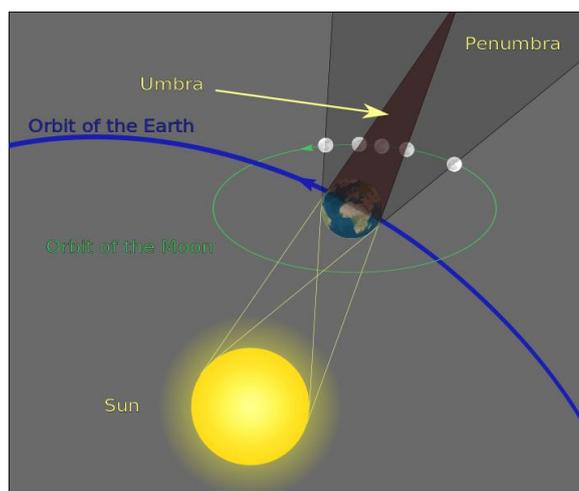


The Night Sky in January, 2019

Welcome to another year! Now we have turned the corner and the nights are drawing out more rapidly. On January 1st, the Sun will rise at 08:26 and set at 16:01. On January 31st it will rise at 07:57 and set at 16:50! There will be a **New Moon** on January 6th and a **Full Moon** on January 21st.

A special event this month is the **total eclipse of the Moon** on January 21st. A total lunar eclipse occurs when the Moon is on the opposite side of the Earth from the Sun as shown in the diagram below. A lunar eclipse can only occur at a full Moon for this reason. However, it doesn't occur at every full Moon because the orbit of the Moon around the Earth is tilted at an angle so that the Sun, the Earth and the Moon are not always in alignment.

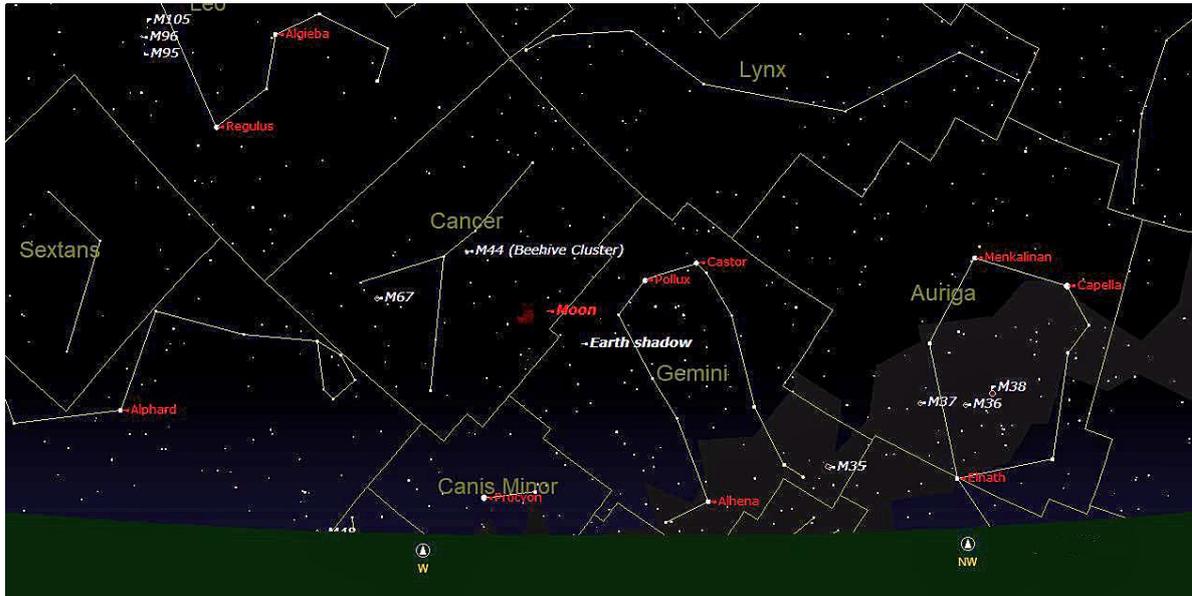


The Moon travels through the Earth's **penumbra** first, that is the partially shaded outer region of its shadow. Then it passes through the **umbra**, the dark central portion of the Earth's shadow. This blocks direct sunlight from falling onto the Moon's surface. But the Moon does not turn completely dark since part of the sunlight still reaches the lunar surface indirectly, via the Earth's atmosphere. As the Sun's rays pass through the atmosphere, some of the colours are filtered out. Red wavelengths are least affected by this, so the light reaching the Moon's surface has a reddish hue, causing the fully eclipsed Moon to take on a red colour. This is a beautiful effect as can be seen in the image below taken by Fred Espenak of NASA.



