Water of garnet in Dabie UHP eclogite: implication for fluid action in continental subduction zone

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Nominally anhydrous minerals are major components of the subducted continental slab and thus regard as important water reservoir in continental subduction zone. The water contents of NAMs are critical for understanding of fluid action and geodynamics of subduction zones. Fourier Transform Infrared Spectroscopy as well as major and trace element analyses were carried out on garnets in Jinheqiao eclogites from the Dabie orogen. The results demonstrate that garnet grains contain both molecular water and hydroxyl (OH). Contents of both hydroxyl and molecular water show rough correlation with Si, Ca, Al and Na, suggesting their incorporation in garnet is related to the formation of garnet. Molecular water is primary or transformed from hydroxyl during exhumation, implying molecular water an internal origin in eclogite. Garnet has varying total water contents up to thousands, with the highest water content corresponding to the garnet's capacity for water storage under subduction zone condition. Water can be saturated in peak metamorphic garnet. The variable water contents in garnet was affected by several factors such as protolith nature, fluid availability, pressure and temperature, but dominated by decompression dehydration during exhumation. The high water contents of garnet suggest that garnet is not only an important media for subducted slab to transport water into deep mantle but also an important source for retrograde fluid during exhumation of deeply subducted continental slab.