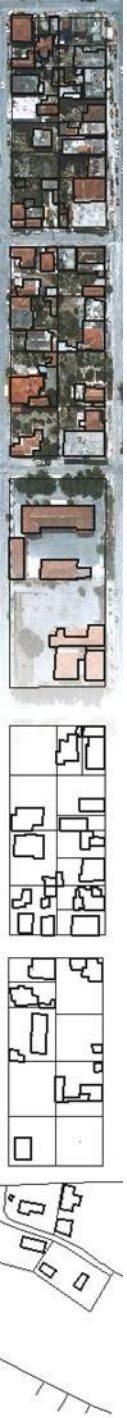

NATIONAL CADASTRE & MAPPING AGENCY S.A.

National Report of Greece

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National Cadastre and Mapping Agency S.A.

Outline

1. **Estimation of tectonic velocities of HEPOS stations**
2. **Monitoring of ionospheric activity over Greece**
3. **The 2015 Lefkada, Ionian Sea earthquake**

   Permanent displacements of HEPOS stations

1. Estimation of tectonic velocities of HEPOS stations

Motivation

The velocity field in Greece is intense and inhomogeneous.

Apart from the constant motion, discontinuities often occur due to geological phenomena (mainly earthquakes).

The problem of maintaining a reference frame in seismo-tectonically active areas is being studied at international level.

Two EUREF WG are currently working on this:
'EPN Densification', 'Deformation models'.

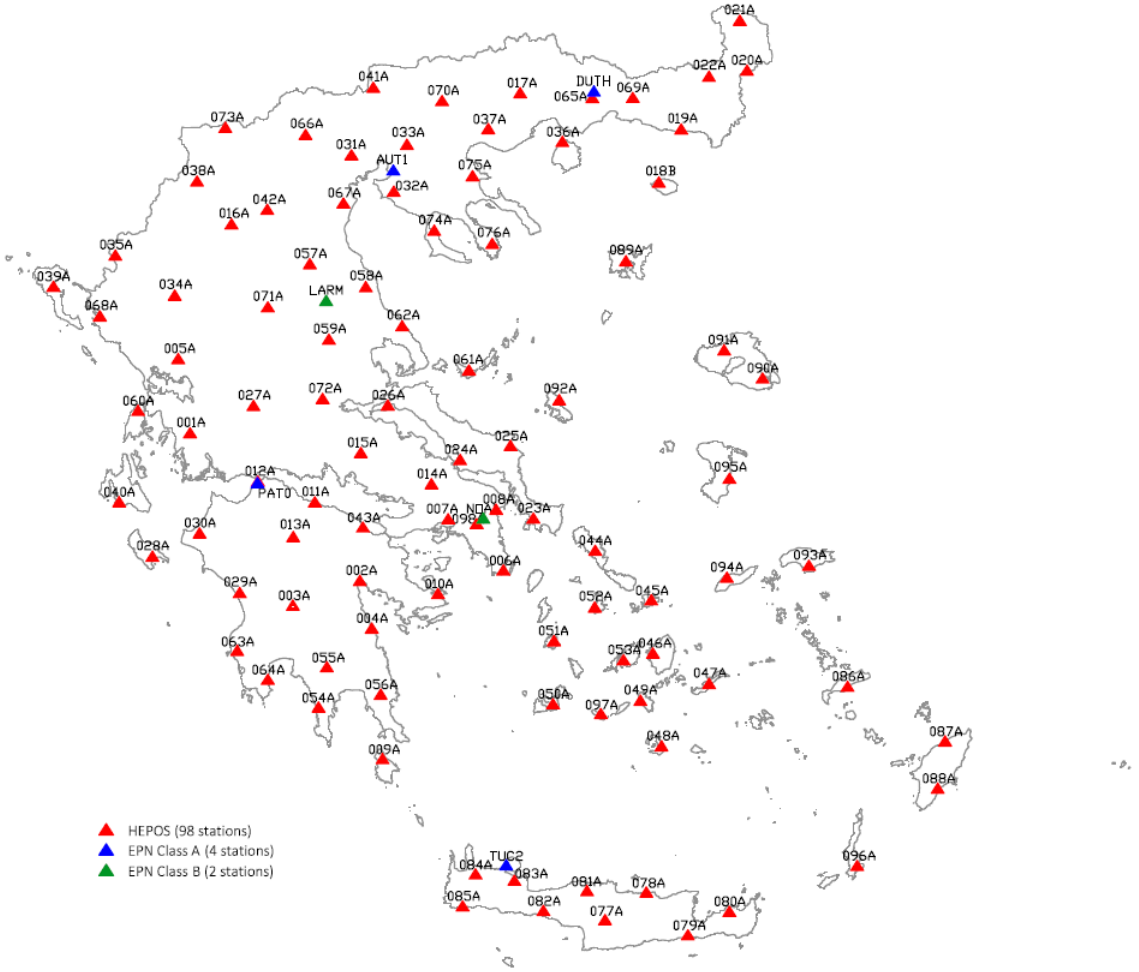
The tectonic activity in Greece is systematically monitored in the context of operating HEPOS.

