Welcome to the

Norman Fisher Observatory, Kenley

Fire exit through kitchen

Society founded in 1956

Observatory opened in 1979. Built by members

No money from Lottery or Council. All self funded by members & donations

What can we see from here?

Observing the sun (with special safe telescopes) during the day

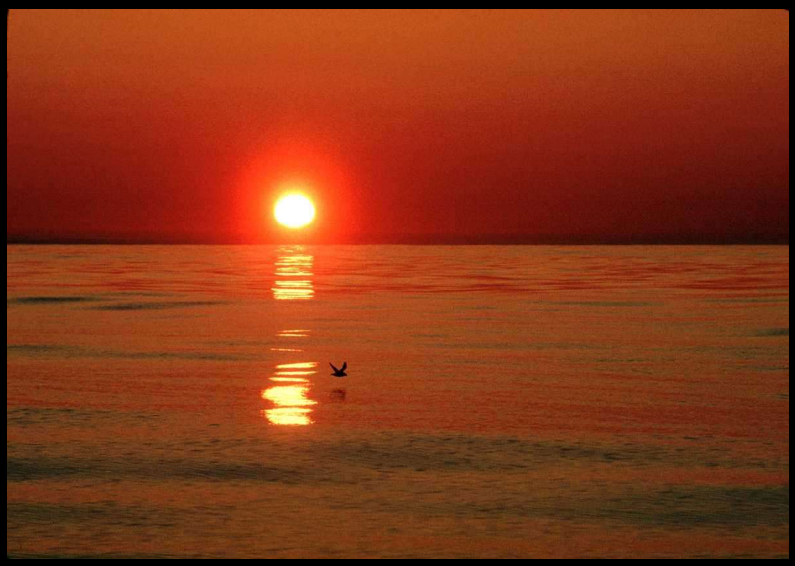
Orig telescope was 18”. Then replaced by 14” GoTo

Current scope 6” (150mm) but very good quality. Mount also good quality

Not just for magnification – also for gathering more light (cf 6” dia with pupil size)

Rare to get a clear evening

The Sun



Bright. Hot

Can start fires. Dangerous

Don’t look at the sun through a telescope – you risk setting fire to your eye (or brain!)

Sun spots. 11 year cycle (next peak in 2025

3000 degrees cf 6000 for rest of surface.

(Upper atmosphere of sun reaches 1,000,000 degrees)

More info: https://spaceplace.nasa.gov/solar-activity/en/

Prominences. Flares. “Bubbling” surface

NASA. Speeded up

Solar flare size will be perhaps a dozen times the diameter of the Earth

https://www.youtube.com/watch?v=6vmiAFctp8Q

Alpine valley – 1 mile deep

Covered in craters from where it has been bombarded by rocks.

More info: https://moon.nasa.gov/moon-observation/viewing-guide/

The far side of the Moon is rough and filled with craters. By comparison, the near side of the Moon, the side we always see, is relatively smooth. Since the Moon is rotation locked to always point the same side toward Earth, humanity has only glimpsed the lunar farside recently -- last century. The light highlands of the far side are older than the dark Maria of the near side. A thinner crust on the near side that allowed for more dark lava flows is thought to be the cause of differences between the two sides. The cause for the crust thickness differences is still being researched, however. The large impact basin pictured above is Crater 308. It spans about 30 kilometers and was photographed by crew of Apollo 11 as they circled the Moon in 1969.

In order of distance from the Earth surface

Noctilucent clouds (“night shining clouds”)

80 km height

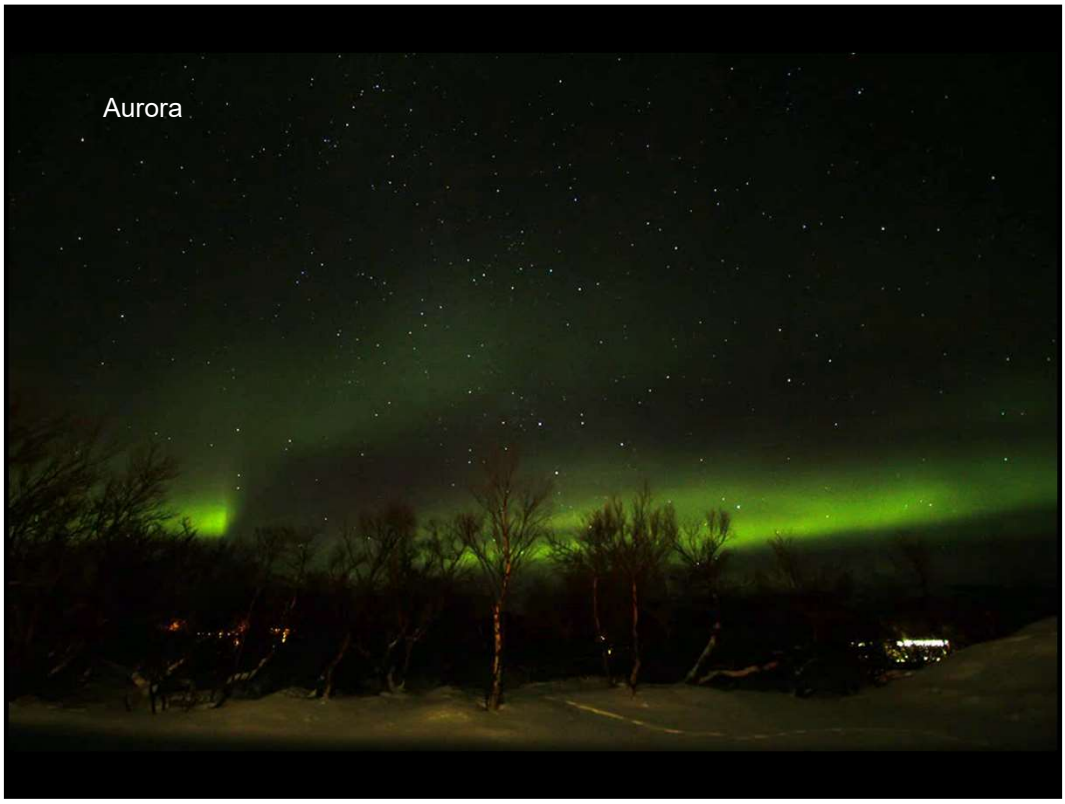
Noctilucent clouds are clouds of icy dust that form at very high altitude on the edge of space, around 76–85km high, when temperatures and pressures in the upper atmosphere are just right.

Noctilucent clouds - or NLCs - are not visible all the time; there is an NLC season between the end of May and the start of August every year.

Because they are so high up, noctilucent clouds are illuminated by the Sun long after it has set for us at ground level, and we see them as blue-white swirls, curls and tendrils shining in the sky. That’s what their name means – ‘nocti’ (night) ‘lucent’ (shining).

But NLCs only form when every thing comes together. What's more, conditions only occur during the summer months and even then not every night.

More info at **https://www.skyatnightmagazine.com/advice/star-map-shorts-noctilucent-clouds/**



Aurora height = 80 to 260 km

Aurora (“Northern Lights”) have been seen from Kenley (decades ago!). Rare this far south. Video is speeded up

Meteors are lumps of rock that bombard the Earth. As the Earth has an atmosphere most meteors burn up in the Earth's atmosphere. Grain of sand size.

