## The timing of core formation in the terrestrial planets

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The isotopic constraints on the time scales of formation of metal cores in the terrestrial planets will be reviewed. Both Earth and Mars exhibit radiogenic W-isotopic compositions compared to the average solar system composition, demonstrating that they formed while <sup>182</sup>Hf (half-life 9 Myr) was extant in Earth and decaying to <sup>182</sup>W. Based on the <sup>182</sup>Hf-<sup>182</sup>W chronology, the mean times of core formation in Earth and Mars are ~ 10 and ~3 Myr after solar system formation, with the total times being about 30 and 10 Myr, respectively. Core formation in the asteroid Vesta is constrained to be even earlier with mean time of ~ 0.8 Myr. This implies that the terrestrial planets underwent early and rapid accretion and core formation that ended by ~ 30 Myr after the origin of the Solar System. Various authors have argued that the U-Pb system requires a longer timescale (cf. [2]), but this is only one of many likely interpretations of the U-Pb isotopic system. Part of the problem lies in the different behavior and interpretation of long-lived versus extinct isotope systems [3].

## References

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[2] Halliday A. N. (2004) Nature 427, 505-509.

[3] Jacobsen S. B. and Harper C. L. (1996) *Geophysical Monograph* **95**, Am. Geophys. Union, 47-74.