# Miller Range 07006

Anorthositic breccia

1.368 g

*Figure 1: Image taken of MIL 07006 in the Antartcic Meteorite Laboratory at NASA JSC. 1 cm scale cube with mm ticks on ruler in foreground.*

## Introduction

Miller Range (MIL) 07006 is a very small meteorite (Fig. 1) found in the Transantarctic Mountains by the 2007-2008 ANSMET search team (Fig. 2). The exterior has a small amount of tannish-brown fusion crust. The interior is a dark gray matrix with white clasts throughout (Fig. 1).

## Petrography

The initial classification of this meteorite was based on one thin section that happened to have some basaltic material, and therefore was called a basaltic lunar breccia. However, observations from subsequent sections have shown that this is a feldspathic breccia, in agreement with the bulk compositional studies as well (see below). Most lithic clasts are 0.5–2 mm in size and feldspathic litholgies (breccia, ferroan anorthosite, impact-melt glass). However, Liu et al., 2009 observed two small clasts (50–100µm) that are suspected to be basaltic (A and B in Fig. 4) based on

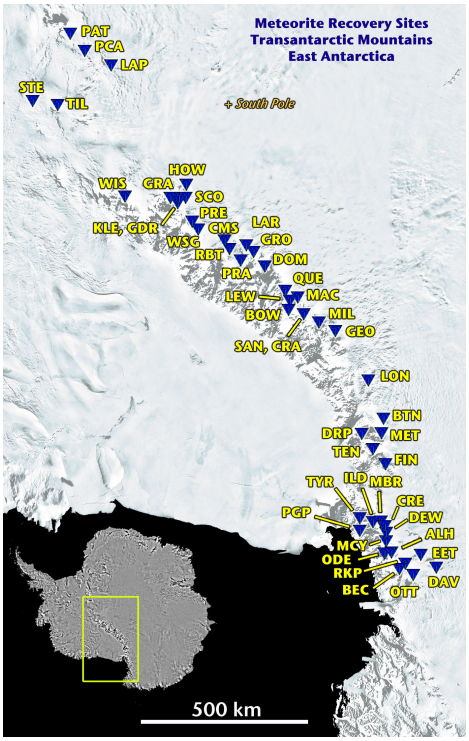


*Figure 2: Location map of ANSMET regions, showing GRA at the northern end of the Trans Antarctic Mtns.*

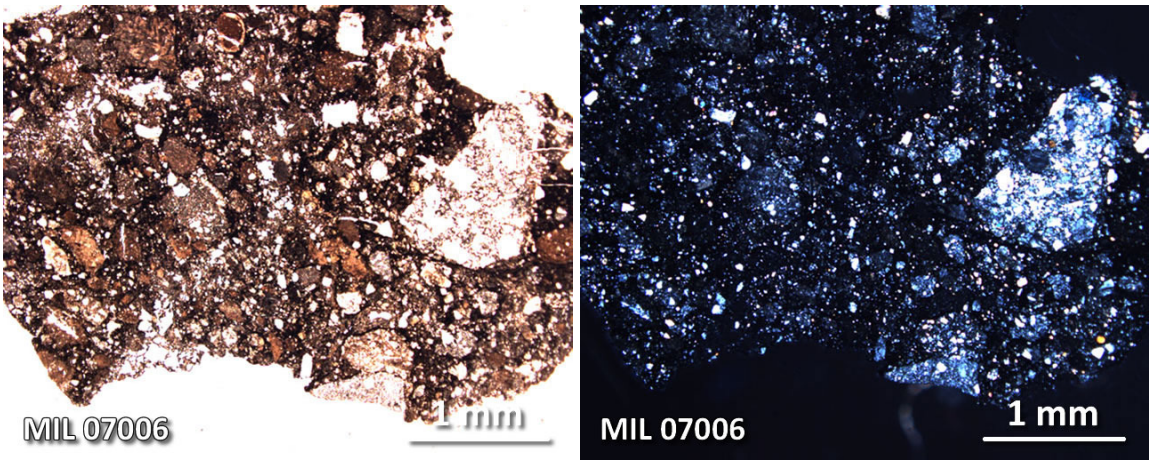


*Figure 3: Plane polarized light (left) and crossed nicols (right) photomicrographs of MIL 07006.*

