

THE HISTORY OF URFU METEORITIC EXPEDITIONS

L. A. Muravyev^{1,2} and V. I. Grokhovsky¹

¹Ural Federal University 620002, Myra st.19, Ekaterinburg, Russia, grokh47@mail.ru;

²Institute of Geophysics Ural Branch of RAS, 620016, Amundsen st. 100, Ekaterinburg, Russia, mlev@igeoph.net

Studies of meteorites in the Ural Federal University have been carried out since 1949, when Ivan Yudin organized a search for the meteorite Kunashak (L6), which had just fallen on South Urals, in the border of the Sverdlovsk and Chelyabinsk Regions. When Soviet and American space missions brought lunar soil to Earth, metal samples entered the laboratory of the Physics and Technology Faculty of the Ural Polytechnic Institute. The research was conducted by a scientific group under the guidance of professor R.I.Mints. It revealed that many metallic particles of the lunar soil are meteoric in nature.

Since 1986, the University has a noncommercial Meteorite Expedition. Every year, students and university staff conduct fieldwork to search for and collect the substance of various meteorite showers on the territory of the USSR and Russia.

As a result of the first expedition in 1986, 15 kg of ataxite Chinga samples were found in the eternal frost of the small stream in Tyva region, South of Siberia. Work on the search for fragments of the Chinga meteorite was carried out in 2000 and 2001. Search in the area of the fall of the famous iron meteorite Sikhote-Alin was carried out in 1987 and 1997. During the expedition on 1989, we purchased from the local population more than 130 kg of Tsarev (L5) meteorite material, among which was the second largest fragment of a meteorite. Also, new findings were made in 1999. Found fragments allowed clarifying orientation, size and shape of the ellipse dispersion fragments of the meteorite [2]. At that date, Tsarev meteor shower became the third stony meteorite in the world by the mass.

The expedition also repeatedly investigated Kunashak meteorite dispersion ellipse, worked in the area of the fall of the meteorite Zhigansk (Yakutia) and in the deserts of Turkmenistan. These works were not successful. In 2012, 168 kg of the palassite Seymchan was found.

We use different methods of search: instrumental search using metal detectors and geophysical methods [3], visual search in the fields, excavations, questioning of eyewitnesses. A systematic work is underway to monitor the flights of bolides. In 2003, the track of the bolide over the Urals was traced. In 2004, the expedition participated in the search for the place of the fall of Vitim Bolide. A positive result was obtained in the calculation of the Kol'sky Bolide of 2014 and the expedition found the meteorite, named Annama (H5, 167.9 g).

Participants in the meteorite expedition were the first to arrive at the site of the meteorite fall Chelyabinsk (LL5, 2013), determined the meteorite nature of the observed phenomenon and organized a search. This became possible due to the fact that the meteorite expedition constantly monitors the reports on bolides in the media and has experience of interaction with the population, search and questioning of eyewitnesses of these phenomena. Since 2016, a bolide network is being developed on the Urals, providing a continuous video recording of the sky. Video recording allows accurate calculation of the coordinates of the fall.

The results of the Chelyabinsk meteorite investigations made our expedition known to the whole world [5] and gave a new impulse to the search and study of meteoritic matter. Since 2015, the Meteorite Expedition UrFU has international status. In December 2015 – January 2016, the Ural Federal University field team as a part of 61 Russian Antarctic Expedition conducted field work in order to find and recover antarctic meteorites on the blue ice fields at Lomonosov Mountains, Queen Maud Land. Within two weeks of field operations about 30 kg of material was found which appearance has similarities to meteorites [1]. January 2017 – expedition to the Lut desert in Iran [4]. As the result of the expedition, 14 kg of meteorites were collected. October 2017 – the Atacama Desert, Chile. In 2018, we plan to organize a meteorite experiment in the stony deserts of the southwestern part of Mongolia. During the years of the expedition, 351 people participated in the fieldwork.

Now the meteorite collection of the Ural Federal University obtained the status of a repository and presents more than 500 kg of meteorites of various types. The collected material is studied by scientists and students in the laboratories of the UrFU, and exchanges with museums and other research centers.

Acknowledgement: This work was supported by the Act 211 of the Government of the Russian Federation, agreement no. 02.A03.21.0006 and the Ministry of Education and Science of the Russian Federation (The projects 5.4825.2017/6.7).

[1] Larionov et al (2016) *Meteoritics & Planetary Science* 51 S1: A400.

[2] Muravyev L. A., Grokhovsky V. I. (2016) *Meteoritics & Planetary Science* 51 S1: A477.

[3] Narkhov E. D. et al (2005) *AIP Conference Proceedings* 1886, 020075

[4] Pastukhovich et al (2017) *Meteoritics & Planetary Science* 52 S1: A265.

[5] Popova et al (2013) *Science* 6162, 1069-1073