

# Displacements Recorded on Continuous GPS Stations following the Jan. 26 and Feb. 3, 2014 M6 Cephalonia (Greece) Earthquakes

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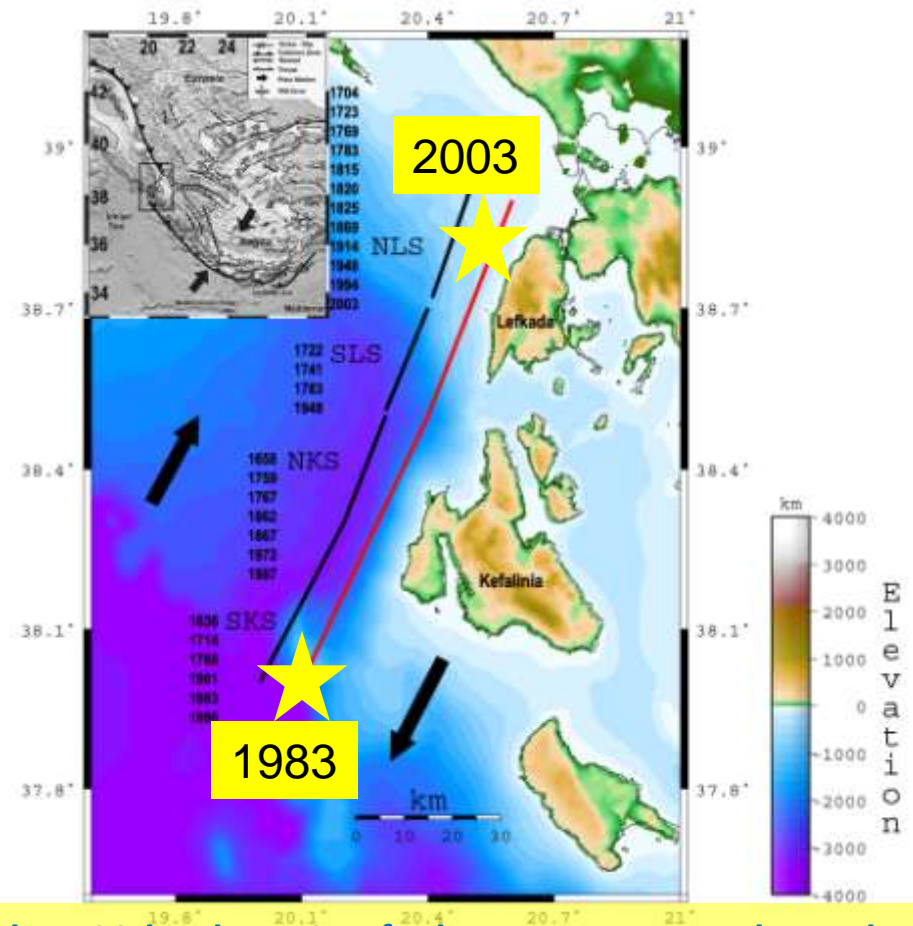
NOA GPS Project <http://www.gein.noa.gr/gps.html>

Hemus NET Project <http://www.hemus-net.org/>

NOA Faults [http://194.177.194.200/services/GPS/GPS\\_DATA/1\\_NOAFaults/](http://194.177.194.200/services/GPS/GPS_DATA/1_NOAFaults/)

# Outline of presentation

- Setting
- Dynamic offsets
- Static offsets
- Comparison with strong motion
- Modeling



The 100-km long CTF fault zone accommodates the relative motion of the Apulia and Aegean plates, and has a GPS slip-rate bracketed between 10 and 25 mm/yr (e.g., Perouse et al., 2012).