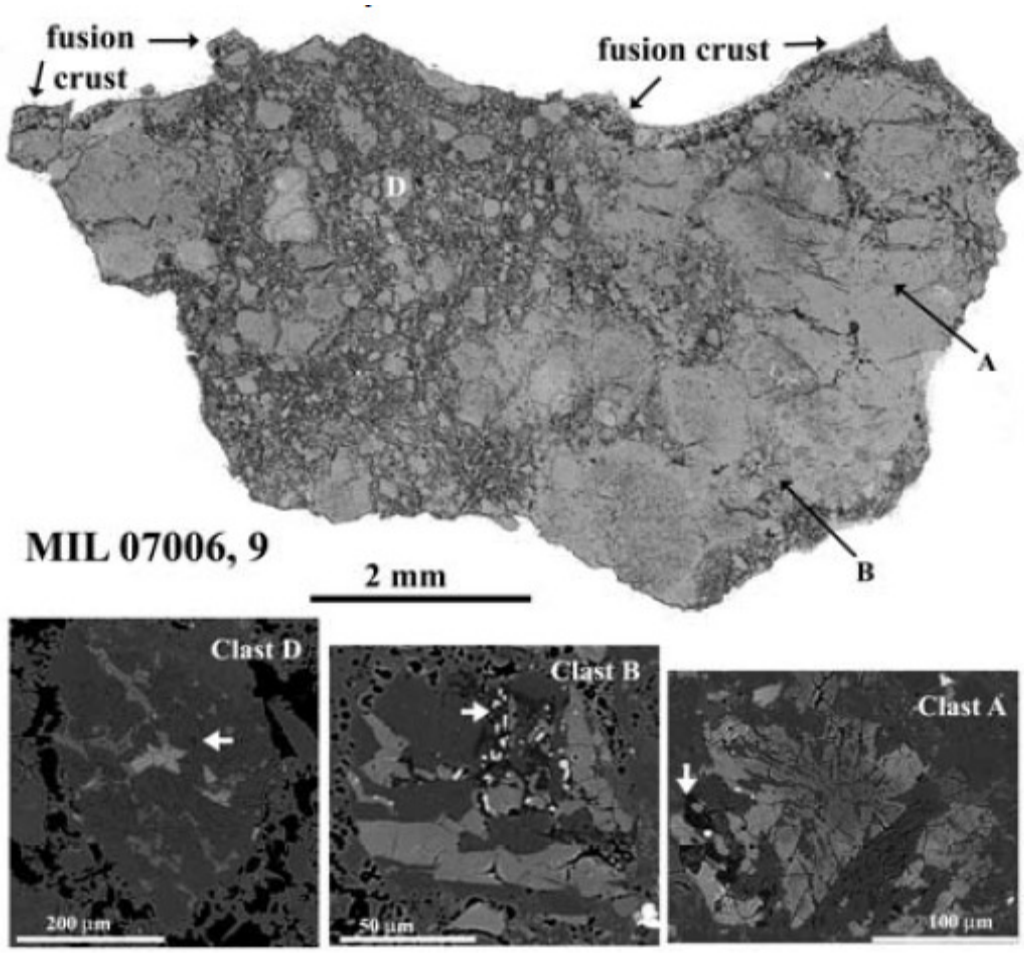


*Figure 4: Photo mosaic of MIL 07006, 9. A, B, and D indicate some lithic clasts. All three contain silica (white arrows) while clasts A and B also contain ilmenite. Clasts A shows compositional zonation in pyroxene. Clast D is a gabbro clast (from Y. Liu et al., 2009).*

