

The Night Sky in January, 2021

The Sun and Moon

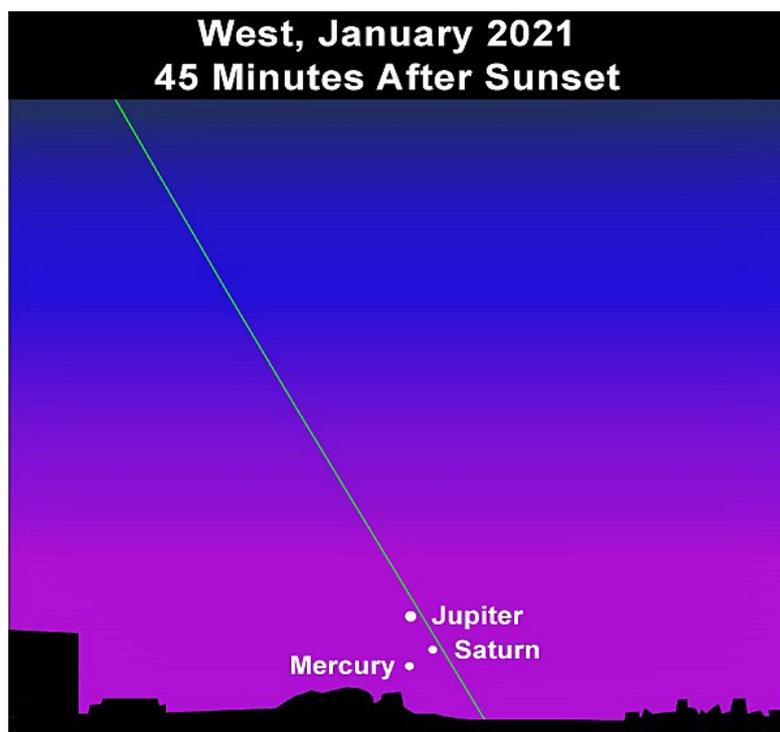
Happy New Year everyone and welcome to the first Newsletter of 2021. Here is hoping that it will be a better year for everyone. Thankfully we are well past the **winter solstice** and the days are getting longer and the nights shorter until we reach the **spring equinox** on March 20th 2021 when the day and night will be of equal length. On January 1st the Sun will rise at 08:26 and set at 16:02 but by January 31st sunrise will be at 07:56 and sunset at 16:51.

This month there will be a **New Moon** on January 13th which means the skies will be dark for observing around that time. The **Full Moon** will be on January 28th. This is known as the **Wolf Moon** and it is the time to go for a night run and howl with the wolves! It is also known as the **Ice Moon** and the Anglo Saxons called it the **Moon After Yule**.

