

Velocity-Density Systematics of Fe-Si Alloys at Extreme Conditions

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Physical properties and dynamics of the Earth's core are critically dependent on the chemical composition. As there is no direct method for sampling core materials, compositional models are obtained by comparing profiles of density (ρ), compressional sound velocity (V_p) and shear velocity (V_s) of candidate alloys as a function of pressure to seismological observations. Here we present V_p and ρ measurements of solid Fe-Si alloys compressed under quasi-hydrostatic conditions to megabar pressures by combined picosecond acoustics and synchrotron X-ray diffraction.

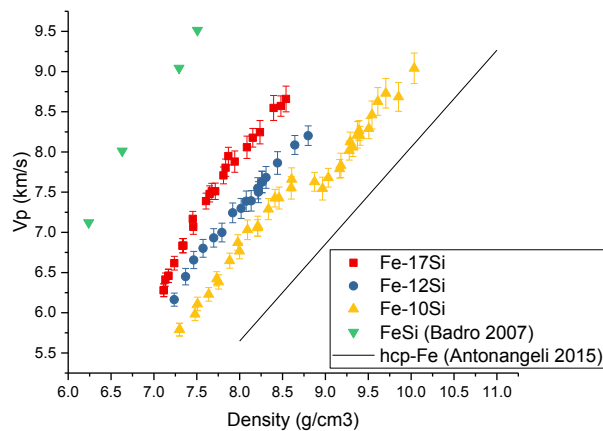


Figure 1. Birch diagram for Fe-xwt%Si ($x = 10, 12, 17$), FeSi [1] and hcp-Fe [2] for reference.

References

[1] Badro (2007) *EPSL* 254, 233-238. [2] Antonangeli (2015) *Prog. in Earth and Plan. Sci.* 2:3.