Approx 100km up

100 tonnes of dust per day enters Earth atmosphere

More info
https://education.nationalgeographic.org/resource/meteorite

Piece of gravel size

The Chelyabinsk meteorite of February 2013

Only the biggest meteors reach the ground. If they do they are called Meteorites

https://earthsky.org/space/chelyabinsk-meteor-exploded-over-russia-feb-15-2013/
(Shown video starts 3 minutes into footage)

These of another meteorite in USA

(Something similar at https://www.youtube.com/watch?v=L-VXV68fLPA)

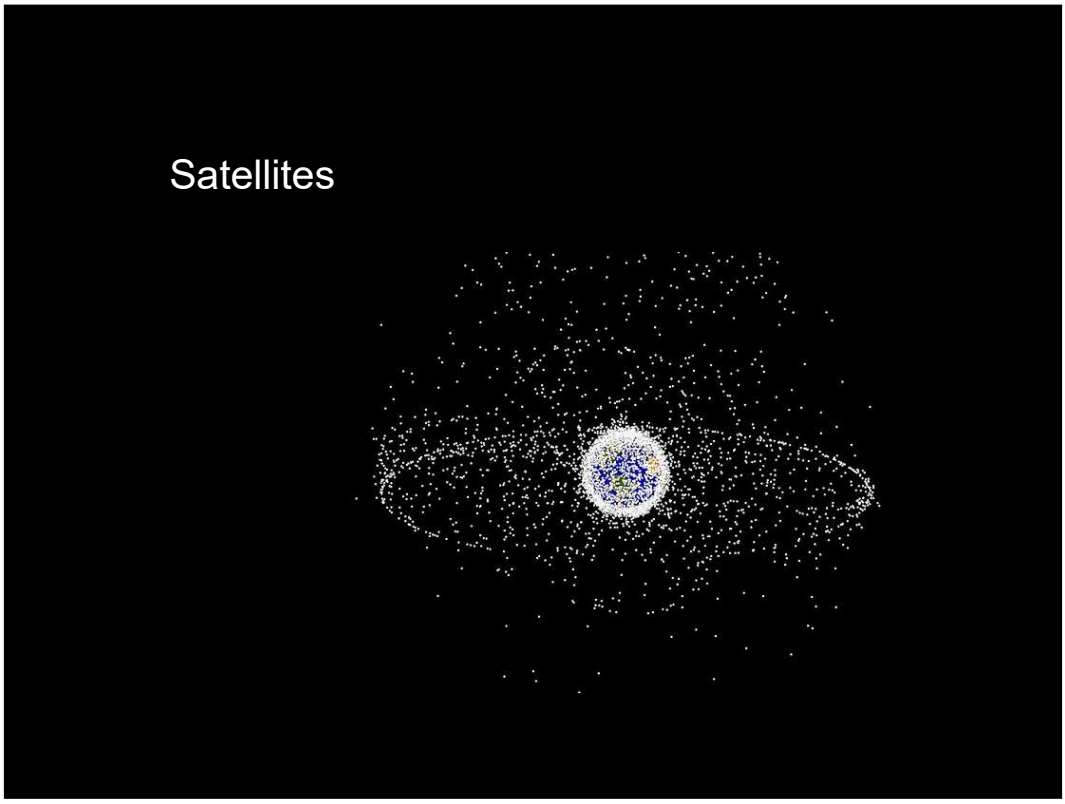
Meteor crater, Arazona

1.2 km across, 180m deep

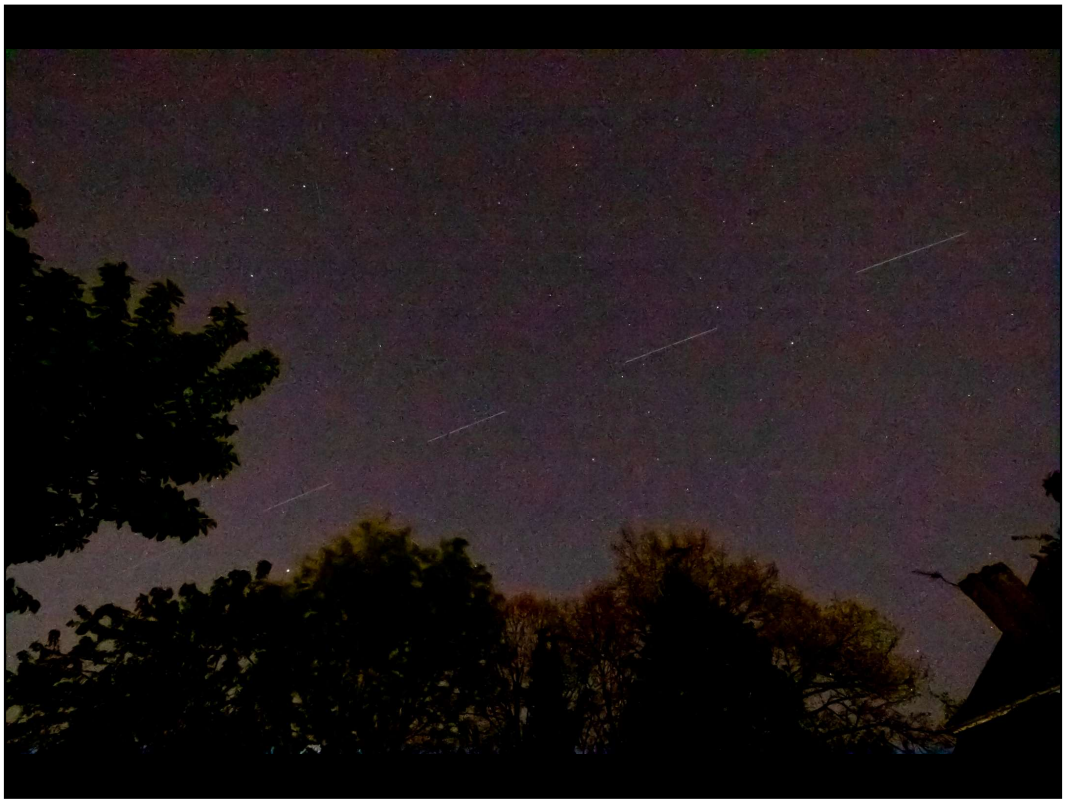
Caused by meteor approx. 40m

175 million tonnes of rock excavated

Formed 50 thousand years ago



7,500 satellites in 2021. 4,500 active. Increasing by 1,500 per year.



Starlink satellite trails (for world wide internet access)

International Space Station crossing moon. From a 0.7 second video
Taken 2014

Comets are “dirty snowballs”

Few km across

From outer reaches of solar system

Distance from Earth varies as, typically, they come from the far reaches of the solar system, swing round the sun, and go out again.