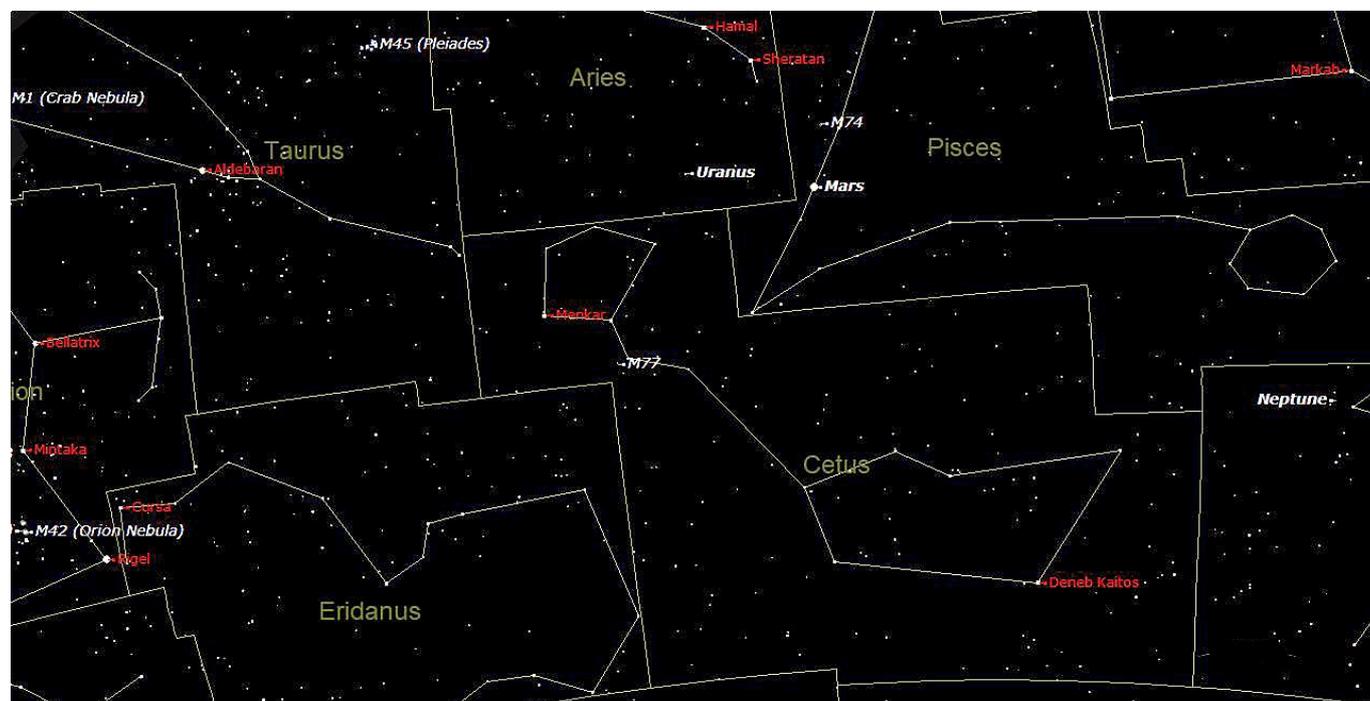
The Planets

One highlight last month was the so called “Great Conjunction” when the planets **Jupiter** and **Saturn** were closer together than they have been since 1623. Unfortunately we were clouded out for several nights and didn't see it at all. I will be interested to hear if any of you managed to see it. Even better, if you were able to image it I would love to see a copy.

Jupiter and Saturn are now moving closer to the Sun. They can be found together low on the horizon in the west. The image below (courtesy of earthsky.org.uk) shows the planets 45 minutes after sunset on January 9th. You can see that they have been joined by **Mercury**. These planets will reach **solar conjunction** on January 24th. This is when we will be unable to see them since they will be drowned out by the Sun. After this date the planets will become visible in the morning sky.



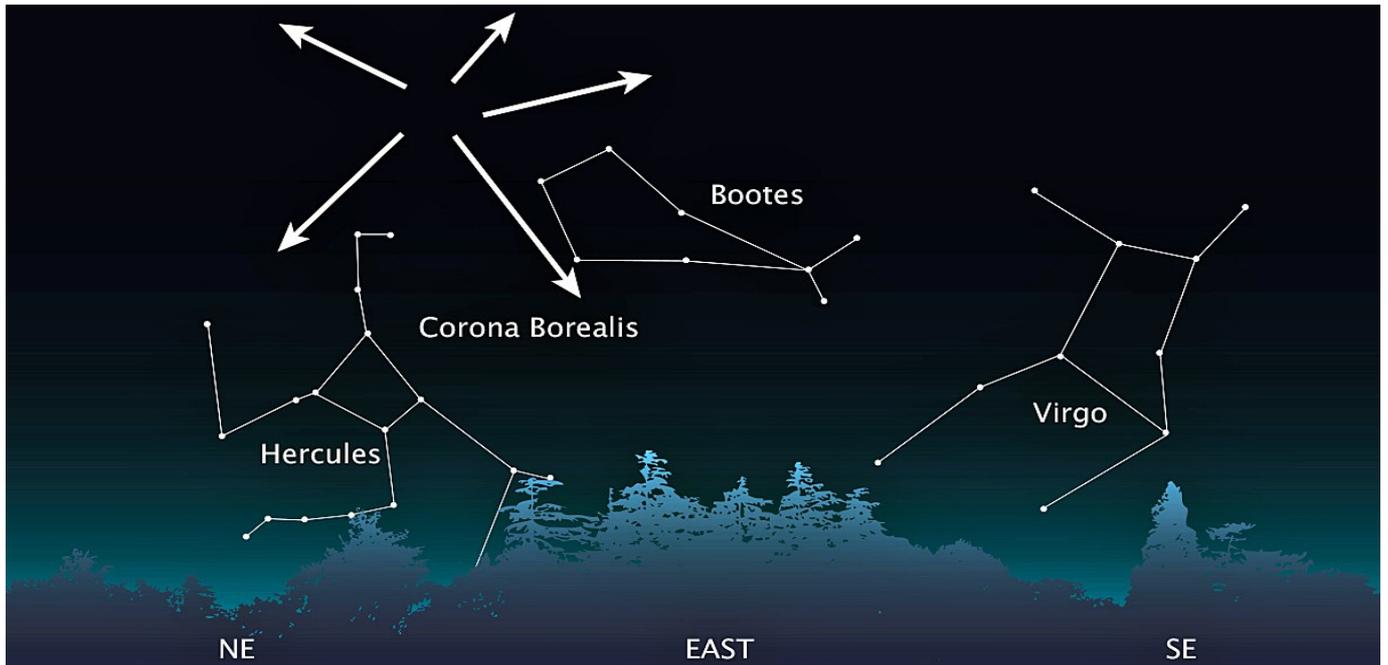
The Sky At Night magazine chooses **Mars** as its planet of the month and the best time to see it is on January 1st at 19:00. You can find it high in the south in the constellation of **Pisces the Fish** as shown in the star chart below. You will need binoculars to see this planet as a star like point but if you want to see its disc you will need a telescope of 150mm (6 inch) aperture at least. As the month goes on, Mars will move further to the east passing from Pisces into the constellation of **Aries**. Note that both **Neptune** and **Uranus** can be seen in the chart below. Also to the left of the chart you can see the **Pleiades**, the constellation of **Taurus the Bull** and part of **Orion** which is just rising in the southeast.