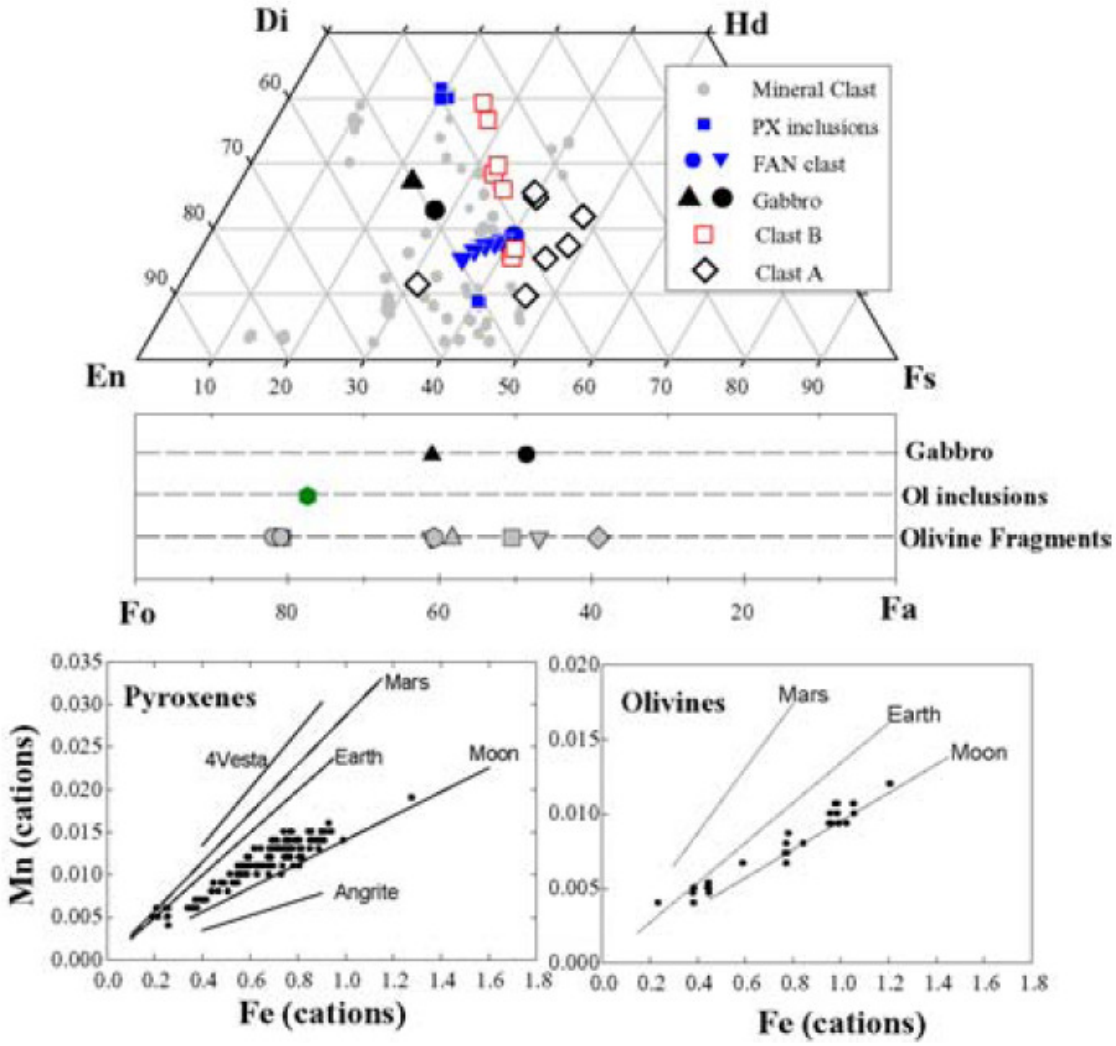


*Figure 5: Compositions of pyroxene and olivine in MIL 07006, 9 (from Y. Liu et al., 2009).*

