Geophysical Research Abstracts,
Vol. 11, EGU2009-9494, 2009
EGU General Assembly 2009

Differentiation of the Fault and Seismicity Pattern on either side of the Major Detachment Fault in the Attica Peninsula and the Saronikos Gulf, Greece

I. Papanikolaou (1,2), D. Papanikolaou (3), and G. Drakatos (4)

(1) Laboratory of Mineralogy & Geology, Department of Geological Sciences and Atmospheric Environment, Agricultural University of Athens, 75 Iera Odos Str., 118 55 Athens - GR , (2) Benfield-UCL Hazard Research Centre, Department of Earth Sciences, University College London, Gower Str. WC1E6BT London, UK. (i.papanikolaou@ucl.ac.uk), (3) Natural Hazards laboratory, Department of Dynamic, Tectonic and Applied Geology, Faculty of Geology and Geoenvironment, National and Kapodistrian University of AthensPanepistimioupolis Zografou, 157-84 Athens, Greece. (dpapan@geol.uoa.gr), (4) Institute of Geodynamics, National Observatory of Athens, 118 -10 Athens GR g.drakat@gein.noa.gr

A major NNE-SSW trending detachment fault divides the Attica peninsula and the Saronikos Gulf, separating the metamorphic units towards the east from the non-metamorphic units towards the west. This detachment caused the downward movement of the non-metarmorphic units and the uplifting of the metamorphic units from the deeper part of the lithosphere where the metamorphism took place in Eocene-Oligocene times. It was active in Middle-Late Miocene - Pliocene and produced several hundred meters of debris-flow deposits that have been traced in NE Attica, resting on its hangingwall. It gradually became inactive during Pliocene, when lacustrine deposits have been accumulated on top, as is observed in NE Attica from Varnava and Kapandriti to Kalamos villages.

The detachment separates the E-W trending faults in the western part from the NW-SE faults in the eastern part. The present day E-W trending active normal faults are longer and have higher slip-rates than the NW-SE trending faults. This set of E-W trending active normal faults in northern Attica is constrained exclusively within the non-metamorphic Alpine units and taper out to the east as approaching the detachment.

This NNE-SSW trending detachment influences also the seismicity pattern as can be revealed by seismic moment summation. Indeed, it coincides with the line separating zone I (lowest category of seismic risk) from zone II (intermediate zone) of the national seismic building code (EAK-2003), which have been compiled based on the seismicity level. This is also supported by the onshore epicentre distribution of the aftershock sequence of the September 7th 1999 earthquake which was restricted westwards of the detachment. Moreover, is also in agreement with the damage pattern of the 1999 Athens Earthquake, where this detachment formed a boundary between higher intensities to sites located both along strike its trace and west from it, and lower intensities towards the east of the detachment.

This detachment divides also the Saronikos Gulf into two areas of different velocity values, implying that their upper crustal structure is different. In addition, in the Saronikos Gulf the part west of the detachment is characterised once again by higher seismicity than the eastern part.

As a result, it is interesting to note that even though this is now an inactive detachment fault, it still exerts a significant influence on the present-day geomorphological, neotectonic and seismicity status. Overall, this study helps us: a) clarify how old and new structures interrelate and interact to provide the present day setting, b) unravel the geological history of the area since the Late Miocene, and c) discuss the implications for seismic hazard assessment.