

Temperature derivatives of elastic moduli of magnesium silicate perovskite

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A precise characterization of the elastic properties of silicate perovskite is of fundamental importance in constraining the chemical composition and mineralogy of the Earth's lower mantle. There have been a number of experimental and theoretical studies aimed at determining the elastic properties and equation of state parameters of MgSiO₃ perovskite. However, the effect of temperature on the elastic moduli is poorly understood. The temperature derivative of the shear modulus, in particular, was so far limited to only one experimental study using the elastic wave velocity measurements. It is thus important to investigate the properties by different technique and compare the results in order to evaluate the reliability of the data. In this study, we report the temperature dependence of elastic moduli of MgSiO₃ perovskite at ambient pressure obtained from the resonance sphere technique, which might allow us to constraint the plausible temperature and chemical composition of the lower mantle, possibly in the near future.