

Supplementary Information

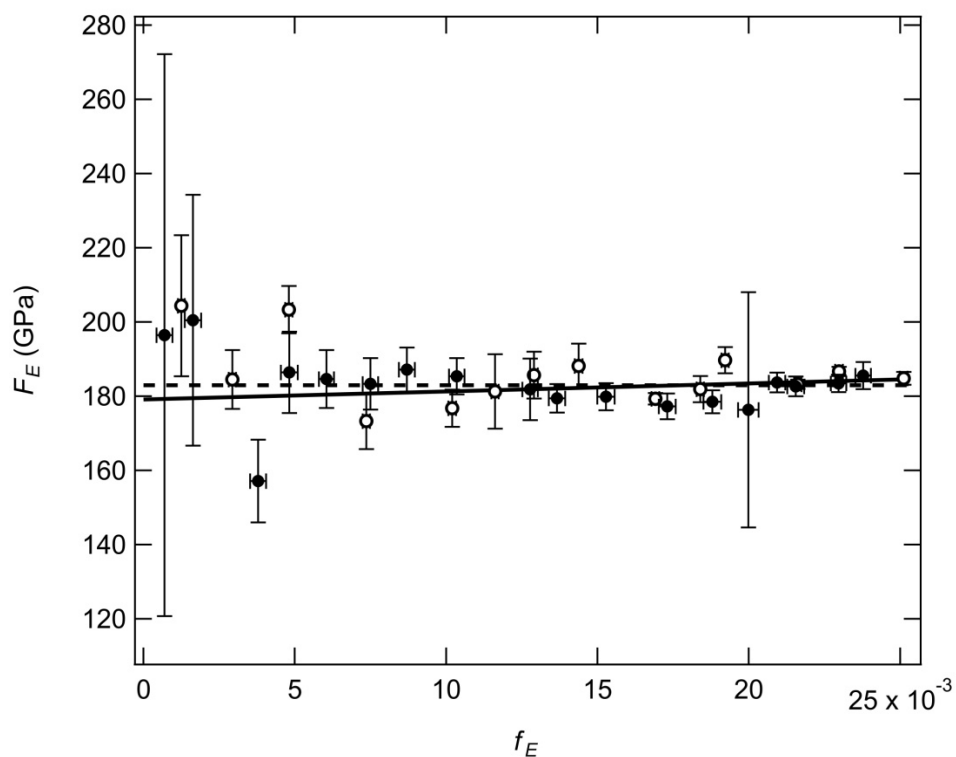


Figure S1: Normalized pressure (F_E) plotted against the Eulerian strain (f_E) for Fe₃O₄ magnetite measured at ambient temperature. The solid circles indicate data collected on a powdered magnetite sample whereas the open circles indicate data obtained from a single-crystal of magnetite. The lines represent 2nd (dashed) and 3rd (solid) order Birch-Murnaghan fits through the dataset.

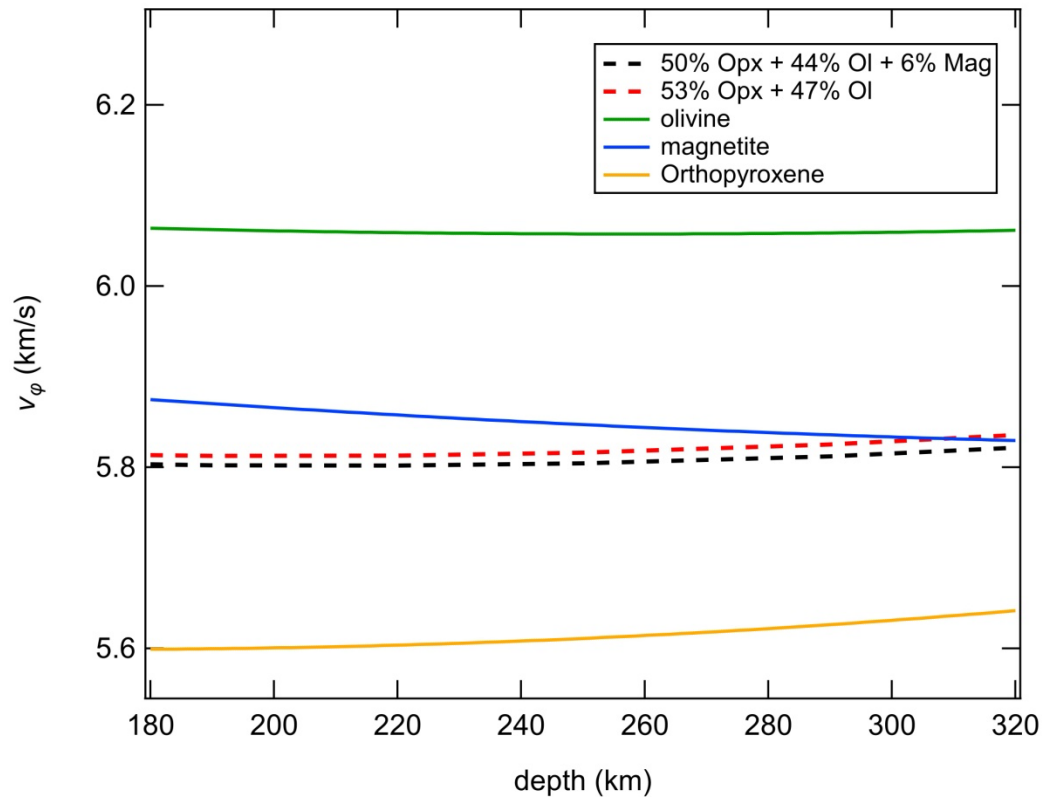


Figure S2: Bulk sound velocity v_ϕ calculated versus depth along areotherm case 12 proposed for Mars (Plesa et al. 2018) for olivine (Fo_{77.5}, green), magnetite (blue) and orthopyroxene (En₈₀, orange). These bulk velocities are compared to the two phase assemblages 1) containing 50 % orthopyroxene, 44 % olivine and 6 % magnetite (black) and 2) a magnetite-free bulk assemblage with 53 % orthopyroxene and 47 % olivine (red) as shown in Figure 4.