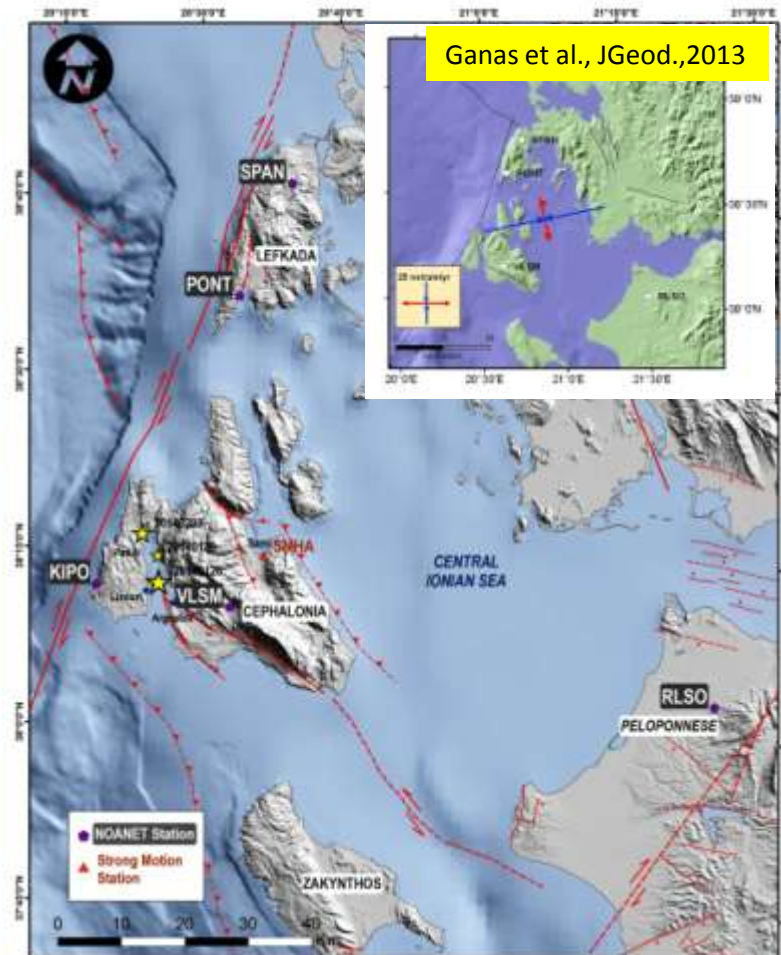
## Displacements Recorded on Continuous GPS Stations following the Jan. 26 and Feb. 3, 2014 M6 Cephalonia (Greece) Earthquakes

Two strong earthquake events, with  $M_L(\text{NOA})$  5.8 and  $M_L(\text{NOA})$  5.7, occurred on Jan. 26, 2014 13:55 UTC and Feb. 3, 2014 03:08 UTC, respectively, onshore the island of Cephalonia inducing