KEEPING UP WITH THE LUNAR METEORITES – 2012. R. L. Korotev[1], A. J. Irving[2], and T. E. Bunch[3], [1]Campus Box 1169, Dept. of Earth & Planetary Sciences, Washington University, Saint Louis MO 63130; [2]Dept. of Earth & Space Sciences, University of Washington, Seattle, WA 98195; [3]Dept. of Geology, Northern Arizona University, Flagstaff, AZ 86011; korotev@wustl.edu

We report compositional data by instrumental neutron activation analysis for hot-desert lunar meteorites for which names have been approved (in **bold**) since our report of three years ago [1] and speculate about pairing relationships on the basis of preliminary petrographic data and compositions of multiple subsamples of the meteorites (20–35 mg).

New pairings. NWA (Northwest Africa) 6221 (109 g), **6355** (760 g), **NWA 6470** (96 g), and **NWA 6570** (415 g) are new pairs of the NWA 4936/5406 pair group [2], expanding the compositional range (Fig. 1) and bringing the total mass of this Apollo-16-soil-like meteorite to 1883 g. **NWA 6252** (113 g), **NWA 6554** (138 g), and **NWA 6555** (30 g) are more stones of the NWA 2995 pair group [2] (total mass: 2224 g). Our samples of NWA 6252 and 6555 expand the compositional range to more mafic (Sc-rich) compositions (Fig. 1). Tiny **NWA 6275** (5 fragments totaling 1.3 g), a granulitic breccia, appears to be another stone of the NWA 3163/4483/4881 pair group (2449 g) [3]. Our small INAA sample of NWA 6275 is considerably more feldspathic, however (Fig. 1). **Anoual** (5.9 g), **NWA 6950** (1649 g) and **NWA 7007** (91g) are more stones of the NWA 773/ 2727/3160 pair group (see companion abstracts [4,5]). Our sample of Anoual has the composition of the olivine phyric basalt lithology. NWA 7007 is a breccia and NWA 6950 consists entirely of the olivine gabbro cumulate lithology [6].

