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Thermally induced velocity variations of ferropericlase in Earth's lower mantle[1] RENATA WENTZCOVITCH, University of Minnesota, Twin Cities, MN, 554555 — Understanding the origin of lateral velocity heterogeneities in the mantle is crucial to understand the constitution of and internal processes at work in the Earth. The spin crossover in iron in ferropericlase (Fp) and the unusual and well documented elastic anomalies introduce unfamiliar effects on seismic velocities. In this work we investigate by first principles calculations potential velocity anomalies caused by lateral temperature variations in the presence of a spin crossover in Fp under mantle conditions. Anti-correlation between shear velocity (V_S) and bulk sound velocity (V_ϕ) in the mantle has long been viewed as an indicator of compositional or mineralogical heterogeneity. This view is not entirely justified in the presence of spin crossover in ferropericlase. We also identify new effects that exist in the presence of a spin crossover. Signatures of these effects appear to exist in the lower mantle.

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