



THE STAR DIAGONAL

THE JOURNAL OF THE OGDEN ASTRONOMICAL SOCIETY

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The President's Message

Hi All:

This month I would like to have a show and tell for our meeting. We will be meeting at the Ogden Airport this month. The Planetarium is under construction to remove asbestos, so we will not be able to meet there for the upcoming few months. I will be attaching a map to the terminal to help you all find it. If for some reason you can't find it, call me 388-6556 and I will try and talk you in. This month we are going to be busy once more. On the 6th we are going to be at the Layton Wall Mart for Astronomy day. This will be a solar party so please bring your filters and sun screen and come have some fun. Our meeting will be on the 11th at 7:30 P.M. On May 12th we have been asked to do a party for some Boy Scouts at Adams Elementary in Layton. This is at the same location as the star party we do for Adams Elementary every year. On May 19th we have been invited to come out to SPOC for a private party with SLAS and OAS. For those of us that have not seen their observatory this will be a excellent opportunity. On the 27th we will be back at Antelope Island for our public star party. This last month we had a excellent turn out with about 70 to 80 people showing up. Please plan on coming out for these public star parties because I think the numbers will increase with folks finding out we are back at the island.

Clear Skies
Craig

Directions to our meeting

From I-15 take the 31st street west bound exit. Follow this to Airport Road this will be a left if your coming from I-15. Follow this around to the main terminal you will know your there when you see the

control tower we will be meeting in the main terminal.



OAS Minutes, April 2006

The Monthly meeting of the Ogden Astronomical Society was held on April 13 at the Ott Planetarium. President Craig Browne called the meeting to order. Craig reminded us of our Antelope Island star party on 4/22. We also have a star party at Adams Elementary on 4/27. SLAS is inviting members of OAS to a private star party at SPOC on 5/19. Our Astronomy Day activity this year will be on 5/6. We will doing a Solar party at the Wal-Mart in Layton. We have also been asked to set up some telescopes in the stadium at Weber State for the Cancer Walk in June. More details will follow. The Lind Lecture Hall will be undergoing to construction this summer. They are removing asbestos. We will be meeting at the Ogden Hinkley Airport's main terminal for our May and June meetings. There has been some discussion of updating our Logo. Ideas for the logo are being solicited. If you have any designs or

suggestions, please send them to Craig or bring them to the meeting. Some of the thoughts that have been going around are adding color and making the logo easier to read. Wayne Sumner announced that Northridge High school has received a donation of a 12" Ishamora telescope. It is very heavy and he wants some advice on how to use it. Some of us are going to get with him to see it. The main part of the meeting was on Solar Eclipses. David Dunn presented pictures and experiences from the eclipse on March 29th in the Libyan desert. Bob Tillotson presented pictures and video from his experience in 1991 from Mexico. After the meeting some of us adjourned to Village Inn for an after meeting meal and visit.

David Dunn

I Really Saw Santa – or Observations of Large KBO 2003 EL61

By Dale C. Hooper

I've come to the conclusion that I'm never going to be able to do a great job at "pretty picture" creation with my CCD camera. However, about a year ago I decided that I could have a lot of fun and maybe even make some scientific contributions by observing asteroids. I started by taking thirty-second images of 2 Pallas, which at magnitude 10.5 was really easy to observe. I've since worked my way up to successfully observing a magnitude 18.6 asteroid. But, along the way I've REALLY had an interest in observing some of the large Kuiper belt objects that have been discovered in recent years.

This past weekend I was able to make a successful observation of large Kuiper belt object (KBO) 2003 EL61. KBO 2003 EL61 is nicknamed "Santa" because it was discovered on December 28, 2004. However, if you are familiar with minor planet preliminary designations you can see that there is a discrepancy between the name of "2003" EL61 and its discovery date of "2004".