extensive structural damages and environmental effects, mainly in the western and central part.

Both earthquakes occurred on near-vertical, strike-slip faults with dextral sense of motion (NOA Moment Tensor solutions).

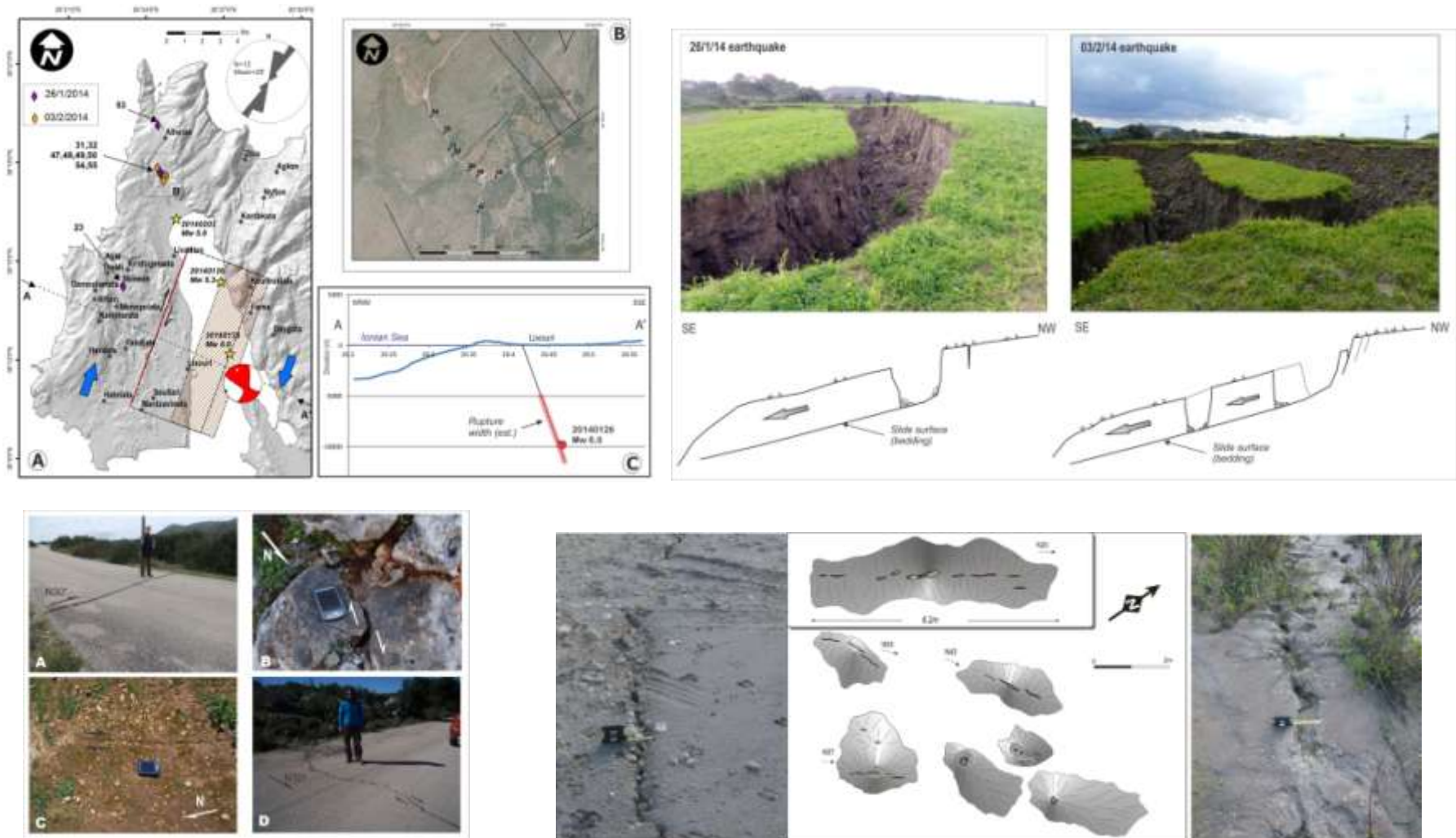
Response to ENE-WSW horizontal strain in central Ionian Sea (Hollenstein et al., 2008; Ganas et al., 2013).

