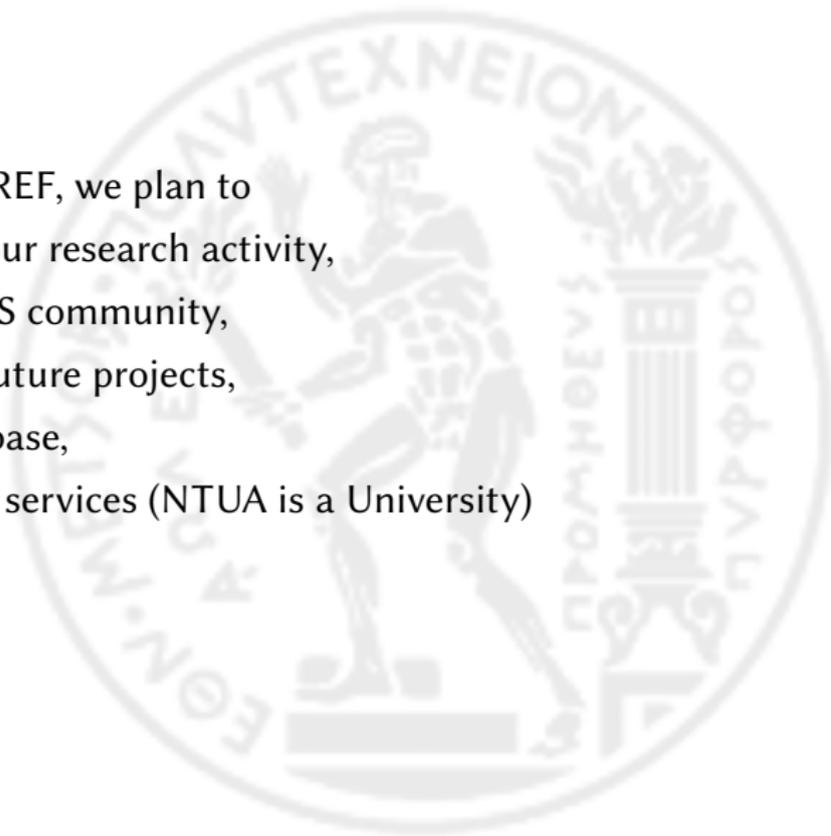*Network uranus*

Joint velocity field (w.r.t. IGb08)

all networks

Motivation

Via our contribution to EUREF, we plan to

- expand & modernize our research activity,
- contribute to the GNSS community,
- take part in ongoing/future projects,
- expand our knowlegdbase,
- improve our academic services (NTUA is a University)

Future Steps

- continue (even expand if possible) our contribution,
- include more stations (e.g. in Albania),
- contribute to EPOS (via our published SINEX files),
- routinely process data (produce and publish final and rapid solutions; the final ones will be contributed to EUREF),
- efficient time-series modelling (e.g. *Post Seismic Deformation*) via in-house software

Processing for both networks ("greece" and "uranus") is currently paused at Feb 2017. We plan on resuming it as soon as possible, adopting IGS14.

Thank you for your attention