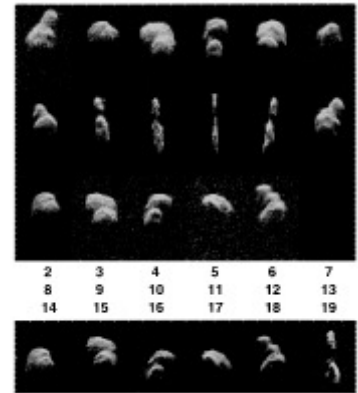


# Asteroid 4179 Toutatis - a Cartes Du Ciel – HowTo

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The Asteroid Toutatis was discovered in 1989 and was named after the gallic god well known from the Asterix comic books. It's elliptical four year orbit stretches from inside Earth's orbit to the asteroid belt between Mars and Jupiter. Additionally the orbital plane of Toutatis is closer to the plane of the Earth than any other several-kilometer big Earth crosser. Toutatis' orbit is chaotic in it's nature, this could be because of the gravitational influence of Earth during the frequent encounters.



During the encounters 1992 and 1996 high resolution Radar observations using the Goldstone and Arecibo radio telescopes the distinct potato-shape of Toutatis was revealed.

On Sep., 29<sup>th</sup> 2004 Toutatis will pass Earth at a distance of “merely” 1.5 million kilometers, while this is a very long distance for any mode of transportation on Earth, it is very close as astronomical distances go.

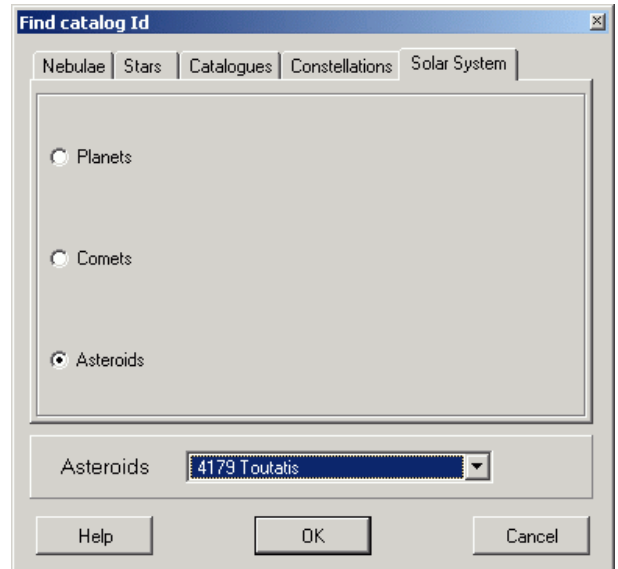
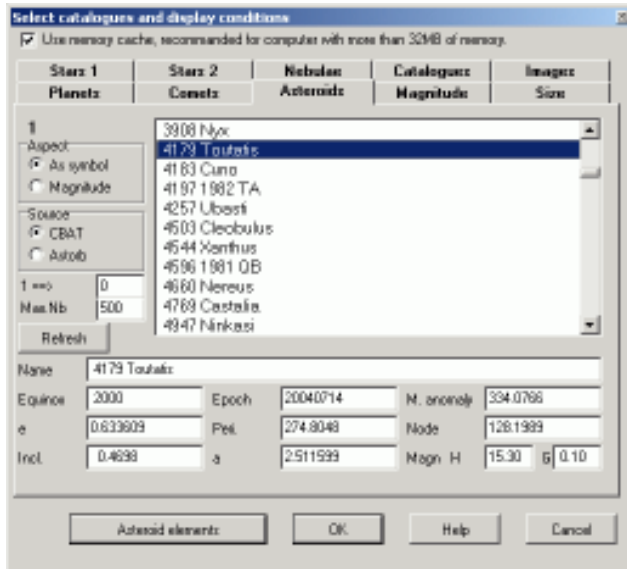
It's nearness means it will be observable in modest telescopes. In this document I try to describe how to make a finder chart for this very special encounter with a very special asteroid...

Due to the small distance Toutatis will display parallax, that means it's location among the stars will be different for observers on different places on Earth. This and the fact that it's motion across will be perceivable make it impossible to create a finder chart which could be used, e.g. in Texas and Stockholm as well.

