THE ASTEROID 1998 WT24. A. Q. Vodniza[1] and M. R. Pereira[2], [1]University of Narino Observatory, Narino, Colombia, aquijanov@gmail.com, [2]University of Narino Observatory, Narino, Colombia, mariorojaspereira@yahoo.com.

Introduction: The asteroid 1998 WT24 flew past Earth on Dec. 11/2015 at a distance of about 11 lunar distances and is very interesting. NASA scientists, using the 70-meter DSS-14 antenna at Goldstone-California, captured the highest-resolution radar images of the asteroid [1]. In December 2001, Goldstone captured the first radar images of 1998 WT24, which revealed that the asteroid has a diameter about 400 meters and has the shape of a potato [2]. The radar images from 2001 had a resolution of about 19 meters per pixel, and the new radar images have a higher resolution of 7.5 meters per pixel. On Dec 16th-2001, the asteroid was about five lunar distances [3].

The study of the asteroids is very important for reducing uncertainties about its orbits, which will allow to obtain a better prediction in its future path. Dr. Donald Yeomans explained at the time: *"This object probably began its life long ago in the main asteroid belt between Mars and Jupiter."* It is presumed that gravitational interactions with Jupiter, Mars, and Earth, transformed the original orbit into the much smaller one it follows today [4].

The asteroid approaches the Sun even closer than Mercury and its maximum distance from the Sun is only 1.02 AU, very close to the parameter of the Earth. This asteroid is an attractive target for space missions and Dr. Yeomans exposed at this time: *"As a rule of thumb, the more an object's orbit is like Earth's orbit, the easier it is to reach with minimal fuel expenditure. It would be relatively simple and cheap to fly a spacecraft by an asteroid like 1998 WT2"* [5].

Methodology: Our study aims to help refining the orbital parameters and the rotation period of the asteroid by astrometry and accurate light curves. From our Observatory, located in Pasto-Colombia, we captured several pictures, videos and astrometry data during several hours during two days. Our data was published by the Minor Planet Center (MPC) and also appears at the web page of NEODyS. The pictures and data of the asteroid were captured with the following equipment: CGE PRO 1400 CELESTRON (f/11 Schmidt-Cassegrain Telescope) and STL-1001 SBIG camera. We obtained the light curves of the body. Astrometry was carried out, and we calculated the orbital elements.

After having processed adequately all the photographies (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 = 0.4190998 +/- 0.000145, semi-major axis = 0.71806850 +/- 6.21e-5 A.U, orbital inclination = 7.39487 +/- 0.0043 deg, longitude of the ascending node = 81.94262 +/- 0.0008 deg, argument of perihelion = 167.30276 +/- 0.0032 deg, mean motion = 1.61977710 +/- 0.00021 deg/d, perihelion distance = 0.41712608 +/- 0.00014 A.U, aphelion distance = 1.01901092 +/- 1.88e-5 A.U, absolute magnitude = 18.4. The parameters were calculated based on 296 observations. Dates: 2015 December: 12 to 13 (28.3 hours) with mean residual = 0.180 arcseconds.

Period of rotation = 3.69 hours, amplitude of magnitude = 0.29. The asteroid has an orbital period of 0.61 years (222.25 days).

References:

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