Near-infrared spectroscopy of asteroids in the Polana-family region: Where are the Eulalias?

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The inner asteroid belt is an important source of Near-Earth Objects (NEOs). This region is located between the ν_6 resonance near 2.15 au and the 3:1 mean-motion resonance with Jupiter at 2.5 au. The two current targets of sample-return missions are believed to originate in the inner belt (e.g., Campins et al. 2010, 2013). These are asteroid (101955) Bennu, target of NASA's OSIRIS-Rex and 1999 JU3, target of JAXA's Hayabusa-2. Both of these asteroids are unlikely to be primordial objects because their collisional lifetime is much shorter than the age of solar system (e.g., Bottke et al. 2005); thus, they are believed to be fragments of larger objects. In searching for their parent bodies, we have studied low-albedo asteroids in the inner belt and we have identified at least five distinct populations: four families (Clarissa, Erigone, Polana and Sulamitis) and the background of low-albedo asteroids outside these families. The background and the Polana family are the two largest populations (Campins et al. 2010; Delbo et al. 2011).

In order to characterize this source of NEOs, we decided to carry out a spectroscopic study of the Polana family, which we started in 2010. For this study, we define the Polana family as the low-albedo component of the Nysa-Polana complex. Interestingly, a recent publication (Walsh et al. 2013) suggests that there are two families of primitive asteroids with low inclination in this region that can be distinguished using NIR spectroscopy and that would have (142) Polana and (495) Eulalia as their parents bodies.

We present results of two different observational campaigns: Pinilla- Alonso et al. (2014) obtained near-infrared (0.8–2.5 µm) spectra with NICS at the TNG telescope at the "El Roque de los Muchachos" observatory (La Palma, Spain) and with SpeX (Rayner et al. 2003) at NASA's IRTF on Mauna Kea, Hawaii. In de Leon et al. (2014), we present visible spectra of smaller members of this population ($H > 15$), using the 10.4-m Gran Telescopio Canarias (GTC).

Our near-infrared spectra show no objects similar to (495) Eulalia; hence, we see no evidence of two spectroscopically distinct families in this region. On the contrary, all the objects are similar to the spectrum of (142) Polana. Our visible spectra of the smaller objects are more diverse but there is no evidence of two distinct B-type populations.

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References: Bottke et al. (2005), Icarus, 179, 63; Campins et al. (2010), ApJ, 721, 53; Campins et al. (2013), AJ, 146, 26; Delbo et al. (2011), ApJ, 728, 42; de Leon et al. (2014), submitted to A&A; Pinilla-Alonso et al. (2014), submitted to A&A; Rayner et al. (2003), PASP 115,362; Walsh et al. (2013), Icarus, 225, 283.