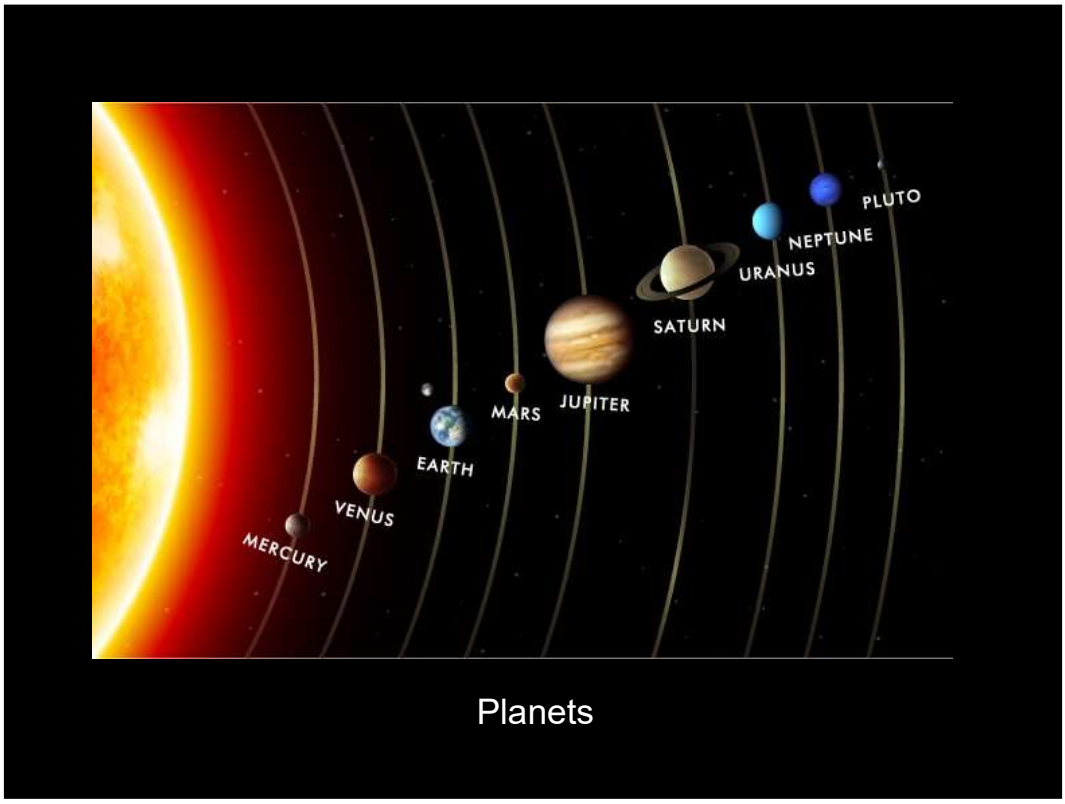
Tails are ice/dust and ions

This picture is of comet Hale Bopp 2013

More info https://solarsystem.nasa.gov/asteroids-comets-and-meteors/comets/

Lovejoy 2015

Comet Neowise 2020



Planets

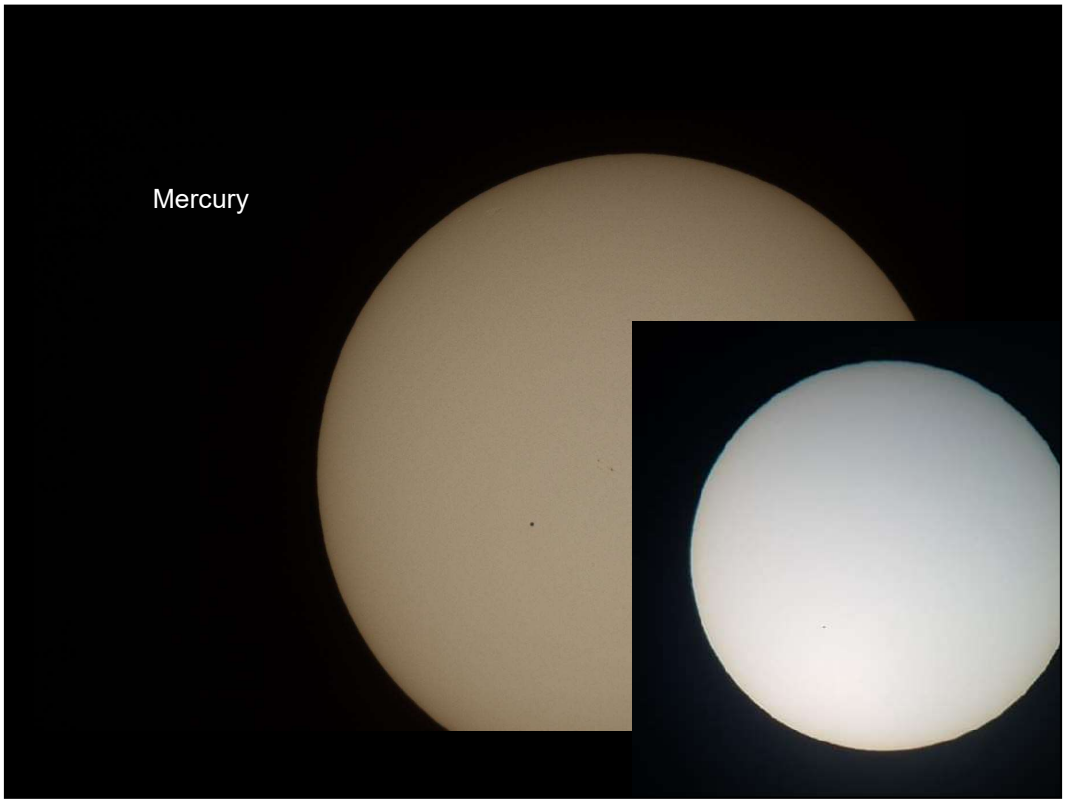
The relative size of the planets

(Since this was published we no longer regard Pluto as a planet)

More info https://solarsystem.nasa.gov/planets/overview/

Mercury is very difficult to see. It is very small and is always very close to the sun

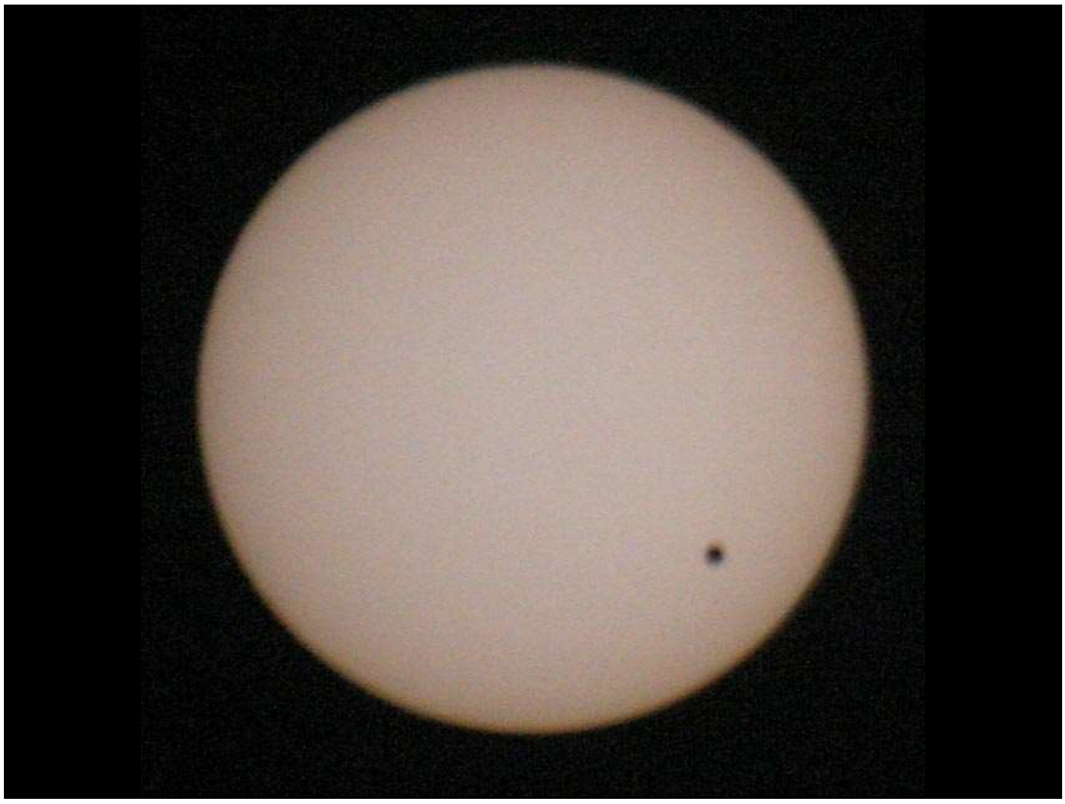
Mercury is seen silhouetted against the sun in 2016 It is the small dot, lower than the middle of the sun and to the left of it. (The bigger dot above the centre of the sun is a sunspot)



