PRESERVATION OF AN OCEAN-CONTINENT TRANSITION ZONE IN THE ECLOGITIC PIEMONTE UNIT: IMPLICATIONS FOR THE DYNAMICS OF OROGENS

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The contact between the ocean-derived eclogitic and blueschist Piemonte units, in the Western Alps, is characteristically marked by several slivers of continental basement units, making up the 'Lower Austroalpine nappes'. Their position in the Alpine tectonic pile represents a long-standing puzzle for alpine geologists. The association of continental basement rocks with ophiolites and slivers of pre-rift sediments (Faisceau de Cogne, Pancherot-Cime Bianche Unit) has generally been ascribed to Alpine tectonics and to the formation of a tectonic melange.

Here, we report a new study on zircons from Permian plutonic rocks of the Etirol-Levaz and Acque Rosse continental basement slices, which crop out in Valtournenche and in the Urtier Valley, respectively, showing that a distinctive phase of zircon growth occurred at ca. 170-160 Ma. High U/Th ratios and zoning patterns suggest that zircons grew as a result of melt infiltration related to the intrusion of mafic magmas, also dated at ca. 170-160 Ma, in the underlying serpentinites. Therefore, the continental basement slices and the oceanic basement rocks were already juxtaposed in the Jurassic and they were probably part of an Ocean-Continent Transition Zone (OCTZ) at the south-eastern margin of the Briançonnais block. Omphacite-bearing zircon rims from the Etirol-Levaz slice crystallized at 47.3±1.3 Ma, showing that the continental basement underwent the same Alpine history of the underlying serpentinites and gabbros. Alpine tectonics, during which the Piemonte OCT was buried to P=23-30 kbars, resulted only in minor reworking of the Jurassic contacts, generally preserving the original geometry. Indeed, OCT's are placed in a favourable position to reach (U)HP conditions, following negatively buoyant oceanic lithosphere into subduction, and then be accreted to the orogen, in response to the arrival of more buoyant continental lithosphere, resisting subduction.

In Valtournenche, the Piemonte OCT crops out in the footwall of a 500 m thick shear zone, mainly localized within the overlying Combin zone, which accommodated multiple episodes of deformation during the Eocene to Oligocene times. The partial preservation on a regional scale of the original relationships between rock units that underwent subduction to (U)HP conditions suggests that the process of tectonic burial and exhumation need not be chaotic, but large coherent bodies can behave relatively rigidly, while well-defined movement zones accommodate most of the deformation.