$MgSiO_3$ Post-Perovskite at D" conditions

R. WENTZCOVITCH

University of Minnesota, USA

The post-perovskite transition in $MgSiO_3$ at pressures and temperatures near those expected at the D" discontinuity of Earth's lower mantle suggests a mineralogical change across this boundary. We calculate the thermoelastic properties of Cmcm post-perovskite at relevant conditions and contrast with those of Pbnm perovskite, the dominant phase above the discontinuity. Two properties of D" appear to relate with this mineralogical change: the jumps in shear and longitudinal velocities in certain places of the D" discontinuity and the anti-correlation between shear and bulk velocity anomalies within the D" region. In addition, the larger shear modulus of post-perovskite at relevant conditions provides a natural explanation for the discrepancy between the calculated shear modulus of perovskite dominant aggregates and the seismological counterpart in the lowermost mantle. This mineralogical model of D" predicts a simultaneous positive correlation between density and shear velocity anomalies in the absence of further chemical/mineralogical changes.

In collaboration with Taku Tsuchiya and Jun Tsuchiya