Collection of Meteorites from Grove Mountains, East Antarctica. Y. Lin[1], B. Miao[2], and S. Hu[1], [1]Key Laboratory of the Earth's Deep Interior, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China, Email: LinYT@mail.igcas.ac.cn, [2]Department of Resources & Environmental Engineering, Guilin University of Technology, Guilin, China.

Searching for Antarctic Meteorites in Grove Mountains

Grove Mountains (75°E, 73°S) locate on the east side of Lambert Rift, Princess Ellisaberth Land, East Antarctica. The region has an average altitude of 2000 m above the sea level, and a straight-line distance of 380 km from the Zhongshan Station. It consists of 64 nunataks in a region of 8000 km^2. These nunataks stretch northeast in an echelon arrangement, blocking the flow of ice sheet from the eastern ice plateau (Fig. 1a,b). Majority of the meteorites were found downstream along the most eastern ridges (Fig. 1a).

The first geological survey of Grove Mountains was conducted by the 15th Chinese Antarctic Research Expedition (CHINARE) during the Australian summer season in 1998-1999. Four meteorites, including 1 iron, 1 L5, 1 H5 and another ordinary chondrite, were found on the blue ice, indicative of a new meteorite-concentrated region. These meteorites were named as Grove Mountains (GRV) 98001-98004. The next year exploration of Grove Mountains resulted in a discovery of 28 meteorites, including a martian meteorite (GRV 99027) [1-4] and an eucrite (GRV 99018) [5]. This discovery promoted establishment of a meteorite-hunting team during the 19th CHINARE in 2002-2003, and it was proved very successful by collection of 4448 meteorites. Continuous search for meteorites were conducted in the same areas in the last two explorations in 2005-2006 and 2009-2010, with collections of 5354 and 1618 meteorites, respectively.

In Grove Mountains, there are a number of moraines among the nunataks. A large proportion of meteorites were found in these moraines. In fact, the blue ice surface was also full of fragments of bedrocks (Fig. 1c). Normally, the margins between the moraines and blue ice were most meteorite-enriched. It was also noticed that many of the meteorites were found in the same areas that had been carefully searched in the last explorations. One possibility is that the meteorites emerged after removing a thin layer of firn by strong wind.

Each meteorite was documented in detail in the field, and kept frozen all the time from the field to the Polar Research Institute of China at Shanghai.

Curation and Classification of Grove Mountains Meteorites

All of the Antarctic meteorites were curated in the Polar Research Institute of China at Shanghai. After return back from Antarctica, the meteorites were stored with the snow and ice samples in the frozen storerooms. The samples selected for classification were first kept in a vacuum chamber overnight to avoid appearance of melted water when the samples were warmed up to a room temperature. All of the selected samples were then weighed, photographed and described under microscope. The magnetic susceptibility of these meteorites were also measured [6]. The magnetic susceptibility can be used for classification, however, there are significant overlaps between H, L and LL groups (Fig. 2). Finally, two sections were made out of each meteorite for petrographic classification.

Up to date, a total of 2436 meteorites have been classified and named. Of the classified samples, there are 2 lherzolitic shergottites, 2 eucrites, 20 carbonaceous chondrites, 10 mesosiderites, 1 pallasite, 9 ureilites and 2 primitive achondrites. It is also noticed that a large proportion of the equilibrated L-group Grove Mountains meteorites were heavily shocked (Fig. 3), and many of them show complicated shock-induced high-pressure mineral assemblages with highly fractionated compositions [7-9]. The detailed information of these samples can be accessed from the Resource-Sharing Platform of Polar Samples (http://birds.chinare.org.cn/index/) and the Meteoritical Bulletin Database.

In order to promote the study of meteorites in China, researchers are encouraged to classify these meteorites, under supervision of the Antarctic Meteorite Classification Committee. There are eight groups from the Chinese Academy of Sciences and 3 universities involved in the classification.

Sample application

All classified Grove Mountains meteorites are accessible as loans to international researchers. The sample applications should be submitted to the Polar Research Institute of China at Shanghai in March and October. These applications will be reviewed by the Antarctic Meteorite Sample Application Committee.

