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Active faulting in south-west Bulgaria and static triggering of the 1904 earthquake sequence

G. Drakatos (1), A. Ganas (1), S. Shanov (2)and N. Dobrev (2)

(1)National Observatory of Athens, Institute of Geodynamics, PO Box 20048, Lofos Nymfon, Thission, Athens 118 10, Greece. g.drakat@gein.noa.gr

(2)Bulgarian Academy of Sciences, Geological Institute, Acad. G. Bonchev Str., Buil. 24, 1113 Sofia, Bulgaria.

We combined field mapping and structural analysis of Landsat imagery in order to identify active faults in the broader area of the Simitli graben and to the east towards the cities of Razlog and Bansko, in southwest Bulgaria. We mapped five (5) large active fault segments of normal-slip kinematics with down-to-north displacement; Fault segments are the Krupnik, Gradevo, Elovitsa, Predela and Dobriniste faults. Along the Predela fault activity has ceased along its northwestern part and all motion is taken by the Elovitsa segment. Three (3) smaller antithetic faults occur near the town of Razlog. These faults are also extensional, normal faults and have been more active during Quaternary than the Predela fault. Further work is necessary to map strain patterns in detail along all these faults because of the dense vegetation cover. Our field work and fault-slip data processing suggest that: a) present-day deformation in SW Bulgaria is extensional and is accommodated by seismic slip along E-W, NE-SW and WNW-ESE normal faults; b) inversion of fault slip data shows a σ_3 axis direction between 336-356 degrees; c) the Krupnik fault comprises one earthquake segment with a general NE-SW strike and dip to the N-NW. Its length is about 20 km so its earthquake potential may not exceed a moment magnitude of 6.7. We also calculated the change in the stress field along selected orientations of fault planes using the stress transfer code DLC. As the 1904 earthquake comprised two (2) events perhaps a triggering hypothesis may apply which is also compatible with the fault segmentation and local morphology of the region. Source faults for the first event may have been either the 12-km Gradevo fault or the 11-km Elovitsa fault and ruptured in a 6.3-6.4 event. The

receiver fault that moved during the second event was the Krupnik fault.