Pre-Alpine stratigraphy and structural architecture of the Monviso meta-ophiolite Complex (Western Alps)

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The Monviso meta-ophiolite Complex (MO) represents a major eclogitized remnant of the Ligurian-Piedmont oceanic lithosphere stacked in the Western Alps, and, despite the overprint of subduction- and collisional-related metamorphism and tectonics, displays records of its oceanic history. The tectonostratigraphy of the MO is characterized by the occurrence of a major shear zone (i.e., the Baracun Shear Zone, BSZ) that, all along the Complex, separates massive serpentinite and metagabbro (i.e., the footwall of the BSZ) from metabasalt and metasediments (i.e., the hangingwall of the BSZ).
The up to 1 km thick massive serpentinite derives from lherzolite and harzburgite, and hosts widespread bodies of Mg-Al-rich metagabbro with dykes and pods of Fe-Ti-rich metagabbro and metaplagiogranite. The massive serpentinite, at the top, is discontinuously overlain by meters thick horizons of meta-ophicarbonate. The metabasalt ranges in thickness from tens of metres to several hundreds of metres, and includes fine-grained aphyric metabasalt, pillow metalavas and volcanic metabreccia. The metasediments consist of two different successions: the lower one rests below or interfingered with the metabasalt and consists of calcschist interbedded by metasandstone and metabreccia of gabbroic composition (i.e., the syn-extensional succession); the upper one unconformable overlains both serpentinite, metagabbro, metabasalt and syn-extensional metasediments, and consists of quartzite, withish marble and calcschist, which is devoid of ophiolite-derived material and is interbedded by layers of marble and quartz-rich schist (i.e., the post-extensional succession).
The BSZ consists of mylonitic talcschist and serpentine schist embedding meters sized blocks of metagabbro, which were unconformable sealed by post-extensional sediments. The BSZ never contains blocks of metabasalt and syn-extensional metasediments, and has been interpreted as a remnant of an intra-oceanic detachment fault, which controlled seafloor spreading and extensional tectonics in a Late Jurassic oceanic core complex.
The oceanic history of the MO evolved through four main stages, which correspond to (*i*) a first magmatic event of late Middle Jurassic age (163±2 Ma), with emplacement of gabbroic plutons into the lithospheric mantle, (*ii*) a main tectonic event of lithospheric-scale extension, with detachment faulting and exhumation of mantle rocks, (*iii*) a second magmatic event of Late Jurassic age (152 ±2 Ma), with emplacement of plagiogranite, eruption of basaltic lava flows and deposition of ophiolitic detrital sediments, and (*iv*) a final stage marking a magmatically and tectonically quiet episode in the history of the Ligurian–Piedmont Ocean, with deposition of chert, limestone and turbiditic sediments which sealed the rugged seafloor topography.