1. Estimation of tectonic velocities of HEPOS stations

Dataset used

104 Stations:

- 98 HEPOS stations
  7.5 years
- 6 EPN stations
  4.4-7.5 years



1. Estimation of tectonic velocities of HEPOS stations

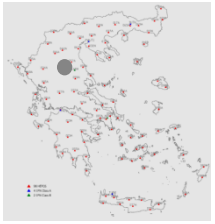
Processing strategy

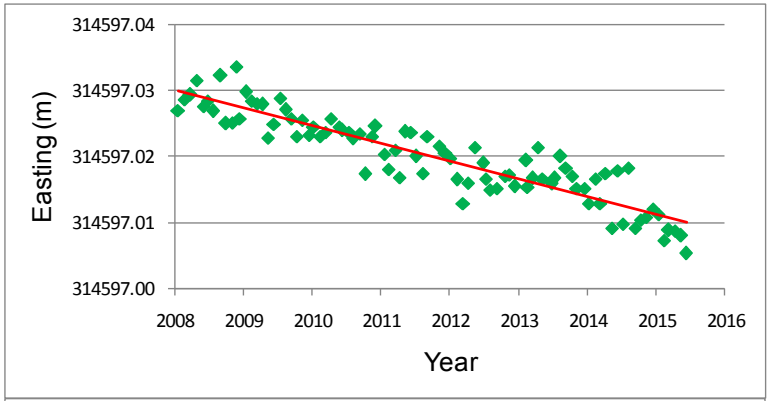
- Method: PPP
- Software: CSRS-PPP
- Orbits and Clocks: IGS
- Processing interval: 30 sec
- Elevation mask: 10^{o}
- One daily solution per month
- Reference frame: ITRF2008(IGb08)
- Removal of effects of geological events like earthquakes

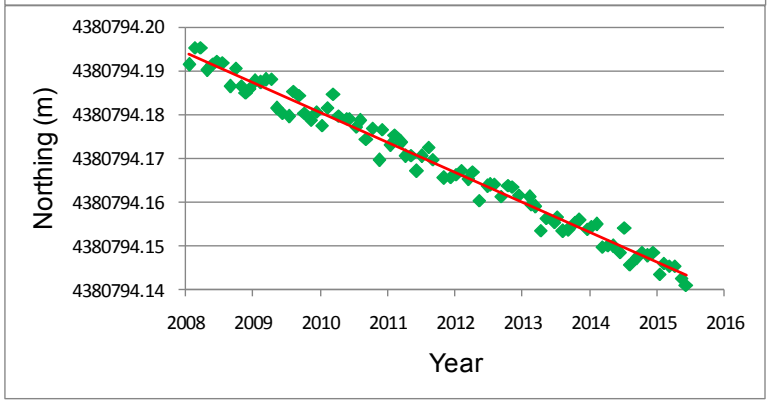
1. Estimation of tectonic velocities of HEPOS stations

