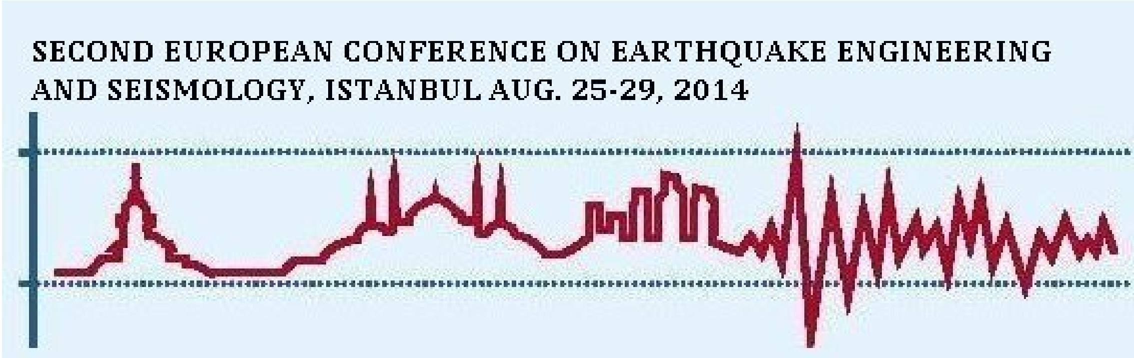

ANISOTROPY STUDY IN THE WESTERN PART OF THE CORINTH RIFT (GREECE)

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The Gulf of Corinth, which is located in central Greece, is characterized by high seismicity (Papadimitriou et al., 2010), causing extensive damage to local residential areas since the antiquity, as in the case of the 373 BC Helike earthquake, as well as during the instrumental era (Papazachos and Papazachou, 2003; Makropoulos et al., 2012). The most important earthquake sequence in the broader study area during the last decades is the 1981 Alkyonides sequence (Jackson et al., 1982; King et al., 1985) in the eastern part of the Gulf of Corinth, while in the western part the most recent destructive event is the 1995 Aigio earthquake (Bernard et al., 1997). The specified region is characterized by intense deformation connected to the local E-W normal faulting (Rigo et al., 1996). The operation of the Corinth Rift Laboratory Network (CRLNET) was initiated in 2000 in the Aigion area (Lyon-Caen et al., 2004). The Hellenic Unified Seismological Network (HUSN) was inaugurated in 2007 and consists of stations belonging to the Seismological Laboratories of the National and Kapodistrian University of Athens and the University of Patras, the Department of Geophysics of the Aristotle University of Thessaloniki and the Institute of Geodynamics of the National Observatory of Athens. The seismic events used in this study were recorded by stations from both the CRLNET and HUSN.

During the last two years more than 3.500 events were located with high accuracy. The majority of these events have occurred in the central part of the W. Gulf of Corinth, having focal depths mainly ranging between 4 km and 12 km. In addition, small clusters lie close to either the northern or the southern coast of the gulf in the vicinity of at least two stations. It should also be mentioned that during the time period May – October 2013, a seismic swarm was observed in the western Gulf of Corinth. The major events of this high seismicity period were observed on 31 May and 15 July, both with a M_w=3.7 magnitude.

Seismic anisotropy involves the propagation of shear-waves as two different components through an anisotropic medium. The occurrence of shear-wave splitting is a result of the existence of microcracks throughout a rock solid. The shear-wave component with the higher velocity, called S_{fast}, displays a parallel polarization to the direction of the microcracks, while the lower velocity component, called S_{slow}, maintains a polarization almost perpendicular to this direction.

Events used in the present study are located in the shear wave window of each station and present an angle of incidence smaller than 45˚ to avoid interaction with the free surface (Booth and

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Crampin, 1985). The amplitude of the shear wave in the vertical component is smaller than the horizontal ones to prevent converted or scattered phases. Polarigrams (Bernard and Zollo, 1989) are used to estimate the polarization direction of the S_{fast}, the time delay between the two split shear waves and the source polarization. Events that exhibit elliptic polarization are rejected. The use of plotted hodograms is necessary when the polarization direction of the fast shear-wave component is close to N90^o. Visual techniques, i.e. polarigrams and hodograms, were used since automatic methods may not provide reliable results of splitting parameters in complicated cases.

During the analysis of the data, the existence of the shear-wave splitting phenomenon, related to an anisotropic layer was observed. The obtained results are presented for each selected station using rose diagrams and equal-area projections. The determined mean anisotropy directions are related to the regional stress field, dominated by a general NNE – SSW direction of extension. The results are compared with the ones of previous studies conducted in the same region (Bouin et al., 1996; Papadimitriou et al., 1999; Kaviris et al., 2008). In addition, variations of the splitting parameters are investigated, since temporal variations of normalized time delays are indicative of stress-aligned aspect-ratios changes between the two split shear waves and have been observed in several cases before the occurrence of seismic events (Gao and Crampin, 2004).

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