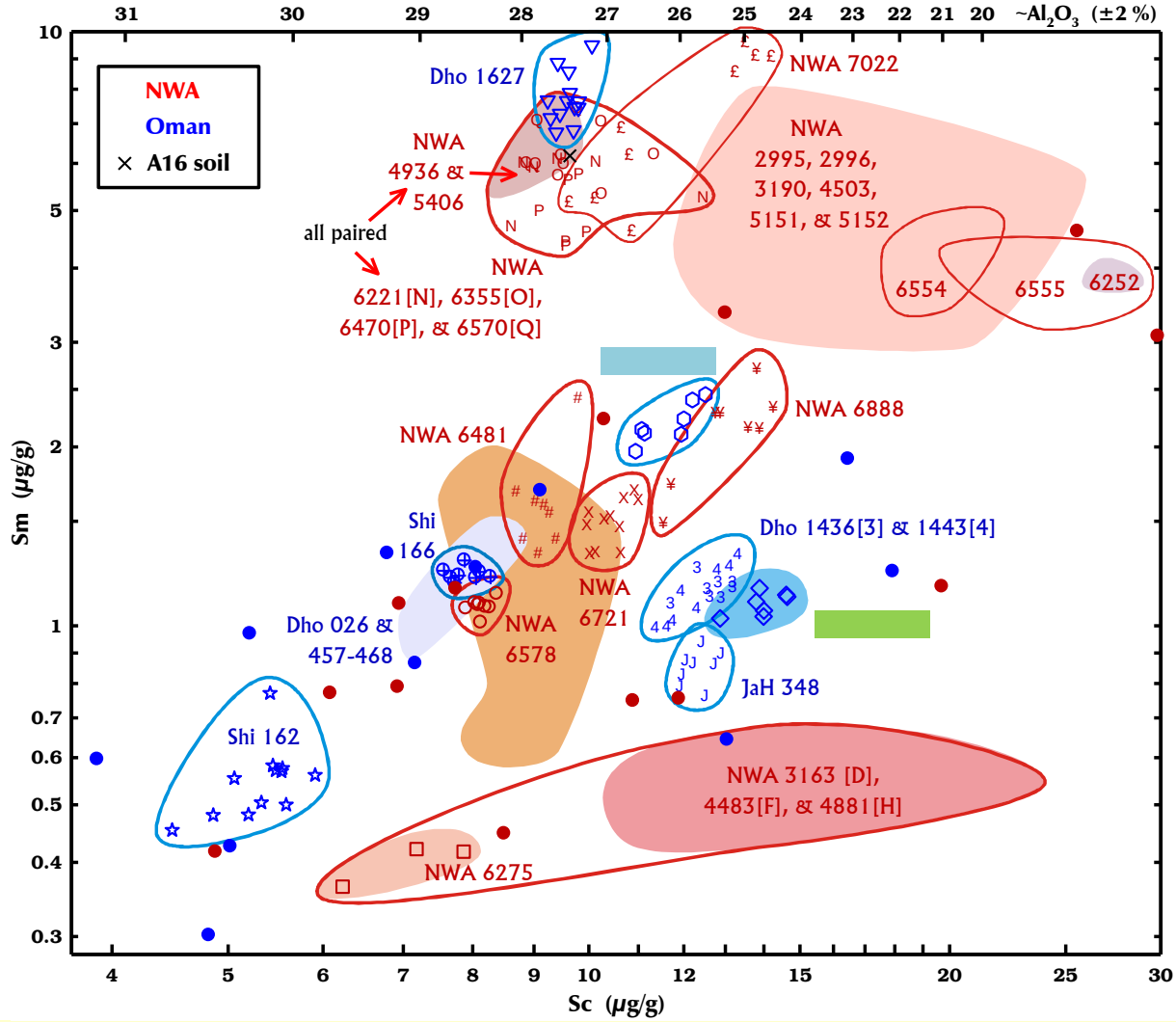

Fig. 1. Sc and Sm in subsamples of feldspathic lunar meteorite stones discussed here. Data for NWA 4936/5406, NWA 2995 et al., and NWA 3163/4483/4881 are from [1] and [3]. Data for Dhofar 026 et al. are from [3] and [9]. Filled circles represent mean compositions of other hot-desert meteorites not discussed here. The × in the NWA 4936 field represents the mean composition of typical soils from Apollo 16 (see Fig. 3). The top axis indicates approximate Al_2O_3 concentrations.

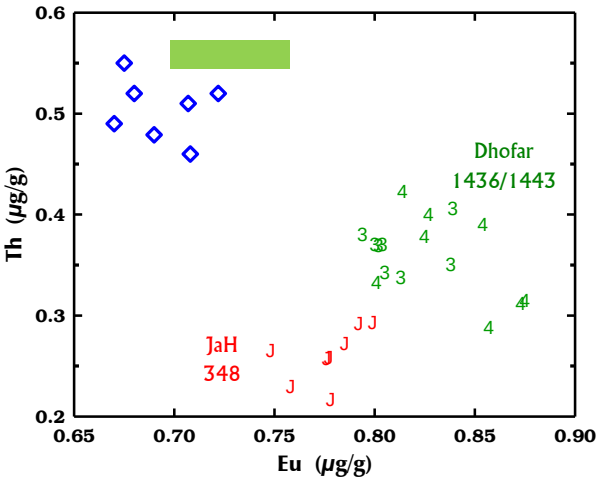

Fig. 2. Although similar to each other in Fig. 1, subsamples of the three meteorites depicted here do not overlap in Eu-Th space.

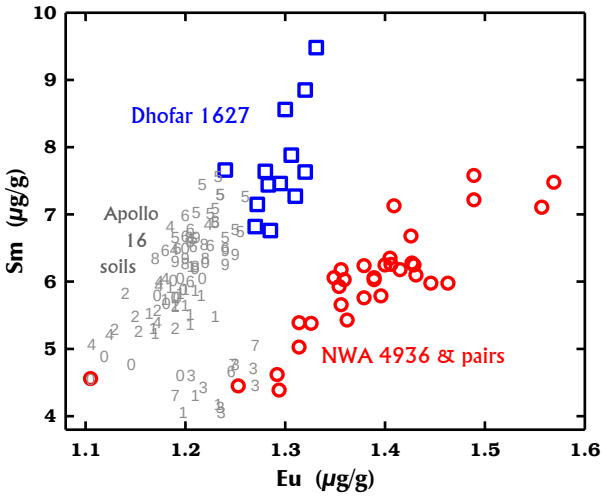

Fig. 3. NWA 4936 and its pairs are similar in composition to Apollo 16 soils (number symbols indicate 2nd digit in sample number), but Eu concentrations are distinctly greater in the meteorite [2]. Dhofar 1627 is more similar to Apollo 16 soils. Soil samples plotting close to NWA 4936 are mainly from North Ray Crater (symbols 3 and 7).

