EXPOSURE HISTORY OF SOME DIFFERENTIATED AND LUNAR METEORITES. O. Eugster and S. Lorenzetti, Physikalisches Institut, University of Bern, Sidlerstrasse 5, 3012 Bern, Switzerland (eugster@phim.unibe.ch).

Introduction: Continuing our study of cosmic-ray exposure (CRE) ages and meteorite parent body breakup histories we analyzed some special meteorites. They belong to classes with few members and were recovered from cold (Antarctica) and hot (Africa, Arabia) deserts. In most cases our work is part of a collaborative effort. The table gives the relevant noble gas data and resulting CRE- and K–Ar ages. The following conclusions were obtained:

Lunar meteorite Dhofar 081, a fragmented feldspatic breccia found in Oman, contains relatively little solar gases but was exposed for > 100 Ma in the lunar regolith.

Lunar meteorite NWA 032, an unbrecciated basalt found in Morocco, is essentially free of solar gases. Adopting a shielding depth of a few tens of cm on the moon the regolith residence time was 220 ± 30 Ma. The K–Ar age of 2.78 ± 0.16 Ga for bulk material agrees with the ^{39}Ar–^{40}Ar age (see comprehensive study by [1]).

Lunar (?) meteorite NWA 773, a cumulate olivine norite with regolith breccia, presently being studied in collaboration with T. E. Bunch and M. Killgore contains solar gases and was exposed to cosmic rays at average 2 • geometry for ~160 Ma. The systematics of trapped solar $^{4}He/^{20}Ne$ and $^{20}Ne/^{36}Ar$ clearly indicate that this meteorite is of lunar origin.

Acapulcoite GRA 98028 yields a CRE age of 5.1 ± 0.8 Ma and a K–Ar age of 4.62 ± 0.16 Ga. It is remarkable that all 19 acapulcoites and lodranites dated until now were ejected from their parent body in a period between 4.0 and 6.8 Ma ([2] and [3]), if we base the CRE ages on production rates according to [4].

Bencubbinite Gujba, analyzed in collaboration with A. Rubin and G. Kallemeyn, is the only fall among the bencubbinites and is texturally more pristine than Bencubbin. The relatively high concentrations of the planetary type trapped gases ($^{36}Ar_{tr}$ = 278 x 10^{-8} cm^3STP/g) are similar to those of Bencubbin. We find that the CRE ages of Gujba and Bencubbin are identical and conclude that the two meteorites originate from the same ejection event on their parent body, 27 Ma ago.

Angrite Sahara 99555 was obtained from D. Mittlefehldt and T. Mikouchi. We find a CRE age of 5.9 ± 0.5 Ma and a K–Ar age of 3.54 ± 0.15 Ga. The CRE age agrees with that of the Asuka 881371 angrite (5.4 ± 0.7 Ma [5]).

Iron meteorite NWA 176 is closely related to the ungrouped iron meteorite Bocaiuva. We analyzed a silicate inclusion as part of a consortium study led by K. Keil and M. Liu [6]. We obtained a CRE age of 41 ± 12 Ma. This age is relatively young for an iron meteorite.

Trapped noble gases (10^{-8} cc/g), CRE (Ma) and K–Ar (Ga) ages.

Meteorite	$^{20}Ne_{tr}$	$^{4}He/^{20}Ne$	$^{20}Ne/^{36}Ar$	CRE age	K – Ar age
Dhofar 081	413	< 0.98	0.60	> 100	–
NWA 032	< 0.7	–	–	220	2.78
NWA 773	19850	< 9.3	8.1	~ 160	–
GRA 98028	0.82	–	0.26	5.1	4.62
Gujba	278	–	0.089	27.3	3.5
Sahara 99555	0.29	–	0.53	6.5	3.5
NWA 176	6.8	–	0.82	41	–

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References: [1]Fagan T.J. et al. (2000) MAPS 35, A51. [2] Weigel et al. (1999) GCA 63, 175. [3] Terribilini et al. (2000) MAPS 35, 1043. [4] Eugster O. and Michel T. (1995) GCA 59, 177. [5] Weigel A. et al. (1997) GCA 61, 239. [6] Liu M. et al. (2001) LPS XXXII, Abstract # 2152.