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The significance of sulfur for the highly siderophile element budget of the Earth's mantle

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It is generally considered that the highly siderophile elements (HSEs) were depleted from the Earth's manlte by core-forming metal and were subsequently replenished by a chondritic late veneer. In most models, light elements such as S have not been taken into account. Sulfur may influence the behaviour of the HSEs during core formation either as S dissolved in the core-forming metal, or through an immiscible FeS sulfide melt segregating to the core [1]. We show by high *P*-*T* experiments that the HSEs become less siderophile with increasing S-concentrations in the metal, rendering core-forming metal less efficient in removing the HSEs from the mantle if S is present. Further experiments confirm that the HSEs are strongly chalcophile also at high *P* and *T*. The sulfide-silicate partition coefficient for Pt strongly increases with *P*, whereas those for Pd, Ru and Ir all decrease. All $D_{HSE}^{sulfide\text{-}silicate}$ increase with increasing T. We propose that the HSEs were stripped from the mantle by immiscible sulfide melts segregating to the core, followed by the addition of a late veneer that raised the HSE concentrations to their current levels.

[1] O'Neill (1991) GCA 55, 1159-1172.

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