

Dhofar 302

Anorthositic impact melt breccia

3.83 g

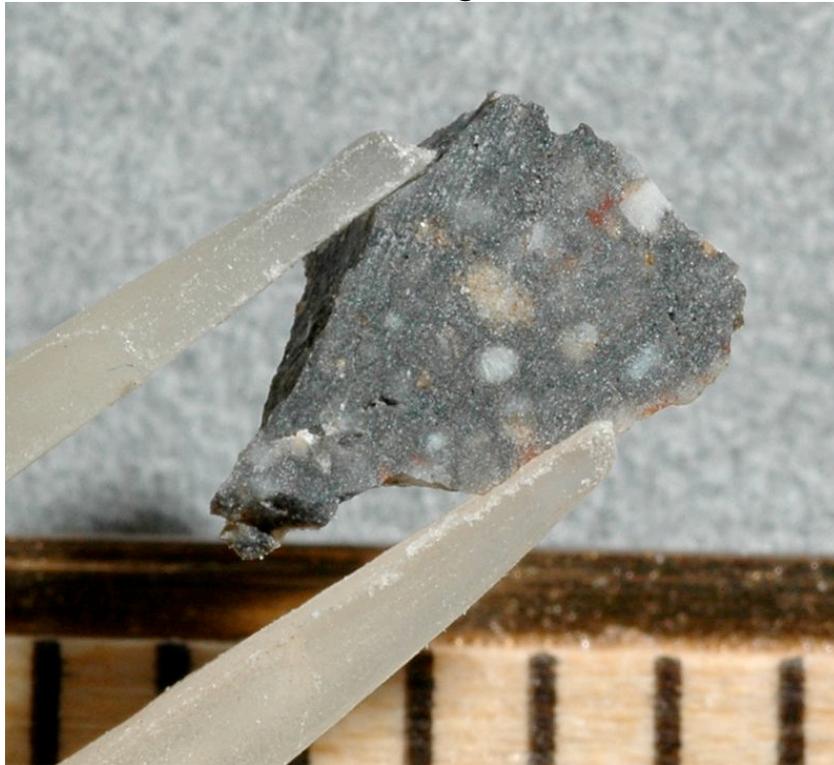


Figure 1: Cut slab of Dhofar 302 showing feldspathic clasts in a breccia. Divisions on scale are 1 mm.

Introduction

Dhofar 302 (Fig. 1) was found in the Dhofar region of Oman (Figs. 2 and 3) in June, 2001. The 3.83 g stone lacks fusion crust, but has very little terrestrial weathering products. Although it has been found near many other feldspathic lunar meteorites in the Oman desert, its distinctive composition has precluded its pairing with other Dhofar meteorites. As a result, it may be a unique stone without recognized pairs.

Petrography and mineralogy

This meteorite is a clast-rich impact melt breccia. The lithic clasts are comprised of both primary igneous rocks and granulites of anorthosite, gabbro-norite and troctolite lithologies (Russell et al., 2002; Nazarov et al., 2002). There are also rare glass fragments of KREEP composition. Plagioclase feldspar ranges in composition from An₉₀ to An₉₉, and olivine varies from Fo₈ to Fo₉₄ (Nazarov et al., 2002). Accessory phases include Ti-rich chromite, MgAl spinel, ilmenite, baddeleyite, silica, troilite, and FeNi metal. The compositions of olivines, pyroxenes and feldspars bridge the gap between FAN and Mg suite rocks of the Apollo highlands samples (Fig. 4).

