Dhofar 1436 / 1443

Anorthositic impact melt breccia

24.2, 36.7 g

Figure 1: Slice through Dhofar 1443 with 1 mm scale bars below (photo by R. Korotev).

Introduction

Dhofar 1436 (paired with Dhofar 1443; Fig. 1) was discovered by an anonymous finder in 2004 on a limestone plateau in the Dhofar region of Sultanate of Oman, far from other known lunar meteorites (Fig. 2 and 3). It consists of a single brownish-green 24.2 g stone, and fusion crust is absent. Dhofar 1443 is a slightly larger stone of 36.7 g (Connolly et al., 2008).

Petrography and mineralogy

The meteorite consists of lithic and mineral clasts embedded in a partially devitrified glassy matrix with abundant bubbles, and can be classified as an impact melt breccia. The lithic clasts are mainly impact melt breccias and rocks of anorthositic, gabbro-anorthositic, and gabbro-noritic lithologies, with minor granular breccia clasts. Lithic fragments range from 0.01 to 7 mm in size. The major minerals are pyroxene (orthopyroxene - $En_{68.2-84.1}Wo_{0.2-5.0}$; Fe/Mn 62 and clinopyroxene - $En_{13.4-63.7}Wo_{12.8-40.5}$; Fe/Mn 63), feldspar ($An_{92.5-98.7}Ab_{1.1-7.2}$), with minor olivine ($Fo_{42.6-72.7}$; Fe/Mn 96). Accessory phases are silica, Al-Ti chromite, ilmenite, Ca-phosphate, troilite and FeNi metal (from Connolly et al., 2008).

Chemistry

Compositional data so far are limited to analysis of the glassy matrix composition: SiO_2 = 45.1, TiO_2 = 0.26, Al_2O_3 = 30.8, FeO = 4.49, MgO = 3.94, CaO = 16.7, Na_2O = 0.48,

K_2O = 0.04 [all wt%, and represents an average]. Oxygen Isotope values fall within the field expected of a lunar meteorite: $\delta^{17}O$=3.286; $\delta^{18}O$=6.244 (both ‰) (from Connolly et al., 2008).

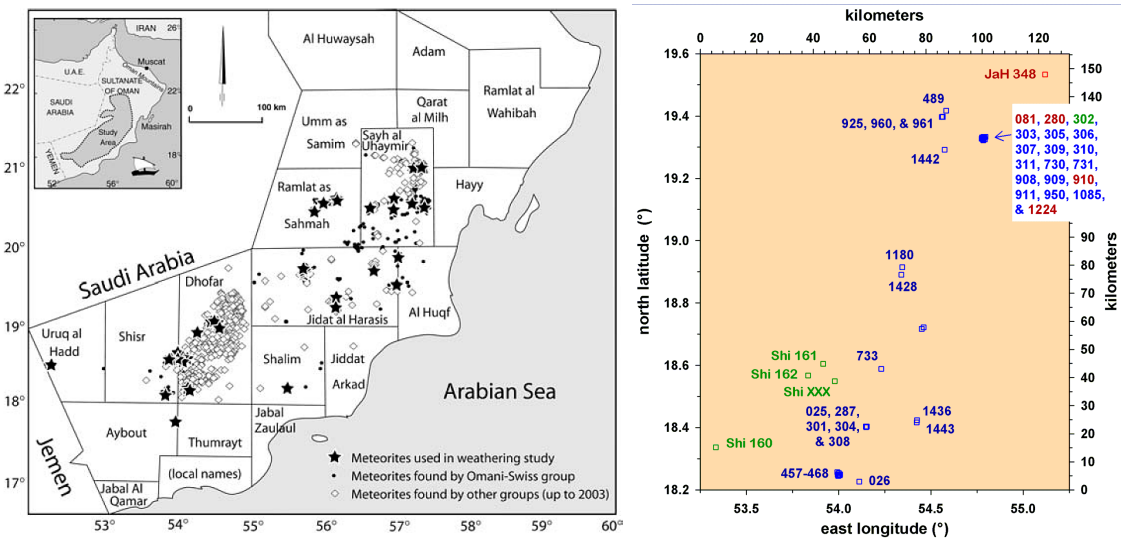

Figure 2 and 3: Location maps of the Dhofar region in Oman (from Al-Kathiri et al., 2005) and the specific coordinates for Dhofar 1436 and 1443 (bottom center; from R. Korotev).

Radiogenic age dating

Korochantseva et al. (2009) analysed two lithologies in Dhofar 1436 – dark matrix material and a brown clast - by high resolution Ar-Ar stepheating. The dark matrix yielded an age of 3.93 Ga for gas released between 1060 to 1380 C. The brown clast yielded an age of 3.93 to 4.09 Ga. In addition, this sample was found to be a gas-rich breccia, which suggests a derivation from mature regolith (Korochantseva et al., 2009).

Cosmogenic isotopes and exposure ages

None yet reported.

K. Righter, Lunar Meteorite Compendium, 2010