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Pd-Ag metal-sulfide isochrons and the cooling history of iron meteorites

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The short-lived ^{107}Pd - ^{107}Ag system ($t_{1/2} = 6.5$ Ma) is very well suited for dating iron meteorites, owing to the very different Pd/Ag ratios of metal and sulfides. However, sulfides often show ^{107}Ag excesses that are inconsistent with their low Pd/Ag, hindering a reliable interpretation of the Pd-Ag systematics in terms of chronology. We obtained Pd-Ag data for different metal and troilite pieces from a single slab of the IIIAB iron Cape York (Aqpallilik), including metal pieces sampled in direct contact to a large sulfide nodule (~2 cm diameter). The metals adjacent to the large sulfide exhibit lower Ag concentrations and less radiogenic Ag isotopic compositions compared to the metals sampled away from large sulfide nodules. The Pd-Ag data, therefore, indicate transfer of radiogenic Ag from metal into sulfide. The large sulfide together with its surrounding metals defines an isochron with shallower slope compared to the isochron obtained from the other metal samples. This difference corresponds to an age difference of ~1 Ma, most likely due to a brief reheating event after initial cooling of the IIIAB core below Pd-Ag closure.

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