VISUAL SPECTRA OF SOME CHONDRITES AND TERRESTRIAL BASALTS A. V. Efimov[1], A. K. Murtazov[2], Ryazan State University named for S. Yesenin, 390000, 46 Svobody St., Ryazan, Russia; ([1]a.efimov@365.rsu.edu.ru; [2]akmurtazov@gmail.com)

Introduction: The task of measuring terrestrial rock reflectance spectra and their comparison with the spectra of meteoroids and asteroids is extremely important. It is related both to the Solar system body origin and its evolution problem, and the problem of detecting space bodies dangerous for the Earth.

Researchers from many countries have accumulated extensive experimental and observational material as far as the comparison between spectral and photometric peculiarities of basic terrestrial rocks, stony asteroids, and meteorites [1-3; 5; 6; 10; 11].

The work presents the results of measuring the spectra reflected by the lava samples collected in the caldera of Teide, Tenerife, and also the spectra of reflection by a number of terrestrial basalt samples, and two samples of ordinary chondrites fallen on the Earth' surface [4; 7-9].

Measurements: We conducted the measuring of the reflectance spectra, based on the methods previously used for the experiments on physical simulation of photometric and spectral characteristics of satellite and asteroid surfaces [7].

We used a small-size monochromator with a 3-4 nm/mm dispersion concave diffraction grating. As a receiving instrument, we used a photoconductor, which is sensitive within the range of 400-900 nm. The incident and scattering light beams formed the angles of 0 and 45 degrees, respectively, to the sample surface normal. For the standard, the flat surface of MgO was used. The relative error of the measurements was 3-4% in the middle of the spectral range and grew up to 10-12% at the range's limits.

Results: Figure 1 shows some lava samples from the Teide caldera, Tenerife, and their spectra [8, 9]. This lava belongs to acid basalt lavas and is colored from dark brown coming near to black to light grey. It is typical of such volcanos and contains a number of chemical elements, e.g. sulfur. Their surface is covered with craters from air bubbles, 0.5–1.0 mm in size, which perfectly well imitates the crater faced surface of the Solar system atmosphereless bodies. The lava sample spectral curves have a radiation excess of 600 – 750 nm and an absorption band of $\lambda > 800$ nm.

Figure 2 shows Earth basalt pictures and spectra from different regions of Russia, Ukraine, and Armenia, the chemical composition and exterior are quite similar to those of lava [8, 9]. With these, the radiation excess falls within 550-600 nm.

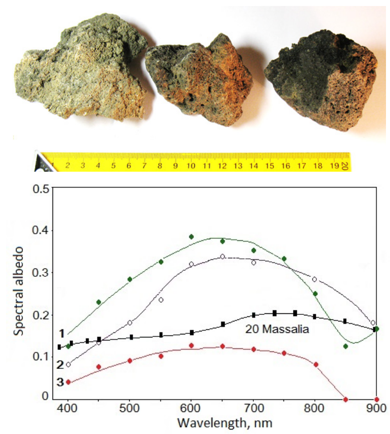

Figure 1

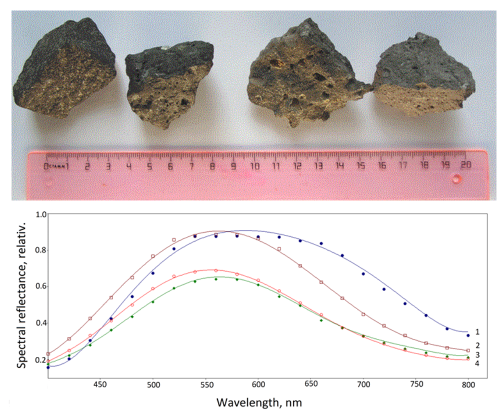

Figure 2

The meteorite Sierra Gorda 008 was found in the Chile's Atacama Desert, Antofagasta province by Timur Kryachko on April, 10, 2018. It coordinates are: Latitude 22°30.15'S; Longitude 69°7.97'W. It was classified as an ordinary chondrite H5.

We investigated the piece from this meteorite with the mass of 53 g (Fig. 3-above, left) was presented by Museum of the Universe, Dedovsk, Moscow region to Ryazan astronomy amauter Alexey Busarov.

The Ozerki meteorite fall occurred June 21, 2018 near the city of Lipetsk, Russia. It was classified as an Ordinary chondrite L6S4-5W0. The meteorite is covered with the crust resulting from its burnout while passing through the atmosphere (Fig. 3-above, right). The inside part with the basic substance looks typical of chondrites.

Fig. 3 (below) shows the spectra of these meteorites in comparison with the basalt lava spectrum.

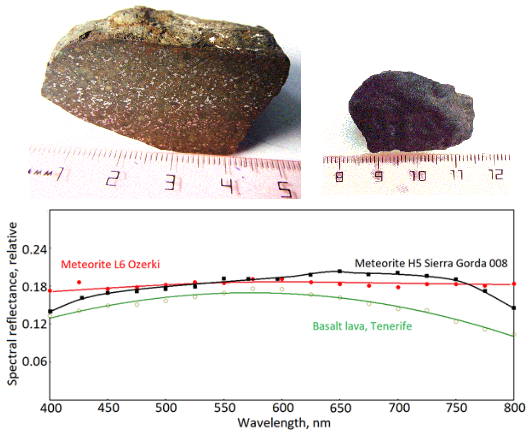

Figure 3

Conclusions: The simplest comparative analysis of volcanic lava and basalt spectra with the spectra of stony meteorites (chondrites) shows, that visibly they are sufficiently similar.

Besides, these spectra are very much similar to those of the stony asteroids [3, 6].

We also analyzed data of the S-asteroid spectra acquired from observations, as well as the experimental data on stony meteorites [1-3; 5, 11]. The analysis resulted in marking the areas on the plane “wavelength-albedo” which occupy these surfaces (Fig. 4).

The results we obtained are close to the multiple data obtained by different researchers.

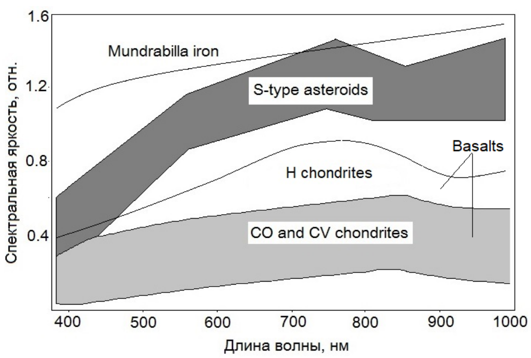

Figure 4

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