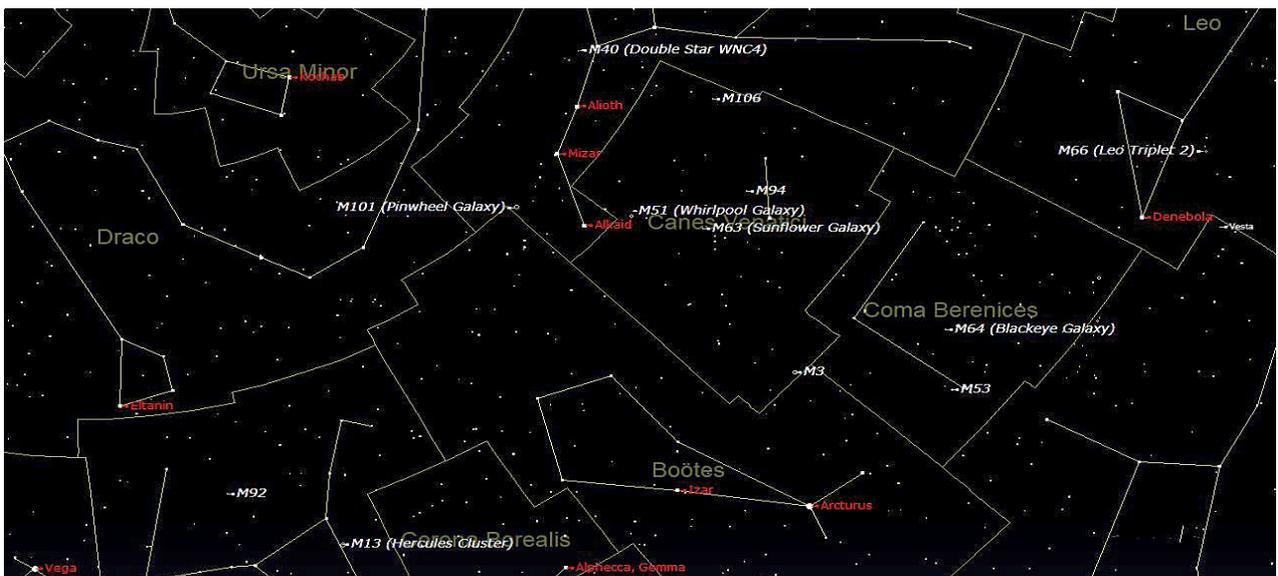
Meteor Showers

The New Year goes off with a bang with the **Quadrantids** meteor shower which peaks at 14:30 on January 3rd. The best time to see them is on the nights of January 2nd /3rd and 3rd/4th. Unfortunately, a waning gibbous Moon will rise around 21:00 drowning out all but the brightest meteors. A very high rate of meteors per hour is expected since the **zenith hourly rate (ZHR)** is 120 meteors per hour. The ZHR is the number of meteors per hour you can expect to see under perfect conditions and looking directly overhead (that is at the **zenith**). But you are likely to see less than this in practice. Also over Oxfordshire there will be about 100% cloud cover on the nights of the 2nd and 3rd! You may have more luck in other areas. However it is possible to see some meteors either side of the peak between January 1st and 12th.

The meteors will appear to come from a point in the sky known as the **radiant**. This point is near to a constellation called **Quadrans Muralis** – hence the name of the shower. This constellation is no longer one of the 88 officially recognized constellations, so for us the radiant will appear to be below the handle of the **Plough** and above the constellation of **Boötes the Hunter**. For this reason, some people prefer to call this shower the **Boötids**. The position of the radiant is shown in the image below.



