

Nucleosynthetic Pd isotope variations in iron meteorites

M. EK^{1*}, A. C. HUNT¹, M. SCHÖNBÄCHLER¹

¹Department of Earth Sciences, ETH Zurich, Switzerland. (*correspondence: Mattias.ek@erdw.ethz.ch)

Nucleosynthetic isotope variations in iron meteorites are reported for several elements including Ru, Mo, and W [1-6]. Palladium lies in the mass range of Mo and Ru making it an ideal candidate in the search for nucleosynthetic anomalies with potential correlations with Mo and Ru. Palladium has six naturally occurring isotopes, one *p*-process (¹⁰²Pd), one exclusively *s*-process (¹⁰⁴Pd), one predominantly *r*-process (¹¹⁰Pd) and three isotopes that are mixtures between *s*- and *r*-process. A study of Pd in the IVB iron meteorites reported nucleosynthetic variations which were interpreted as the result of an *s*-process deficit [7]. Here, we present new Pd isotope data for the IAB, IIAB, IID, IIIAB, IVA and IVB iron meteorites. In addition, we evaluate the potential of Pd isotopes as a neutron dosimeter for galactic cosmic ray (GCR) irradiation.

Palladium was separated from the matrix following the procedure outlined by [8]. Aliquots of Pt were also analysed and used to correct for the effects of GCR. Samples were measured on a Thermo Scientific Neptune *Plus* equipped with an Aridus II desolvating nebuliser at ETH Zürich [8].

Our samples were GCR-corrected using the model of [9] and Pt isotopic measurements from the same aliquots. Using this approach we confirm the presence of a nucleosynthetic anomaly in the IVB iron meteorites ($\epsilon^{110}\text{Pd} = 0.53 \pm 0.20$) that is in good agreement with the value reported by [7] ($\epsilon^{110}\text{Pd} = 0.46 \pm 0.12$). Our results also tentatively suggest nucleosynthetic anomalies in the IIAB and the IIIAB iron meteorite groups. These anomalies are consistent with an *s*-process deficit. They also show a correlation with nucleosynthetic Mo isotope variations [5]. In agreement with previously reported work [7], the *s*-process deficit required to produce the Pd isotope effects is between 0.5 - 0.3 of that needed for Mo, pointing toward different dilution effects acting on Mo and Pd isotopes in the solar system.

[1] Wittig *et al.* (2013) *EPSL* **361**, 152-161. [2] Kruijer *et al.* (2013) *EPSL* **361**, 162-172. [3] Chen *et al.* (2010) *GCA* **74**, 3851-3862. [4] Fischer-Gödde *et al.* (2015) *GCA* **168**, 151-171. [5] Burkhardt *et al.* (2011) *EPSL* **312**, 390-400. [6] Kruijer *et al.* (2014) *Science* **344**, 1150-1154. [7] Mayer *et al.* (2015) *ApJ* **809**, 180-187. [8] Hunt *et al.* (2015) *LPSC* **46**, 1835. [9] Leya & Masarik (2013) *MAPS* **48**, 665-685.