

New chronological constraints in the Orobic Alps: evidence for Late Cretaceous to pre-Middle Eocene compressions

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The Orobic Alps represent the central sector of the Southern Alps. The entire wedge includes an almost complete crustal section, comprising a Variscan basement and an overlying Permo-Mesozoic sedimentary cover. Alpine deformation results in severe shortening by folding and thrusting of both sedimentary cover and basement (Schönborn, 1992). The absence of reliable time markers has still now hampered a precise interpretation of the timing of the Alpine deformation in this area.

New radiometric data are now available on different sets of andesitic dykes that crosscut Alpine thrust surfaces developed in the Triassic successions south of the Orobic Anticlines. Previously obtained ages (K-Ar on amphiboles) show a very large range between 50-45 Ma (Fantoni et al., 1999) and 65 Ma (Zanchi et al., 1990), but are generally considered poorly reliable due to the strong alteration of amphiboles. New radiometric data obtained on zircons and fission tracks analysis on apatites, separated from dykes in the Gandino and Presolana area, now provide more reliable chronological constraints, giving Late Eocene ages very similar to the oldest ages obtained for the Adamello massif. Structural evidence indicates that the emplacement of these magmatic bodies post-date one of the major thrusting event affecting the Triassic succession south of the Orobic Anticlines.

A complete interpretation of the Alpine evolution of the Orobic Alps should also take into account the main structures of the northern sector. The occurrence of pseudotachylytes (Carminati & Siletto, 1997; Meier, 2003) along the main thrust surface of the Orobic Thrust and Porcile reverse Fault in the Passo San Marco area, offers the possibility to obtain absolute age determinations of the main compressive phases along these structures. Pseudotachylyte veins related to thrust surfaces and reverse faults have been dated by means of step heating $^{40}\text{Ar}/^{39}\text{Ar}$ experiments. Pseudotachylytes related to the Porcile fault always display Late Cretaceous ages, coexisting with uppermost Cretaceous-Paleocene-Eocene ages along the Orobic Thrust in the Passo San Marco area. These new data have very important consequences for the interpretation of the evolution of the Southern Alps, confirming definitively the occurrence of a Late Cretaceous compressive event west of the Giudicarie Line.

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