Examples of time-series

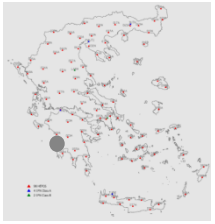
Station 071A

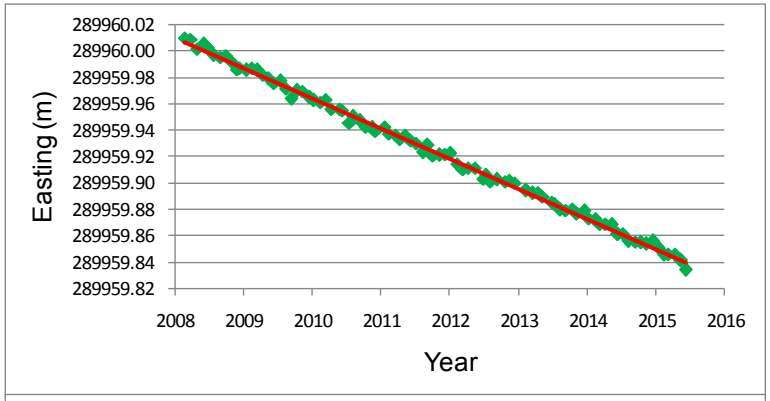


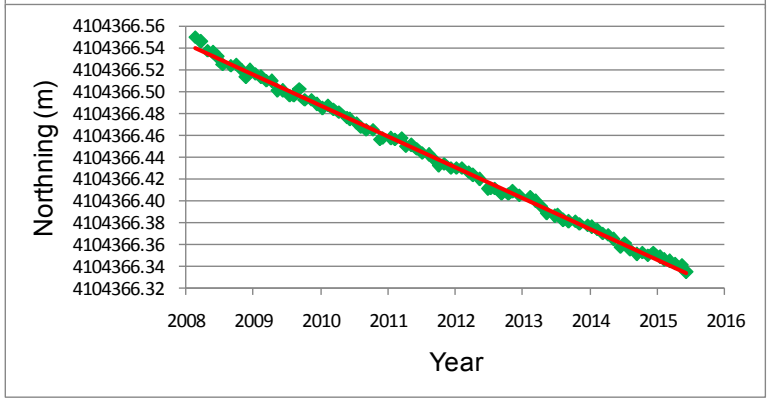




Station 063A





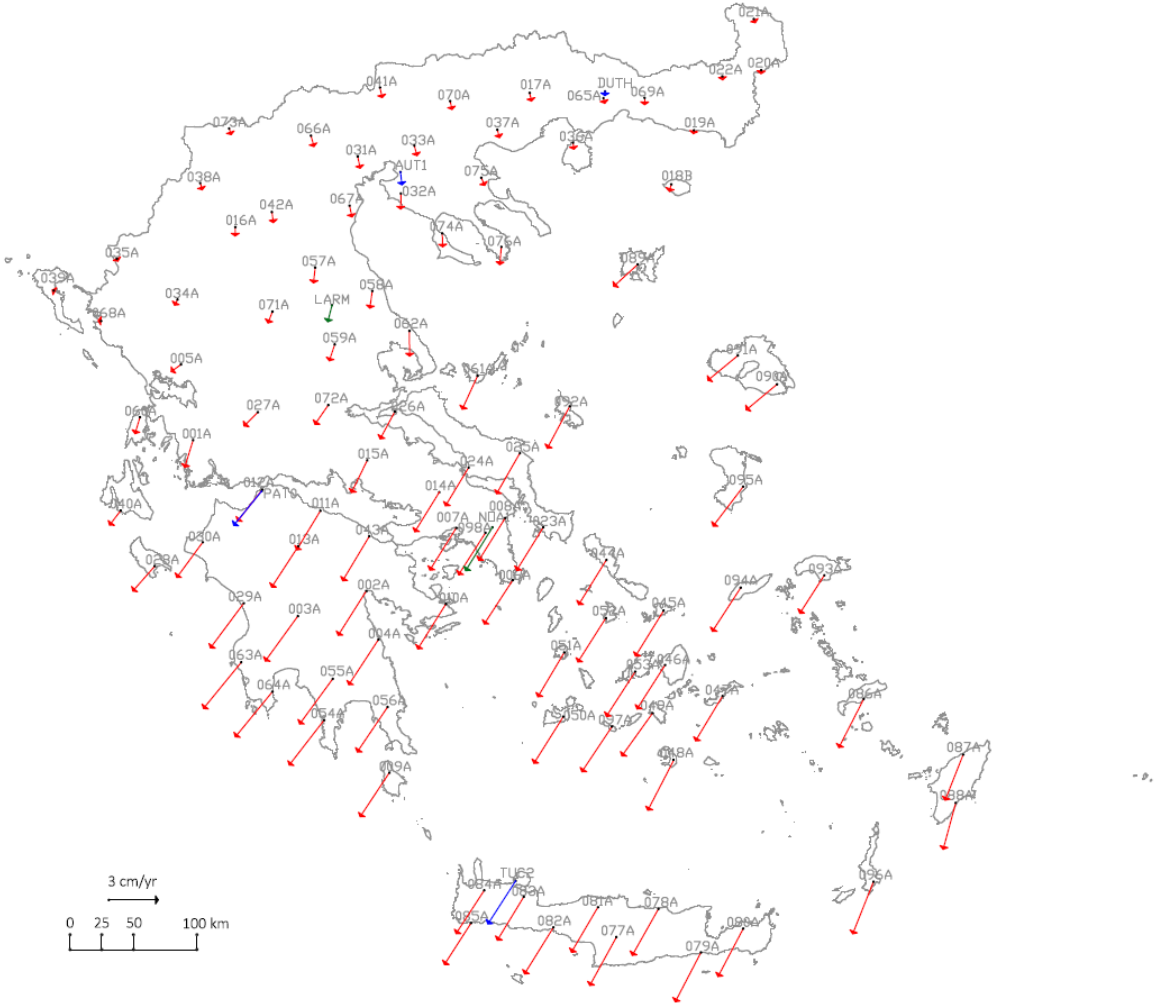


1. Estimation of tectonic velocities of HEPOS stations

Estimated horizontal velocity field in ETRF2000

104 stations:

- **98 HEPOS**
- **4 EPN Class A**
- **2 EPN Class B**



For comparison reasons, EUREF velocities are shown for the 4 EPN Class A stations *(EPN_A_ETRF2000_C1875.SSC).*

For the 2 EPN Class B stations PPP velocities are shown.

2. Monitoring of ionospheric activity

Motivation

The ionospheric activity over Greece is continuously monitored as a part of the operation of HEPOS:

