

The Marguareis Massif (southwestern Alps): A natural lab to unravel large-scale superposed fold systems at shallow levels tectonics in collisional setting

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In the Marguareis Massif (southwestern Alps) a tectonic pile of Helminthoid Flysch and Briançonnais Units stacked toward SW occurs. The structurally highest Marguareis Unit shows a low- to very low-grade metamorphic imprint achieved during alpine collision starting from middle-Late Eocene. This unit consists of Meso-Cenozoic sedimentary rocks showing a transition from Triassic-Jurassic carbonates to middle-Eocene turbidite deposits. The exceptional exposure of Marguareis Unit along the southwestern sectors of Marguareis Massif, allow us to full decipher its intricate finite strain pattern recorded at different shallow structural levels.

In order to depict the finite strain pattern recorded by Marguareis Unit we performed a high-resolution geological mapping and micro-to map-scale structural analyses.

The intricate deformation history dealing with superposition of different generations of fold systems (D1, D2, D3 and Post-stacking (PS) folds) and faulting developed at different crustal depths. The firsts (D1, D2) are testified by penetrative granular-scale foliations (S1 and S2) associated to isoclinal SW- and NE-vergent folding systems (F1 and F2, respectively), up to km-scale amplitude, with scattered (A1) and NW-SE trending (A2) fold axes. The third folding event (D3) imposed thrusting of Marguareis Unit onto the underlying Helminthoid Flysch Unit, and it produces a knee-shaped km-scale fold (F3) with NW-SE trend developed at shallower crustal depth and unable to assist penetrative granular foliation. However, this folding event is responsible of an important re-orientation moving from NE toward SW of pre-existing structural features. The PS folds, shared by all the units and developed at very shallow crustal levels, overprint all the previous structures, including the unit-bounding shear zones. The faults represent the last deformation event recorded by the unit, but these turn out to be unable to significantly modify the architecture.

Keywords : Marguareis Massif, southwestern Alps, fold systems, shallow tectonics, collision