A gemstone's journey in the mantle: Petrochronological constraints on the formation and evolution of W. Alps jadeitites (Monviso meta-ophiolite)

Samuel Angiboust[1,2], Aitor Cambeses[3], Antonio Garcia-Casco[3]

[1] ENS Lyon, University of Lyon, CNRS, LGL-TPE, 46 Allée d'Italie, F-69007 Lyon, France
[2] IPGP, Université Paris Cité, CNRS, 1 rue Jussieu, F-75005 Paris, France
[3] Department of Mineralogy and Petrology, University of Granada, 18071 Granada, Spain
*: corresponding author (samuel.angiboust@ens-lyon.fr)

Jadeitite from the Monviso area, known as the main European source of prehistoric jade axes, has been reported as loose blocks and quaternary deposits in the thick serpentinite sole at the base of this well-known meta-ophiolitic massif. We herein present new field, geochemical and petrochronological data from an *in-situ* block wrapped within a serpentinite-bearing shear zone cross-cutting the eclogitized meta-ophiolitic sequence that was buried down to the lawsonite eclogite-facies field during the alpine subduction event. The studied meter-sized block exhibits from rim to core (i) a sheared talc-tremolite blackwall at the contact with the surrounding serpentinite, (ii) a mylonitized omphacitite outer rim with numerous lawsonite pseudomorphs and (iii) a core of quartz-free jadeitite where phengite (Si = 3.7 atoms per formula unit) and epidote+paragonite pseudomorphs after lawsonite coexist with sodic clinopyroxene of varied composition. This jadeitite contains a high amount of small, corroded zircon crystals that yield SHRIMP U-Pb core ages near 150 Ma. Bulk composition of the jadeitite together with zircon ages confirm the previously proposed hypothesis by Compagnoni *et al.* (2012) that Monviso jadeitites derive from the (nearly-complete) replacement of former plagiogranitic dykes that formed on the Tethyan seafloor. These dykes were later disrupted, boudinaged and spread along large, serpentinite-rich intra-slab shear zones during subduction and exhumation. Our findings demonstrate how metasomatic replacement processes can fully obliterate magmatic textures in jadeitites and provide a unifying model explaining the coeval presence of metaplagiogranites, omphacitites and jadeitites in eclogite-facies shear zones within subducted oceanic mantle.

Figure: Close up view of the dark jadeitite found in the Monviso meta-ophiolite. Lawsonite pseudomorphs set in dark jadeitite and late green omphacitite stand out clearly.

Compagnoni, R., Rolfo, F., Castelli, D., 2012. Jadeitite from the Monviso meta-ophiolite, western Alps: occurrence and genesis. *European Journal of Mineralogy* 24, 333-343.