# Palladium-Silver Chronology of Iron Meteorite Parent Bodies

A. C. HUNT*[1], K. J. THEIS[2] & M. SCHÖNBÄCHLER[1]

[1] ETH Zürich, Department of Earth Sciences, Switzerland
(*correspondence: alison.hunt@erdw.ethz.ch)
[2] SEAES, The University of Manchester, UK

The short-lived $^{107}$Pd-$^{107}$Ag decay system ($t_{1/2}$ ~ 6.5 Myr) is a useful tool to constrain core crystallisation. However, this chronometer is disturbed by neutron capture reactions when exposed to galactic cosmic rays (GCR) [1]. It has been demonstrated that Pt isotopes are a powerful dosimeter that can be used to correct measured $^{107}$Ag/$^{109}$Ag ratios for the effects of GCR [2]. We apply this method to iron meteorites from the IAB, IIAB and IIIAB groups to further constrain the thermal evolution of parent bodies in the early Solar System.

Both isotope systems were analysed by MC-ICPMS. Silver isotopes were measured at the University of Manchester. Data for the IAB irons and analytical methods are published in [3]. Platinum isotope compositions were determined at ETH Zürich, after [4]. Material for these two sets of analyses was taken from adjacent sampling locations.

New GCR-corrected data for IIIABs yield a regression with a slope of (2.20±0.57) x$10^{-5}$, which is within uncertainty of sample-specific isochrons [2]. The IIABs combined with data from [2] define an isochron with a similar slope of (2.21±0.30) x$10^{-5}$. Therefore the Pd-Ag system in these bodies closed, and hence the asteroids cooled, in the same time frame. The solar system initial $^{107}$Pd/$^{108}$Pd of (5.9±2.2) x$10^{-5}$ [5] has a relatively large uncertainty and thus yields conservative ages. Using this, the IIAB and IIIAB Pd-Ag ages are 9.2 ± ~4.6 Myr after CAI. This is within uncertainty of, but more robust than, ages from [5]. Data for the IAB iron meteorites indicate two isochrons with distinct slopes when uncorrected for GCR effects [3]. However, GCR-corrected data define a single isochron with a slope of (1.50±0.16)x$10^{-5}$ that corresponds to 12.8 ± 3.8 Myr after CAI. This includes samples from multiple IAB sub-groups and suggests a body-wide event ~7 Myr after the heating episode inferred by [6]. The slope derived for the IABs is resolved from the IIAB and IIIABs and hence the Pd-Ag system in IABs closed later. The event at ~12.8 Myr likely corresponds to cooling after the postulated impact break-up and reassembly of the body [3, 6].

REFERENCES: [1] Leya & Masarik (2013), *MAPS* 48, 665-685. [2] Matthes et al. (2015), *GCA* 169, 45-62. [3] Theis et al. (2013), *EPSL* 380, 402-411. [4] Hunt et al. (2017), *Geostand. Geoanal. Res.* 41, 633-647. [5] Schönbächler et al. (2008), *GCA* 72, 5330-5341. [6] Hunt et al. (2018), *EPSL* 482, 490-500.