

SPECIAL COLLECTION: BUILDING PLANETS: THE DYNAMICS AND GEOCHEMISTRY OF CORE FORMATION

Modeling siderophile elements during core formation and accretion, and the role of the deep mantle and volatiles†

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ABSTRACT

The last decade has seen general agreement that moderately siderophile elements (MSE) in Earth's primitive upper mantle (PUM) can be explained by metal-silicate equilibrium at mid-mantle depths in an early Earth magma ocean environment. Despite the agreement, there are some differences in the detailed modeling that has been carried out. This paper will examine siderophile element metal/silicate partitioning with respect to three different topics: (1) an examination of aspects of the modeling that one might suspect leads to differences in outcomes or in comparison between models, but actually are in agreement with experimental data and between models; (2) a discussion of the role of the deep mantle in modeling efforts; and (3) the role and/or fate of volatiles in magma ocean scenarios with an emphasis on where data are lacking.

Keywords: Core, mantle, magma ocean, siderophile, volatile, accretion