Geophysical Research Abstracts
Vol. 20, EGU2018-16303, 2018
EGU General Assembly 2018
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The Katouna Fault Zone, (Western Greece): a multidisciplinary study combining structural observations and space-based multi-temporal SAR interferometry

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The termination of the Hellenic subduction zone is located in Western Greece and coincides with the Kefallinia dextral strike slip fault zone. Further east, in western mainland Greece, normal and strike-slip faulting coexist. The Katouna Fault Zone is a major NNW-SE fault zone that connects the extensional half-graben of Amvrakikos Gulf to the extensional graben of Patras Gulf. In order to study the Katouna Fault Zone we combined geological mapping, structural observations, remote sensing, GPS and data.

Detailed geological mapping revealed that the Katouna Fault zone is hosted in the mid-Triassic strongly brecciated evaporate layer, which is the basal layer of the Ionian zone. The fault zone comprises several NNW-SSE discrete fault surfaces flanking the evaporites. On these surfaces, we identified and measured strike-slip slickenlines. Numerous kinematic indicators (grooves, clasts, small-scale corrugations), indicate left-lateral slip along the fault zone.

Further study of the differential movement across KFZ has been achieved using the state of the art technology of Synthetic Aperture Radar (SAR) interferometry through time-series analysis. A Singular Value Decomposition (SVD) interferometric analysis was applied using descending and ascending datasets of ENVISAT ASAR SLC images and the interferometric stacking, in order to investigate the ground motion rate. The derived displacement maps showed a differential movement across the fault zone, as revealed by their different acquisition geometries. This indicates that the horizontal component of displacement is much more significant than the vertical component. Interestingly, the transition from areas with negative to areas with positive displacements is not a discrete line but a few kilometers wide zone, which more or less coincides with the mid-Triassic evaporite layer. Published GPS vectors in general, show a SW motion but the western block velocities are higher compared to the eastern block.

Based on the above evidence, we conclude that the Katouna Fault Zone is a major active left-lateral strike slip fault zone which transfers the movement between the extensional half-graben of Amvrakikos Gulf to the extensional graben of Patras Gulf.