



On the evolution of the Western Alps: Pressure cycles and deformation mode switches

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Evidence of two burial-exhumation cycles that took place during a single orogeny has been found in rocks belonging to the Piemonte unit of the Western Alps. An early high pressure event, which resulted from tectonic burial down to pressures of 1.5 GPa, is indicated by the presence of relict rutile, garnet and omphacite. This episode was followed by retrogression to greenschist facies conditions at $P=0.20-0.35$ GPa and $T=390-420^{\circ}\text{C}$, as indicated by the presence of amphibole of actinolitic/hornblende compositions. Exhumation was accomplished as a result of extensional deformation. Renewed shortening resulted in upright folding of the extensional structures and culminated in the crystallization of barroisitic amphibole, for which conditions of $P=0.65-0.80$ GPa have been estimated. Renewed generalized extension led to the formation of large-scale recumbent folds and extensional shear planes and resulted in the final exhumation of the study area to upper crustal levels. Existing geochronological data allow only ca. 13-19 Ma for the completion of both burial-exhumation cycles. Therefore, we suggest that the evolution of orogens is characterized by multiple short-lived burial-exhumation cycles related to orogen-scale alternance between shortening and extensional deformation.