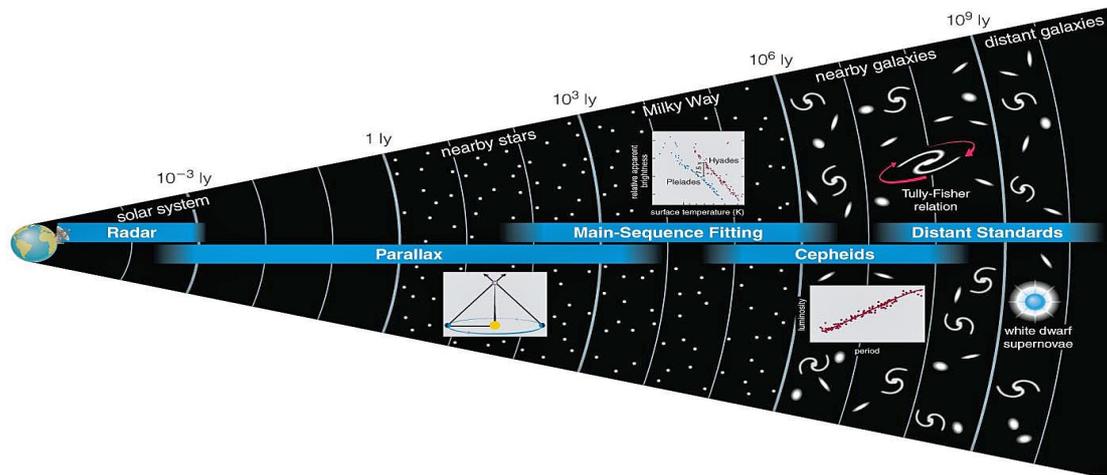
The star chart below shows the sky in the east at 01:00 on January 3rd. The handle of the Plough can be seen at the top centre of the chart. Below it is Boötes which is a kite shaped constellation.



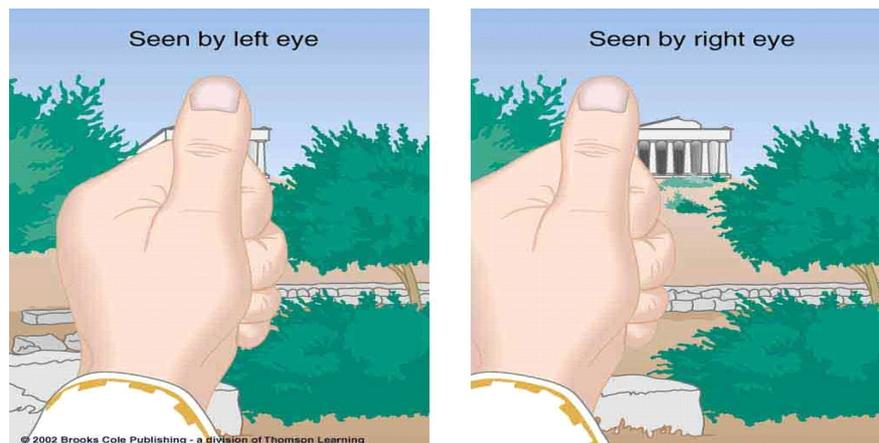
Astronomy for Dummies

I will continue to respond to Andy Robertson's question which is "I (and maybe others) would be interested to know how such huge distances can be measured...and to what accuracy? How long have we been able to make such estimates?".

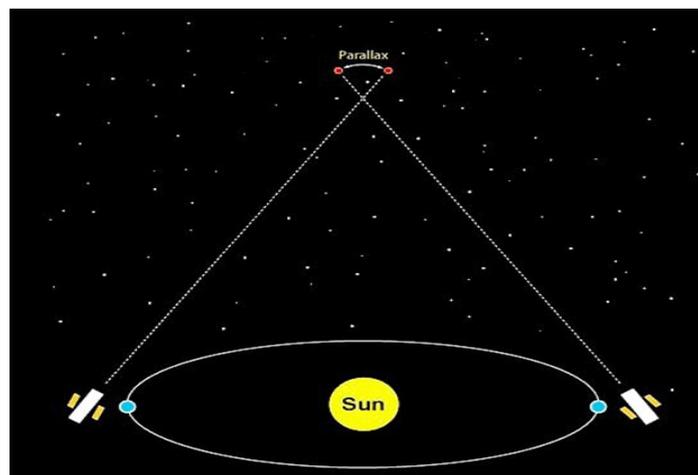
Last month I described how distances to the Moon or planets in our Solar System can be measured by using radar or laser beams. But if we want to measure the distances to stars, then other methods are needed. This is illustrated in the diagram below. Radar techniques can be used within the solar system but for more distant objects the method of parallax can be used.



A simple way of measuring parallax is to hold your thumb up to a distant object as shown in the image below. First close your right eye and note the position of the object with your left eye. Then close your left eye and note the position with the right eye. You will see that the object appears to have moved to a different position. By measuring the difference between the two positions and knowing the distance between your eyes, it is possible to calculate the distance to the object.



If you want to measure the parallax of a star then you note the position of the star at one end of the earth's orbit (say the middle of winter) and then note its position at the opposite end of the earth's orbit (in the middle of summer). This is illustrated in the diagram below. Then if you know the diameter of the earth's orbit (which is known very accurately) you can calculate the distance to the star.

