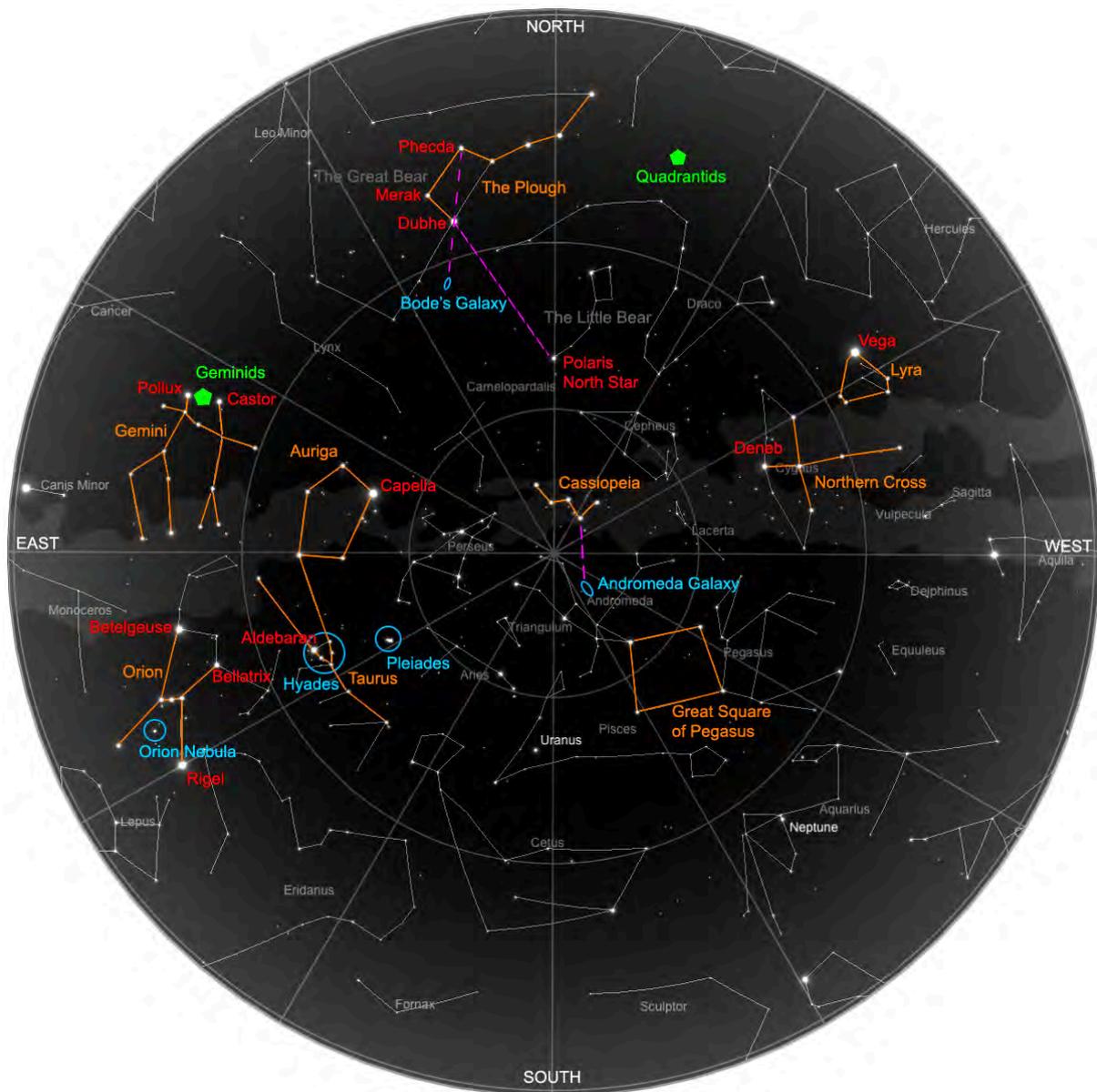


Winter Star Gazing

By Jean M. Dean and Jason Hill for the Astronomy Section of the Société Guernesiaise

With the long winter nights now is a great time to do some star gazing. Here is a guide to show you some night sky wonders over Christmas and the winter months, starting in just two days time with the Geminid meteor show. Wrap up warm, go outside on a dark, clear night and make yourself comfortable away from exterior lights. Let your eyes grow accustomed to the dark - this can take about 20 minutes, but it's worth the wait. If you need a torch to move around or read the charts, try to cover the front with red film (even a sweet wrapper will do) - this will preserve your night vision. You only need your eyes to start with, but if you have a pair of binoculars you will be amazed at how much more you can see.



