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Evidence for brittle deformation events in eclogite-facies (example from the Mt. Emilius klippe, W. Alps).

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Eclogitic rocks are crucial for our knowledge of the subduction interface because they provide key constraints on both the evolution (P-T-t paths) and the deformation modes sustained by rocks in subduction zones. We herein focus on eclogitised flattened mafic bodies exposed within granulites from the continental basement slice of the Mt. Emilius klippe (W. Alps, Italy).These eclogites exhibit highly deformed garnetite and clinopyroxenite layers. In some places, these deformed rocks (up to mylonitic) can be found as clasts within meter-thick brecciated fault rocks formed close to the metamorphic peak conditions in the lawsonite-stable eclogite facies (at P $\sim$ 2.2-2.4 GPa and T $\sim$ 500-550°C).The garnet-rich layers tend to show brittle features, whereas deformation within clinopyroxene-rich layers is accommodated by both dislocation creep and fracturing. We present a petro-structural study of these eclogites allowing to track the brittle deformation mode associated with the chemical evolutionfrom the outcrop to the microscopic scale. We propose a new tectono-metamorphic model for the deformation of these rocks, related to the alpine eclogitic stage.This model is consistent with the coexistence of both ductile and brittle features that developed in the same metamorphic facies, and closely associated with fluid circulations. Our study shows therefore that the crustal material, along the subduction interface at HP-LT conditions, can record several successive brittle events in places where deformation is classically envisioned as ductile. This brings new constraints in our understanding of the mechanical processes in the subduction zone interface.