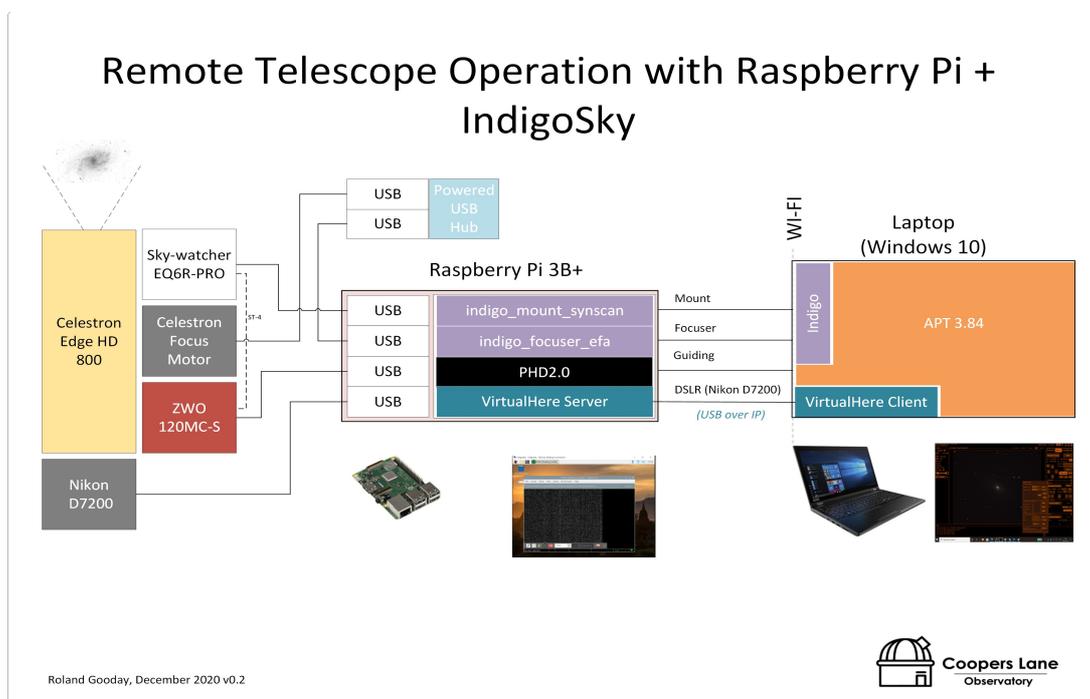


Obviously with today's technology and many satellites out there in space, measuring the parallax of stars is now automated. Next month I will describe how we measure the distances to stars and galaxies even further away using **standard candles**.

Images of the Month

Roland Gooday is continuing to be very active in astrophotography as you will see if you look on his Facebook page. He is doing something that we have always intended to do but haven't got round to yet – that is setting ourselves up so that we can operate the telescope remotely from inside our warm house to avoid suffering the cold outside. If you are interested, here is Roland's description of what he is doing.