New meteorites. A number of the new lunar stones appear to represent new meteorites in that they are compositionally and petrographically distinct from known meteorites found in the same areas. **NWA 6481** (13.7 g) and **NWA 6721** (184 g, 17 stones) are feldspathic fragmental breccias that were both found in the Hamada du Drâa area of Morocco. The compositions are similar (Fig. 1), but for some elements (Br, Ba, Eu) there is a distinct compositional hiatus between subsamples of the two meteorites (not shown). **NWA 6578** (1638 g) is a granulitic breccia that is more feldspathic and richer in incompatible elements than NWA 3163/4483/4881, the other NWA granulitic breccia (Fig. 1). **NWA 6888** (208 g) is a feldspathic impact-melt breccia that is the more contaminated with terrestrial Ba (0.6%) than any lunar meteorite we have studied. **NWA 7022**, a dilithologic breccia that we discuss in another abstract [7], is unusually sodic but compositionally indistinguishable from MIL 090036 [8]; it may be a launch pair.

From Oman, **Dhofar 1443** (4 stones, 37 g) is compositionally identical to Dhofar 1436 found 0.8 km away and we assume that the two are paired. **JaH (Jiddat al Harasis) 348** (18.4 g) is similar (Fig. 1), but not identical (Fig. 2), in composition and texture to Dhofar 1436/1443; it might be a launch pair. [redacted] (53 g) is a metal-rich (1200 µg/g Ni), feldspathic impact-melt breccia that is similar to, but in detail different from, Dhofar 1436/1443 and JaH 348 in lithophile element concentrations (Figs. 1,2). [redacted] (213 g) is another moderately mafic impact-melt breccia, but with concentrations of incompatible elements at the high end of the range usually seen among feldspathic lunar meteorite. Metal rich (550 µg/g Ni) **Dhofar 1627** (86 g) has the greatest concentrations of incompatible elements among feldspathic lunar meteorites from Oman (Fig. 1). It is similar in composition to the NWA 4936/5406 pair group (Fig. 1), but is different for some element concentrations (Fig. 3) as well as texture. **Shişr 162**, at 5525 g, is the largest lunar meteorite find from Oman. It is a highly feldspathic (31% Al_2O_3) impact-melt breccia. **Shisr 166** (129 g), a vesicular impact-melt breccia, is compositionally indistinguishable from paired stones Dhofar 026 (38 km east southeast) and Dhofar 457–468 (33 km south [9]), all granulitic breccias.

Curiosity. Lunar meteorites found in hot deserts are larger than those found in Antarctica (Fig. 4). Those from the Sahara tend to be the largest.

Acknowledgment. This work was funded in part by NASA grants NNG04GG10G and NNX11AB26G to RLK.

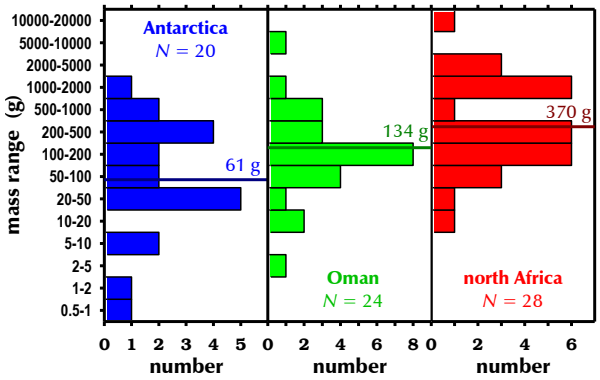

Fig. 4. Comparison of mass distributions for lunar meteorites from Antarctica, Oman, and northern Africa (all stones of a pair group = 1 meteorite). The horizontal lines represent the geometric-mean masses, 61 g, 134 g, and 370 g.

References. [1] Korotev R. L. et al. (2009) LPSC 40, #1137. [2] Korotev R. L. et al. (2009) *M&PS* **44**, 1287–1322. [3] Hudgins J. A. et al. (2011) *GCA* **75**, 2865–2881. [4] Kuehner S. M. et al., NWA 7007, this conf. [5] Shaulis et al., this conf. [6] Zeigler R. A. et al. (2007) LPSC 38, #2109. [7] Kuehner S. M. et al., NWA 7022, this conf. [8] Korotev R. L. et al. (2011) LPSC 42, #1999. [9] Warren P. H. et al. (2005) *M&PS* **40**, 989–1014.