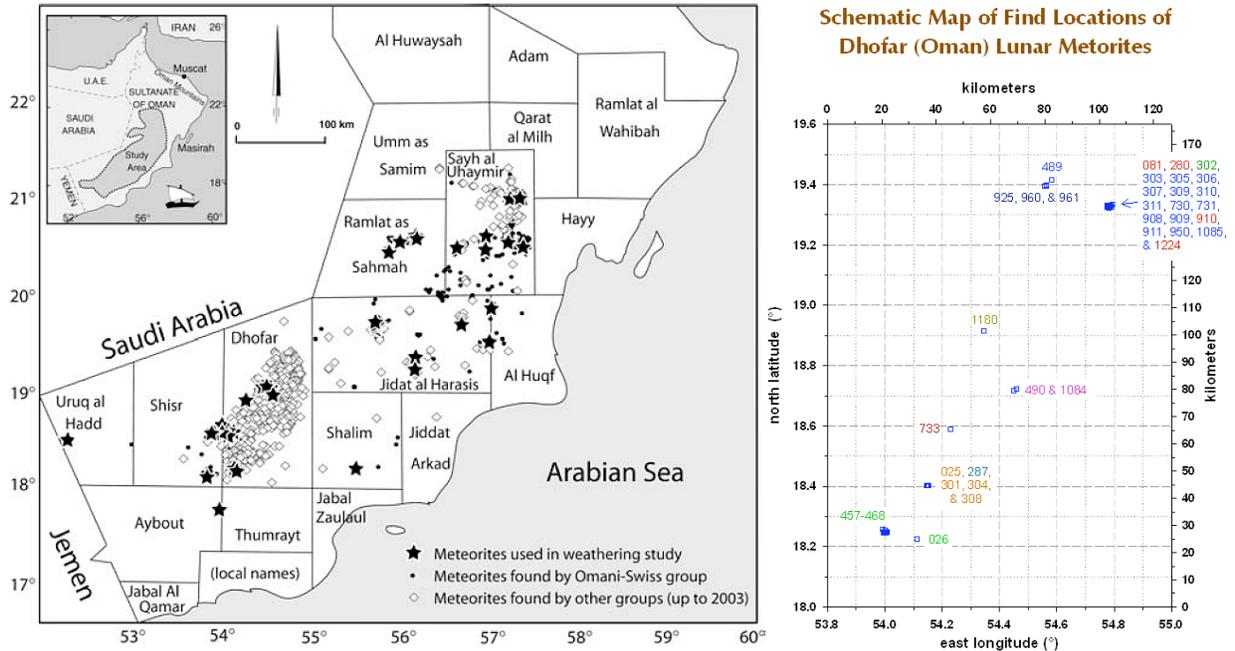


Figure 2 and 3: Location maps of the Dhofar region in Oman (from Al-Kathiri et al., 2005) and the specific coordinates for Dhofar 302 (in green, upper right).

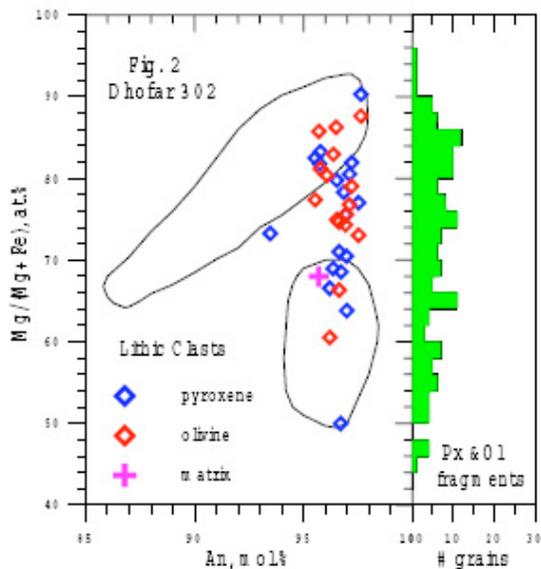


Figure 4: Mg# (in olivine, pyroxene and matrix) vs. An content (mole%) for lithic clasts and fragments of the Dhofar 302 lunar meteorite compared to fields defined for FAN and Mg suite rocks of the Apollo collection. (from Nazarov et al., 2002).

