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water content at the stagnant slabs deduced from the sound velocity of hydrous ringwoodite

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Elastic properties of polycrystalline ringwoodite with 0.30, 0.40 and 0.76 wt.% H_2O were measured at simultaneous high pressure and high temperature up to 23 GPa and 750 K using ultrasonic interferometry in conjunction with in situ synchrotron X-ray diffraction in a multi-anvil apparatus. The observed density, compressional (V_P) and shear (V_S) velocities were combined and fitted to functions of temperature, pressure and water content, yielding an adiabatic bulk modulus = GPa and a shear modulus = GPa, and their ambient water derivatives and . Our results suggest a weak and strong reduction for V_P and V_S with increasing hydration state, respectively. Under *P*-*T* conditions of interest, we did not find significant vanishments of hydration-induced reduction of either P- or S-velocities as pressure and temperature increasing. Along the normal mantle geotherm, 1 wt.% H_2O dissolved into ringwoodite at MTR reduces the V_P and V_S by ~1.3 % and ~2.4 %, respectively, and equal to rise temperatures by ~300 K and ~450 K for V_P and V_S, respectively. Comparing our results with seismic observations, we have evaluated the potential H_2O content at the bottom MTR near the stagnant slabs and indicated that the observed seismic velocity anomalies and related depth depression of 660-km discontinuity could be attributed to thermal variations together with the presence of 0.6~0.9 wt.% H_2O, which approaches to the saturated solubility of ringwoodite at relevant *P*-*T* conditions.