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Interactive comment on "Focal mechanisms in the Southern Aegean from temporary seismic networks – implications for the regional stress field and ongoing deformation processes" *by* W. Friederich et al.

n. houlie (Referee)

nhoulie@ethz.ch

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Interactive Referee Comment on "Focal mechanisms in the Southern Aegean from temporary seismic networks – implications for the regional stress field and ongoing deformation processes" by W. Friederich et al.

This study aims at describing the stress field in southern Aegean region from the first motion and waveform inversion of earthquake radiations patterns. This study presents a large dataset of stress tensors axis and discuss the spatial variations in the horizontal

and vertical field of the stress field with great detail. I recommend the acceptance of this paper with major revision because I think some elements are missing but there is no major flaw in the analysis carried on. I detail below why.

In the geodesy community, there is a large consensus to think that block models (d'Alessio et al., 2005) are not the best way to describe the surface deformation inferred from GPS velocity field. This is true for a very practical reason: faults are not all known, even large fault systems can be understood as inactive (L'Aquila event) or are so complex that multiple fault segments remain hidden to us before the occurrence of an event. In this context, how defining blocks?

This is where the authors of this study have a great opportunity to contribute to their field:

How about defining tectonic blocks based on the stress tensors analysis completed at the local scale? Stress tensors are the measure of the local stress field (L<20km). We can consider the rupture initiation area of large events (Mw>7.0) are of the same order of magnitude. A rupture corresponding to a magnitude of M3.8 (the lowest magnitude considered in this study) does not rupture a fault area larger than 1 km2 (Wells and Coppersmith, 1994). If, at the regional scale, stress axes are compliant with such local stress measurements, here is your result, and we need to know how it is possible. Many hypotheses could be invoked (complexity of the crust, faults inherited from previous tectonic phases, etc.) to explain discrepancies between the stress fields at two various scales. Recent works have shown that when strain, strain rate and stress fields are in agreement, some science can be achieved (Houlié and Stern, 2012).

Here some minor comments:

-Citing (Hardebeck and Michael, 2004) on San Andreas fault would be nice somewhere in the text. Inversion of stress field in blocks have been completed a long time ago in California -For western Turkey you should at least cite (Aktug et al., 2009) who completed a strain analysis there -Show the GPS field measured in Greece, this would

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provide some context to your study. This might also provide some insight to define the boundaries of the block. I personnaly think there is no much evidence to defined block from the GPS surface velocities (Figure 1). -I would rename some of the section (see annotated document) and move other to the supplementary materials. The description of the stress field for each area for both shallow and deep earthquakes is tedious. On the contrary, I would appreciate to see the stress field presented in a tarball in the supplementary materials. -Could you plot the GPS field of the area, the seismicity for earthquake larger than ML=2.0? It would give a more complete picture of the seismicity of the study area. -Would it be possible to estimate what is the uncertainty related to the position of one event (unc$\sim$20km) on nodal plane parameters? Authors say there is no much impact but it is not proven yet (while I suspect it is true because the data have been lowpass filtered at 10s).

Figure 1: Geodetic measurements of Greece and western Turkey. GPS velocity field compiled from campaigns and continuous GPS motions in the ITRF2000 (Hollenstein et al., 2006; Hollenstein et al., 2008; Reilinger et al., 2006). Right: Principal strain axes (shortening in red and extension in green). The strain field has been computed using the software SSPX (Cardozo and Allmendinger, 2009) on a 30km grid using the near neighbour strategy (6 neighbours, max distance = 100km).

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Please also note the supplement to this comment:
http://www.solid-earth-discuss.net/5/C798/2013/sed-5-C798-2013-supplement.pdf

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Interactive comment on Solid Earth Discuss., 5, 1721, 2013.

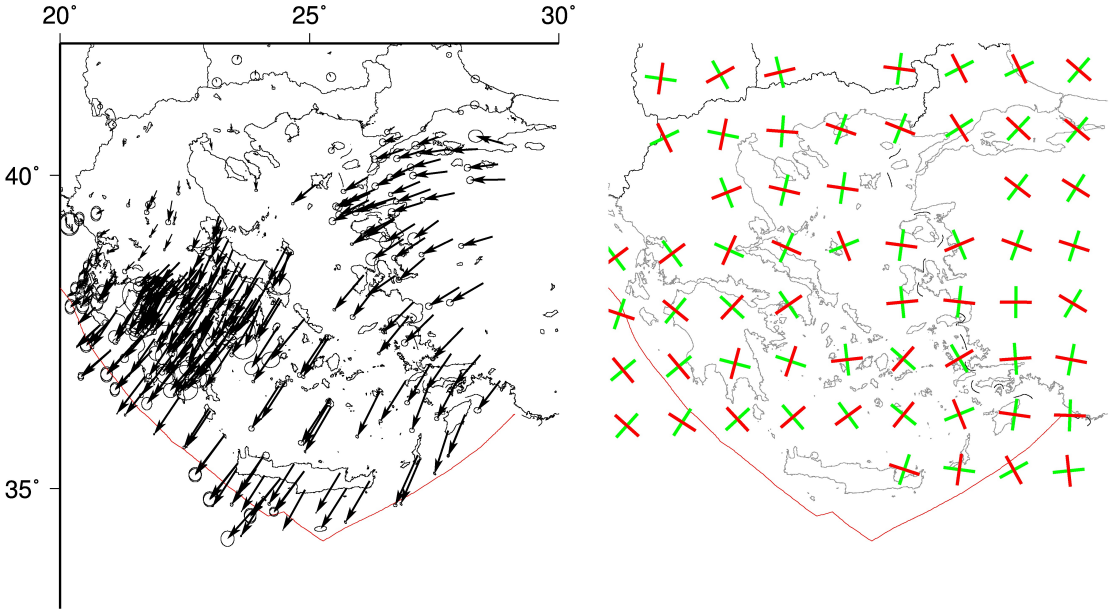

Fig. 1.

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