Spectral investigation of asteroid families beyond 2.5 AU

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Introduction: Basaltic asteroids have been discovered all around the Main Belt region, despite that only (4) Vesta has been identified as the source of differentiated material.

The origin of basaltic asteroids distributed beyond the 3:1 MMR (Mean Motion Resonance) at 2.5 AU, recently observed with ground-based facilities [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11] is yet to be addressed, although they seem to be likely linked to the break-up of large, differentiated objects other than Vesta. This idea comes from dynamical considerations and from the slight differences in the composition observed in their spectra [12].

Dynamical studies allowed the identification of possible asteroid families, like (221) Eos, (1272) Gefion and (1040) Klumpkea, which could be the result of the disruption of a differentiated or partly-differentiated parent body. These asteroid families count members with very different spectral types, including basaltic asteroids. Among the asteroids we observed in a previous ground-based campaign, some confirmed V-type asteroids were found to be members of these identified asteroid families, while others lay close to these asteroid families [10].

In figure 1, confirmed basaltic asteroids located beyond 2.5 AU are shown in the proper a- proper I plane and indicated with a circle. Asteroid families are also marked with different colors. Some objects classified as M- (crosses) and A- type (triangles) are also included.

In this work we revise the spectral and dynamical properties of basaltic asteroids in the middle and outer main belt, not related to Vesta, and present observations of asteroids members of the (221) Eos, (1272) Gefion and (1040) Klumpkea families recently obtained with the GTC and TNG telescopes.

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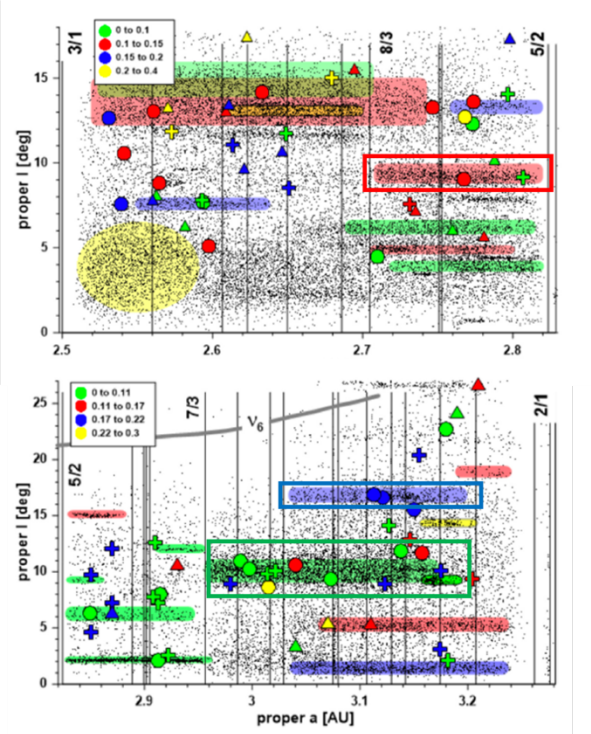

Figure 1. a-i plane of proper semimajor axis and inclination of the middle (upper panel) and outer (lower panel) main belt. Basaltic asteroids from [10] are shown with circles. Some are identified as members of the asteroids families shaped with different colors, while some are located close to these families. Some M- type and A- type asteroids, located in the same region, are also reported with crosses and triangles, respectively, for comparison. The (1272) Gefion family is indicated with the red box in the top panel image, the (221) Eos and (1040) Klumpkea families with the green and blue boxes in the lower panel image, respectively.

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