And again in 2019

Next transit 2032

2021 – mercury at twilight

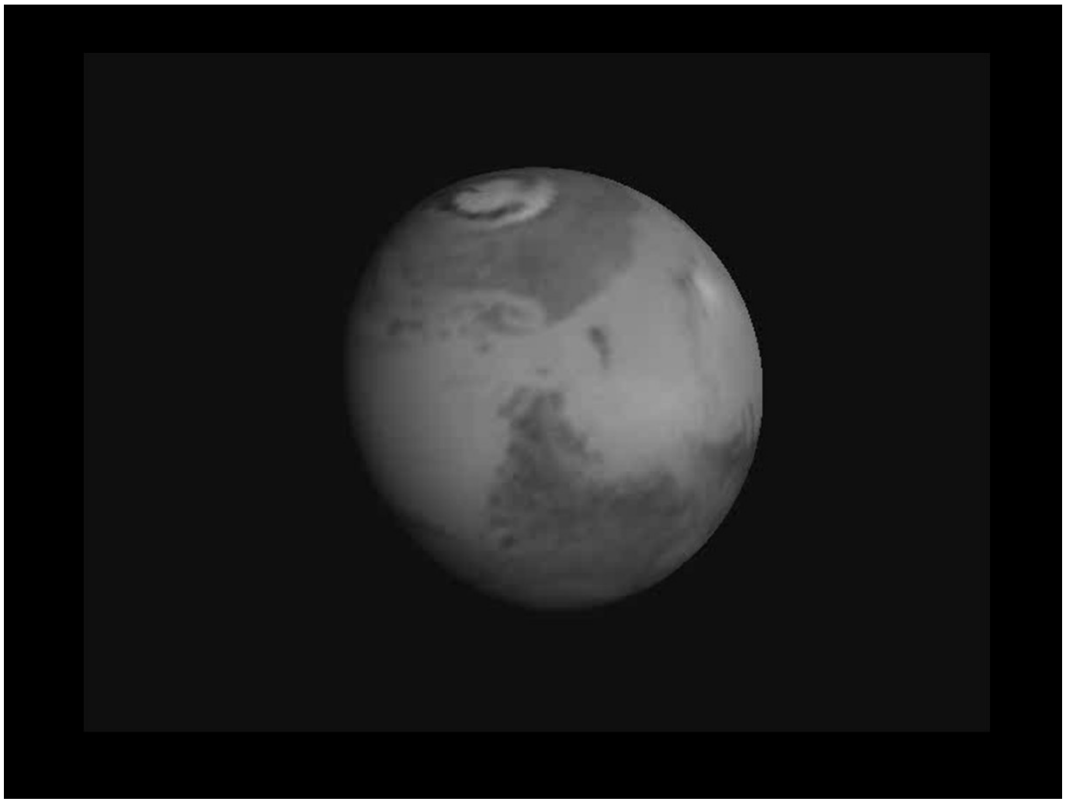


Venus transit 2004
Bigger than Mercury

Next transit 2117

Venus shows phases, just like the moon,
taken from our observatory

An amateur photo of Mars taken from our observatory

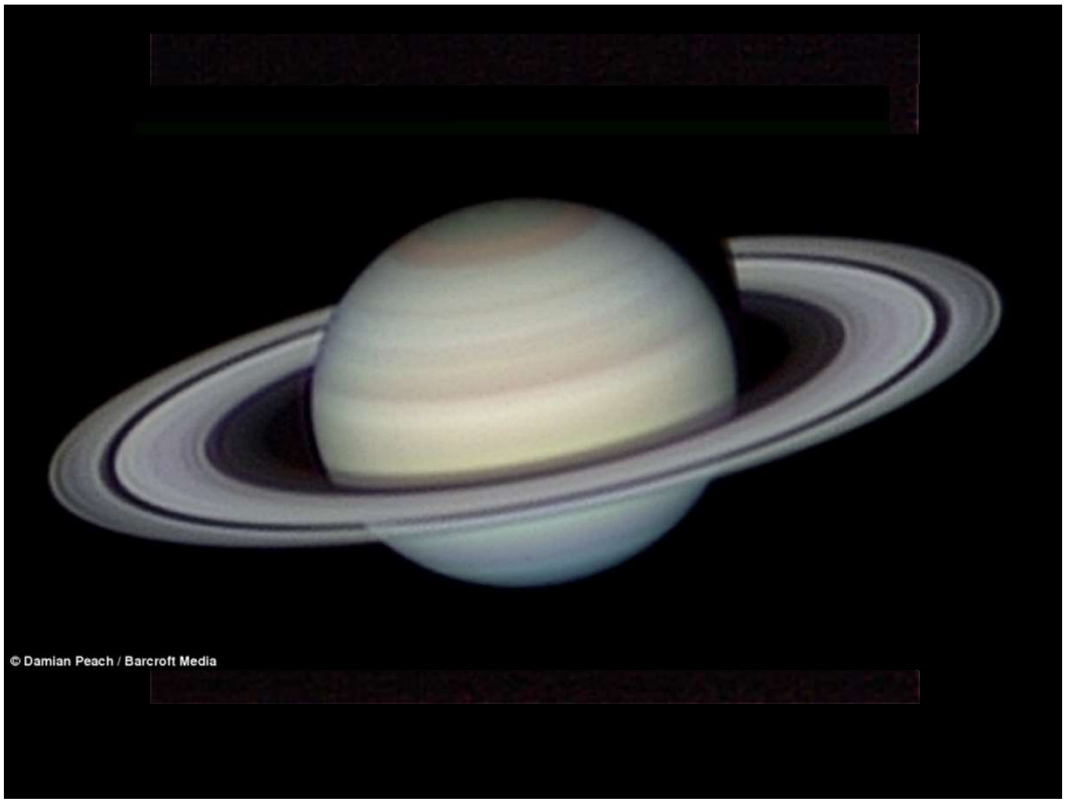


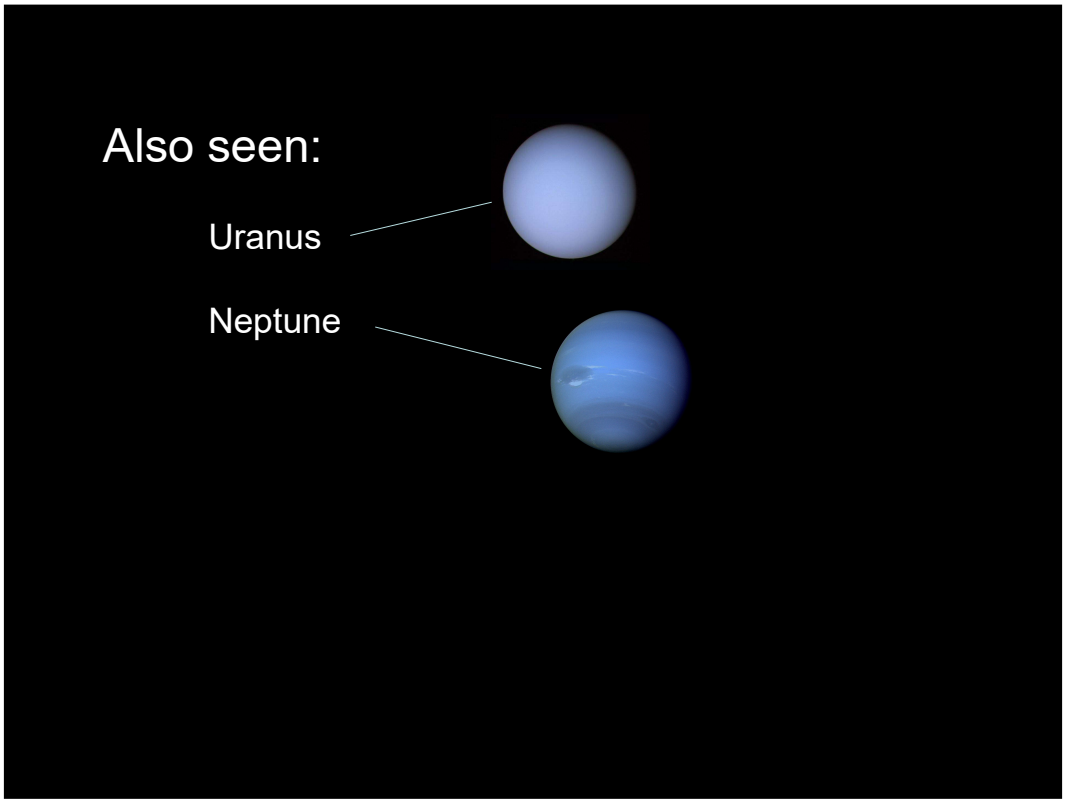
Amateur photos (made into video). From a back garden in East London