That's because, as I found from searching Wikipedia [1], there was some controversy about its discovery. In July 2005 a group led by astronomer Jose Luis

Ortiz Moreno announced the discovery of the object when they re-analyzed images that were made on March 7, 2003. This is a process that Wikipedia refers to as a "precovery". However, a group led by Michael Brown (the discoverer of 2003 UB313) had been studying the object for about six months. A week before Ortiz' announcement, Brown's group released an abstract where they referred to the object by the code name they were using, K40506A. This allowed anyone to use a search engine and look at Brown's observation logs, which included the coordinates of 2003 EL61. Server logs showed that a computer with an IP address from Ortiz' group had accessed Brown's data. Ortiz denied that he had done anything wrong but admitted that he had accessed Brown's information and he conceded that Brown's group had made the discovery!

Michael Brown has referred to 2003 EL61 as, "the strangest known object in the Kuiper belt". This is because it is shaped like a football. Its largest axis is about as big as Pluto but its minor axis is about half that size. It rotates in about four hours and it has two small moons.

2003 EL61 is currently about 50.4 AU from the Earth (Pluto is about 30.5 AU). At magnitude 17.4 it is about twenty-five times dimmer than Pluto, but it's still brighter than several of the other asteroids that I've observed. It's also one of the brightest large Kuiper belt objects and apparently has a very high albedo. But, unlike the asteroids I had previously observed it moves very slowly against the stellar background. It only moves about one arcsecond/hour. I use a 10" LX-200 SCT with an SBIG ST-8XME/AO7 CCD setup. From previous observing I determined that I would need exposures somewhere in the three to four minute range to detect it. I decided to go with four-minute exposures spaced thirty minutes apart to give me a good likelihood of detecting it.

I was able to obtain ephemeris information for 2003 EL61 from JPL's Horizons ephemeris generator page [2]. It's a great web page because you can generate ephemerides for any solar system object and you can specify the time span and time step size. I got a late start, because Friday night it was supposed to be "mostly cloudy". But, about

11:00pm it started to clear up so I decided to take a chance and open the roof of the observatory. I was finally ready to go just a bit after midnight, and I planned to take ten images so I got the following table of ephemeris information for 2003 EL61 from the JPL website:

Time (UTC)	RA	Dec	Mag	Distance (AU)
2006-Apr-22 06:15	13 28 15.38	+20 19 01.6	17.43	50.3665303802471
2006-Apr-22 06:45	13 28 15.30	+20 19 01.9	17.43	50.3666306621064
2006-Apr-22 07:15	13 28 15.22	+20 19 02.2	17.43	50.3667310522805
2006-Apr-22 07:45	13 28 15.13	+20 19 02.6	17.43	50.3668315507568
2006-Apr-22 08:15	13 28 15.05	+20 19 02.9	17.43	50.3669321575227
2006-Apr-22 08:45	13 28 14.97	+20 19 03.2	17.43	50.3670328725658
2006-Apr-22 09:15	13 28 14.88	+20 19 03.6	17.43	50.3671336958735
2006-Apr-22 09:45	13 28 14.80	+20 19 03.9	17.43	50.3672346274331
2006-Apr-22 10:15	13 28 14.72	+20 19 04.2	17.43	50.3673356672320
2006-Apr-22 10:45	13 28 14.63	+20 19 04.5	17.43	50.3674368152576

Table 1 - 2003 EL61 Ephemeris Information from JPL Horizons

Everything was going great until about 3:20 am when a huge cloud came right across Coma Berenices where the object was! But, still I had seven images so I felt pretty good about it (and I felt pretty tired).

Before any of the images can be used for finding anything an astrometric solution has to be calculated so that you can tell where the telescope is actually pointed. To do this I use the Pinpoint Astrometric Engine software and I use the US Naval Observatory A2.0 astrometric catalog, which has positions for about 526 million stars! Pinpoint compares the stars in the image with stars in the database and determines where you are looking. It also gives you information about how reliable the solution was.

Using the images with their astrometric solutions I was able to load the files into a tool called Visual PinPoint for doing the blink comparisons. It takes all the images and orients them so that north is up, east is left, etc. It also turns the background to red and stretches the image contrast some to aid in the detection. It then cycles through – or blinks – each image so that you scan spot objects that are moving.