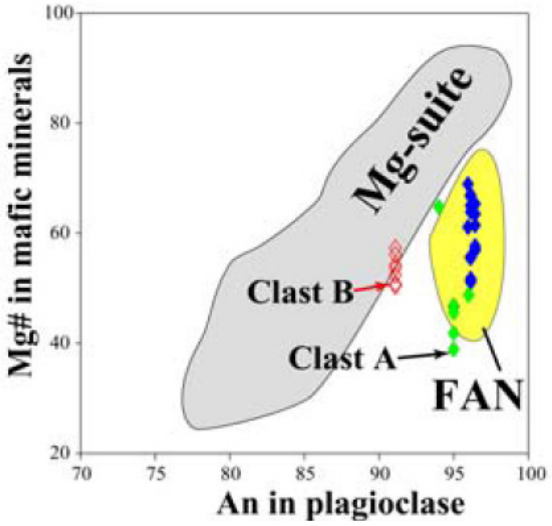


*Figure 6: Compositional ranges of plagioclase and mafic minerals in some lithic clasts from MIL 07006, 9 (from Y. Liu et al., 2009).*

texture, zoned pyroxene, and presence of silica and ilmenite. Zoning on the pyroxenes and olivines is evident (Fig. 5), and the plagioclase feldspars are very calcic as it typical of lunar feldspathic rocks (Liu et al., 2009).

## Chemistry

INAA analysis of MIL 07006 has revealed that this sample is very similar in composition to the feldspathic breccias Yamato 791197 and it has been suggested they could be launch paired (Korotev et al., 2009a).

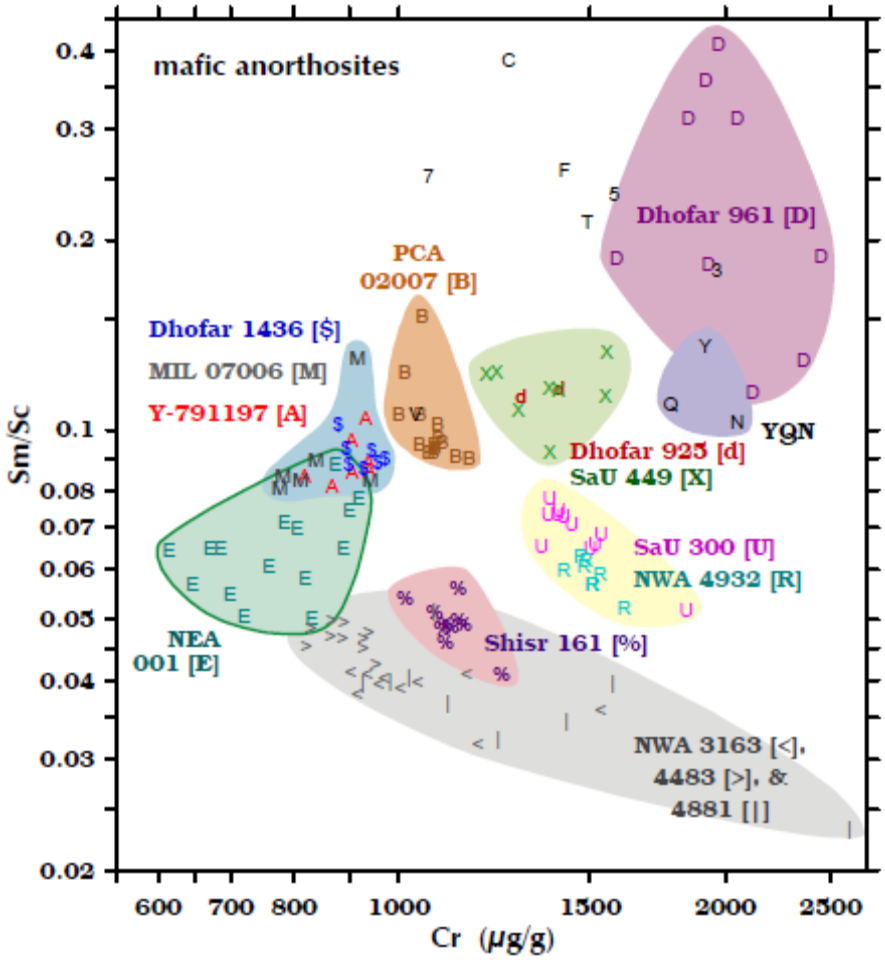


*Figure 7: Sm/Sc versus Cr for MIL 07006 compared to many other feldspathic lunar meteorites (from Korotev et al., 2009a).*

## Radiogenic age dating

None yet reported.

## Cosmogenic isotopes and exposure ages

None yet reported.

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