Episodic normal faulting in South Peloponnesus, Greece

Emmanuel Skourtsos[1] & Spyridon Lekkas[1]

[1]Faculty of Geology and Geoenviroment, National & Kapodistrian University of Athens, Panepistimioupolis Zografou, 15784, Athens (Greece) (eskourt@geol.uoa.gr) (slekkas@geol.uoa.gr)

Peloponnesus is located at the southeastern part of the Hellenic Arc and comprises alpine rocks (HP/LT metamorphic and non-metamorphosed), originally from different palaeogeographic domains. During Upper Oligocene-Lower Miocene these units formed a heterogeneous pile of thrust sheets which was later destroyed by ongoing normal faulting from Upper Miocene to recent times. Upper Miocene-Lower Pliocene extension of south Peloponnesus was accommodated by four mappable brittle detachment faults that form the Parnon Detachment System. These detachments exhibit a top to the NE-ENE sense of shear and either run sub-parallel to each other or have incised and excised geometries. The hanging wall of the detachment system comprises a number of highly tilted fault blocks (>60^{o}), containing abundant evidence of intense internal deformation by three generations of normal faulting and layer-parallel shearing contemporaneous with faulting. These fault blocks are remnants of a cohesive extensional block that slipped to the NE-ENE and broke up along high-angle normal faults that seem either to sole into or cut by the detachments. The biggest part of this block is located at the eastern edge of the metamorphic core forming the hanging wall of the East Parnon high-angle normal fault that excised part of the Parnon Detachment System. Upper plate reconstruction shows that the non-metamorphosed units were affected by high-angle normal faults that sole in low-angle normal faults formed in the upper metamorphic units. During Upper Miocene-Lower Pliocene the lowermost metamorphic units did not seem to be affected by the previous extensional episode. On the contrary these units appeared to be subjected to intense contraction by continuous folding.

Since Middle-Upper Pliocene further uplift of the metamorphic rocks resulted in the formation of a number of high-angle normal fault that overprint the Neogene extensional structures and cut all known units of the nappe-pile. The most impressive of those high-angle normal faults is the East Taygetos fault close to the western edge of the core complex which until recently seems to operate as a secondary breakaway fault. Where previously Mt Parnon was in the footwall of the Parnon Detachment System, it is currently located in the hanging wall of this breakaway fault. Slipping along the newly formed high-angle normal faults has resulted in earlier detachments obtaining progressively opposite dips and appearing today as low-angle thrusts.