Excess ^{180}W in iron meteorites: cosmogenic or radiogenic?

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Introduction: Excesses in ^{180}W occur in members of many groups of magmatic iron meteorites, but their origin is debated [1,2,3]. Excess ^{180}W may represent p-process heterogeneity [1], radiogenic ingrowth from ^{184}Os decay [2], or spallogenic production due to galactic cosmic rays (GCR) [3]. A suite of five IIAB irons were chosen that represent different portions of the crystallization sequence [4] in order to evaluate the relative contributions to ^{180}W excesses from GCR effects versus those from potential ^{184}Os decay.

Methods: Tungsten isotopes were measured by MC-ICPMS at ETH Zürich using the method of [5]. Isotopes of noble gases (*e.g.*, Ne and Ar) were analysed at the University of Bern based on [6]. Analyses of cosmogenic radionuclides (*e.g.*, ^{36}Cl and ^{41}Ca) were performed at the DREsden Accelerator Mass Spectrometry facility (DREAMS, [7]).

Results and Discussion: Three out of five IIAB irons show ^{180}W excesses, which are correlated with published [4] Ir/W ratios. Three of the samples were previously analysed by [3], and their $\varepsilon^{180}W$ values are in good agreement with the published values. For two of these samples, their small ^{180}W excesses ($\approx 1.2\varepsilon$) are now clearly resolved from the terrestrial standard. The CRE ages, based on ^{36}Cl-^{36}Ar, range from 12 to 408 Ma. The sample with the longest exposure age shows significant burnout of $\varepsilon^{182}W$ from neutron capture reactions. These effects are minimal to absent in the other samples. The determination of siderophile trace element concentrations are underway. These data, in conjunction with the CRE ages and $\varepsilon^{182}W$ values, will enable a correction for GCR effects on ^{180}W. We will present the GCR-corrected W isotopic data along with a re-assessment of the potential radiogenic contribution to ^{180}W from ^{184}Os.

References: [1] Schulz et al. (2013), *EPSL* **362**, 246-257. [2] Peters et al. (2014) *EPSL* **391**, 69-76. [3] Cook et al. (2014), *GCA* **140**, 160-176. [4] Wasson et al. (2007), *GCA* **71**, 760-781. [5] Cook & Schönbächler (2016), *JAAS*, 31, 1400-1405. [6] Ammon et al. (2011), *MAPS* **46**, 785-792. [7] Akhmadaliev et al. (2013), *Nucl. Instrum. Methods Phys. Res. B* **294**, 5-10.