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Refined fault model for the M_w=6.3, June 15, 1995 Aigion EQ (Greece) derived from InSAR data and implications for extensional tectonics of the western Corinth rift

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On June 15^{th}, 1995, a M_w= 6.3 earthquake struck the western part of the Gulf of Corinth with mainshock epicentre 16 km NNE from Aigion city. The present study presents the application of SAR interferometry (InSAR) techniques for obtaining the co-seismic deformation pattern and inferring the fault model parameters for this seismic event. A second objective is test the Rigo et al., (1996) model for active tectonics of the western Gulf. Both ascending (Track 279, Frame 2835) and descending (Track 415, Frame 765) ERS-1/2 SAR acquisitions were initially selected within 2 years from the mainshock, with the aim of investigating the area affected by the earthquake under different observation directions, different atmospheric conditions and during different seismic activity phases. Standard DInSAR processing was performed in order to produce a stack of differential interferograms. A SRTM DEM of the area was used to remove the topographic component from the interferometric phase. The data time distribution appears suitable for investigating possible pre- and post-seismic activity; however, both pre-shock and after-shock interferograms do not show evidence of any deformation pattern, as the dominant differential phase component seems principally due to atmospheric signal. An in-depth investigation of the co-seismic activity has been instead possible thanks to several suitable interferograms obtained by using both descending and ascending data. In both cases a co-seismic deformation pattern

is clearly visible around Cape Psaromita. The spatial distribution of fringes seems in good agreement with that reported in the study of Bernard et al., 1997. However, atmospheric artefacts are recognizable, especially for daytime acquisitions. Therefore, a *stacking* procedure has been performed in order to filter out the atmospheric signal and to obtain a more reliable deformation pattern. Six complex descending differential interferograms were selected, generated from seven acquisitions acquired between 19 August 1993 and 23 June 1996. After phase offsets correction, a weighted average of the unwrapped interferograms was performed. The resulting differential interferogram contains mainly the temporally correlated displacement signal, while the temporally uncorrelated atmospheric components have been mostly filtered out. By using this refined interferometric pattern of the deformation field, measured along the Line Of Sight (LOS) of the ERS spacecrafts, forward and inversion procedures were performed in order to obtain a new reliable fault model for the Aigion EQ. This single fault plane solution represents a significant improvement of the Okada-like fault models proposed in Bernard et al., (1997), because the effect of the crustal layering of the western Gulf of Corinth was included in the fault model formulation and because of the smaller RMSe between measured and synthetic deformation pattern. Our main findings include: a) the 1995 earthquake did not occur along the onshore Aigion Fault b) the 1995 earthquake occurred along a low angle fault probably with increasing dip towards the surface c) the 1995 earthquake did not rupture the surface and d) the high-angle, antithetic faults of McNeil et al., (2005) terminate against the low angle fault.