

Paleostress analysis of the upper-plate rocks of Anafi Island (Cyclades, Greece)

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The Attic Cycladic complex (Aegean Sea, Greece) is an area where profound extension, as a result of the Hellenic trench retreat due to slab-rollback, has exhumed mid-crustal rocks to the surface. The remnants of the upper plate are observed in the form of clippens scattered throughout the complex, occupying a very small percentage of the area.

Anafi Island, located at the southeastern rim of the Attic-Cycladic complex, represents one of the few areas where a significant part of the upper plate units can be observed and studied. The complex tectonostratigraphy of Anafi Island is characterized by inverted metamorphism and includes a series of medium to high-grade metamorphic rocks that are thrust onto a non-metamorphosed Paleogene flysch. The uppermost amphibolitic-facies thrust sheets were intruded in the late Cretaceous by intermediate to felsic magmatic rocks. The nappe pile was later destroyed in the late Miocene – Pliocene through successive stages of normal faulting that included both low- and high-angle normal faults. During that stage, supra-detachment syn-extensional sedimentation has taken place thus giving the opportunity to put some age constraints on the fault activity.

Paleostress analysis with the separation and stress inversion method TRM revealed two stress tensors that can explain the fault-slip data-set of Anafi Island related to \sim NE-SW and \sim N-S extension, respectively. The older \sim NE-SW trend is related to the late Miocene stress field whereas the \sim N-S is likely related to the present day stress field. These results show that there was a gradual rotation to the trend of least principal stress axis (σ_3), that could be associated with regional events such as the escape of Anatolia towards the Aegean and fastest retreat of the Hellenic subduction zone.