
Variscan eclogites in the Argentera-Mercantour massif witness oceanic subduction in the southern Variscan belt

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Résumé

Variscan eclogites are extensively documented in the Alps, particularly in the External Crystalline Massifs, where they are found as lenses and boudins enclosed within migmatitic gneiss. These rocks provide valuable insights for investigating and determining the location of a Variscan suture zone in the southern part of the Variscan belt. With this purpose, we present data from multiple eclogite localities within the Argentera-Mercantour Massif, focusing specifically on the protoliths and their prograde metamorphic evolution. Lithostratigraphic, structural and petrologic data are confronted to LA-ICP-MS U-Pb zircon ages from zircon cores and rims, which exhibit REE profiles indicative of crystallization from igneous to metamorphic high-pressure conditions. The eclogite protoliths show distinct geochemical affinities, even oceanic, and emplacement ages ranging from late Cambrian to Silurian. In certain eclogite samples, a prograde metamorphic evolution from prehnite-pumpellyite to eclogite facies conditions is inferred by the occurrence of low-grade mineral inclusions in the core of eclogitic garnet, whereas omphacite is only locally preserved. Petrologic modeling and zircon-rutile Ti-Zr thermometry consistently indicate peak eclogite conditions at a temperature of 610 to 660 °C and a pressure of 1.9 to 2.3 GPa. The prograde path, depicting the transition from very low- to high-pressure metamorphic conditions along a temperature-depth ratio of $\leq 10^\circ/\text{km}$, reveals that these rocks were deformed and transformed during oceanic subduction prior to the Lower Carboniferous. Our results confirm the occurrence of a dismembered Variscan suture zone in the pre-Alpine continental crust of the External Crystalline Massifs.

Mots-Clés: Variscan suture, External Crystalline Massifs, western Alps

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