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Strain partitioning in the Belledonne and Pelvoux massifs. Some clues to understand the Variscan tectono-thermal evolution.

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This contribution presents new structural, petrological, geochemical and geochronological data obtained in the Variscan basement of the Alpine Belledonne and Pelvoux External Crystalline massifs. The Belledonne-Pelvoux area is a stack of four litho-tectonic units.
The uppermost unit is the early Ordovician Chamrousse ophiolite. It overthrusts a volcanic-sedimentary unit (VSU) made of an alternation of volcanoclastic rocks, plagiogranites and metapelites. The VSU crops out in the eastern Belledonne and western Pelvoux massifs. It is unconformably overlain by a Visean sandstone-conglomerate series with felsic lava (keratophyres). The lowermost litho-tectonic unit is made of felsic and mafic migmatites and granitoids that form the major part of the Pelvoux massif. The western boundary of this tectonic pile is the "synclinal median" strike-slip fault, on the western side of which crops out the Belledonne micaschist unit made of Cambro-ordovician turbiditic series.
The structural analysis revealed four main tectono-thermal events: Dx, D1, D2, and D3. Dx is only recorded in relictual metamorphic assemblage in Ky-Grt-Ab bearing micaschist from the VSU holding an obduction metamorphic gradient (3kbar, 370°C up to 7kbar, 430°C). The age of the Dx event remains unknown. The D1 event, characterized by westward low-angle dipping foliation (S1) and a NE-SW striking stretching lineation (L1), is responsible for the crustal thickening resulting of the Eastward emplacement of the Chamrousse ophiolite upon the VSU. D1 is coeval with a barrovian metamorphism with P-T conditions of 6kbar, 600°C recorded in metapelites, and partial melting developed at the base of the VSU. Monazite LA-ICP-MS U-Pb dating revealed that D1 crustal thickening occurred at 337±7 Ma.
D2 is a sinistral transpressional deformation responsible for the folding of S1 and L1, and the development of a NE-SW trending pervasive sub-vertical foliation S2. In the lower structural domain, i.e. the partially molten Pelvoux core, D2 intensifies with the development of C-C'sub-vertical sinistral shear zones. At mid-crustal level, in the western Pelvoux massif, a flat lying S3 foliation transposes the D2 S-C-C' pattern. The D3 event occurs in response to a vertical shortening probably due to the ascent of the partially molten crust beginning during D2. D3 marks a transition zone where the deformation is partitioned between molten and unmolten rocks.
In spite of Alpine shear zones, due to the high elevation, the Belledonne-Pelvoux area provides a continuous section of the upper to middle Variscan crust. From the data set presented above, we propose that the Belledonne-Pelvoux area exposes two different tectono-metamorphic expressions of the same geodynamic history, due to their different structural position in the continental crust. This interpretation challenges the classical "tectonic collage" model along the east Variscan shear zone that would have put in contact different tectono-metamorphic realms.