Five (5) NOANET stations in this area (1Hz / 5 Hz sampling rate).



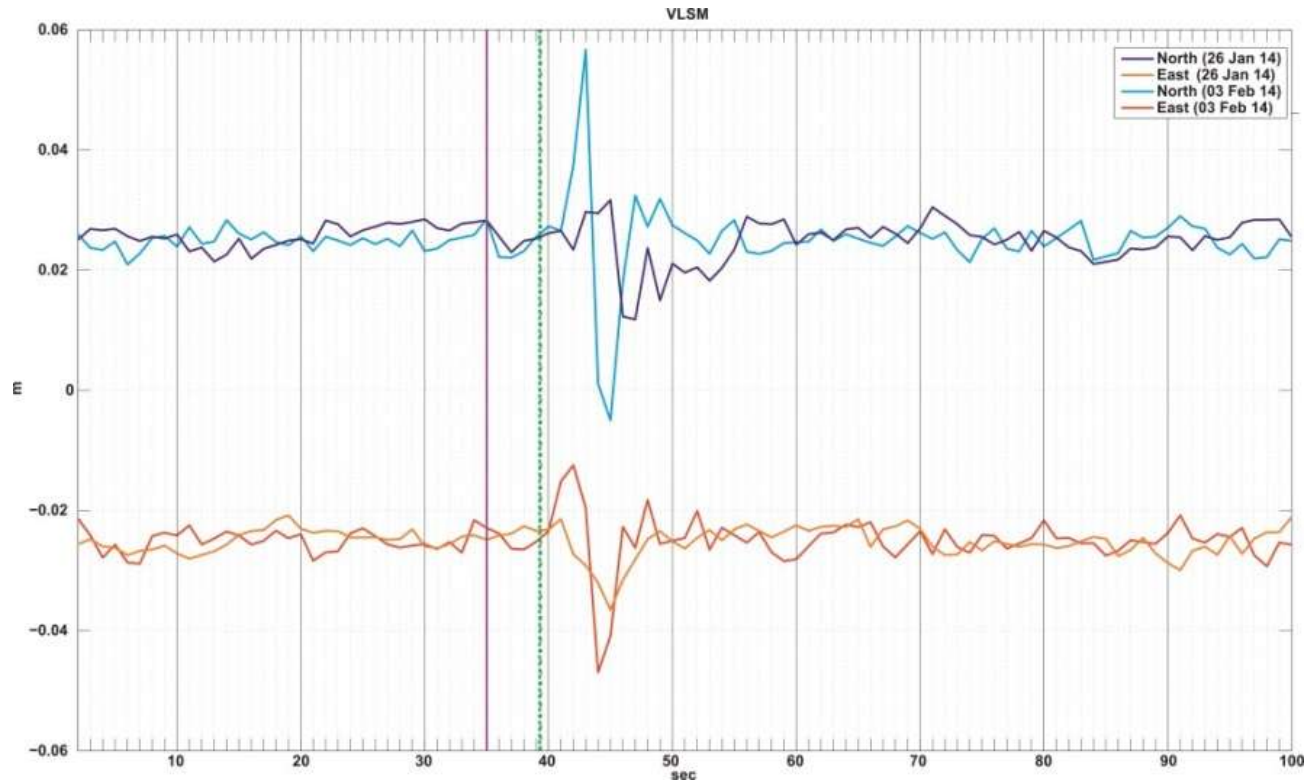
Ganas et al., JGeod., 2013

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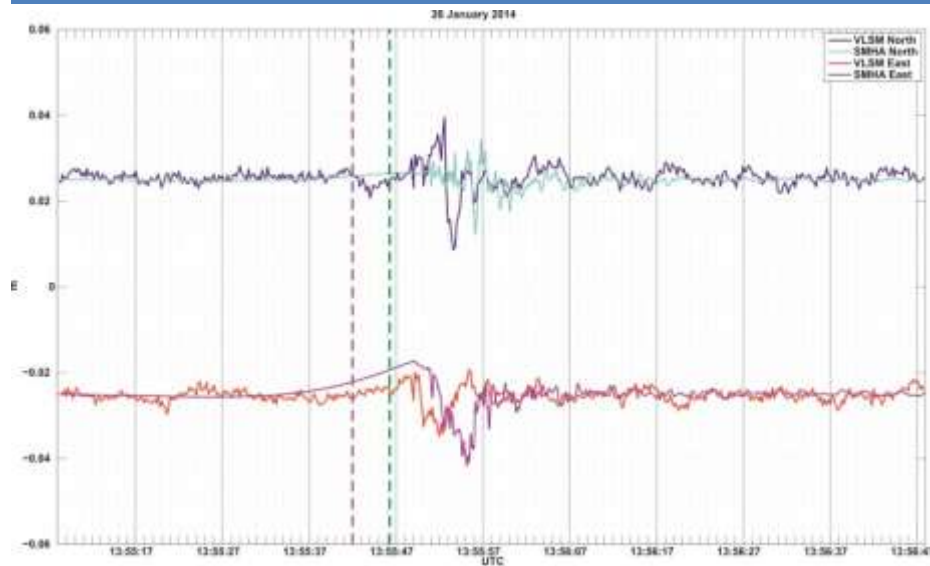
# GPS signal comparison at Valsamata station



Comparison between the 1-Hz GPS time series at VLSM station for the two events. The purple line is the time of the earthquakes, while the green dotted line shows the P-wave arrival.

