

Carbonate formation during subduction metasomatism: Insights from eclogitic marbles (Alpine Corsica, France)

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Recent studies have shown how fluid-rock interaction at high-pressure condition (HP) plays a crucial role in promoting carbonate dissolution, and thus providing a potential source of C for the mantle wedge metasomatism and arc volcanism at convergent margins. However, little is known on the fate of carbonic fluids in the subducting slab. Here we present the petrology and geochemistry of eclogite-facies marbles occurring within a metasomatic area in Alpine Corsica (France). Silicate-bearing marbles (rod-shape Ca-carbonate, clinopyroxene, lawsonite, \pm garnet) and Ca-carbonate+omphacite crack-seal occur along metasomatized lithological boundary separating serpentinites and metasedimentary rocks. Carbonate is in textural equilibrium with omphacite and garnet and fresh aragonite has been detected by Raman spectroscopy. A series of observations indicates that the carbonate precipitated from the fluid as either vein-filling or chemical replacement of the protolith rock. $\delta^{18}\text{O}$ values of carbonate in these rocks show remarkably light values (ranging between 10 and 15‰) and provide additional evidence for fluid-mediated precipitation buffered by external, likely ultramafic sources. Rock-carbonation at HP conditions has a potentially great impact on the fluxes between Carbon reservoirs in subduction zones. This process of C oxidation contrasts with previous works on C reduction along similar lithological boundaries in Alpine Corsica, and stresses on our still limited knowledge on the behavior of C in open systems at HP conditions.