Winter Night Sky Chart

This chart is for 21 December at 8pm. As the night and days progress the Northern Cross and Lyra will get lower to the horizon while Orion, Gemini and Auriga will get higher in the sky. To use the chart: hold it so the direction you are facing is at the bottom, the lower half of the chart shows the sky in front of you and the centre of the chart is the region directly overhead.

Meteor showers

Anyone who watches the night sky for an hour or so is almost guaranteed, at any time of the year, to notice occasional bright streaks flash across the sky. These are meteors and are caused when tiny grains of dust or rock (some no bigger than grains of sand) burn up when they slam into the Earth's upper atmosphere at very high speed. Between the 8th and 17th December (with a peak at about 2am on 14th December) you can expect the rate of meteors to increase significantly during the Geminid meteor shower - this is a very rich shower and this year is hoped to be particularly favourable. The Quadrantid meteor shower occurs between the 1st and 6th January (with a peak at about 9pm on 3rd January), although this isn't expected to be as good as the Geminid shower. Meteor showers are notoriously unpredictable, but patience is often its own reward.

The Plough and how to find North

The Plough has a good distinctive shape that's easy to remember - it looks a bit like the blade and handle of an old fashioned plough, or a bent-handled ladle. It's part of the constellation of the Great Bear. An imaginary line drawn between the two stars furthest away from the handle (Merak and Dubhe) "points" towards Polaris, the Pole Star (North Star). Polaris is due north in the constellation of the Little Bear and is very near to the point around which the whole sky appears to revolve during the course of the night.

Cassiopeia

Another distinctive shape that you should be able to find easily is the wonky "W" (or "M" depending which way up it happens to be at the time) forming part of the constellation of Cassiopeia. It's roughly on the other side of Polaris from the Plough.

Orion

A lovely constellation in the winter sky is Orion, the hunter. It will probably be somewhere in the south (so opposite Polaris) and has three stars forming the "belt". If you look carefully below the belt and about halfway to the two stars at the base of the constellation you should see a dim misty patch. This is the Orion nebula and is a place where stars are being born - look at it through binoculars and you will see much more detail.

The colours of the stars

If you look carefully at the stars (Betelgeuse and Rigel in Orion are good for this - top left and bottom right respectively) you might notice that some have distinct colours. Betelgeuse is decidedly pale red/orange when compared to, say, Rigel. Colour is a sign of a star's surface temperature - orange/red is much cooler than white, which in turn is cooler than blue/white.



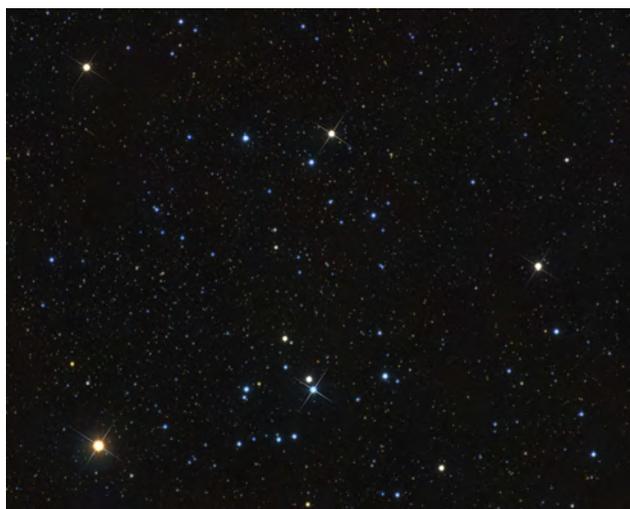
Orion Nebula

A cosmic cloud around 1,500 light years away where new stars are forming (Image Credit: J.M. Dean).