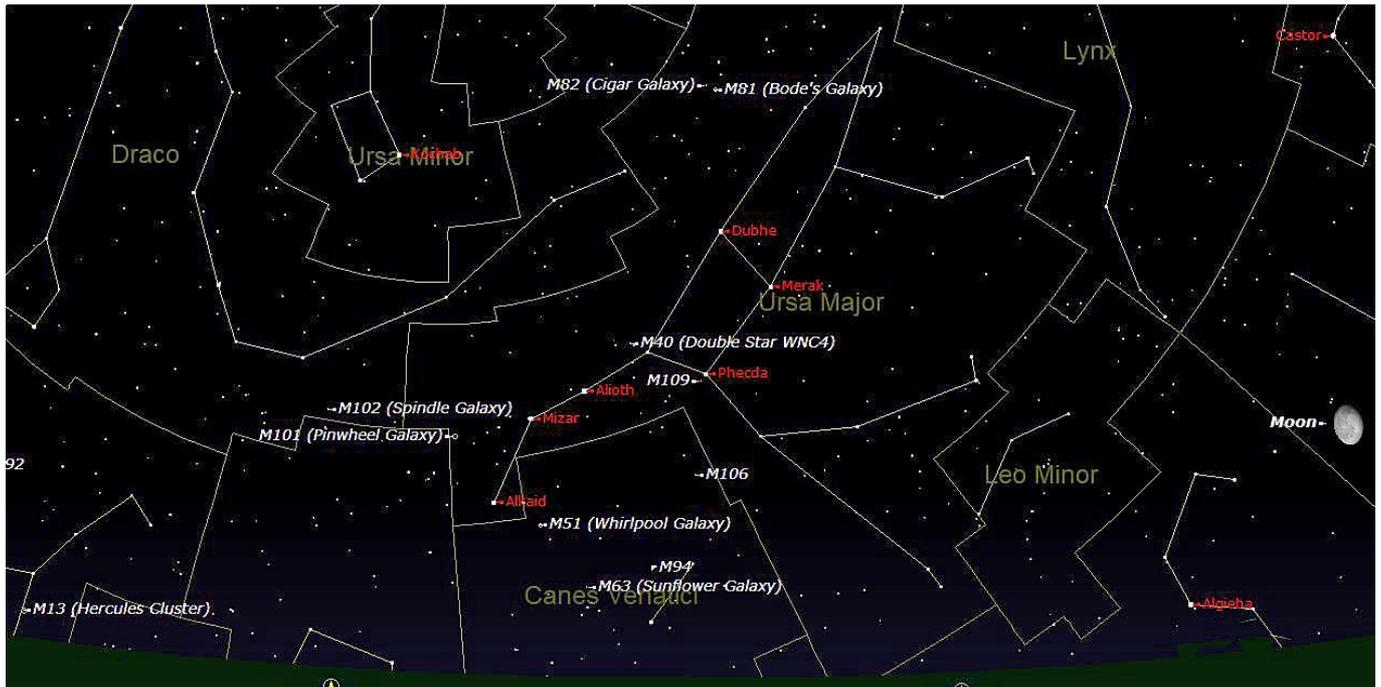
“I have spent much of the last few weeks working on my remote telescope setup. The design principle is to drag as little out into the garden as possible whilst doing as much as I can while comfortable and warm in the kitchen...for the least expenditure as possible. I think I've made some progress, but the weather has been less than ideal. I'm basing my solution around a low cost computer that can be velcroed to the mount somewhere and hooked up to the mount, the focuser, the guide camera and the main imaging camera. In this case I'm using a £50 Raspberry Pi. The Raspberry Pi is intended as educational / enthusiast mini computer that can be easily tailored to do pretty much anything ('Internet of Things'). They run Linux operating systems, which are generally free, and a number of these OSs have been especially built as astro-imaging solutions. I'm using 'IndigoSky'. In practice they need quite a bit of tweaking to get working, but I think I'm nearly there (current set up attached as reference)”. Below you can see a block diagram of Roland's kit!



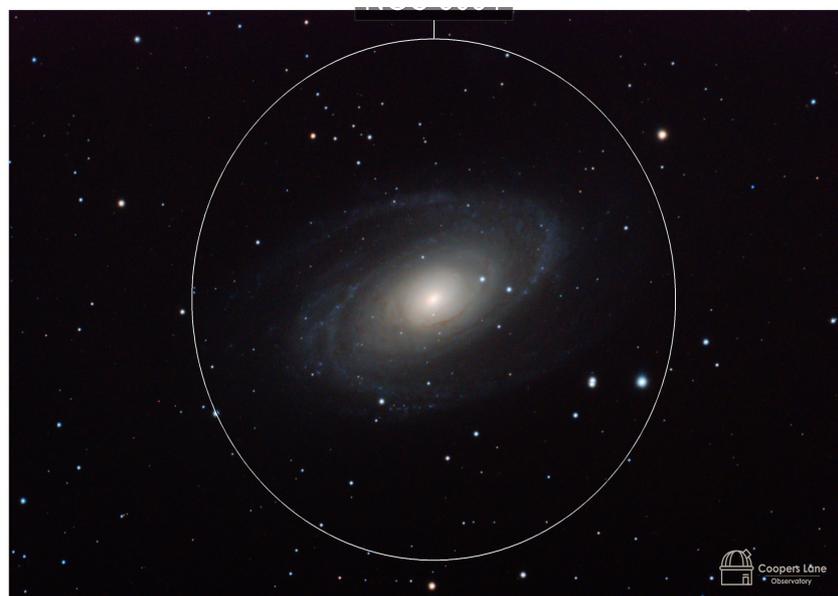
“I spent some time trying to image the 'hidden galaxy' on Christmas Eve, but this didn't really pan out. At the end of the session, despite a reasonably bright moon, and over just half an hour I did manage to grab a quick shot of M81. For the first time since getting the new mount I had some mechanical issues in tracking, and I haven't quite worked

out what caused these. In addition, I wasn't using the new OAG as I couldn't find a guide star for IC 342, so I was using the guide scope again when I got to M81, compounding my tracking issues. The net result are some fat fuzzy stars, but all the same, the end result isn't so bad.

M81 is a spiral galaxy which is also known as **Bode's galaxy**. It is located near the Plough in the constellation of Ursa Major as can be seen in the star chart below. This shows the sky in the north at 20:00 on January 1st. M81 can be seen at the centre top of the chart. Note that to the left of M81 you can see another galaxy **M82** also known as the **Cigar galaxy** because of its shape. Both of these galaxies are popular imaging targets for amateur astronomers.