***Dynamic offsets***

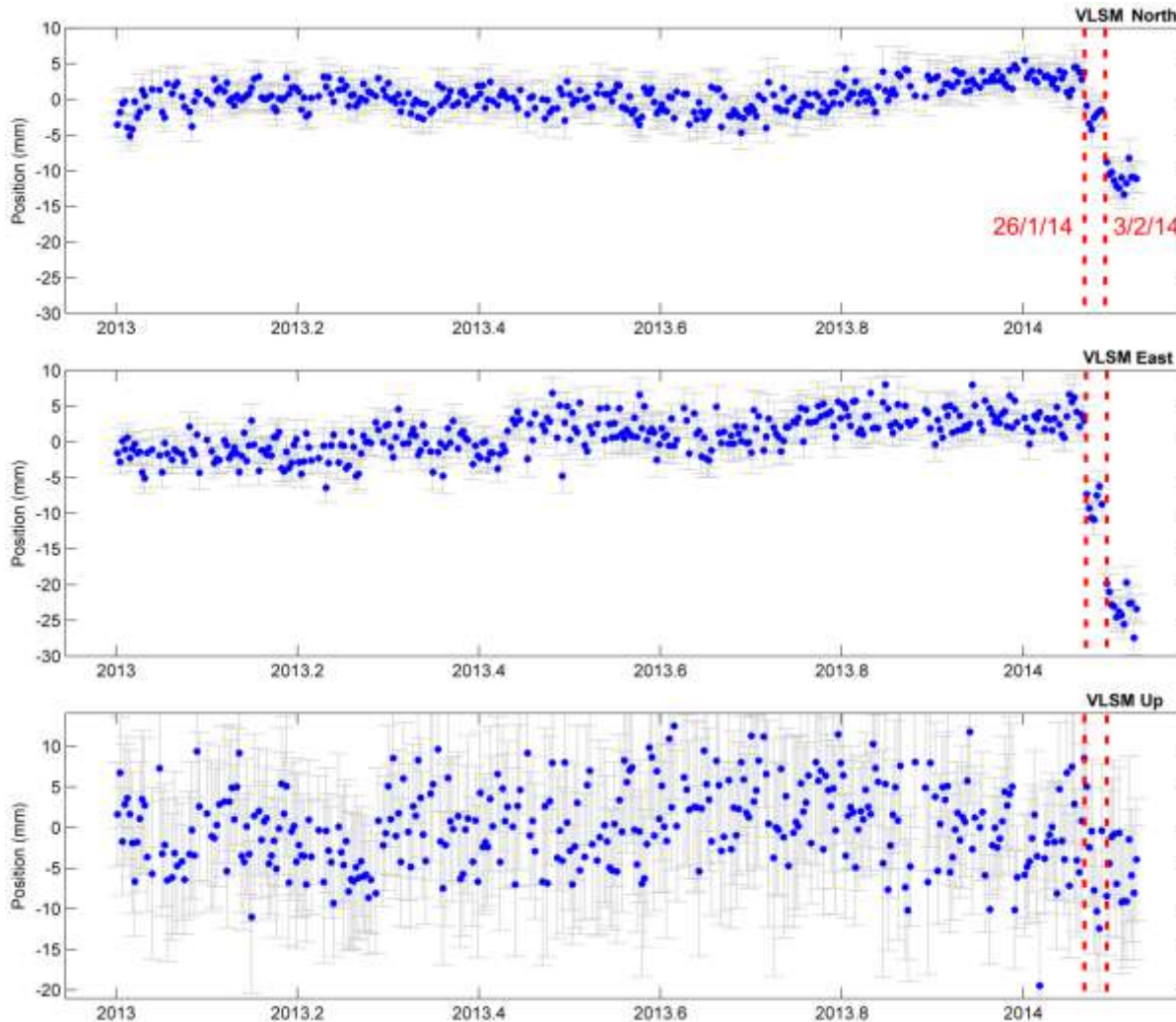
# Waveform comparison VLISM - SMHA



Comparison between the displacement at VLISM station estimated by GPS and strong motion estimated at SMHA station by an accelerometer, for the two earthquakes. The time series are aligned with the occurrence of the earthquake

**Comparison with strong motion**

# VLSM 30-s data: geodetic strain



Detrended time series (N, E, U) of VLSM site with coseismic offsets processed with GAMIT.

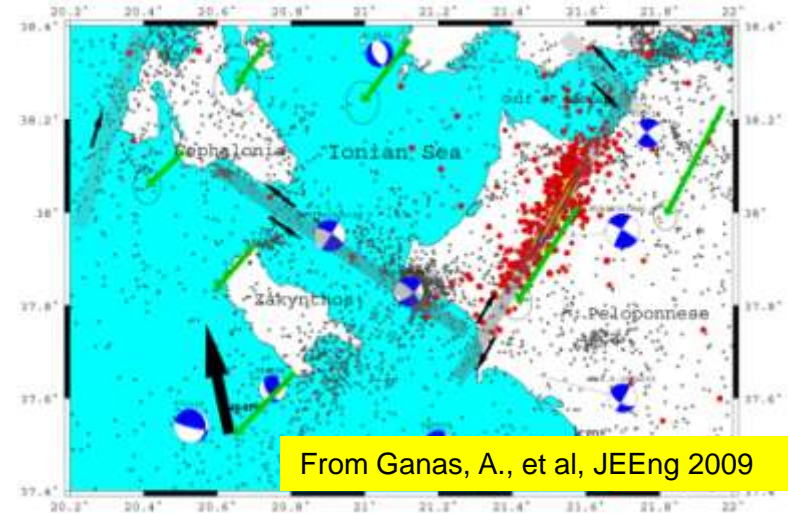
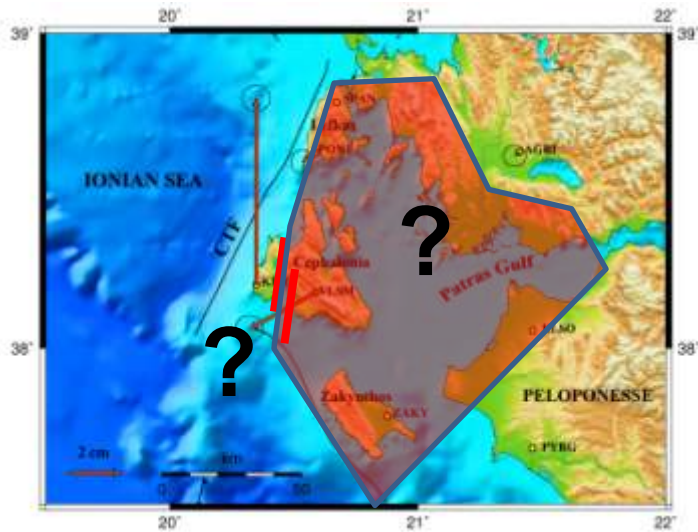
Two static offsets of cm-size are clearly detected on the horizontal components for the days following the 2014 Cephalonia earthquakes.

