INTRA-OCEANIC TECTONOSTRATIGRAPHY AND ALPINE TECTONIC EVOLUTION OF THE MONVISO META-OPHIOLITE COMPLEX (WESTERN ALPS), ITALY

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Keywords: *Western Alpine ophiolite, oceanic core complex, structural inheritance.*

The Monviso meta-ophiolite Complex represents a large remnant of fossil oceanic lithosphere originated from the Jurassic Ligurian-Piedmont ocean, which was part of the Western Tethys (Dilek and Furnes, 2019). This oceanic lithosphere fragment is now tectonically stacked up in the Western Alps, and is juxtaposed against the passive continental margin sequences of Europe. Although its ophiolitic subunits and oceanic structures are overprinted by subduction- and continental collision-related metamorphism and deformation, the Monviso meta-ophiolite provides an excellent record of its seafloor spreading magmatic and tectonic history (Balestro et al., 2019).

The intra-oceanic tectonostratigraphy and the internal structure of the Monviso ophiolite are strongly controlled by the complex-wide, Baracun Shear Zone. The footwall of this shear zone is composed of massive serpentinite with Middle to Upper Jurassic gabbro and minor plagiogranite intrusions. The hanging wall includes metavolcanic rocks and Upper Jurassic to Lower Cretaceous metasedimentary rocks (i.e. calcschist). The Baracun Shear Zone consists of talcschist and serpentine schist, locally embedding meters-sized blocks of metagabbro. We infer that this shear zone represents the remnant of an intra-oceanic detachment fault in a Late Jurassic oceanic core complex (Festa et al., 2015).

The Alpine-stage tectonic evolution of the Monviso ophiolite involved three main deformation phases. During the first stage (D1), the Monviso was subducted as a coherent slice of oceanic lithosphere and metamorphosed under eclogitic facies conditions, whereas during the second stage (D2) the meta-ophiolite succession was pervasively deformed along localized shear zones and shortened by large-scale, non-cylindrical folds. The third stage (D3) was characterized by tilting and final exhumation of the Complex in a dome geometry (Balestro et al., 2018, with refs.).

Our findings show that the Alpine tectonic evolution and the present-day structural setting of the Monviso Complex were controlled by its inherited, intra-oceanic architecture, specifically: (i) lateral and vertical variations in its sedimentary cover facies and thickness; (ii) ocean-related shear zone lithologies and structures; and, (iii) remnants of a major volcanic ridge segment.

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