Below is Roland's image of M81. You can just make out the spiral arms in the image. Bode's galaxy is situated 12 million light years away. Its diameter is 90,000 light years compared with the Milky Way's diameter of 100,000 light years.

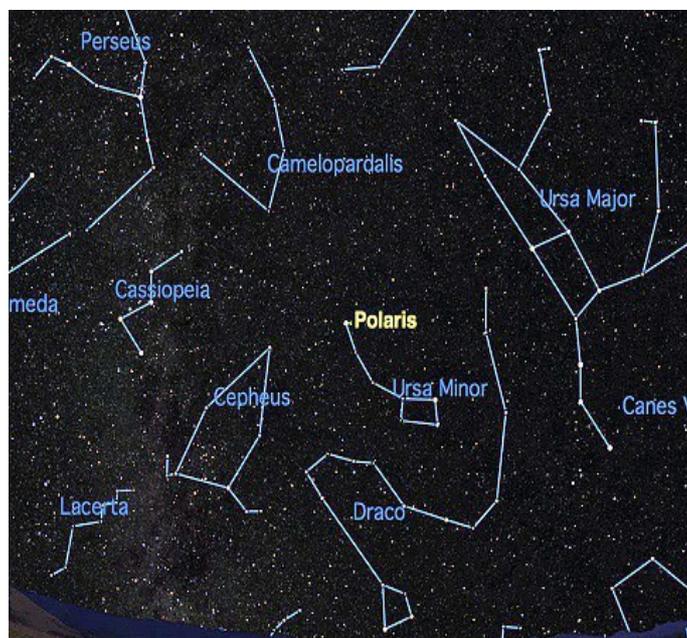


I must confess I have not heard of the “**Hidden Galaxy**” before. It is called this because it is difficult to find and the reason for this is that it is very close to the centre of our galaxy which is shrouded in dust. Below is a fabulous image of it take by Keith Steffens at the Frog Island observatory in Michigan. Something to aspire to!

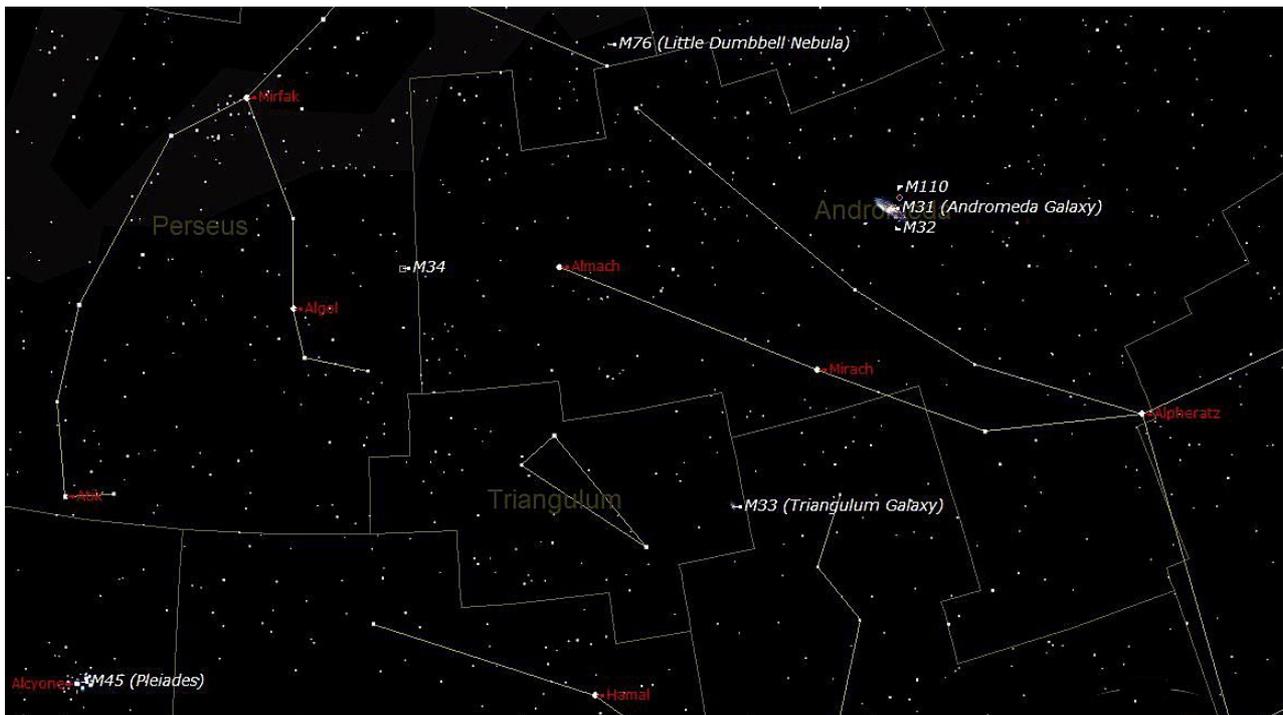


Constellation of the Month

In recent months I have described 5 circumpolar constellations as shown in the image below. Last month I moved move further away from the pole to describe the constellation of **Perseus**. This is shown in the top left of the image below.



