



Backarc extension, detachments and granitoids in the Aegean, their relations to slab tear and asthenospheric flow

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The Cycladic granitoids (Ikaria, Mykonos, Naxos, Kos, Lavrion, Serifos, Tinos) intruded the Aegean crust during a rather short period (17-10 Ma) compared to the much longer Oligo-Miocene crustal thinning phase (35 Ma to the Present). Their geochemical characteristics show that their sources have changed through time and space, with a progressive decreasing component of continental crust contamination with time and from east to west. They all interacted with large-scale detachments, namely the North Cycladic Detachment System (NCDS) in the north and the West Cycladic Detachment System (WCDS) in the south. In Mykonos, Naxos, Serifos and Ikaria the plutons are also associated with a high-temperature metamorphic dome of Miocene age. Their intrusion period roughly covers the same time window as the fast clockwise rotation of the western Aegean evidenced by paleomagnetic measurements and they are contemporaneous with a surge of alkaline volcanism in the eastern Aegean that can be related to a slab tear imaged below western Anatolia. The continental crust component in the Middle Miocene Cycladic plutons is not found in the early Miocene plutons of the northern Aegean, like in Kavala and Vrondou. They thus probably record a quite sudden thermal event in the Cyclades that led to the partial melting of the extending deep crust.

We propose a model involving slab tear starting at ~ 17 Ma, fast retreat of the slab west of the tear and southwestward influx of hot asthenospheric material below the Aegean crust, leading to melting of the lower crust. Partial melting of the whole lower crust above the hot asthenospheric flow could explain the flat Moho observed below the Cyclades. The close proximity of plutons with the detachments suggests that their ascent toward the upper crust is favoured by the extreme extension at work there. The first granitoids in the region of the tear (Ikaria) are the richest in crustal component and this component decreases while the crust thins more and more, the youngest plutons being more purely derived from the mantle as for instance Kos and the granitic dyke swarm of Samos.