COSMIC-RAY PRODUCTION RATES OF KR ISOTOPES BASED ON CHLORINE-36/ARGON-36 AGES. Ingo Leya and Rainer Wieler, Institute for Isotope Geology and Mineral Resources, ETH Zürich, 8092 Zürich, Switzerland, Leya@erdw.ethz.ch.

Introduction: The ^{81}Kr-Kr method of cosmic-ray exposure dating [1] allows the determination of shielding-corrected cosmic-ray exposure ages based on a single Kr analysis. The basic equations, which correlate the ^{81}Kr/^{83}Kr ratio to measured ^{78}Kr-^{80}Kr-^{83}Kr concentrations, were deduced from Apollo 12 lunar samples. They are also widely used to date meteorites, which may have widely different concentrations of the major target elements Rb, Sr, Y, Zr, and Nb. However, so far the reliability of these equations has been tested on two meteorites only [2]. We therefore analysed He, Ne, Ar, Kr, and Xe in 9 H-chondrites which were recently investigated for their ^{36}Cl-^{36}Ar exposure ages and light noble gas production rates. We also analysed 7 samples from the very large L4 chondrite Gold Basin. An analysis of the well studied L/LL5 chondrite Knyahinya proved the reliability of our method.

Results: Two aliquots of the Gold Basin meteorite yield ^{81}Kr-Kr ages in good agreement. In addition, the ^{81}Kr-Kr age of Knyahinya of 41 ± 4 Myrs is in very good agreement with literature data. This confirms that the method used here produces reliable and reproducible ^{81}Kr-Kr cosmic-ray exposure ages. A comparison of the exposure ages deduced via ^{36}Cl-^{36}Ar [3] with the ^{81}Kr-Kr ages determined here is shown in Fig. 1.

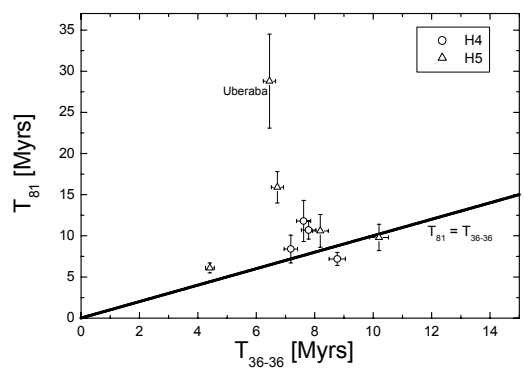

FIG. 1. Comparison of cosmic-ray exposure ages determined using ^{36}Cl-^{36}Ar with those obtained by the ^{81}Kr-Kr method

The ^{81}Kr-Kr exposure age for one meteorite (Uberaba) is about 4 times higher than its ^{36}Cl-^{36}Ar age. At present we cannot give an explanation for this discrepancy. For the remaining 8 H-chondrites, five show ^{81}Kr-Kr and ^{36}Cl-^{36}Ar ages in agreement with each other. The ^{81}Kr-Kr ages are higher by ~3σ for two meteorites and by ~5σ for one meteorite (Cereseto). Considering the data we believe that the fact that 8 of the 9 ^{81}Kr-Kr ages are higher than their ^{36}Cl-^{36}Ar ages is significant. We will therefore measure the concentrations of Rb, Sr, y, Zr, and Nb in aliquots of the samples and search for correlations of the Kr isotopic ratios with the relative target element abundances, *e.g.* Rb/Sr.

References: [1] Marti K. (1967) Phys. Rev. Lett. 18, 264-266. [2] Finkel R.C. et al. (1978) GCA, 42, 511-519. [3] Graf T. et al. (2001) Icarus, 150, 181-188