



Young Astronomers

Spot an asteroid

Classroom Activity – After visiting the Observatory

Overview

Age Range: 7-10 years

Prep. Time: 30 min.

Lesson Time: Min. 30 min.

Cost per activity: Low

Includes the use of: Computer, SAO Image DS9 program (free to download) ja asteroid sample data set, optional: crafting material for a flip book (paper, pen, stamper)

Outline

Asteroids are small objects that zoom around the Solar System. See if you can find the asteroid in the photos in this assignment! Pluto was discovered using this same method.

Pupils will Learn:

- Asteroids are objects in our Solar System. In terms of size, they are smaller than planets but larger than meteoroids.
- Asteroids can be found by taking photographs of a particular part of the sky at different times and then comparing them in quick succession. This way asteroids can be seen moving in relation to the distant stars in the photographs.



Lesson Plan:

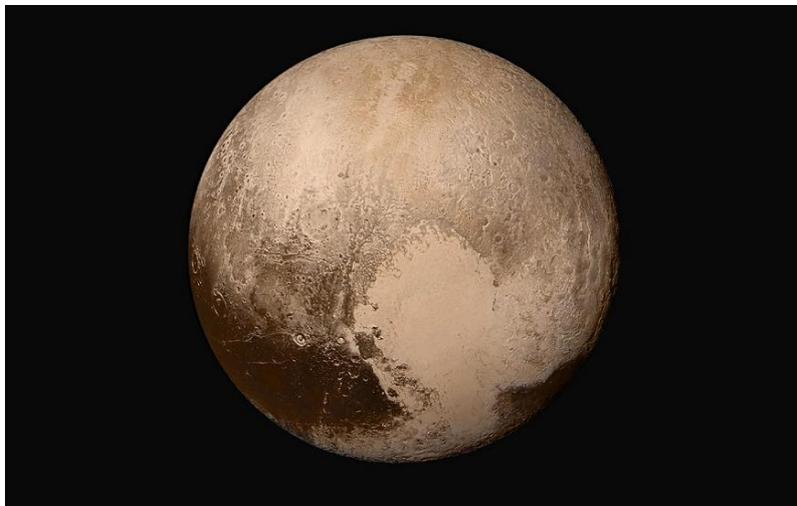
Description	Time	Notes
Introduction to the subject	10 min	
Activity 1	about 15 min (+Preparation time about 30 min)	Download before the lesson: (http://ds9.si.edu/site/Download.html) and asteroid sample data set (http://resources.faulkes-telescope.com/course/view.php?id=67)
Assessment	5 min	
Further activities: Flip book	30-60 min	https://en.wikipedia.org/wiki/Flip_book

Introduction to the subject:

- What are asteroids and where can they be found?

[Asteroids are objects in our Solar System that are smaller than planets but larger than meteoroids. They are most common in the asteroid belt between Mars and Jupiter as well as in the Kuiper belt near Pluto, but asteroids can also be found elsewhere, sometimes even close to planets.]

- Do you know how Pluto, which is now classified as a dwarf planet, was discovered in Lowell observatory in the USA (Flagstaff, AZ) in 1930? [Photographs were taken of the same patch of sky at slightly different times (at approximately three-week intervals). When these photographs were viewed in quick succession, researchers found that while the stars appeared to stay put, something seemed to be moving between them. This is how they spotted Pluto! In this activity, you will be able to try doing the same! This time there is an asteroid, not a dwarf planet, hiding in the photos.]



