

STUDY OF 2003 YT1 ASTEROID. A. Q. Vodniza¹ and M. R. Pereira², ¹University of Narino Observatory, Narino, Colombia, aquijanov@gmail.com, ²University of Narino Observatory, Narino, Colombia, mariojaspereira@yahoo.com.

Abstract: The asteroid 2003 YT1 was at approximately 25 million kilometers from the Earth on May 05-2011 (U.T) [1]. It has an orbital period of 1.17 years and it was estimated to have a size of 2.63 kilometers [2]. From our Observatory, located in Pasto-Colombia, we captured several pictures, videos and astrometry data during three days. Our data was published by the Minor Planet Center (MPC) and also appears at the web page of NEODYs [3]. Our observatory's code at the MPC is "H78". Pictures of the asteroid were captured with the following equipment: 14" LX200 GPS MEADE (f/10 Schmidt-Cassegrain Telescope) and STL-1001 SBIG camera. This asteroid has a rotation period of 2.343 hours [4] and its binary nature was noted by the Modra and Ondrejov Observatories independently [5]. Nolan used radar observations to determine that this is a binary with sizes of approximately 1 and 0.2 km and primary rotation period of $P < 2.6$ h [6]. The asteroid will be at approximately 0.0348 A.U from the Earth on October 31-2016 and at approximately 0.0113 A.U from the Earth on April 29-2073 [7]. Astrometry was carried out, and we calculated the orbital elements. It was designed a computing program on Visual Basic 6.0. SPACEWEATHER published our video of 2003YT1 on May 5/2011 [8].

Introduction: After having processed adequately all the photographs (bias reduction, dark frames correction and correction of flat frames), we employed the software "The Sky6" and the "CcdSoft-Version 5" in order to identify the stars appearing on the images, so we could have the coordinates of any standard star. It is necessary to use many reference stars so we can have a higher precision on determining the asteroid's coordinates. The asteroid is identified superposing the photos and designing a small video to appreciate clearly enough its movement with regard to the fixed stars.

Summary And Conclusions: We obtained the following orbital parameters: eccentricity = 0.29137550, semi-major axis = 1.10890668 A.U, orbital inclination = 44.01734 deg, longitude of the ascending node = 38.36315 deg, argument of perihelion = 90.86792 deg, orbital period = 1.17 years (426.51 days), mean motion = 0.84403716 deg/d, perihelion distance = 0.78579839 A.U, aphelion distance = 1.43201498 A.U. The parameters were calculated based on 104 observations (2011 May: 5-10 U.T) with RMS error = 0.354 arcseconds.

Acknowledgements: The autors would like to thank to Dr. Adriana Ocampo (NASA HQ-DG000)

and Dr. Mario Pérez (NASA HQ-DH00) for their special suggestions.

References:

- [1] <http://www.spaceweather.com/archive.php?view=1&day=05&month=05&year=2011>. [2] Delbo, M. et al. (2011) Icarus 212,138-148. (The cool surfaces of binary near-Earth asteroids) (5381,153591,164121). [3] <http://newton.dm.unipi.it/neodyS/index.php?pc=2.1.2&o=H78&ab=1>. [4] Larson, S.M. et al. (2004) B.A.A.S. 36, 1139. (Physical Characteristics of the Binary PHA 2003 YT1). [5] <http://adsabs.harvard.edu/abs/2009ATel.2289....1H> [6] Nolan, M.C. et al., (2004) I.A.U. Circ 8336. (2003 YT1) (radar and lightcurve obs. - binary asteroid). [7] <http://newton.dm.unipi.it/neodyS/index.php?pc=1.1.8&n=2003YT1>. [8] <http://www.spaceweather.com/archive.php?view=1&day=05&month=05&year=2011>