High precision SIMS U-Pb zircon geochronology for Ophiolites in the Western Alps and Corsica

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Knowledge of the age and timing of ophiolite sequences is essential for understanding the mechanisms of plate tectonics. The ophiolites in the Western Alps and Alpine Corsica represent remnants of the Liguria-Piemonte ocean basin that opened as a branch of the Central Atlantic during the separation of Adria/Africa from Europe. We provide integrated in situ analyses of zircon U-Pb age and O-Hf isotopes for ophiolitic rocks from the Chenaillet (Western Alps) and the Schistes Lustrés nappe (Corsica). High precision SIMS U-Pb dating results indicate that the Chenaillet ophiolitic troctolite and albitite crystallized synchronously at ~165 Ma, and the ophiolitic gabbros and plagiogranites in the Schistes Lustrés crystallized at ~159 Ma. All these ophiolitic zircons have typical mantle zircon $\delta^{18}O$ values of ca. 5.2-5.4‰ and εHf(t) values of 13.0-15.9, suggesting that their derivation from a depleted N-MORB type mantle source.

Based on our new U-Pb isotopic dating results and compilation of the reliable literature U-Pb age data, the ophiolitic rocks from Eastern, Central and Western Alps, Liguria and Corsica crystallized at a limited time interval of 158-169 Ma, indicating a short life span of ~11 m.y. for the formation of the Piemont-Liguria oceanic domain. Provided the spreading velocities of ~3 cm/yr full rate for the magma-poor MOR sequences, the width to the Liguria-Piemonte oceanic floor would have been in the order of 300±100 km, taking into consideration of the dating uncetainty. Subduction of such a small-size oceanic basin would release limited amount of fluids to fertilize the mantle wedge, which might be one of the major causes responsible for the absence of magmatic arc in the Apline orogeny.