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Study of time-series photometry of several Transneptunian Objects.

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1. Introduction

Since 1992, more than 1300 Transneptunian Objects (TNOs) have been discovered. One can cite various observational approaches to study the physical properties of these bodies. Our own approach to understand this kind of objects is to study their rotations by monitoring their brightness variations ([1], [2], [3], [4], [5], [6], [7]). By studying the rotational properties of the TNOs a wealth of information can be obtained on their physics, like has been done for the asteroids for many decades. Therefore, the study of the spins and shapes of TNOs is a very powerful method of gaining information on the Kuiper Belt.

2. Status of the Transneptunian Objects photometric study

Less than 5% of the known TNOs have a well determined rotational period and lightcurve. We must add that the sample of studied objects is highly biased toward "bright" objects, objects with large amplitude of variability and objects with short rotational periods. Why is the sample of observed objects so small and why the sample is so severely biased: (i) a lot of observational time is needed for faint objects with telescope above the 2 meter class; (ii) Determining low amplitude lightcurves is more time consuming (iii) Detecting long rotation periods requires even more observing time (iv) the 24h-aliases considerably complicate the analysis of time series photometry.

In [2] we have addressed the bias against low variability objects and other approaches are being devised in order to study the bias against mid and long periods. Concerning the 24h-aliases we are trying to carry out coordinated campaigns with several telescopes around the world to continuously monitor our objects, like has been done in asteroseismology studies, even though the use of a space telescope is in principle a superior way to deal with the problem.

3. Results

In this work, we present our lastest results about short-term variability of Trans-Neptunians Objects (TNOs) or Kuiper Belt Objects (KBOs). We performed broad-band CCD photometric observations using several telescopes in Spain, and in Chile: the 1.5 m telescope of Sierra Nevada Observatory, the 2.2 m and the 3.5 m telescopes of Calar Alto Observatory, the 82 cm telescope of the Instituto de Astrofísica de Canarias, the 3.58 m Telescopio Nazionale Galileo, and the 3.58 m New Technology Telescope. We present results based on 3 years of observations (2008, 2009 and 2010), and we report the short-term variability of 10 transneptunian objects. Our sample of studied targets is composed by Classical, Resonnant, Scattered and Detached Disk Objects: (40314) 1999 KR_{16}; (44594) 1999 OX_3; 2001 QY_{297}; 2002 KW_{14}; (84522) 2002 TC_{302}; (55636) 2002 TX_{300}; 2004 NT_{33}; (230965) 2004 XA_{192}; (145480) 2005 TB_{190}; and (202421) 2005 UQ_{513}.

We also report our first intent of coordinated campaign by using two telescopes located in Europe and Chile: the 3.58 m Telescopio Nazionale Galileo (Spain), and the 3.58 m New Technology Telescope (Chile) ([1]). Some results obtained during this campaign will be shown and discussed. An example of our results is the lightcurve shown in Fig. 1, obtained during our coordinated campaign.

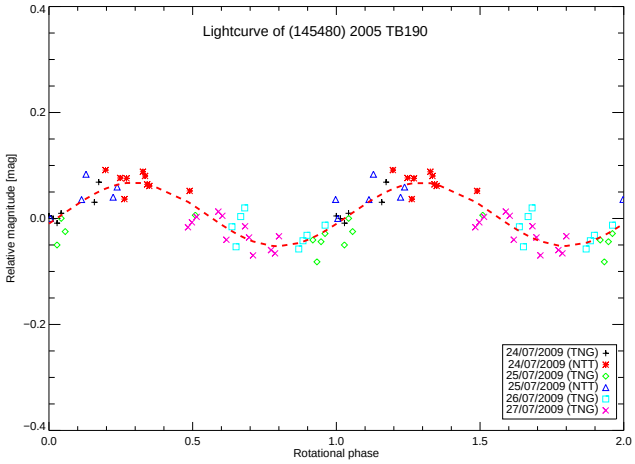

Figure 1: Coordinated lightcurve between the New Technology Telescope (NTT, La Silla, Chile) and the Telescopio Nazionale Galileo (TNG, Canary Islands, Spain) for (145480) 2005 TB_{190}.

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