NEW INSIGHTS INTO THE STRONTIUM CONTAMINATION OF METEORITES.

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Introduction: Since the discovery of meteorites in hot deserts studies on their weathering and contamination have become important to understand the terrestrial overprint of these samples. One of the early recognized features is the continuous uptake of Ba and Sr of meteorites in hot deserts [e.g. 1-4]. Our studies focus on the quantification of the contamination patterns and on the determination of the source of contaminants and their correlation with terrestrial ages.

Methods: Meteorites found during the joint Omani-Swiss meteorite search project are routinely classified by standard procedures. Some selected samples (covering all weathering degrees and all LL chondrites) were dated by ^{14}C [e.g. 5]. Currently, the elemental concentrations of all samples (excluding samples from large strewn fields) are systematically analyzed by handheld XRF (HHXRF) with special focus on Ba and Sr contamination. Three L chondrites from selected sites representing three distinct typical geographical provenances of meteorites were analyzed for their $^{87}Sr/^{86}Sr$ isotopic ratio. Strontium isotopes were measured on aqueous and acidic leaches from meteorites and corresponding soil samples.

Results: The terrestrial age pattern of Oman meteorites is characterized by an abundance peak at 20 ka and a lack of young (<10 ka) meteorites. The correlation of terrestrial age and weathering degree with Ba and Sr contamination is obvious. An estimation of the terrestrial age of meteorites by a combination of HHXRF measurements, weathering degree, geographical find location and physical weathering signatures such as fragmentation and wind ablation will likely be possible. Strontium isotope ratios of corresponding meteorite-soil pairs obtained by leaching with water are very similar, but characteristic for each of the three locations. Acidic leaches from meteorites are also similar to the former, while the leachates of soil samples with strong acid are less radiogenic, probably because leaching with strong acid taps Sr reservoirs that are insoluble in rainwater.

Discussion: Based on our observations there is strong evidence that the source of Sr contamination is the local soil and not sea spray, since the strontium isotope ratio of Miocene and recent ocean-water is significantly more radiogenic [6]. By measuring the contamination pattern (Ba and Sr concentration, Sr isotopes and alteration mineralogy) of meteorites it is possible to trace back the find location, to some extent even within the homogeneous Omani desert.

References: [1] Gibson E. K. and Bogard D. D. 1978. *Meteoritics 13*:277–289. [2] Stelzner T. et al. 1999. *Meteoritics & Planetary Science* 34:787-794. [3] Al-Kathiri A. F. et al. 2005. *Meteoritics & Planetary Science 40*:1215-1239. [4] Lee M. R. and Bland P. A. 2004. *Geochimica et Cosmochimica Acta* 68:893-916. [5] Jull T. 2006 in Meteorites and the Early Solar System II (eds. D. S. Lauretta and H.Y. McSween, pp. 889-905. [6] Palmer M. R. and Elderfield H. 1985 Nature 314:526-528