Cenozoic multiphase orogenic deformations in Northern Calabria Arc: hints from geological mapping in the Longobucco Basin

Giulia Innamorati, Simone Fabbi, and Massimo Santantonio
Sapienza, University of Rome, Earth Sciences, Italy (giulia.innamorati@uniroma1.it)

The Mesozoic/Cenozoic geodynamic evolution of the Calabria Peloritani Arc (CPA) has been, and is still, hotly debated, this sector of the Apennine chain being an exotic continental ribbon scraped off from its original position (European Plate) during the south-eastward migration of the Apenninic slab.

The Southern sector of the Arc (Peloritani Mts.) has been analysed using a multidisciplinary approach. An analysis of pre-, syn- and late-orogenic siliciclastic deposits (Militello Fm, Frazzanò Flysch, Capo d’Orlando Fm) is essential for our understanding of how orogenic phases developed through the Late Cretaceous and Palaeogene. Biostratigraphical constraints reveal a multi-step compressive history, with discrete events (Alpine phase – Balearic phase – Apenninic phase).

The Northern sector of the Arc is conversely less well known, namely with regards to its pre-Serravallian history, due to the lack of continuous exposures of the Mesozoic/Cenozoic sedimentary cover. One remarkable exception is the Longobucco Basin (Sila Greca, CS), where a Mesozoic/Cenozoic succession covers unconformably the igneous and metamorphic Hercynian basement. A geological mapping project of the Longobucco Basin is proving instrumental in constraining the Cenozoic dynamics of this sector of the Arc. In particular, the Paludi Fm has been analysed. This is a multifaceted lithostratigraphic unit, made of conglomerates/breccias, reddish marls and arenaceous turbidites, whose composition testifies the dismantling of an orogen. This unit is in turn crosscut and deformed by north-eastward verging thrusts dated as Burdigalian by Vignaroli and co-authors (2014), therefore it also apparently predates a younger tectonic phase (see the Frazzanò Flysch in Southern CPA for an analogy).

Despite the regional importance of this Unit, its age is highly debated in the literature, ranging from the Late Cretaceous to the Aquitanian, according to different Authors. In this light, a biostratigraphic study of this unit (nannoplankton, micro- and macroforaminifer)a, has been performed.

Field mapping has revealed a wealth of sedimentary structures ascribable to ductile and or/brittle-ductile deformation, typical of mass transport deposits (i.e. slumps, non-tectonic thrusts, pseudo sigma structures, asymmetric rootless folds and ductile shear zones). The occurrence of olistostromes, with evidence of syn-emplacement deformation, has been mapped. These plastically deformed bodies are Late Cretaceous in age (Aptian to Maastrichtian). They document...
lost parts of the succession, eroded during the uplift phases and cannibalized within a younger part of the succession, which must therefore be post-Cretaceous.

Being the age obtained from micropaleontological data comprised between the Eocene and the Oligocene, we must preliminarily ascribe the emplacement stage to an alpine phase. The Burdigalian thrusting event predates the opening of the Tyrrhenian sea and the detachment of the CPA from the Corsica-Sardinia block. It cannot therefore be ascribed to an Apenninic s.s. phase. We attribute this thrusting event to an earlier phase (Balearic phase) related to the Corsica-Sardinia block rotation.