An amateur photo of Jupiter taken from our observatory.

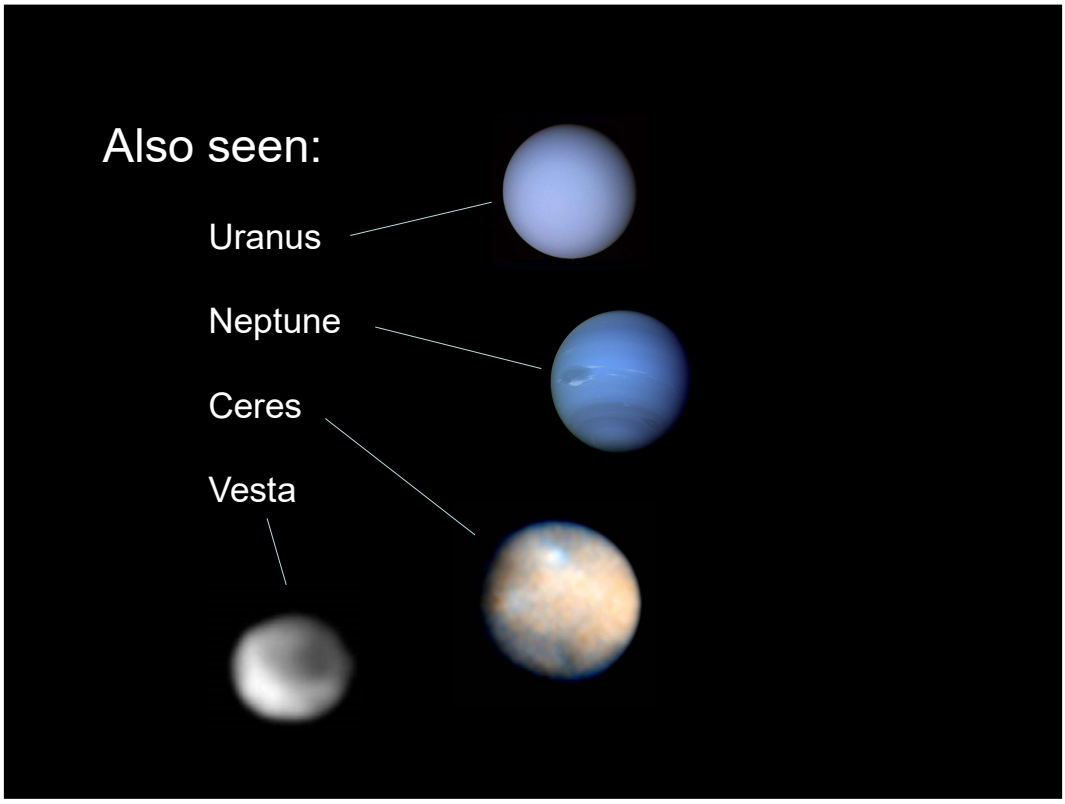
Amateur photo

Amateur photo of Saturn taken from our observatory


© Damian Peach / Barcroft Media



Gas giants. No solid surface



There are other minor planets and dwarf planets

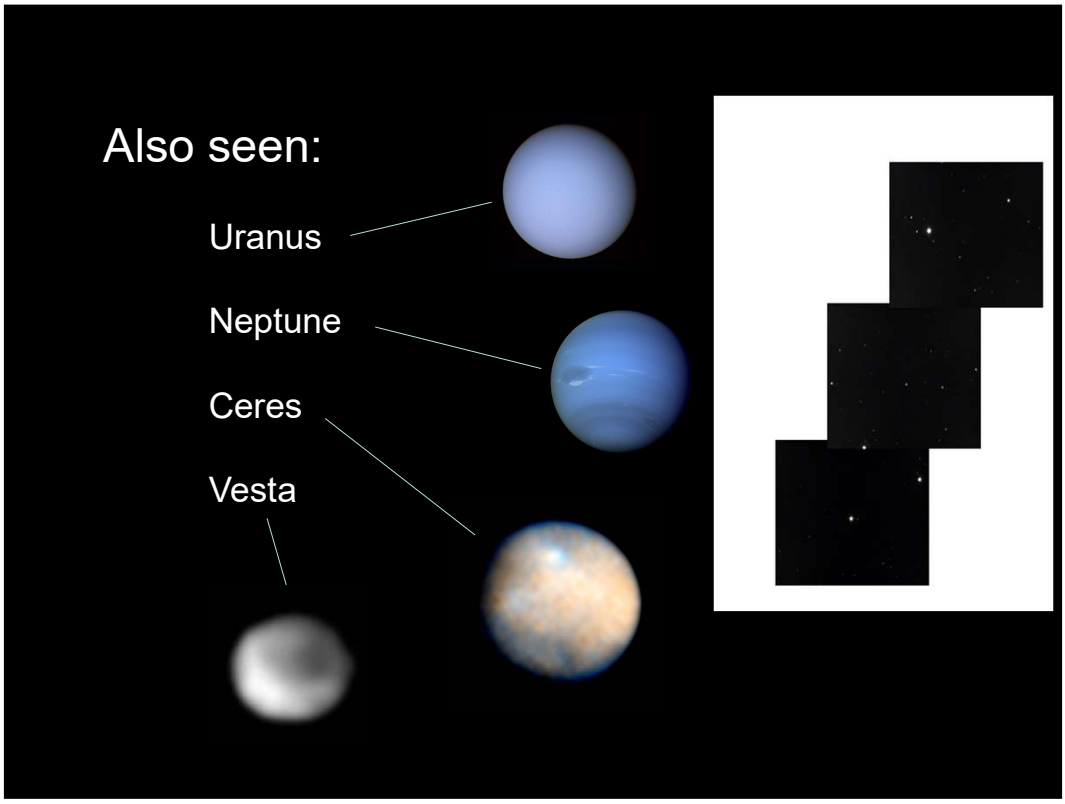
Ceres is between Mars & Jupiter and is dwarf planet

