Laboratory measurements of volcanic lava spectra in comparison with spectra of meteoroids

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The measuring of terrestrial rock reflection spectra and their comparison with the spectra of meteoroids and asteroids is very important and therefore is frequently carried out by many investigators.
We have some volcanic lava samples from the Teide volcano (Tenerife, Canaries, Spain).
This is basaltic lava (Fig. 1), typical of such volcanoes, which has impregnations of different chemical elements (e.g. sulphur). As known, the composition of stony meteorites and some asteroids' surfaces are close to the structure of ultrabasic volcanic rocks.

Figure 1. The lava samples from Teide volcano, Tenerife

The measuring techniques were earlier developed by us during the physical simulation of asteroids' and artificial satellites' optical properties [2, 3].
The measurements were held within the spectral range of 250-900 nm. For the light source we used a concave grating monochromator (linear dispersion 3-4 nm/mm). For the radiation receiver – a CCD camera Watec-902H normally used in astronomical observations.
The measurement results are presented in Fig. 2. Here the colour lines represent smoothed spectra (reflectance versus wavelength) of the four lava samples.
For comparison, shown here are: the spectrum of S-asteroid 20 Massalia [1] represented by black squares; the region (grey band) containing the average spectra (relative reflectance) for the H, L and LL ordinary chondrite meteorites derived from [4, 5].

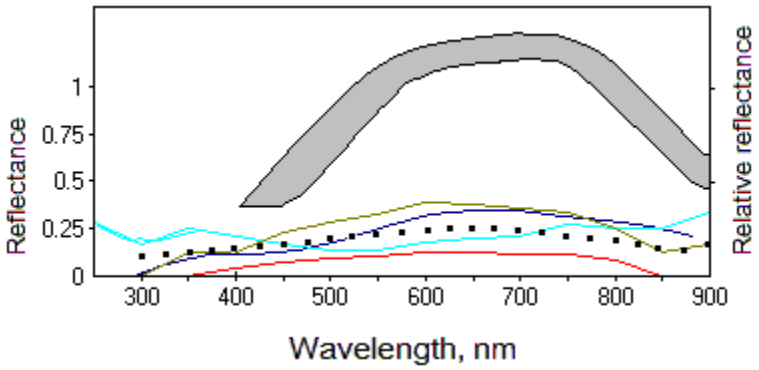

Figure 2. Smoothed lava sample spectra (colour curves) as compared to asteroid 20 Massalia (black squares) and chondrite H, L and LL spectra (grey band)

References

1. *Hiroi T., et al.* (1993). Modeling of S-type asteroid spectra using primitive achondrites and iron meteorites. Icarus. **102,** pp.107-116.
2. *Kuryshev V.I., Murtazov A.K., Vereshchyagin S.I.* (1985). Modelling of astronomical objects photometric characteristics. USSR higher school proceedings. Instrument engineering, **28**, pp. 81-85.
3. *Murtazov A. K.* (2013). Physical simulation of space objects' spectral characteristics for solving the reverse problem of their photometry. American Journal of Modern Physics. Science PG, **2**:6, pp. 282-286.
4. *Trigo-Rodriguez J.M., et al.* (2013). UV to far-IR reflectance spectra of carbonaceous chondrites. I. Implications for remote characterization of dark primitive asteroids targeted by sample-return missions. MNRAS. 27 pp.
5. *Vernazza P., et al.* (2008). Compositional differences between meteorites and near-Earth asteroids. *Nature.***454**, pp. 858-860.