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Basaltic asteroids observed with ESO/XShooter

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1. Introduction

We present new spectroscopic observations of 17 putative basaltic asteroids, in the 0.3-2.5 μm region, with the ESO/XShooter facility. The observed spectral range encompasses the two pyroxene bands centred at 0.9 and 2.0 μm , typical of the basaltic asteroids. The data allowed to taxonomically classify the observed asteroids, and in some cases to confirm their basaltic nature.

2. Data selection and reduction

Observations were carried out at ESO/VLT, equipped with the XShooter spectrograph (Vernet et al. 2011), on 13-14 October 2017 (program ID 0100.C-0698(A)). This instrument allows covering the wavelength region 0.3-2.5 μm in a single acquisition.

Asteroids were selected from lists of putative basaltic asteroids, compiled on the basis of visible (Roig et al. 2006) and near-infrared (Licandro et al. 2017) colors. Putative basaltic candidates, distributed throughout the Main Belt regions, were identified and observed, aiming to compare properties of asteroids belonging to the Vesta family and located outside the family region. In particular, 8 asteroids out of the 17 are located in the Middle region and 4 in the Outer region of the Main Belt. Observational details are provided in table 1.

Data were calibrated using the ESO pipeline REFLEX (Freudling et al. 2013), which includes bias correction, flat-fielding and wavelength calibration. Asteroids were finally divided by solar analogs, to obtain the relative reflectance.

3. Results

Most of the observed asteroids present the two absorption bands at 0.9 and 2.0 μm . However, most of the asteroids located in the middle and outer main belt regions show slightly different pyroxenes bands with respect the typical basaltic absorption bands. Hence, the preliminary taxonomic classification, using the Demeo online tool (Demeo et al. 2009), for most of these asteroids is more close to S and X complex. On the other hand, the basaltic nature is clearly confirmed only for 4 objects, of which only one located in the Outer belt.

Table 1. Observing circumstances.

Asteroid	Semimajor axis (AU)	Inclination (°)
2452	3.157	8.98
5758	2.247	0.58
7675	2.414	7.51
9197	2.163	2.46
10800	2.549	5.30
17239	3.046	2.65
22308	2.773	6.46
36118	2.709	4.25
48797	2.939	3.69
66905	2.746	8.39
67299	2.575	15.6
73076	1.961	21.2
76551	2.373	7.05
85812	2.844	10.2
93580	2.644	16.6
93620	2.632	8.27
189597	2.658	11.1

For the confirmed basaltic asteroids, the acquired spectra have been analysed in order to derive compositional surface information. Comparison with

previously acquired V-type asteroids spectra will also be presented.

The acquired data allow to have a better insight on the selection parameters for putative basaltic asteroids and to provide further progress in the basaltic material distribution throughout the Solar System.

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