American Mineralogist, Volume 103, pages 1002–1005, 2018

LETTER

UHP Ti-chondrodite in the Zermatt-Saas serpentinite: Constraints on a new tectonic scenario

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ABSTRACT

We focus on the key role of different Ti-humite minerals in subducted serpentinites as possible indicators of extreme pressure conditions. The occurrence of Ti-chondrodite and/or Ti-clinohumite assemblages in the eclogitized serpentinites of the Zermatt-Saas Zone (ZSZ) of the Western Alps allows the recrystallization of such rocks at UHP conditions (P = 2.8–3.5 GPa, T = 600–670 °C) to be determined. Such conditions are similar to those registered by the nearby Cignana unit, a main Alpine area for UHP metamorphism, where coesite and microdiamond have been found. In ZSZ serpentinites, the new UHP assemblage predates the previously recognized HP-UHP paragenesis, which was recently dated at 65 Ma. This finding opens up a new interpretation for the petrologically and structurally well-constrained HP/UHP records, especially because all other ages for HP-UHP metamorphism in the ZSZ are much younger, and for the size of UHP units. Our findings suggest that ophiolites in the axial zone of collisional belts are a mosaic of oceanic lithosphere slices that recorded contrasted thermal and mechanical evolutions during their physical trajectories in the subduction wedge.

Keywords: Ti-clinohumite and Ti-chondrodite assemblages, integrated mineralogical and structural analysis, Alpine subduction, Western Alps