NOBLE GAS MEASUREMENTS IN METAL FROM PALLASITES.

L. Huber[1], G.F. Herzog[2], D.L. Cook[2,3], I. Leya[1]. [1]University of Bern, Space Research & Planetary Sciences, Switzerland. [2]Rutgers University, Piscataway, NJ, USA, [3]University of Oxford, Oxford, UK. E-mail: liliane.huber@space.unibe.ch.

Introduction: Pallasites are stony-iron meteorites that likely formed at the core-mantle boundary of one or more differentiating parent bodies [e.g., 1]. The noble gas concentrations of pallasites are interesting for several reasons. *First*, some samples of Brenham olivines contain solar gases [2,3], which raises the question how the olivines managed to retain the trapped solar component during the differentiation process. It was suggested [2,3] that the solar component resides in a carrier phase interstitial to olivine and metal. But how the carrier phase did avoid being degassed is not yet clear. However, a better knowledge of the noble gas components of pallasites might help answering this question. *Second*, studies of cosmic-ray exposure (CRE) ages demonstrate systematic increases on going from stones to mesosiderites to irons, perhaps reflecting increases in mechanical strength and resistance to collisional destruction. Published CRE ages for pallasites are comparable to those of mesosiderites but with a few exceptions [e.g., 1] have been calculated without the use of modern production rates or shielding corrections. *Third*, pallasites can help to validate model calculations for cosmogenic production rates. Reliable model calculations exist for iron meteorites [4] and for ordinary and carbonaceous chondrites [5]. In the latter study the matrix effect, i.e., the non-linear dependence of the production rates on the bulk chemical composition of the meteoroid is studied theoretically. By using data from pallasites along with those from mesosiderites [6] we can test the model predictions for a high-iron matrix. Here we present first results of a comprehensive study of noble gas concentrations in the metal phase from 12 pallasites.

Samples: We analyzed noble gas concentrations in metal separates of the pallasites Ahumada, Albin, Brenham, Eagle Station, Esquel, Finmarken, Glorieta Mountain, Huckitta, Imilac, Krasnojarsk, South Bend, and Springwater. The cosmogenic radionuclides were measured in adjacent samples and are reported separately [Cook et al., this conference]. For noble gas measurements the samples were heated in a molybdenum crucible with a boron-nitride liner (to avoid corrosion of the crucible) and were degassed at ~1800°C via RF-heating. The gases were cleaned on various Ti getters and the noble gas isotope concentrations were measured in peak jumping mode using two static noble gas mass spectrometers built at the University of Bern. The noble gas blanks, which are crucial for the study of metal samples, are low, i.e., less than a few percent for ^{3,4},He, ^{21,22}Ne, and ^{36,38}Ar. Preliminary values of the ^{38}Ar concentrations range from 0.3×10^{-8} to 9×10^{-8} cm^{3}STP/g. At the conference we will present detailed results and discuss their implications for CRE ages.

References: [1] Mittlefehldt D.W., McCoy T.J., Goodrich C.A., Kracher A. 1998 In: Planetary Materials. Rev. in Mineralogy 36 [2] Mathew K.W. and Begemann F. 1997. *Journal of Geophysical Research 102*:11015–11026. [3] Nagao K and Miura Y.N. 1994 *Meteoritics & Planetary Science* 29 (Abstract). [4] Ammon K., Masarik J., and Leya I. 2009. *Meteoritics & Planetary Science* in press [5] Leya I. and Masarik J. 2009 *Meteoritics & Planetary Science* in press [6] Albrecht et al., 2000. *Meteoritics & Planetary Science* 35:975