



Determination of MgO elasticity at high pressure and high temperature: an alternative method

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Constraints on mantle composition are obtained by comparing elasticity, as seen by seismic waves, with that of candidate minerals' assemblages. Elastic properties of individual phases are therefore to be known. We present a method to determinate the (isothermal) elastic moduli of periclase MgO (Mg-end member of magnesiowustite), at simultaneous high pressure (HP) and high temperature (HT) conditions. It consists in a direct comparison of HT-room pressure elastic moduli, with an extrapolation of the same quantities from the HP-room temperature data. The observed difference (i.e., the intrinsic temperature dependence of the moduli) is shown to depend linearly upon the temperature for C11, C44 and the isothermal bulk modulus K_T . From this observation, we infer that a quasi-harmonic model is pertinent to calculate the aforementioned moduli at HP-HT conditions; further, we determine the bias due to the neglect of mixed P-T partial derivatives. It can be as high as 1.5% at mantle conditions.