NOBLE GASES IN THE XINJIANG (ARMANTY) IRON METEORITE – A BIG OBJECT WITH A SHORT COSMIC-RAY EXPOSURE AGE

I. Leya[1], K. Ammon[1], Y. Lin[2], [1]Physical Institute, University of Bern, Sidlerstrasse 5, 3012 Bern, Switzerland. [2]Key Laboratory of the Earth's Deep Interior, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, China. Email: Ingo.Leya@space.unibe.ch

Introduction: With a single mass of about 28 tons the iron meteorite Xinjiang is the third largest meteorite mass found so far (e.g., [1,2]). Note that this meteorite is called Armanty in the original Russian reports and in the British Museum catalogue [3] but is called Xinjiang in the Chinese literature. The larger masses are Hoba (~60 tons) and Cape York (~ 58 tons). Xinjiang is 2.42 m long, 1.85 m wide, and 1.37 m high [1]. Recently a new iron meteorite, Ulasitai, has been found about 130 km southeast from the Xinjiang finding site [4]. Due to similarities in the find location as well as in the bulk chemical composition and petrography it is likely that Xinjiang and Ulasitai are paired [4]. While Hoba and Cape York have been already studied for noble gases, there is so far no cosmogenic nuclide study for Xinjiang and/or Ulasitai.

Experimental: We measured the concentrations and isotopic compositions of He, Ne, and Ar in five samples of the Xinjiang (IIIE) iron meteorite. The samples were taken from different locations. The noble gas extraction and mass spectrometric measurements were performed at the University of Bern. The methods used are standard procedures similar to the ones used previously [5].

Results: The cosmogenic nuclide concentrations in Xinjiang (IIIE) proof its exceptional large size. By comparing measured and modeled $^{4}He/^{21}Ne$ ratios we conclude that Xinjiang most probably had a pre-atmospheric diameter of 260 – 280 cm, which corresponds to a pre-atmospheric mass of 70 – 80 tons. In addition, the $^{4}He/^{21}Ne$ data indicate that the samples analyzed by us most probably come from a shielding depth of about 30 cm. Low $^{3}He/^{38}Ar$ ratios indicate substantial ^{3}He and/or ^{3}H diffusive losses. Calculations indicate that Xinjiang must have lost almost all of its ^{3}H during cosmic-ray exposure. Based on the size and depth estimate and using the measured nuclide concentrations together with modeled production rates we calculate a cosmic-ray exposure age of about 27 ± 15 Ma, i.e., Xinjiang also belongs to the group of iron meteorites having a relatively low cosmic-ray exposure age.

Unfortunately, due to the lack of radionuclide data, we can currently not firmly decide whether Xinjiang experienced a single or a complex exposure history. If this object experienced a complex exposure, the second stage was most likely very short. However, our data are entirely consistent with a single exposure.

References: [1] Chen Y. and Sun Y. 1986. *Geochimica* 1986:271-277. [2] Buchwald V.F. 1975. Iron meteorites. University of California Press 1418 pp. [3] Grady M.M. 2000. Catalogue of Meteorites, 5th edition. London: The Natural History Museum. 690 pp. [4] Xu L., Miao B., Lin Y., and Ouyang Z. 2008. *Meteoritics & Planetary Science* 43:1263-1273. [5] Ammon K., Masarik J., and Leya I. 2008. *Meteoritics & Planetary Science* 43:685-699.