Vesta is asteroid (doesn’t make it as a dwarf planet)

Four more dwarf planets beyond Pluto

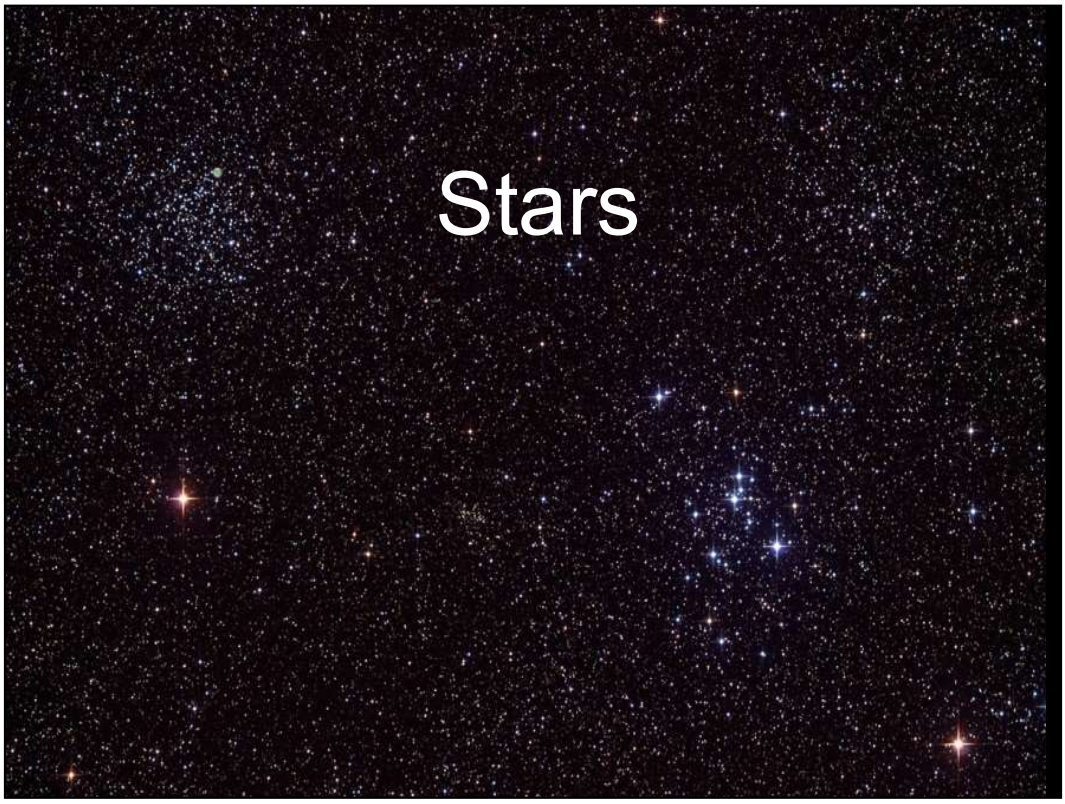
Objects are called dwarf planets if their own gravity is sufficient to achieve hydrostatic equilibrium and form an ellipsoidal shape.

Asteroids are small, rocky bodies that have been left over from the formation of the planets 4.5 billion years ago. They are often known as 'minor planets'. There are thought to be billions of these chunks of rock. Most of them lie in a doughnut-shaped 'main belt' between the orbits of Mars and Jupiter