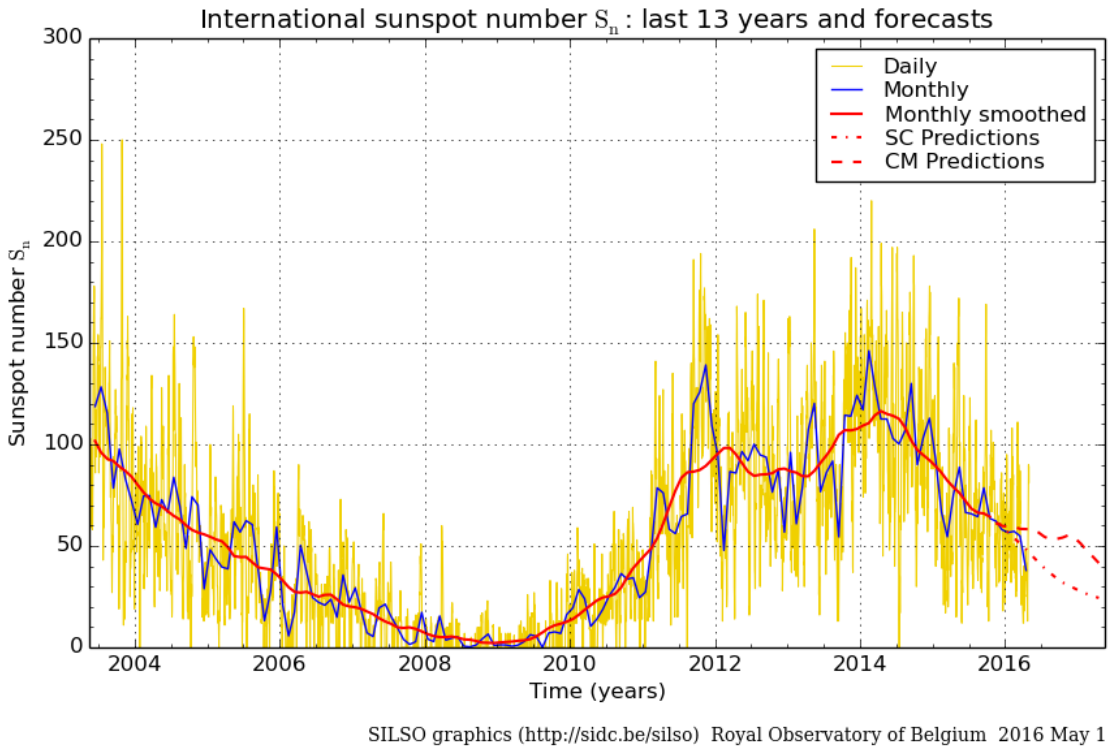
- system supervision
- user support/information

During the maximum of the Solar Cycle, intense ionospheric activity seriously affected RTK applications in Greece, mainly in the Southern