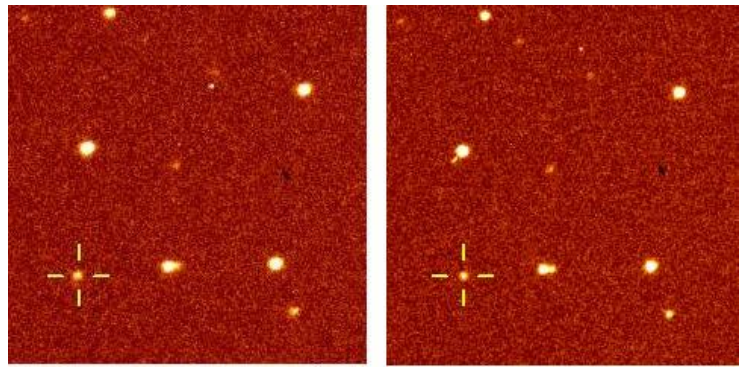
Since I had four-minute exposures it was very common to have cosmic ray hits – so it was definitely helpful that I had several images. I didn't know exactly where it was on the images so I had to scan around. I finally found an object, which was moving from image to image. I wasn't sure if it was the correct object but I decided to tag it. When I was done tagging the images that was the only object that I could tell was moving across all the images. I then generated a Minor Planet Center (MPC) report from the tagged locations and – EUREKA – I could tell that I had the right object! The table below shows the MPC report information that I had gathered.

Time (UTC)	RA	Dec	Mag
04 22.26181	13 28 15.45	+20 19 01.2	16.7
04 22.28270	13 28 15.36	+20 19 01.5	17.1
04 22.30346	13 28 15.29	+20 19 01.4	16.8
04 22.32431	13 28 15.20	+20 19 01.9	16.7
04 22.34513	13 28 15.11	+20 19 02.4	16.4
04 22.36597	13 28 15.02	+20 19 02.7	16.8
04	13 28 14.94	+20 19	16.8

22.38681		02.6	
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Table 2 - MPC Report Information for KBO 2003 EL61 Observations

You can see from comparing this table with the previous table of ephemeris information that my results are within a few tenths of an arcsecond of the predicted values. So, I feel pretty good about that – for a first set of observations. You can also see that my magnitude values are off by a ways. However, I didn't use any filters with my CCD camera so I think this is to be expected. Below are snippets from images 1 (0615 UTC) and 7 (0915 UTC) so that you can see if you can find it on your own. These are the raw images (with only a dark frame correction) from the CCD - which are inverted images.



Snippet from Blink Comparison Image 1 (0615 UTC 22Apr06)

Snippet from Blink Comparison Image 7 (0915 UTC 22Apr06)

It also may be just my imagination but while looking at the blink comparison images I believed that I could see that the object was spinning. It was only later that I found out that the rotational period of 2003 EL61 is about 4 hours! Looking at zoomed in images around the KBO does still, indeed, give me the impression that the observed shape is changing. It was a bit tedious to take the images but it was a lot of fun looking at the information and realizing what I had been able to do with tools that are readily available to amateur astronomers today. I plan on observing several other large KBO's over the course of spring and summer and getting my results to the point where I feel comfortable in submitting them to the Minor Planet Center. I'll be working my way up to 2003 UB313 (the tenth planet) this fall. If anyone has similar interests it would be fun to do some work together and OAS members are always welcome in my observatory.

[1] http://en.wikipedia.org/wiki/2003_EL61

[2] <http://ssd.jpl.nasa.gov/horizons.cgi#results>



Snippet from Image 1 (0615 UTC 22Apr06)

Snippet from Image 7 (0915 UTC 22Apr06)

I know that I would have a really tough time identifying the KBO from the above images. However, with the Visual PinPoint blink comparison software it is fairly straightforward to find the KBO. Things have come a long ways since Clyde Tombaugh discovered Pluto using the blink comparator he had available. Below are snippets from the blink comparison images 1 and 7 with 2003 EL61 annotated by the crosshairs.