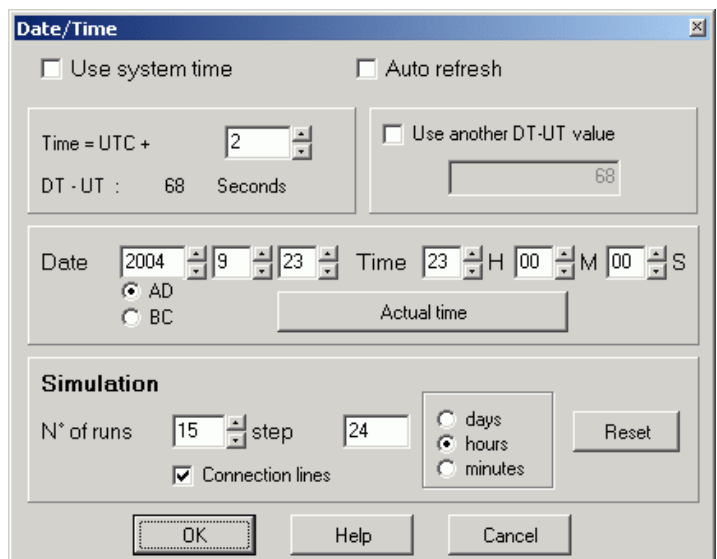
The first thing we have to do in Cartes Du Ciel is to select our observing location: selecting **Preferences -> Observatory** will bring up the dialogue window at right, here can you put in the geographical coordinates of your observing location, or select a city near you from the provided list. If you provide your own location, do not forget to save it, so you can retrieve it any time later.

Then we need the orbital data for Toutatis. When I first checked in the Asteroid catalog settings (**Preferences -> Catalog and Object Parameters -> Asteroids**) I didn't find Toutatis

so I updated CdC's asteroid file ASTEROIDES.DAT by clicking on: **File -> Online Resources -> Asteroid elements**. This brings up a confirmation window which asks you to connect to CBAT's home page and download the lists of bright and unusual asteroids. After that **4179 Toutatis** showed up:

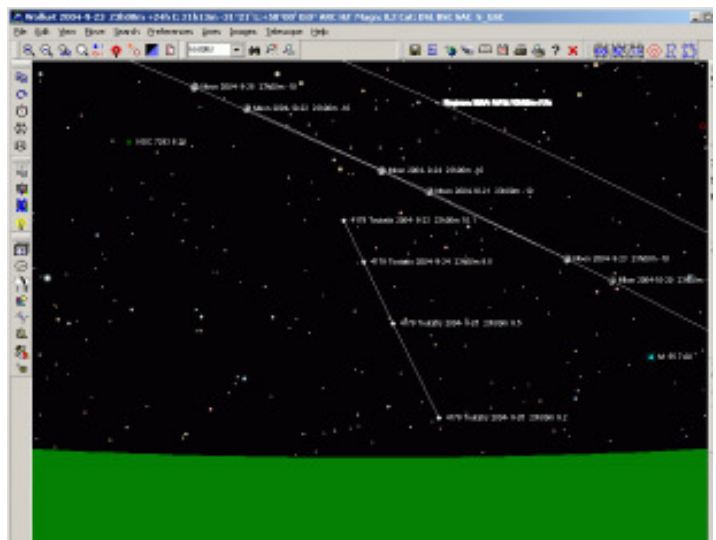


Afterwards it was possible to select Toutatis under the Solar System Tab in the **Search -> Find** window. After clicking **OK** Toutatis will be centered in Cartes Du Ciel's main window. At the date of the minimum distance Toutatis is located in the Southern Sky which is invisible from my location in Central Europe, so I choose to display the location a few days earlier: Under **Preferences -> Date/Time** I selected Sep. 23<sup>rd</sup> 23:00 with 15 steps 24 hours apart. This results in CdC plotting the position of moving objects not only for the given date but for 15 more dates 24 hours apart.

