Mantle wedge infiltrated with saline fluids from dehydration and decarbonation of subducting slab

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Slab-derived fluids play an important role in heat and material transfer in subduction zones. Dehydration and decarbonation reactions of minerals in the subducting slab have been investigated using phase equilibria and modeling of fluid flow. Nevertheless, direct observations of the fluid chemistry and pressure-temperature conditions of fluids are few. This report describes CO2-bearing saline fluid inclusions in spinel-harzburgite xenoliths collected from the 1991 Pinatubo pumice deposits. The fluid inclusions are filled with saline solutions with 5.1 +/- 1.0 percent wt NaCl equivalent, magnesite crystals, CO2-bearing vapor bubbles, and a talc and/or chrysotile layer on the walls. The xenoliths contain tremolite amphibole, which is stable in temperatures lower than 840 degree C at 30 km depth. Pinatubo volcano is located at the volcanic front of the Luzon arc associated with subduction of warm oceanic plate. The present observation is the first report suggesting hydration of forearc mantle and the uppermost mantle by slab-derived CO2 bearing saline fluids. Dehydration and decarbonation take place and seawater-like saline fluids migrate from the subducting slab to the mantle wedge. Saline fluids can dissolve more metals than pure H2O and affects on the chemical evolution of mantle wedge.