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COST Action 625 Results: Monitoring of the Kaparelli active fault, 2003-2006

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Since November 2003 a collaborative group between Greek, Polish, and Slovak colleagues installed a dense network of non-permanent GPS stations and extensometers to monitor active faults in the eastern end of the Gulf of Corinth, central Greece. The network includes eleven GPS stations across the Kaparelli fault and the Asopos rift valley to the east and two TM-71 extensometers that were installed on the Kaparelli fault plane. The motions recorded by the TM-71 instruments show agreement with long-term fault kinematics and comparable rates. Data from the TM71 instruments along the Kaparelli Fault show fault-normal opening as expected for this normal fault. A seasonal effect is also discernible in the data of TM71-Kapa1 instrument. Also, the shear motion in TM71-Kapa1 is dextral in agreement with non-uniform strain patterns along active normal faults (Roberts and Ganas, 2000). The GPS network has been measured in three campaigns (2004, 2005 & 2006) with very good accuracies (1-4 mm in the horizontal plane). The GPS data processing provide conditions for detecting horizontal movements at our stations at 2 mm level (on average). Taking into account the fault movement rate of about 0.5 mm/y indicated by TM-71, significant displacement across Kaparelli can be detected by GPS after 4-5 years of observations. With data of such precision we could address two important questions: (1) is there systematic variation along strike in the near-fault strain rate? Variations along strike could be explained by spatial changes in the depth to which the fault is locked in the inter-seismic period, or by variations in the elastic properties of rocks near the fault

zone. (2) How well can a single elastic model fit both the near-field and far-field strain observed geodetically? A second point concerns the total offset on the Kaparelli fault that is small ($<$ 200 m), while the geological data suggest that it is segmented. So our GPS measurements will differentiate strain accumulation among the segments. These observations will also shed light into fault growth processes as Kaparelli is an early phase in the development of large normal faults that involves the merging of two or more faults of differing strikes, rather than the steady lengthening of a single fault segment. Finally, the results from the GPS observations will help us establish the magnitude of geodetic strain and compare it with the Holocene faulting record as published in Kokkalas et al., (in press; Bolletino della Società Geologica Italiana - Special Issue, Guest Editors F. Galadini, F. Dramis, P. Galli, E. Vittori).