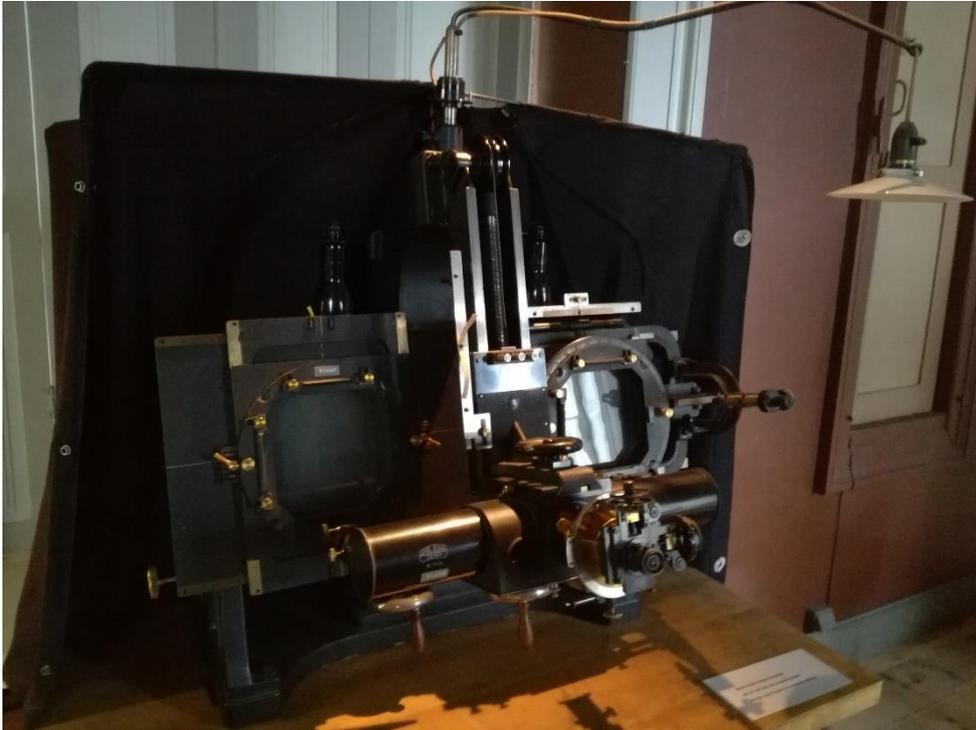
Pluto, now a dwarf planet, was discovered from photographs. Credit: NASA/JHUAPL/SWRI.

The online observatory collaboration consists of the following partners:

Baldone Observatory, Brorfelde Observatory, Cardiff University, Harestua Solar Observatory, Helsinki Observatory



- This machine, on exhibition at the Helsinki Observatory, is called the stereocomparator. Perhaps you remember seeing it during the Helsinki Observatory's guided tour? It was used to compare or “blink” two images of the same area as described above. This is how you can find asteroids!



Stereocomparator. Credit: HUM.

Activity 1:

Pre-activity steps

- Download SAO Image DS9 program (free):
<http://ds9.si.edu/site/Download.html>
- Download a sample data set of asteroids:
<http://resources.faulkes-telescope.com/course/view.php?id=67>

You can choose either the dataset (16197) Bluepeter Asteroid Data Set.zip (easier) or (2004) XD6 Asteroid Data Set.zip (it is a bit more challenging to find the asteroid in these images). Unzip the files to a folder.

- Go through the steps below before the lesson.

During the lesson

1. Open the first image with the SAO Image DS9 program: **file-> open**
2. In order to make the image more visible press: **scale-> scale 99%**
3. Zoom in the image: **zoom -> zoom fit**



4. The next step is to open the second image. Open first a new frame: **frame-> new**
5. Then you can open the second image: **file-> open**
6. Repeat the steps above for the second, third and fourth image
7. In order to ensure that the stars in the images stay still while blinking the images, press: **frame-> match -> frame -> WCS**
8. Now you are ready to blink through the images: **frame->blink**
9. Show the images to the pupils by blinking through them. Can you find the asteroid moving across the sky? Happy asteroid hunting!

Assessment:

- Which are further away from us, the stars or asteroids in the photo?
[The asteroids in the photo are in our Solar System, but the stars are much further away from us.]
- Do you know how an animation (moving picture) is made?
[Comparing the three asteroid photos in quick succession was like watching a very short movie! This is how videos are made, with many separate images displayed in rapid succession.]

Further Activities:

- You can create your own “movie” by making a flip book:
https://en.wikipedia.org/wiki/Flip_book

Background Material/Knowledge:

There are different objects in the sky (bodies of our own Solar system, distant stars etc.)