

**Density and velocity of liquid Fe-
11.8wt%S alloy up to 211GPa:
Implies sulfur-rich Earth's outer
core**

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Since the outer core is less dense than pure iron at core conditions, one or more light elements are contained in the outer core, such as sulfur (S), oxygen (O), carbon (C), silicon (Si), and hydrogen (H)¹⁻⁴. Among these light elements, S has long been proposed as the main light elements based on geophysical and geochemical constraints, but these results are not consistent with each other and give varying values of 0–20 wt% of the S content in the core⁵⁻¹¹. Using dynamical compression, we measured the equation of state and sound velocity for liquid Fe-11.8wt%S alloy (named Fe-11.8S hereafter) up to 211GPa. Compared the measured data with the seismological model under the outer core condition, it is found the best fit to both densities and bulk sound velocities profiles allows 10wt% sulfur in the outer core.