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Mercury's and Mars' core composition estimated from elastic properties of liquid iron alloys.

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To constrain the interior structure of terrestrial planets and in particular the composition their cores, elastic properties (density and bulk modulus) of liquid iron alloys at high pressure are essential. In this study, we model the core compositions of Mercury and Mars based on newly obtained elastic properties of liquid Fe-Ni-S and Fe-Ni-Si at high pressure. The elastic properties have been determined from measured sound velocity and density at high pressures using large volume press with ultrasonic and X-ray absorption methods. Our results show, that in order to agree with geodesy data, comparable amounts of sulfur or silicon are required for the core of Mercury as deduced from previous published elastic data whereas for Mars, the predicted amount of sulfur is significantly larger.