Chemistry

Dhofar 302 is similar to other feldspathic highlands breccias having Mg# near 0.70, Sc ~ 6 ppm, and Ni ~ 200 ppm. The extent of terrestrial desert weathering can be monitored with Ba and Sr contents relative to other feldspathic highlands meteorites such as those from Antarctica (Fig. 5). Dhofar 302 has Ba and Sr contents lower than many other Dhofar lunar meteorites, consistent with its lack of alteration products and minerals that are prevalent on many desert meteorites. Compositional aspects of Dhofar 302 have not been studied in great detail and will be of great interest.

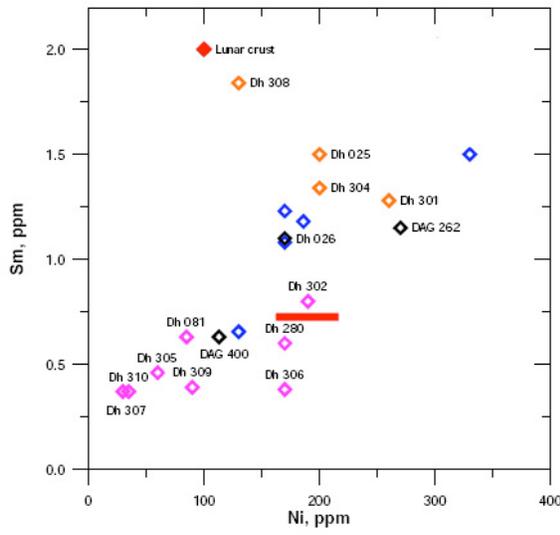
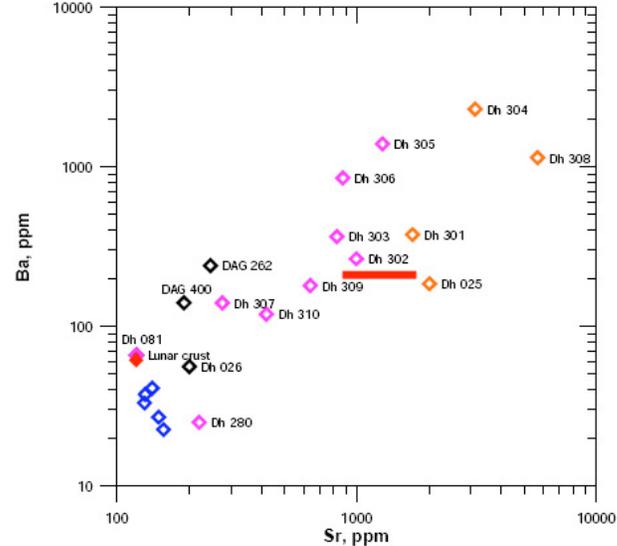
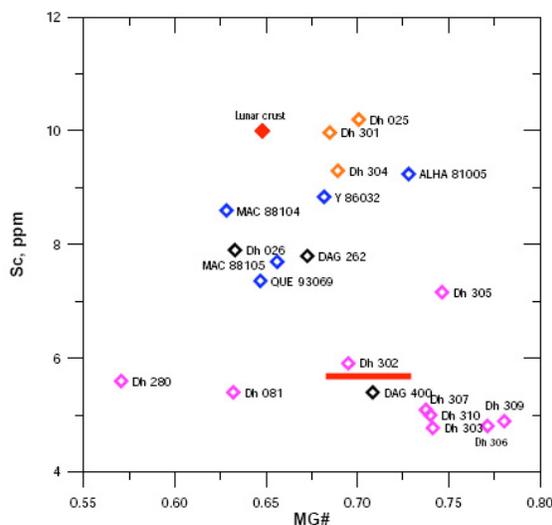


Figure 5: Mg# vs. Sc, Ba vs. Sr, and Sm vs. Ni for some Dhofar lunar feldspathic meteorites, compared to Antarctic lunar feldspathic meteorites (from Nazarov et al., 2003). Dhofar 302 is underlined in red in each figure.

Radiogenic age dating

No work has been reported yet.

Cosmogenic isotopes and exposure ages

No work has been reported yet.