The Hyades and the Pleiades

If you go to the right and up a little from Orion you might be able to find a distinctive “V” shape of stars in the constellation of Taurus that includes another red/orange star called Aldebaran. The stars in that “V” shape (excluding Aldebaran) are called the Hyades and form a cluster of stars that are approximately the same age and are moving together through space.

Go right and up from the Hyades and there’s another misty patch - the beautiful cluster called the Pleiades, or Seven Sisters. Look at this cluster through binoculars for another view of a nebula - this time a dust cloud illuminated by the stars passing through it.



The Hyades (left) and The Pleiades (right) (Image Credit: J.M. Dean).

The Andromeda Galaxy

Another fine sight is the Andromeda Galaxy. Find it by starting with the three stars forming the right hand “V” in the “W” of Cassiopeia. Use them like the head of an arrow and carefully track in the direction they point - although fainter than either Orion’s nebula or the Pleiades, you should be able to find another faint misty patch. The view in binoculars is quite impressive. This is another galaxy - quite distinct and separate from our own Milky Way. It’s probably the most distant object you can see with the naked eye and is about 2.5 million light years away (one “light year” is the distance that light travels in one year and is about 9.5 thousand billion kilometers, or 5.9 thousand billion miles).



The Andromeda Galaxy

Our inter-galactic neighbour, which in about 4.5 billion years will collide with our Milky Way Galaxy! Also visible are two smaller galaxies top centre and bottom left (Image Credit: J.M. Dean).

Bode's Galaxy

Go back to the the Plough and join up the stars Phecda and Dubhe with an imaginary line and project it by the same amount again. You'll almost certainly need binoculars to see this one, but you should be able to find another faint misty patch - this is Bode's Galaxy.

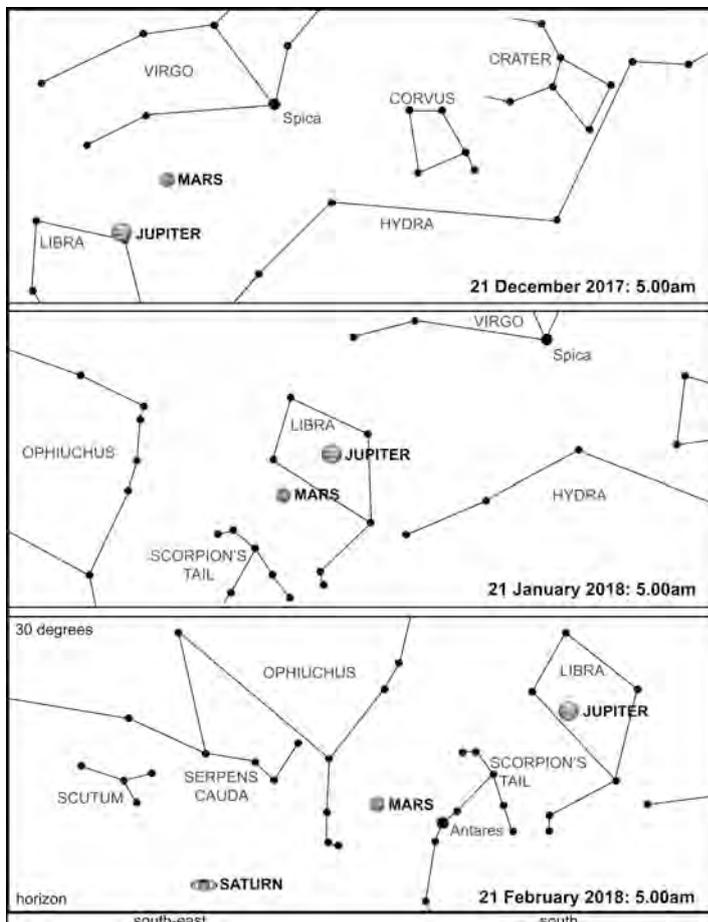


Bode's Galaxy

A galaxy that is similar in size to our Milky Way Galaxy with spiral arms and sweeping dust lanes, you will need binoculars to see this object (Image Credit: J.M. Dean).

