DATING CORE CRYSTALLISATION OF IIAB & IIIAB IRON METEORITES USING THE PALLADIUM-SILVER DECAY SYSTEM.

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Introduction: The IIAB and IIIAB iron meteorites exhibit distinct fractional crystallisation trends, which indicate that they formed by the crystallisation of a metallic liquid during the segregation of an iron core in an asteroidal parent body. Core segregation for the IIAB parent body is estimated to have occurred around 1.2 Ma after the formation of Allende CAI's based on the Hf-W decay system [1] and Pt-Re-Os dating of core crystallisation yielded an age of 4546 ± 46 Ma [2]. The ^{107}Pd-^{107}Ag decay system can also be used to date these iron meteorites and it has the advantage that it yields a higher degree of precision due to the relatively short half-life of ^{107}Pd (6.5 Ma). Previous data show [3,4] that IIAB iron meteorites may define two isochrons with ages of (i) 8.9 Ma after solar system formation for IIAB's with high Ir contents and (ii) 10.9 Ma for IIAB's, which are inferred to have formed later in the crystallisation sequence based on their low content of the compatible element Ir. Likewise, the IIIAB iron meteorites also display fractional crystallisation trends, but with relatively high scatter in the Ir versus Au diagram. The scatter is thought to be the result of parental melt that was trapped within the crystallising metal [5]. As these conclusions are based on only a few data, this study aims to further constrain the Pd-Ag isochrons for both IIAB and IIIAB iron meteorites.

Analytical Techniques: Ion exchange chemistry [6] is used to separate Pd and Ag from four IIAB (Sikhote-Alin (x2), North Chile and Coahuila) and three IIIAB (Thunda, Boxhole and Henbury) iron meteorites. Silver isotopes are analysed on the Nu Plasma MC-ICPMS at Manchester relative to the NIST SRM978a Ag standard. Palladium and Ag concentration are acquired by isotope dilution.

Results and discussion: The results for North Chile are in good agreement with those of previous studies [3,4] and fall on the same linear correlation in the Pd-Ag isochron diagram, corresponding to an age of 10.9 Ma after CAI formation [3]. Coahuila falls between the two IIAB isochrons [3] indicating that the sample analysed here may be disturbed or formed slightly later (by ~1 Ma). Sikhote-Alin, which crystallizes late in the sequence according to elemental data [7], plots well below both isochrons. This suggests very late crystallization or later resetting. Our analysed sample displays an unusually high Ag content (4.77 ppb) and a duplicate will be analysed to confirm the data. The IIIABs will also be analysed and the results presented at the conference.

References: [1] Markowski A. et al. 2006. *Earth & Planetary Science Letters* 250:104-115. [2] Cook D. L. et al. 2004. *Geochimica et Cosmochimica Acta* 68:1413–1431. [3] Schönbächler M. et al. 2010 *Meteoritics & Planetary Science* 45:A183. [4] Chen J. H. et al. 2002. *Geochimica et Cosmochimica Acta* 66:3793-3810. [5] Wasson J. 1999. *Geochimica et Cosmochimica Acta* 63:2875-2889. [6] Schönbächler M. et al. 2007. *International Journal of Mass Spectrometry* 261:183-191. [7] Wasson J. T. et al. 2007. *Geochimica et Cosmochimica Acta* 71:760-781.