The effect of H2O on phase boundary of alpha-beta transition in olivine

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It has been clarified that H2O was supplied to the Earth's interiors by subducting slab, and it affects the mineral properties and melting temperatures of the Earth's materials.

We have conducted high-pressure experiments in the system Mg2SiO4-Fe2SiO4 (H2O contents 1wt%%), and investigated the effect of H2O in the alpha-beta phase transition. A multi anvil apparatus (EUDES-700) were used in this experiments, and the run products were examined using a microfocused X-ray diffractometry and an electron probe micro analyzer.

As a result, alpha-beta phase transition boundary shifted to low-pressure side and the coexisting region of alpha-beta become narrower than that in anhydrous system. Therefore the shallower region of the observed 410km seismic discontinuity may suggest the existence of H2O.