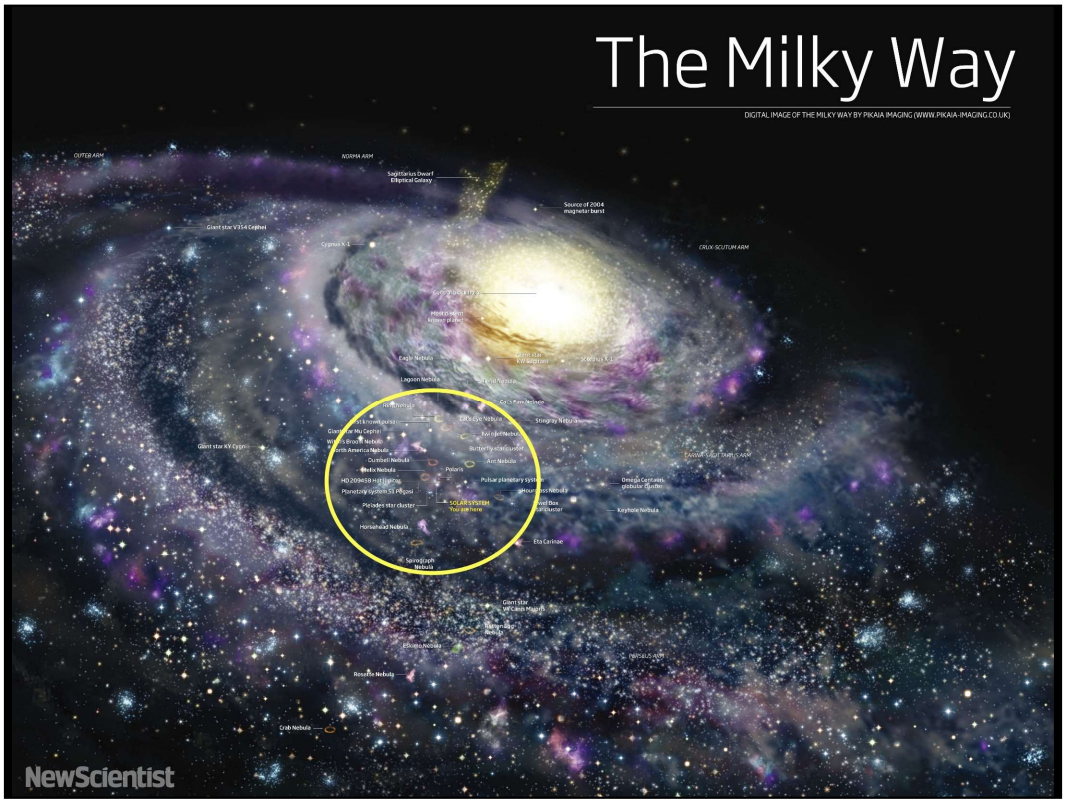


Vesta over five nights against star background. Taken from our observatory

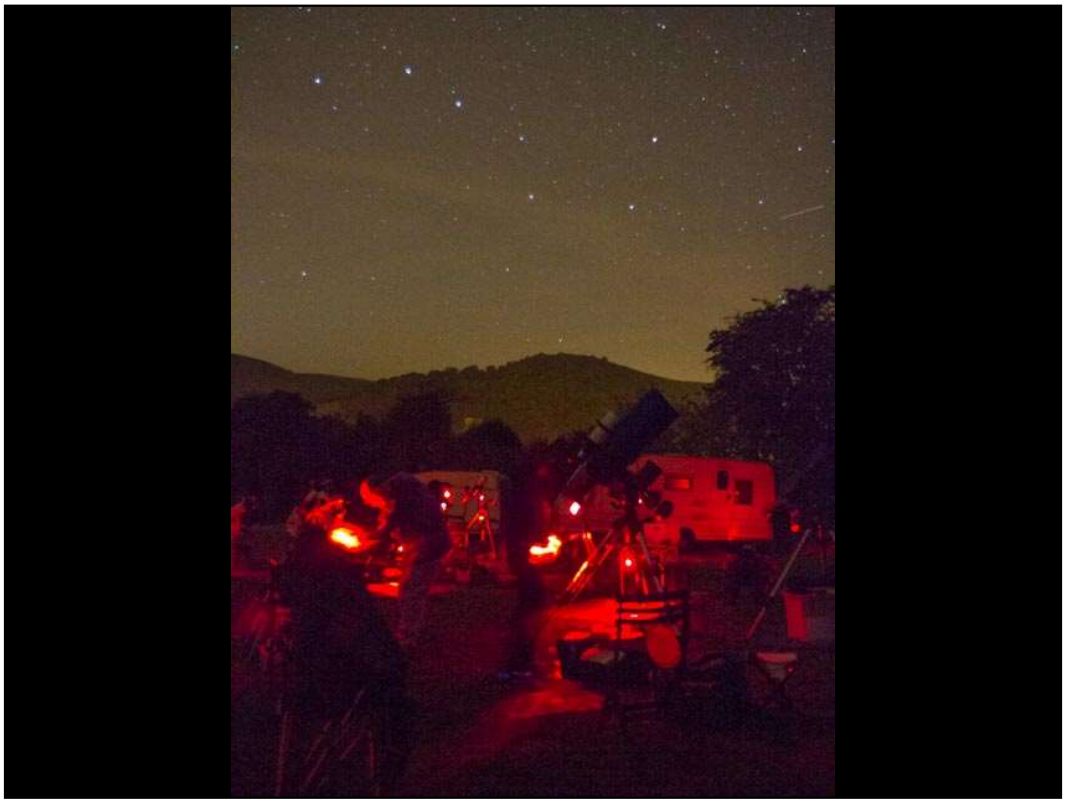
The word planet is from the Greek **planete** , meaning **"wanderer"** . All of the known planets moved against the background stars; the historically-known planets included Mercury, Venus, Mars, Jupiter, and Saturn (and Earth, of course). Mercury and Venus stayed close to the Sun.



The sun is a star. They are huge explosions, held together by gravity.



Stars from groups called galaxies. There are many thousands of stars in a galaxy.
Our sun, and the planets, are in the Milky Way galacy (100,000,000,000 stars)
All the stars we see are in Milky Way galaxy (small, close part of it)