part of the country. After the summer of 2015 the ionosphere became considerably less active.

2. Monitoring of ionospheric activity

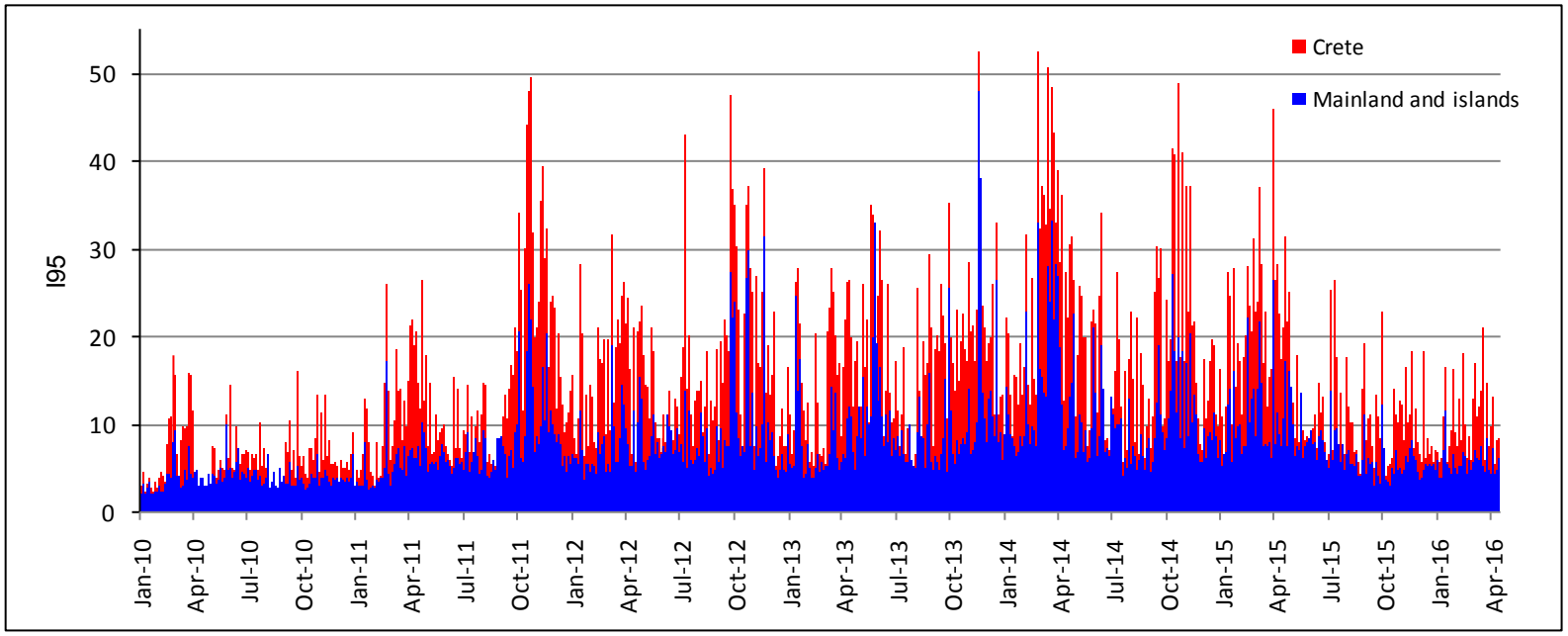
Ionospheric activity around maximum of SC 24