Both offsets are cm-size and are directed towards the south and west. Daily position uncertainties are indicated by grey error bars.

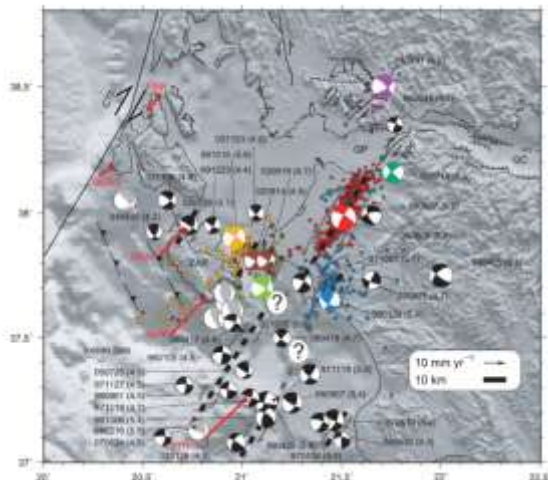
**Static Offsets**



# Central Ionian block or microplate

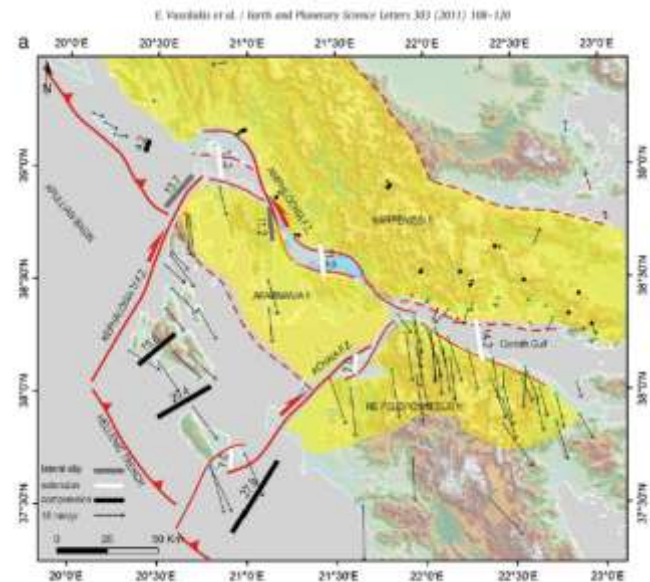


From Ganas, A., et al, JEng 2009



From Feng L., et al, GJI 2010

**Modeling**



## Conclusions

1. We estimated the peak-to-peak motion obtaining for the Jan. 26 event a maximum dynamic displacement in the North component of 3.0 cm and 1.5 cm in the East component, while for the Feb. 3 event we estimated the maximum displacement of 6.1 cm and 3.4 cm in the North and East components, respectively.
2. VLSM & SMHA shows the comparative behaviour on the ground shaking (both amplitude and shape of waveforms) and the time delay due to the different location. The difference in S-wave amplitude between the two earthquakes is confirmed also by the strong motion data.
3. The northward motion of station KIPO implies that the western peninsula of Cephalonia island (Paliki) belongs to a separate crustal block with respect to the rest of the island.

**ΕΥΧΑΡΙΣΤΩ ΓΙΑ ΤΗΝ ΠΡΟΣΟΧΗ ΣΑΣ!**