Compositional model for the terrestrial planets

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Oxygen, iron, magnesium, and silicon comprised ~90% of the mass and atomic proportions of chondrites, the building blocks of the terrestrial planets, with about one of every two atoms being oxygen and 10% to 15% each of the atoms being iron, magnesium, and silicon. Chondrites have ~25% variation in Mg/Si and up to a factor of 3 difference in Fe/Si. This wide compositional variation in iron matches that seen in the core mass fractions of the rocky planets. The magnetic field strength of the protoplanetary disk, which scales as a function of radial distance from its central star, likely controlled this heterogeneous distribution of iron in the accretion disk and lead to decreasing core size of the terrestrial planets with radial distance outward from the Sun.

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