Jupiter, Saturn and Mars

If you're an early riser try looking out for three of the other planets in the Solar System in the pre-dawn sky towards the South. The brightest is Jupiter, the biggest planet in the Solar System; look at it through binoculars and you might see up to four of its moons as tiny points of light on either side of the disk. Mars usually has a slight salmon pink tinge and so is easy to distinguish from Saturn. You will also see the bright star Spica which sits to the right and slightly higher. Saturn becomes visible in the predawn sky in February along with the distinctively reddish star Antares which will briefly sit close to Mars.



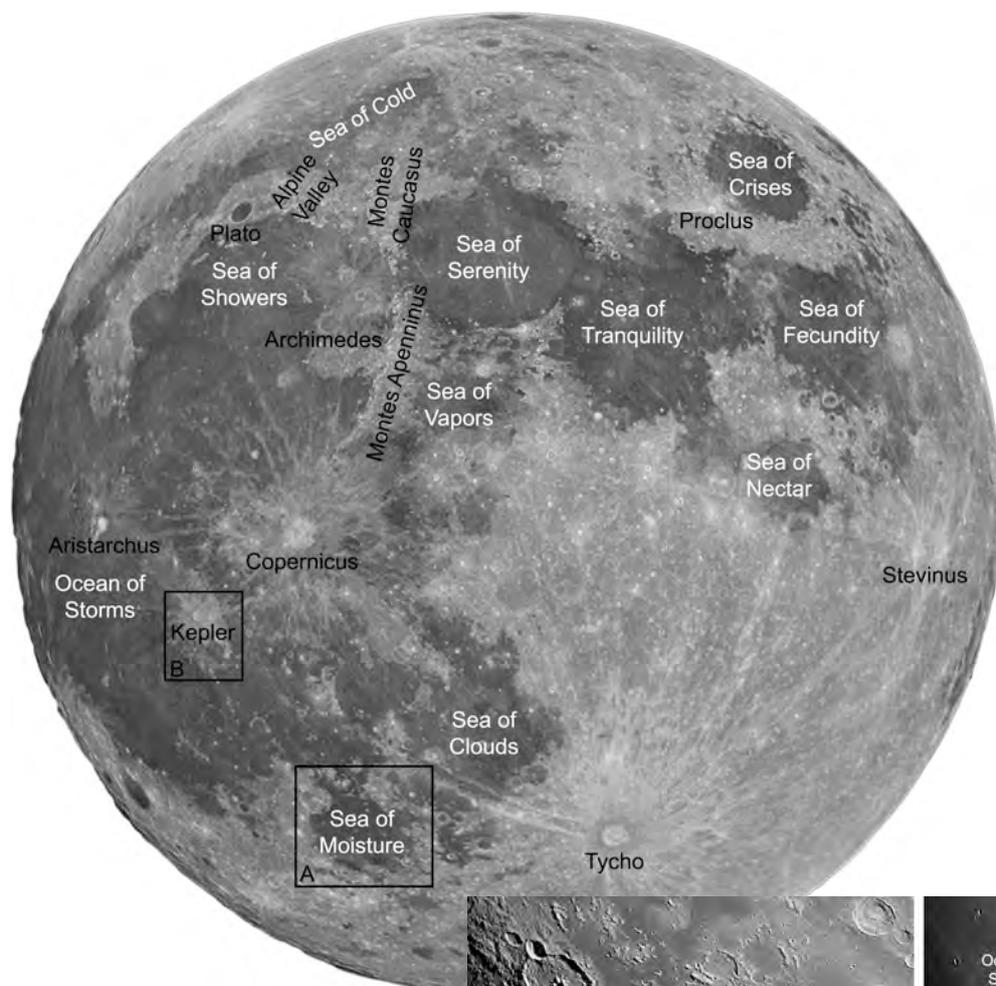
Early Morning Planets

Look south-east to south at around 5am to see Jupiter, Mars and Saturn. Be cautious of the rising Sun, do not look directly at it.

