The Hf and W isotope inventory of sequentially leached chondrites

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The stepwise dissolution of primitive chondritic meteorites allows to investigate component-specific nucleosynthetic anomalies that are otherwise hidden on the bulk rock scale. Here, we present combined Hf and W isotope data for acid leachates of several primitive chondrites, also including some of the first sufficiently precise analyses of p-process ^{174}Hf and ^{180}W.

For sequential leaching experiments, sample powders were first treated with 6M HCl and divided into leachate and residue fractions. The residues were further treated with 3:1 HNO_3:HF. The remaining residues were finally digested in 1:1 HNO_3:HF using Parr® pressure vessels for 4 days at 180°C.

Hafnium and W were separated from the same sample matrices using cation and anion exchange chromatography. Tungsten was subsequently purified on TEVA resin, and Hf was further purified using LN resin. Measurements were performed on a Neptune MC-ICP-MS at Cologne-Bonn. For collection of small ion beams, amplifiers with $10^{12}\Omega$ resistors were employed. The external reproducibilities (2 SD) were typically < 60 ppm for ^{174}Hf (60 ng Hf) and < 50ppm for ^{180}W (50 ng W).

Our data reveal Hf and W isotope compositions that agree with variable contributions from s- or r-process material, consistent with results of [1] and [2]. In terms of p-process isotopes, no resolvable anomalies in ^{174}Hf were found, whereas significant positive and negative ^{180}W anomalies relative to the terrestrial standard are resolved for most of the leachates and residues. The ^{180}W anomalies cannot be explained by variable contributions of radiogenic ^{184}Os [3]. The observed dichotomy between ^{174}Hf and ^{180}W possibly points towards different carrier phases for p-process Hf and W.

[1] Qin L. et al. (2011) *GCA*, **75**, 7806-7828. [2] Burkhardt C. et al. (2012) *AJL*, **753**, L6. [3] Peters S. et al. (2014) *EPSL*, **391**, 69-76