

The intriguing Tina asteroid family: a compositional investigation

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Abstract

The Tina dynamical family is the only family in the asteroid main belt known to be completely embedded in a secular resonance (namely, the v6) stable island configuration. To investigate the nature of the parent body, identify possible interlopers, space weathering trends or links with meteorites, we obtained visible spectral data (acquired with the FORS2 instrument at the ESO-VLT) of 7 family members, and visible colour indices (acquired with the LRS instrument at the TNG) of further 23 asteroids. Our preliminary results will be presented and discussed.

1. Introduction

The small (~ 100 members), relatively young (~ 140 - 190 Myr) Tina asteroid dynamical family lies in the middle main belt ($a \sim 2.8$ au). It is the first case of a v6 anti-aligned librating family. Such dynamical state limits the maximum eccentricity of Tina members, preventing them from close approaches with Mars and forming a stable island of a new dynamical type. Because of the close relationship with the v6 secular resonance, the Tina family could be a non-negligible source of Earth meteorites [2], [3].

Asteroid (1222) Tina is considered of “metallic” nature due to its X-type spectrum and moderate ($\sim 20\%$) geometric albedo [1], [4]. Very scarce information is available for the other asteroids belonging to the dynamical family. Such physical characterization is however essential to confirm their common origin from a collisional event and to identify the objects that are possible interlopers. Information about possible links with meteorites and about the space weathering processes which occurred on these asteroids could also be retrieved studying their surface composition.

For this reason, we performed an observational survey of asteroid members of the Tina dynamical family, retrieving visible spectra at the 8.2-m ESO-VLT UT1 (using the FORS2 instrument) and visible colour indices at the 3.6-m TNG (using the LRS instrument).

2. Preliminary data analysis

We obtained the visible spectra of 7 asteroids (Tina, 1998 SV34, 1998 VU19, 2001 FT34, 2001 KV54, 2002 RV27, 2006 GO45) and derived their taxonomic classification. Interestingly, three other asteroids share the X-type classification (and moderate albedo measurements in the literature) with Tina, while two targets present a flat, C-type spectrum (unfortunately, no albedo measurements are available for these bodies). One target presents an intermediate C/X spectrum, and an albedo of $\sim 10\%$.

The reduction and analysis of the BVRI photometric data obtained for further 23 bodies is currently ongoing.

All of our results will be presented and discussed.

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