Instraslab UHP metasomatism: A model for the evolution of deeply subducted carbonates and calc-silicates and the formation of diamond under H_2O fluid conditions

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Deep continental subductions are an input process in material cycling from surface to deep mantle. The Kokchetav UHP carbonate and calc-silicate rocks are the best samples and the evidence to understand chemical processes in subducting materials. During the subductions, silicate rocks are H_2O reservoirs as hydrate minerals, and carbonate/calc-silicate rocks are CO_2 reservoirs. Dehydrations precede decarbonations and H_2O play as a trigger for decarbonations. The amount of H_2O infiltrating in carbonate rocks controls the amount of CO_2 carried into the mantle. In the case of calc-silicate rocks, for example Grt-Cpx rock in the Kokchetav, carbonate mode is small and even a small amount of H_2O can decompose all amount of carbonates to form Grt and Cpx that contain several hundreds to 1,000 ppm of OH and H_2O, as new water reservoirs. UHP metasomatism forming such skarn-like rocks by H_2O infiltration means the switching of H_2O reservoirs from hydrous minerals in silicate rocks to NAMs in calc-silicate rocks. H_2O-bearing fluid also plays an important role for diamond formation during subduction of continental materials. Diamonds form and dissolve in subducting materials through H_2O fluid. In UHP dolomite marble of the Kokchetav Massif, diamonds formed at two stages and 2nd stage growth was from H_2O fluid. The diamonds at 2^{nd} stage have light carbon isotope compositions, -17 to -27 ‰, whereas 1^{st} stage diamonds have -8 to -15 ‰. Light carbon of 2^{nd} stage could be organic origin in gneisses carried by H_2O fluid; dissolution of diamond could have occurred in gneisses. Summarizing these from the Kokchetav Massif, “Intraslab UHP metasomatism” was proposed.