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How different are the Greeks from the Trojans?

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Abstract

The Greek and Trojan camps situated at the stable L4 and L5 Lagrangian points of Jupiter are two largely unexamined populations of asteroids that could provide vital clues to the formation and evolution of the solar system. A close examination of the differences and similarities between the camps could hint at the mechanisms responsible for their precarious placement as well as the primordial conditions of the early Solar System within which they formed. Also, their position at Jupiter's orbit means that they are an ideal intermediate population between the inner Main Belt asteroids and the asteroids in the outer Solar System.

1. Discussion

For this ongoing project, we have begun a collection of comprehensive data on the largest and brightest of the Greeks and Trojans. This is necessary due to the current lack of information for this large, relatively close population. Considering the fact that the known population of Jupiter Greeks and Trojans is believed to be complete up to a Heliocentric absolute magnitude (H) of ~13 [2], it is surprising that no systematic survey can be found documenting the basic observational and physical properties of even the very brightest of these objects.

2. Observations

Here we present the initial results of our comprehensive survey using the CTIO .9m, the CTIO 1m, and the Lowell 42in telescopes. In totality, this survey will include *BVRI* photometry for the 113 intrinsically brightest (H = 10.0 or brighter) Greeks and Trojans, as well as complete light curves and phase curves for the 25 brightest members. Not only will each of these observations shed light on various physical properties of the Greeks and Trojans, but each method is also important for accurately calibrating the others. Through this comprehensive survey, we hope to achieve a greater understanding of the evolutionary differences between the two Jupiter swarms[3] and to use this intermediate population to bridge the gap between the small bodies of the inner and outer Solar System by performing detailed comparisons in both directions.

3. Figures

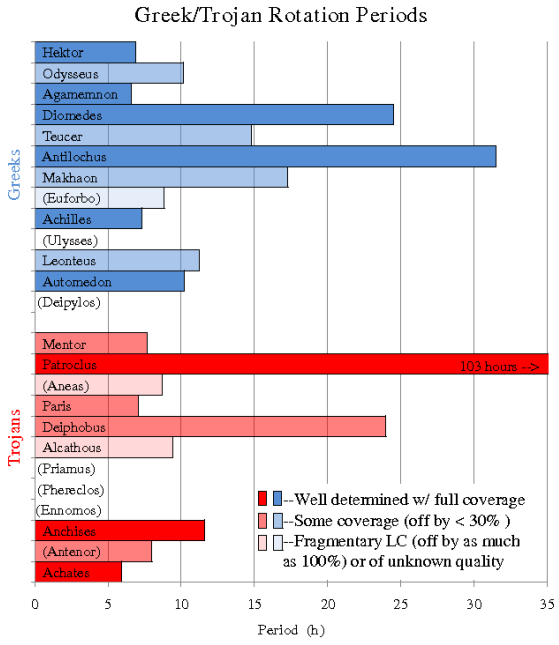

Figure 1: Rotation periods for the 25 brightest Jupiter Greeks and Trojans. The objects are separated into camps and are in order of brightest to faintest absolute heliocentric magnitude (H) within those camps. The most heavily shaded objects have the most well defined periods, and objects with names in parentheses do not yet have published periods. Both Patroclus and Hektor have known companions, and the listed period for Leonteus is potentially ambiguous. Most of these periods are from The Asteroid Lightcurve Database [1]

4. Tables

Table 1: A breakdown of the 113 brightest Trojans and Greeks is given based on H. The number of objects within each range is given along with the number that have photometry publicly reported in the JPL Small-Body Database (SBDB). Note that all photometry for these objects consists of *B*-*V* and *U*-*B*. There are no reported colors including either *I* or *R* filters.

H (mag)	Number of Objects	Objects with Photometry in JPL's SBDB	
7.5-7.9	3	3	(100%)
8.0-8.5	6	3	(50%)
8.6-9.0	25	11	(44%)
9.1-9.5	35	3	(8.6%)
9.6-10.0	44	0	(0.0%)
Total	113	20	(17.7%)

Acknowledgements

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References

[1] Harris, A.W., Warner, B.D., and Pravec, P., Eds., Asteroid Lightcurve Derived Data V11.0. EAR-A-5-DDR-DERIVED-LIGHTCURVE-V11.0. NASA Planetary Data System, 2010.

[2] Karlsson 2010 A\&A, 516, A22

[3] Szabo et al.~2007 Mon. Not. R. Astron. Soc., 377, 1393.