LUNAR METEORITES FROM ANTARCTICA AND OMAN

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Thirty-three named lunar meteorite stones representing 19–21 meteorites have been found in Antarctica, all by government-sponsored expeditions (Japan and U.S.). (It has not yet been established whether the 4 MIL 0900XX lunar stones represent 1, 2, or 3 falls [1].) The total mass of lunar material recovered from Antarctica is 5.43 kg, and 0.12% (by stone name, excluding provisional names) of the meteorites from Antarctica currently listed in the Meteoritical Bulletin Database are from the Moon.

In comparison, 57 named lunar meteorites stones representing 16–22 meteorites have been found in Oman, all but one (SaU 169) by private collectors. Many of these are not well characterized, although we have analyzed samples at least one stone of all Omanian lunaites by INAA (39 stones). The mass of lunar material from Oman, a country about the size of Poland, is 9.75 kg. In the area of the main concentration of meteorites (those with names Dhofar, Jiddat al Harasis, and Shişr), the concentration of lunar meteorite finds is a remarkable 0.9 g/km^2. This value is 3.8× that calculated by Nazarov et al. [2] because of 10 more years of new finds, including 5.5-kg Shişr 162. The fraction of lunar meteorites among named stones from Oman, 2.35% (by stone name), is 2000× that for Antarctica presumably because of collection bias, i.e., many ordinary chondrites from Oman never receive names.

Assuming 21 Antarctic lunaites, 13 are feldspathic breccias (3–9% FeO), 4 are mare basalts (21–23% FeO), and 4 are breccias containing both highlands and mare material (12–18% FeO). None has a large proportion of KREEP (MIL 090036 and Yamato 983885 have about 2 μg/g Th). Assuming 21 Omanian lunaites (author's preference), 17 are feldspathic breccias, 1 (Dhofar 287) is a mare basalt, 1 (Dhofar 1180) is a mare-highlands breccia, and 2 are KREEP-rich breccias (SaU 169 with two lithologies having 9 and 30 μg/g Th and Dhofar 1442, a regolith breccia, having 14 μg/g Th). Thus, the distribution of lunar rock types differs considerably between the 2 regions.

Among the Antarctic lunaites, several cases of launch pairings are established or suspected, leading to 13–17 lunar craters represented. Because of lack of cosmic-ray exposure data for most Omanian lunaites, launch pairings among the Omanian meteorites are not established. On the basis of similar composition and texture, SaU 449 is likely launch-paired with Dhofar 925/960/961 (340 km separation) [3] and JaH 348 may be launch paired with paired stones Dhofar 1436 and Dhofar 1443 (143 km separation). Although texturally different, Shişr 166 is compositionally identical to Dhofar 026 found 33 km away. These stones may represent yet another launch pairing.

On the basis of similar texture and compositions, possible Antarctic-Oman launch pairings include Dhofar 1428 and MAC 88104/5. Dhofar 1436/1443, an impact-melt breccia, is compositionally identical to MIL 07006, a regolith breccia.

Omanian lunaites are contaminated, to varying degrees, with K, Sr, Cs, Ba, As, Se, Br, Sb, and U compared to their Antarctic counterparts and Apollo samples.

References: [1] Korotev R. L. et al. (2011) *LPS XLII*, no. 1999. [2] Nazarov M. A. et al. (2004) *Solar System Research* 38:49–58. [3] Korotev R. L.et al. (2009) *M&PS* 44: 1287–1322.