References

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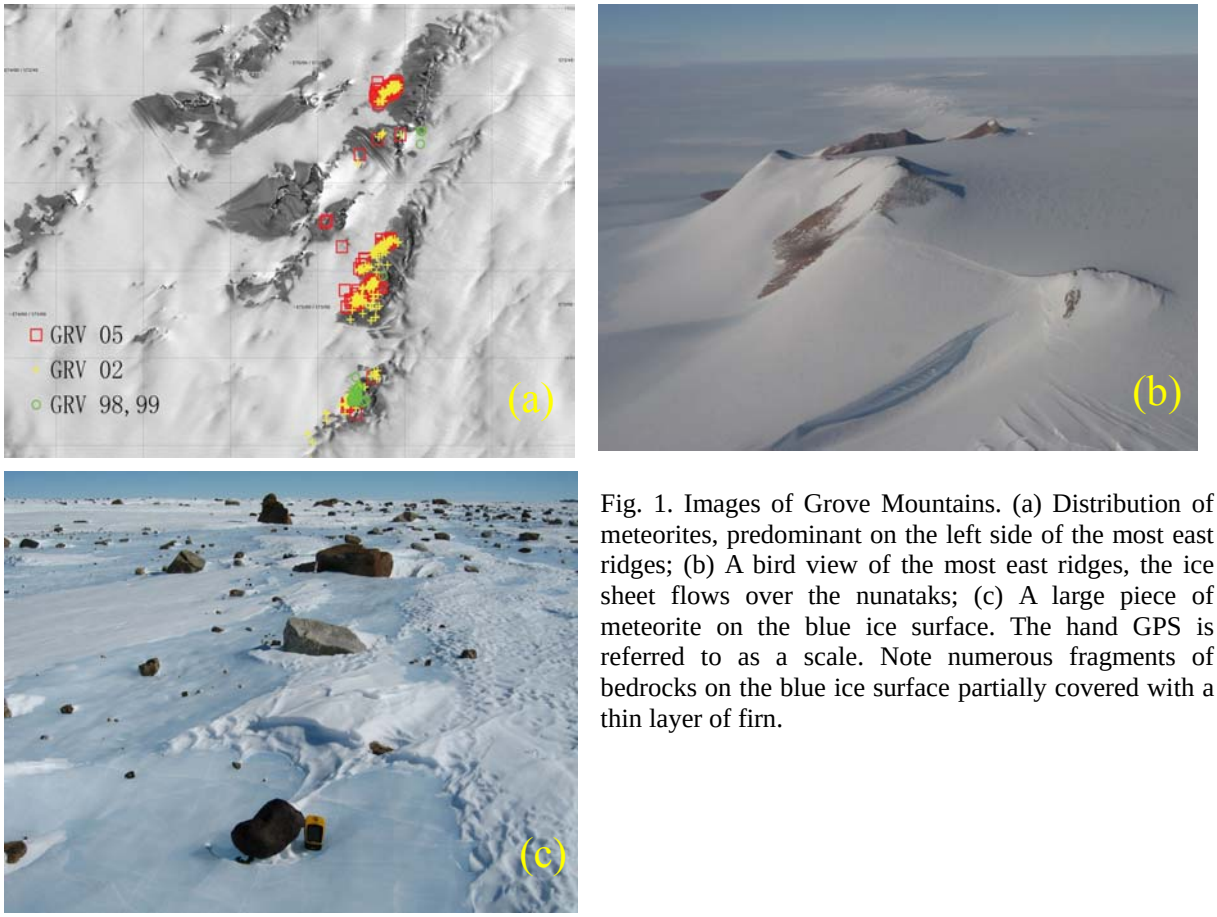

Fig. 1. Images of Grove Mountains. (a) Distribution of meteorites, predominant on the left side of the most east ridges; (b) A bird view of the most east ridges, the ice sheet flows over the nunataks; (c) A large piece of meteorite on the blue ice surface. The hand GPS is referred to as a scale. Note numerous fragments of bedrocks on the blue ice surface partially covered with a thin layer of firn.

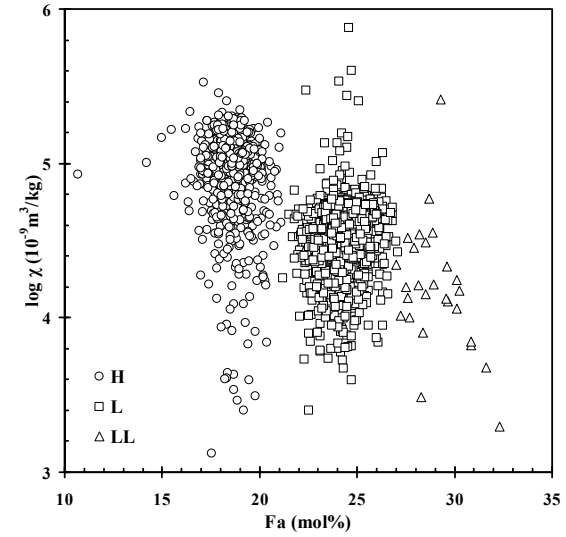

Fig. 2. Magnetic susceptibility versus the Fa-contents of olivine of the classified equilibrated ordinary chondrites from Grove Mountains.

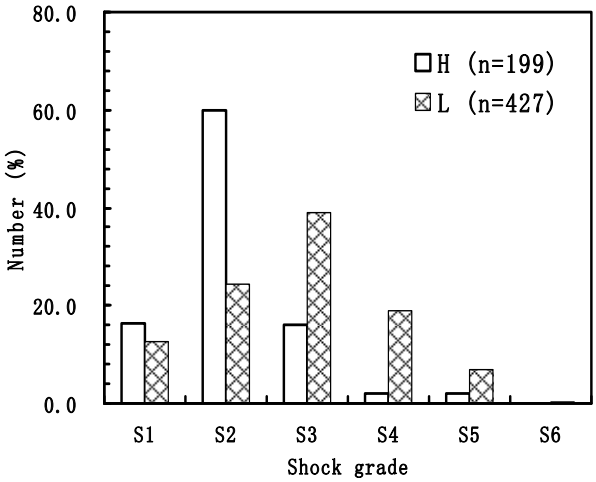

Fig. 3. Distribution histogram of the shock grade of H and L chondrites from Grove Mountains, note a significant proportion of L-group meteorites heavily shocked.