

Elastic properties of hydrous ringwoodite

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ABSTRACT

Sound velocities and single-crystal elastic moduli of hydrous γ -Mg₂SiO₄ (ringwoodite) containing 2.3 wt% H₂O have been measured by Brillouin spectroscopy at ambient conditions. The aggregate elastic moduli (VRH averages) are $K_s = 165.8(5)$ GPa and $\mu = 107.4(3)$ GPa for the adiabatic bulk modulus and shear modulus, respectively. Although the aggregate elastic moduli and acoustic velocities of hydrous ringwoodite are smaller than those of anhydrous ringwoodite by about 10% and 3.6% respectively, our results indicate that water has a smaller effect on the elastic moduli and velocities of ringwoodite than implied by previous studies. Our new results are consistent with systematic relationships between changes in the elastic properties and density that accompany the hydration of mineral phases.