- The 24th Solar Cycle was double-peaked
- It is the first SC in which the second peak in sunspot number was larger than the first one *(http://solarscience.msfc.nasa.gov/predict.shtml)*
- Currently, the ionospheric activity is at moderate levels.



2. Monitoring of ionospheric activity

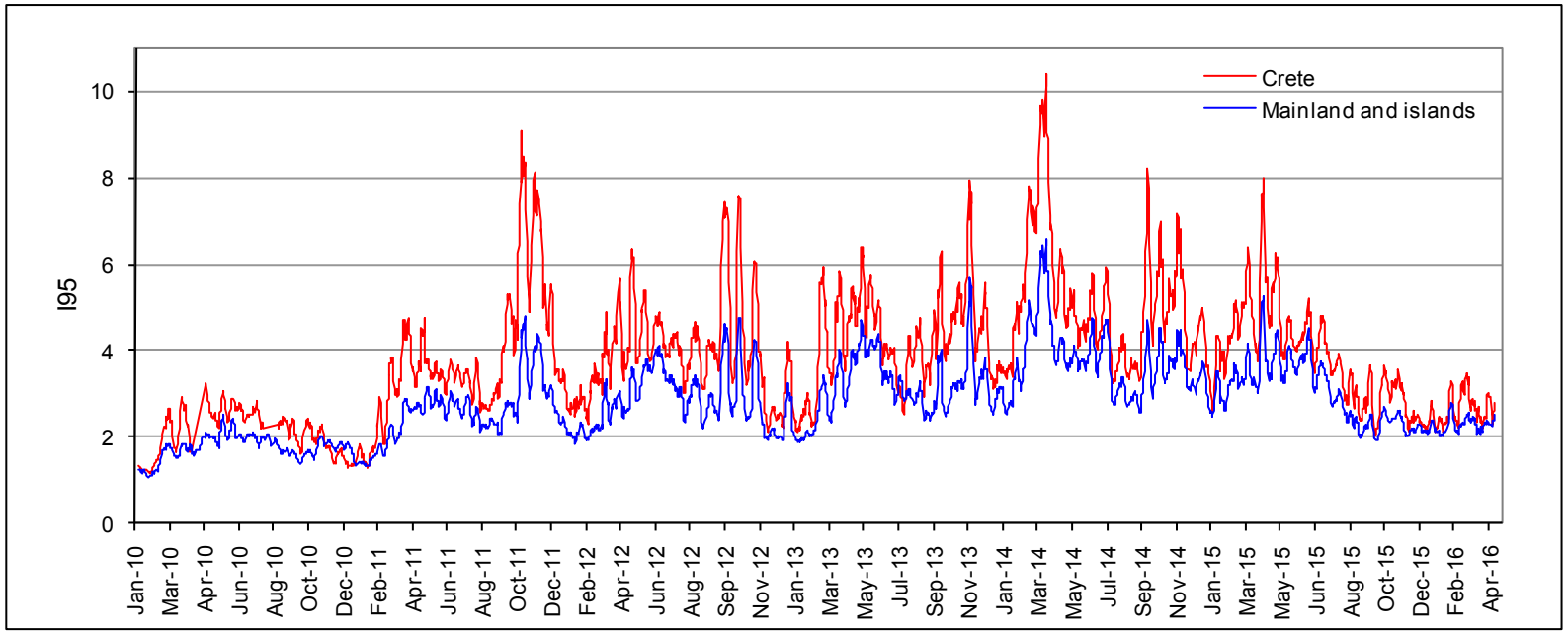
HEPOS I95 index
Daily maximum



2. Monitoring of ionospheric activity

HEPOS I95 index
Daily mean

Mean of the 24 hourly values, smoothed with moving average filter (span: 7 days)



3. The 2015 Lefka earthquake

Details of the earthquake

The 2015 Lefkada, Ionian Sea EQ

- **Day: November 17, 2015**
- **Mw: 6.6**
- **Depth: 9 Km**

The Earthquake caused significant permanent displacements.

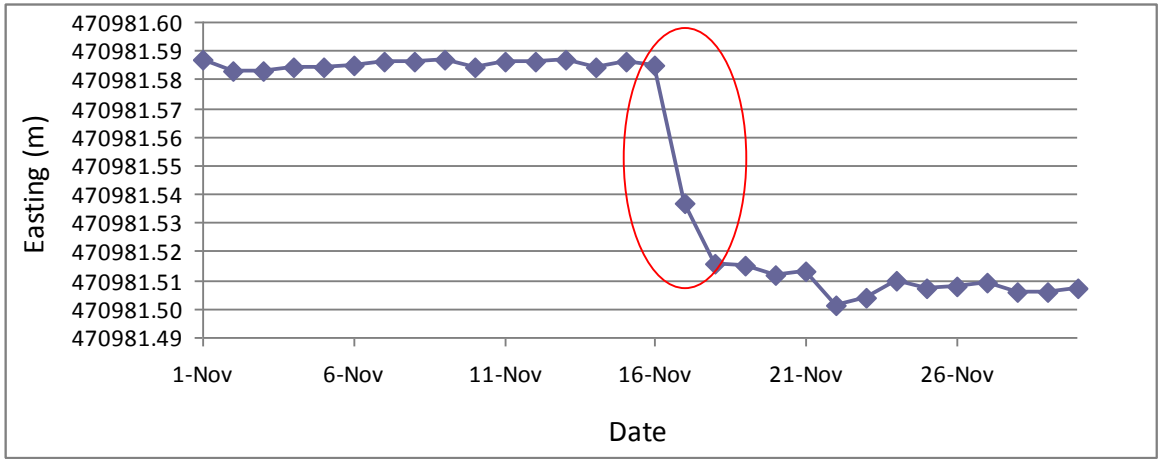
3. The 2015 Lefkada, Ionian Sea earthquake