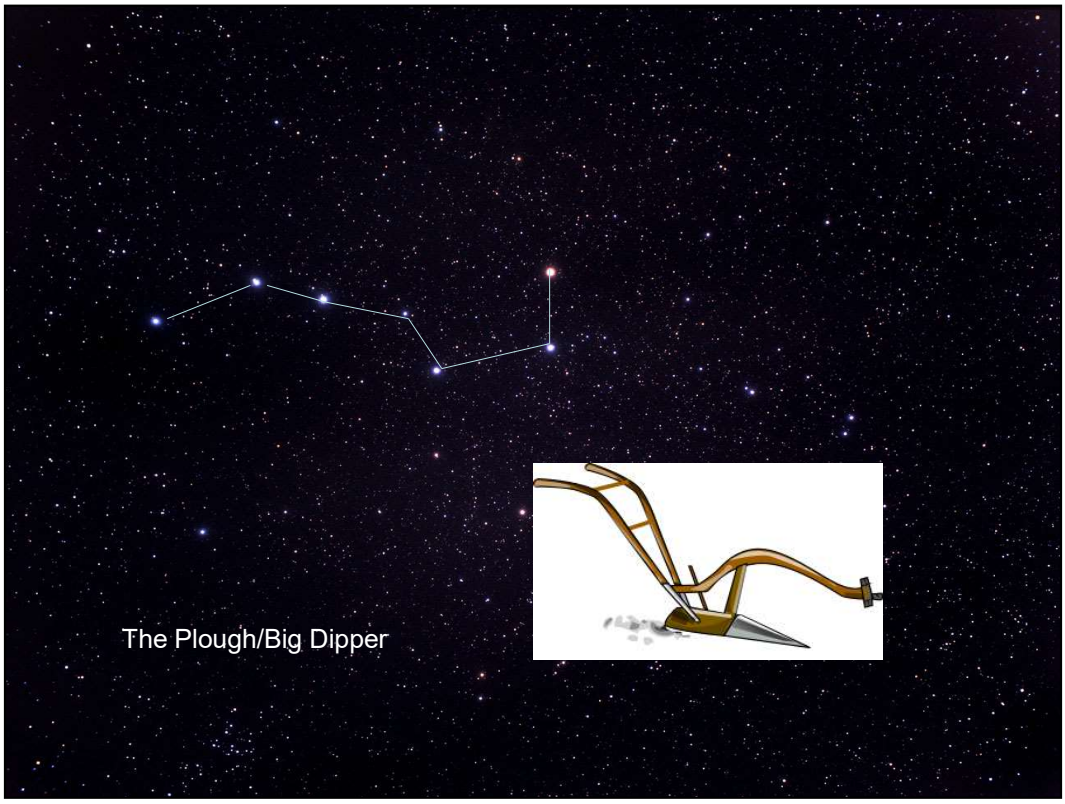


SKIP IF TIME IS SHORT

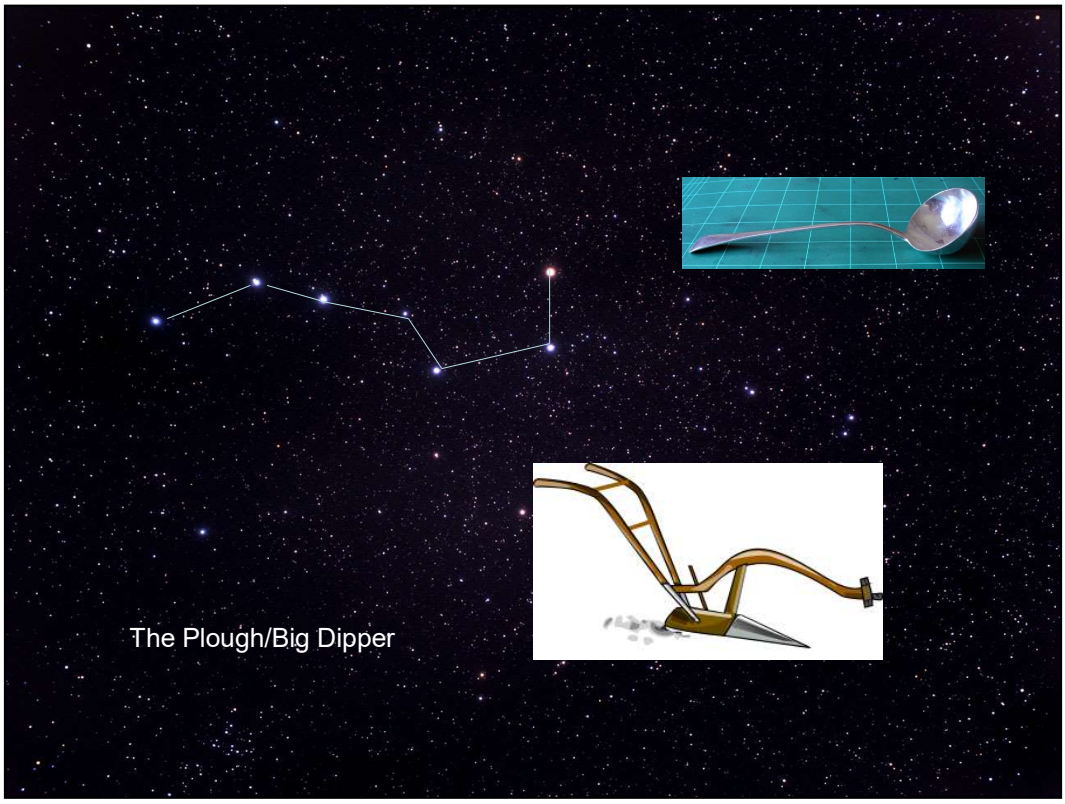
Patterns of stars

Plough. Always up there somewhere

More info https://www.twinkl.co.uk/teaching-wiki/the-plough-star-constellation



Old fashioned plough



Or ladle (American: dipper)

Two pointers show direction of pole star (Polaris).

Polaris over N pole of Earth, Find your way


URSA MAJOR
URSA MINOR

About one hour exposure

Stars appear to rotate around pole star due to rotation of the Earth

Another pattern of stars which is easy to spot

Cassiopeia is always visible (other side of pole star from plough)

Queen Cassiopeia sitting on her throne (!)

very famous pattern of stars (constellation) visible in the autumn and winter – Orion

More info https://www.space.com/16659-constellation-orion.html

Hunter. Only visible in winter/spring

Belt, sword, (bow/shield)

Pleiades

Star cluster

Seven sisters

Over 400 stars

We use the term Deep Space Objects for objects that we can see that are beyond our solar system.

They are usually too feint to see (not too small).

We use a telescope to see them.

One famous one is the Orion nebula which can be seen in the “sword” of Orion

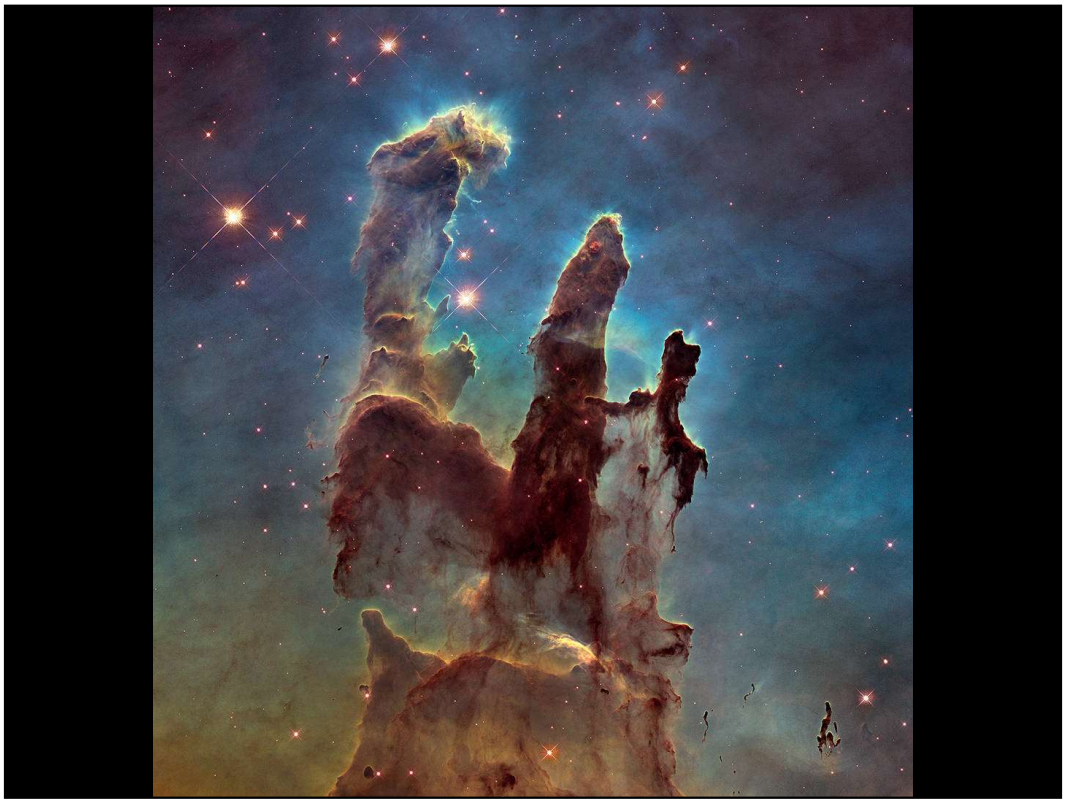
Looks like a star but it isn’t

Nebula means cloud. This nebula is a star-forming region (taken from our observatory)

Here is another Star forming region. Taken from our observatory

Pillars of Creation (centre of Eagle nebula) 7,000 light years away

More info
https://www.nasa.gov/feature/goddard/2017/messier-16-the-eagle-nebula



The same Pillars of Creation (Eagle nebula) taken by the Hubble telescope

Dumbbell nebula taken from our observatory

The nebula is and Exploded star

About 10,000 years since star exploded

1360 light years away

Sometimes called planetary nebula (because of shape. Nothing to do with planets)

More info
https://www.nasa.gov/feature/goddard/2017/messier-27-the-dumbbell-nebula

Some stars clump together into Globular star clusters

Around Milky Way

This is the cluster given the number M10 There are lots of others

More info
https://www.nasa.gov/feature/goddard/2017/messier-10

And https://earthsky.org/astronomy-essentials/definition-what-is-a-globular-cluster/

Here is a photo of another galaxy.
Whirlpool galaxy taken from our observatory
(These are actually two galaxies which are colliding)
30 million light years away

More info https://hubblesite.org/science/galaxies

And https://www.nasa.gov/feature/goddard/2017/messier-51-the-whirlpool-galaxy

Side on view of galaxy

Needle galaxy – 40 million light years away