
Magmatic intrusions and tectonics, insights from the syn-tectonic granitic plutons in the Miocene Mykonos-Delos-Rheneia MCC (Cyclades, Greece)

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Résumé

The Aegean region shows metamorphic core complexes (MCC) underneath crustal-scale detachments accommodating large displacements of the order of 50-100 km. These MCC were intruded by Miocene syn-kinematic granites. A common finite geometry and kinematics of all these detachment/pluton systems is recognized with asymmetric intrusive bodies extracted from anatectic lower crust, whose internal structure is controlled by the large-scale dynamics, from the magmatic stage to mylonitization and final exhumation in brittle conditions. Detachments are organized in sets of 2nd structures working sequentially evolving from ductile to brittle, the successive branches of the detachment being progressively inactivated by emplacing plutonic batches. This evolution, also observed in the Tuscan archipelago in the Elba MCC, might represent a general process. During this evolution, magmas evolve from leucogranite toward granodiorite and even mafic venues, as a consequence of crustal thinning. The Mykonos-Delos-Rheneia (MDR) MCC shows these interactions between lower crustal migmatites and different syn-kinematic plutons. Our new detailed map of Delos (1/5000) shows geometrical and kinematic relationships between the different magmatic venues during deformation. A strong internal orientation of granites is observed from the magmatic stage until the last ultramylonites below the upper detachments. The deepest magmatic batches are rich in high-grade rocks septae and mafic enclaves, also oriented parallel to regional stretching. Evidence for magma mixing and mingling further indicates interactions with mafic venues at the base of the crust. Large high-grade rocks septae are intensely molten and the contact zone between host gneiss and plutons shows intense migmatitization with a foliation parallel to the granite magmatic foliation. Characteristic banded facies marking the contacts between the different intrusions result from high-temperature shearing at the magmatic stage. At all scales foliation and lineation in magmatic rocks and surrounding gneiss are parallel, suggesting a similar weak rheology. The quality of outcrops in Delos, Rheneia and Mykonos, as well as the links between magma emplacement and regional tectonics makes the MDR MCC a natural laboratory for studying the interactions between magmatic intrusions and crustal deformation in tectonically active and hot contexts. In such contexts magmatic and tectonic processes appear closely interconnected and work at a similar pace.

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Mots-Clés: extension, detachments, granite, syn, kinematic