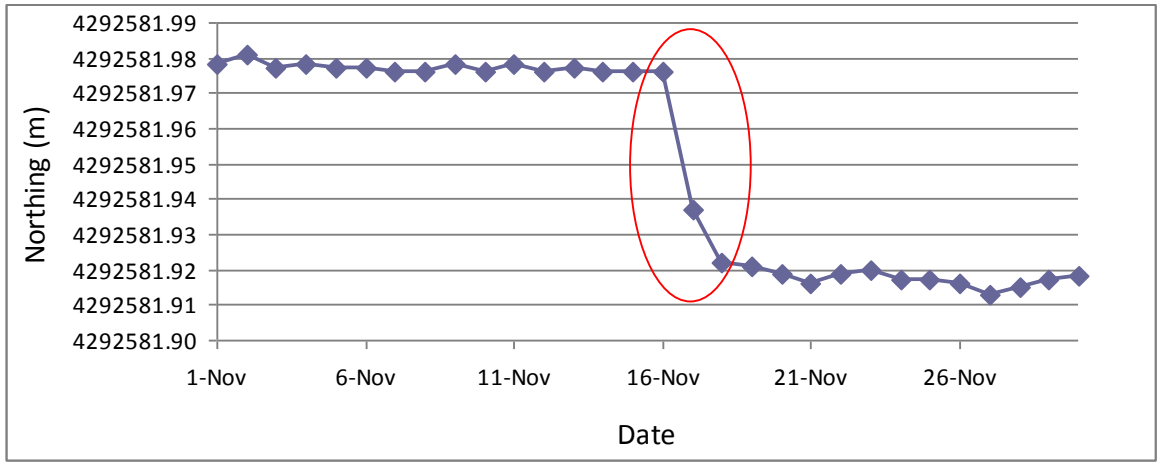
Data processing schema

- Daily solutions
- Method: PPP
- Software: CSRS-PPP
- Orbits and Clocks: IGS
- Processing interval: 30 sec
- Elevation mask: 10^{o}

3. The 2015 Lefkada, Ionian Sea earthquake

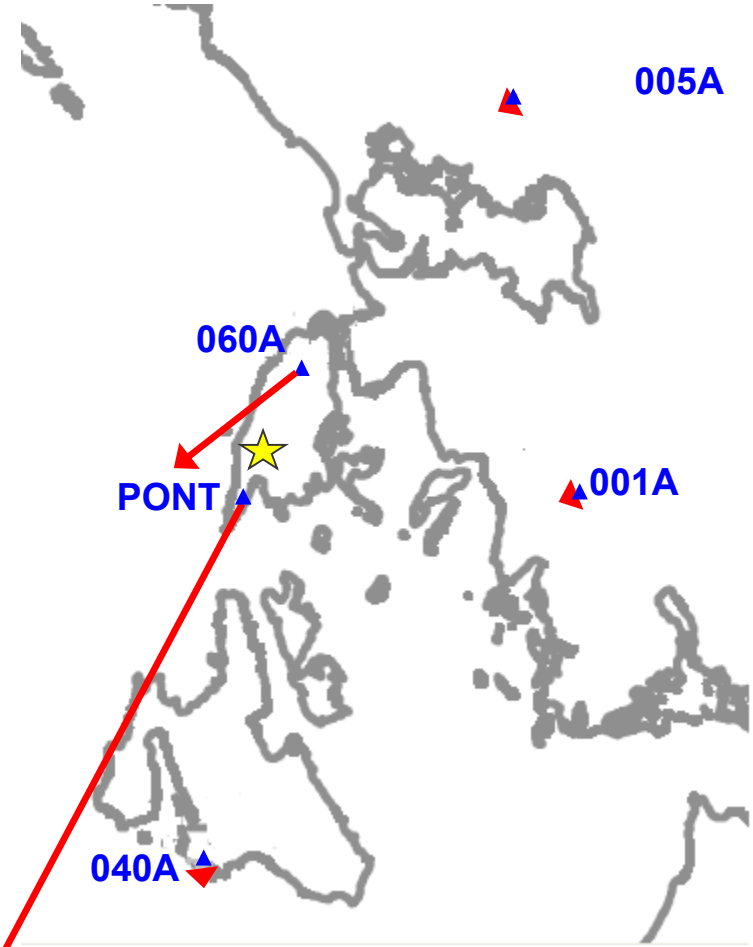
Produced time-series (HEPOS station 060A)





3. The 2015 Lefkada, Ionian Sea earthquake

Observed displacements (preliminary results)



HEPOS stations

- **060A: 10 cm**
- **040A: 1 cm**
- **001A: 1 cm**
- **005A: 4 mm**

NOANET station

- **PONT: 40 cm**

Acknowledgments

The HEPOS project is part of the Operational Program “Information Society” and is co-funded by the European Regional Development Fund.