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Impact of ferropericlase spin crossover on the Earth's lower mantle temperature profile[1] JUAN VALENCIA-CARDONA, GAURAV SHUKLA, RENATA WENTZCOVITCH, University of Minnesota — The pressure induced iron spin crossover in ferropericlase, the second most important lower mantle phase, introduces anomalies in its thermodynamics and thermoelastic properties. Here we investigate how these anomalies can affect the Earth's lower mantle adiabatic temperature profile. The effect is examined in likely lower mantle aggregates consisting of mixtures of $Mg_{1-x}Fe_xSiO_3$ perovskite (bridgmanite), $Mg_{1-x}Fe_xO$ (ferropericlase), and $CaSiO_3$ perovskite, at different Mg/Si ratios varying from harzburgitic to perovskitic (Mg/Si $\sim$ 1.5 to 0.8). We find that the anomalies introduced by the spin crossover increase the isentropic temperature gradient and thus the geotherm proportionally to the amount of ferropericlase. The geotherms can be as much as $\sim$ 200K hotter than the conventional adiabatic geotherm [1] at deep lower mantle conditions ($\sim$ 125GPa). Aggregate elastic moduli and seismic velocities are also sensitive to the spin crossover and the geotherm, which impacts analyses of lower mantle velocities and composition. [1] J.M. Brown and T.J. Shankland, Geophys. J. R. Int., 66, 579 (1981).

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