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Elasticity of Deep-Earth Materials at High P and T: Implication for Earths Lower Mantle JAY BASS, Geology Dept, University of Illinois Urbana-Champaign, S.V. SINOGEIKIN, UIUC, ESTELLE MATTERN, Laboratoire de Sciences de la Terre, Ecole Normal Superieure de Lyon, France, J.M. JACKSON, D. LAKSHTANOV, UIUC, J. MATAS, ENS de Lyon, J. WANG, UIUC, Y. RICARD, Univ. de Lyon — Brillouin spectroscopy allows measurements of sound velocities and elasticity on phases of geophysical interest at high Pressures and Temperatures. This technique was used to measure the properties of numerous important phases of Earths deep interior. Emphasis is now on measurements at elevated P-T conditions, and measurements on dense polycrystals. Measurements to 60 GPa were made using diamond anvil cells. High temperature is achieved by electrical resistance and laser heating. Excellent results are obtained for polycrystalline samples of dense oxides such as silicate spinels, and (Mg,Al)(Si,Al)O3 –perovskites. A wide range of materials can now be characterized. These and other results were used to infer Earths average lower mantle composition and thermal structure by comparing mineral properties at lower mantle P-T conditions to global Earth models. A formal inversion procedure was used. Inversions of density and bulk sound velocity do not provide robust compositional and thermal models. Including shear properties in the inversions is important to obtain unique solutions. We discuss the range of models consistent with present lab results, and data needed to further refine lower mantle models.

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