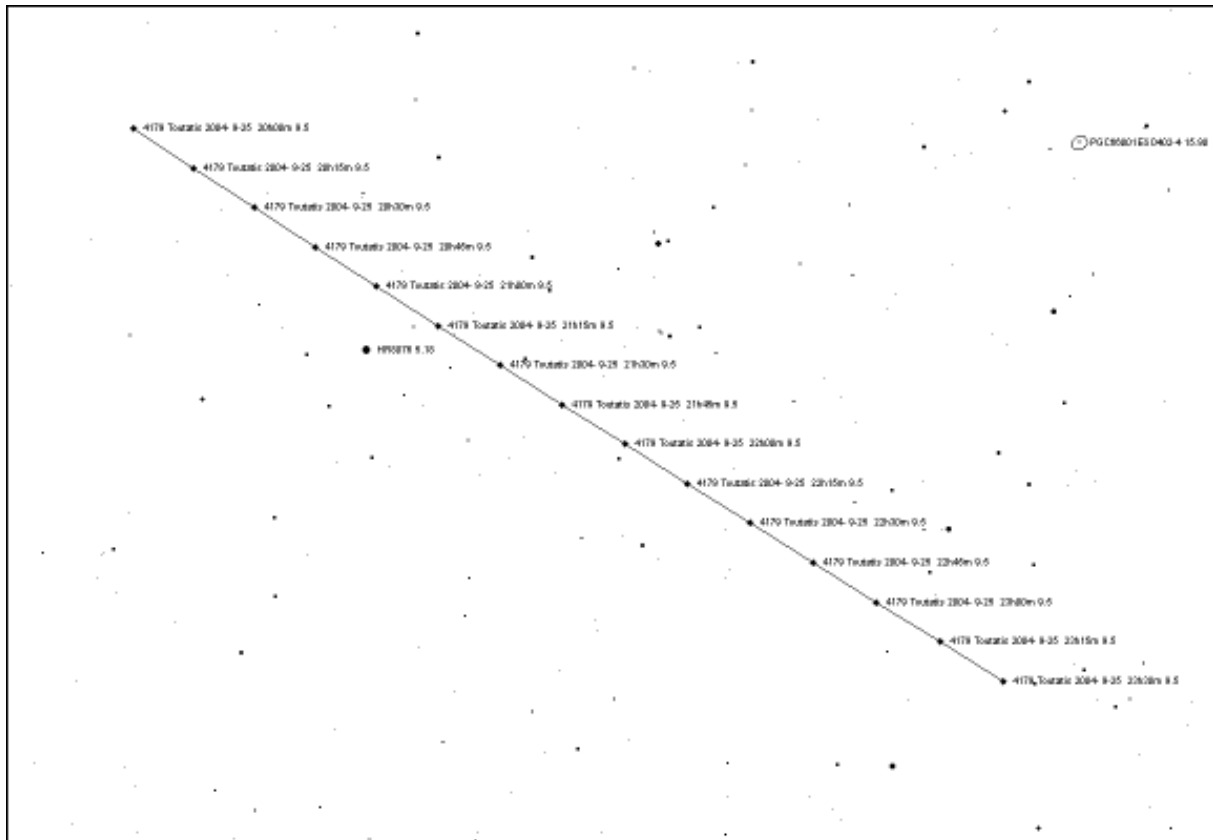


This screen showed that Toutatis is moving in a southerly direction and will slip below the horizon after Sep. 26<sup>th</sup>.

To have a more detailed finder chart, I made another chart for a specific evening by selecting Sep. 25<sup>th</sup> and displaying the position for 15 steps with 15 minutes intervals starting at 20:00. I set the field with to 1 degree (**View -> Field Width - 1°**)



and changed to a black on white chart appearance (**Preferences -> Chart appearance -> White/Black**).



You can find more information about Toutatis here:

[http://echo.jpl.nasa.gov/asteroids/4179\\_Toutatis/toutatis.html](http://echo.jpl.nasa.gov/asteroids/4179_Toutatis/toutatis.html)

Cartes Du Ciel is a great freeware program made by Patrick Chevalley, it is available for download at:

<http://www.stargazing.net/astropc/>

The Yahoo-Group for Cartes Du Ciel is THE place to look for answers for your questions/problems using CdC:

<http://groups.yahoo.com/group/skychart-discussion/>