The Moon

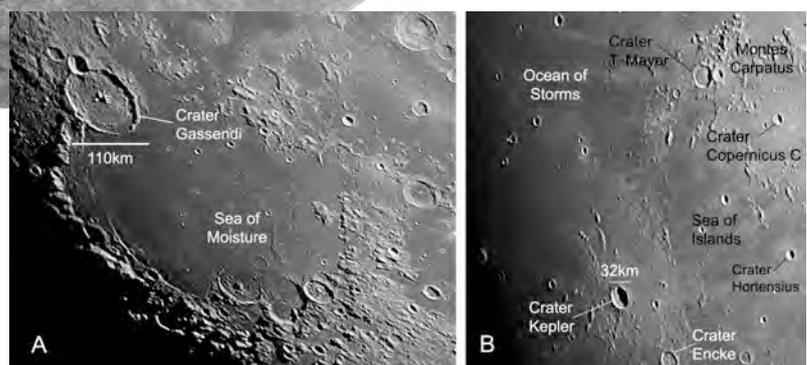
Our Moon is always a lovely object to observe. The dark patches on its surface are called “seas”, although there’s no water in them. In fact the seas are really low lying basins filled with solidified lava; the brighter areas of the Moon are higher lying areas. People are often surprised to learn that you can see much more detail when the Moon isn’t “full”. Using binoculars, look at the line dividing the bright side from the dark (this is where the Sun is rising as viewed from the Moon’s surface) and you will see many craters. The shallow angle of the rising Sun on the Moon casts long shadows and makes them stand out much better. The two most striking craters are Tycho which is relatively young at 108 million years old and is around 53 miles in diameter and 3 miles deep; and Copernicus which is also considered young at 800 million years and is around 58 miles in diameter 2 ¼ miles deep.

There are also mountain ranges such as Montes Apenninus which is very ancient at 3.9 billion years old and some 370 miles long with peaks up to 3.1 miles high. After a short gap at the northern end lies the Montes Caucasus. There are also valleys on the moon such as the distinct linear-shaped Alpine Valley with its lava-flooded floor.



Map of the Moon's Surface

Some of the main “seas”, craters and mountains with panes A and B showing enlarged detail from a waning gibbous moon (Image Credit: J.M. Dean).



Lunar Calendar and Times of International Space Station Passes over Christmas

Phase	Date Rise and Set
	17 December 06:53 - 16:05
	26 December 12:25 - 00:48
	1 January 2018 16:07 - 08:07
	8 January 23:25 - 11:48
	16 January 07:24 - 16.20
	24 January 11.21 - 00.56
	31 January 17:12 - 08:17
	7 February 00.31 - 11.05
	15 February 07.15 - 17.10
	23 February 10.58 - 02.22
	1 March 10:19 - 07.17

Lunar Calendar: rise and set times for new moon, 1st quarter, full moon and 3rd quarter phases.

Date and Time	Appears/Disappears*
15 December 4.50pm	WNW/SE
30 December 6.53am	WSW/ENE
31 December 6.02am	SSW/ENE
1 January 6.54am	WSW/ENE
2 January 5.54am	OVERHEAD/ENE
3 January 6.36am	W/ENE
4 January 7.18am	WNW/E
5 January 6.28am	WNW/E

*The stated times can vary by a few minutes.



The International Space Station (image courtesy of NASA)

The International Space Station (ISS) Passes

The ISS looks like a rapidly moving bright star in the sky as sunlight is reflected off the station. Currently it is manned by Expedition Crew 53 comprising astronauts from the United States, Russia and Italy, they orbit the Earth approximately every 90 minutes and are studying cosmic ray particles, manufacturing of fibre optic filaments in microgravity and the abilities of a new drug to accelerate bone repair (Image Credit: NASA).

Futher Information

If you wish to learn more about the night sky and astronomy the WEA offer a 6 week course run at the Astronomical Observatory in St Pierre du Bois. It is led by members of the Astronomy Section of La Société Guernesiaise and is a mixture of illustrated talks and observing through their various telescopes. The next course starts 8th February 2018. For further information see <https://www.wea.org.gg/product-page/star-gazing>.

There are also various resources available for personal computers, tablets and phones including: Cart du Ceil, Sky Map, Sky Safari, The Sky X, Stellarium and Celestron Sky Portal. Web sites such as <http://www.heavens-above.com> and <https://www.calsky.com> give information on satellite and ISS passes and observing the sun, moon, planets, comets and asteroids.

If you have a telescope and need a little help in learning how to use it please contact the Astronomical Observatory via email at: astronomy.gg@cwgsy.net.