The following star chart below shows the sky in the south at 19:00 on January 1st. The constellation of Perseus which is the shape of a chicken wishbone can be seen in the left of the chart. To the right of it you can see two lines of stars which make the wedge-shaped constellation of **Andromeda**. This is my constellation of the month.



The most interesting object near Andromeda is of course **M31**, the **Andromeda galaxy**. You can find it by first looking along the bottom line of stars in the Andromeda constellation until you reach the bright star **Mirach**. Then move up to the top line of stars until you reach the star above Mirach. If you move upwards the same distance again you will reach M31. You should also be able to find the galaxies **M32** and **M110** nearby,

GoSpaceWatch

Michael Bryce is now advertising his next GoSpaceWatch Zoom presentation as shown below. Tickets are £3 pp and can be purchased from the website shown.

Wednesday January 27th 7:30 pm

Dr David Whitehouse

“Take a look at the next 50 Years of Human Spaceflight ”

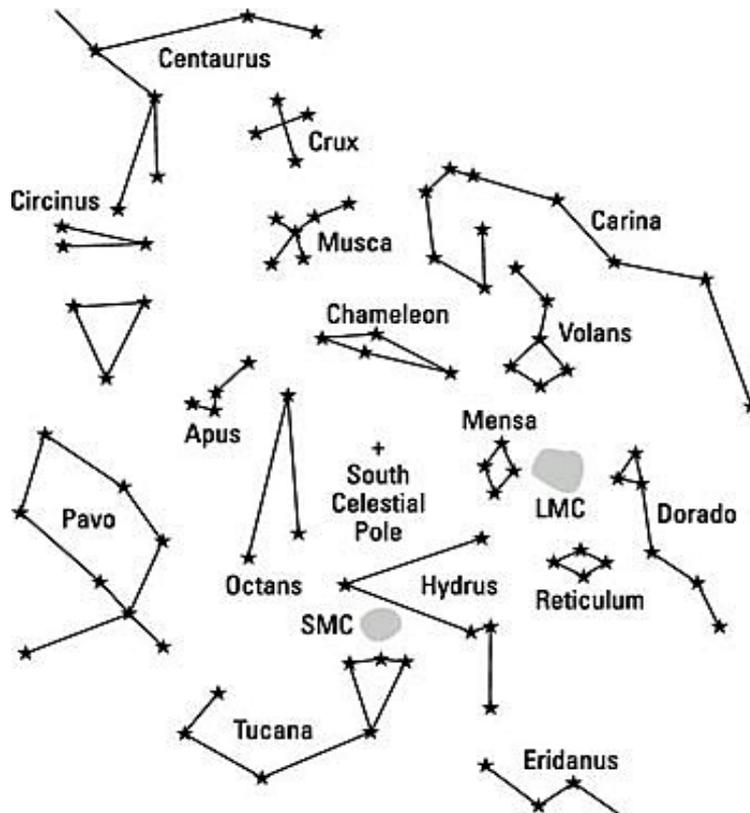
Tickets <https://bit.ly/36f5FKH>

What's Up in Dalian, China?

I have come to the conclusion that it is not necessary to write a separate section for Dalian. Most of what I write in the previous sections of this newsletter applies to you. Since you are in the Northern Hemisphere, the sky you see is very similar to ours except that you are further south so you can see further down into the Southern Hemisphere. Also, objects that are low down on the horizon for us, are higher in the sky for you. This is a great advantage since they will be easier and clearer to see. Dalian time is 8 hours ahead of Greenwich Mean Time so you will see things before we do. You will be able to see the Quadrantids and also the planets as described earlier.

What's Up in the Southern Hemisphere?

Recently I have been talking about the circumpolar constellations in the southern hemisphere. There are only three, that is **Centaurus**, **Carina** and **Crux**. In the last two months I have talked about Centaurus and Carina and so the only one left is Crux, the Southern Cross. As you can see in the chart below, Carina is situated to the right of Centaurus and Crux is between these two.



It is unlikely that you will be able to see the Quadrantids since they are too far north. But you will be able to see the planets as described earlier.

Well that is all for the first month of 2021! I wish all of you the very best for the coming year. Stay safe and well!

Valerie Calderbank FRAS