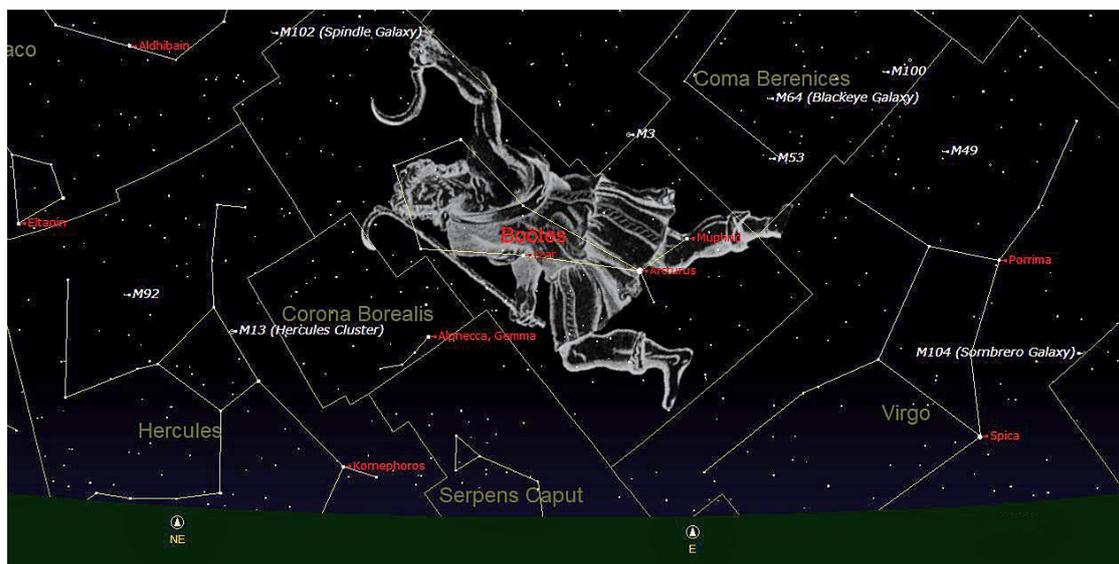
The eclipse will start at 02:37 on the 21st when the Moon's edge first touches the Earth's penumbral shadow, although you are unlikely to be able to see this. The Moon will be in the west between the constellations of **Cancer** and **Gemini**. The edge of the Moon will touch the edge of the Earth's umbral shadow at 04:41. This is the start of the total eclipse. It will reach the **point of greatest**

eclipse at 05:12. Totality will end at 05:53. The star chart below shows the sky in the west at 05:12, on January 21st. There you can see the constellation of **Cancer** to the left of the Moon. This has the shape of an upside-down Y. To the right of the Moon is the constellation of **Gemini** and to the right of that is **Auriga the Charioteer**. At the top left of the chart you can just see the head of **Leo the Lion**. This is called the **sickle** and looks like a backwards question mark.

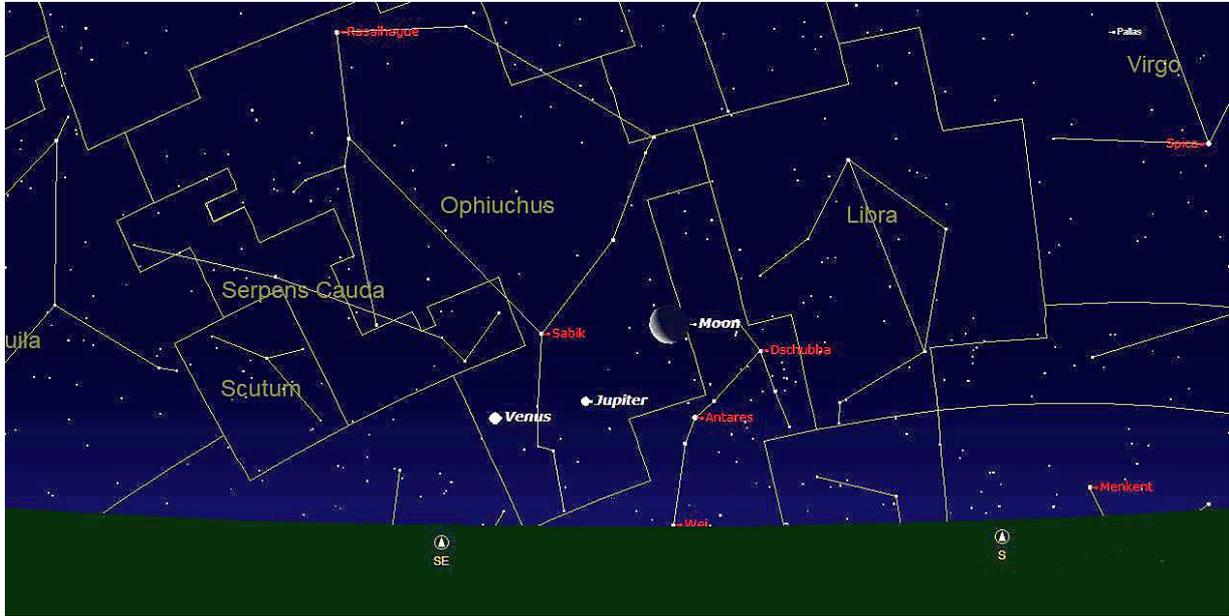


On the night of January 3rd/4th, the **Quadrantid** meteor shower will reach its peak at 02:00. Since there is a new Moon on January 6th conditions couldn't be better for observing the meteors, assuming we have clear, dark skies. A very high rate of meteors per hour is expected since the **zenith hourly 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 the **zenith**). You will see less than this, but a good show of 50-100 mph is expected. It is likely to be the best meteor shower of the year since meteor showers later in the year will be spoiled by a bright Moon.

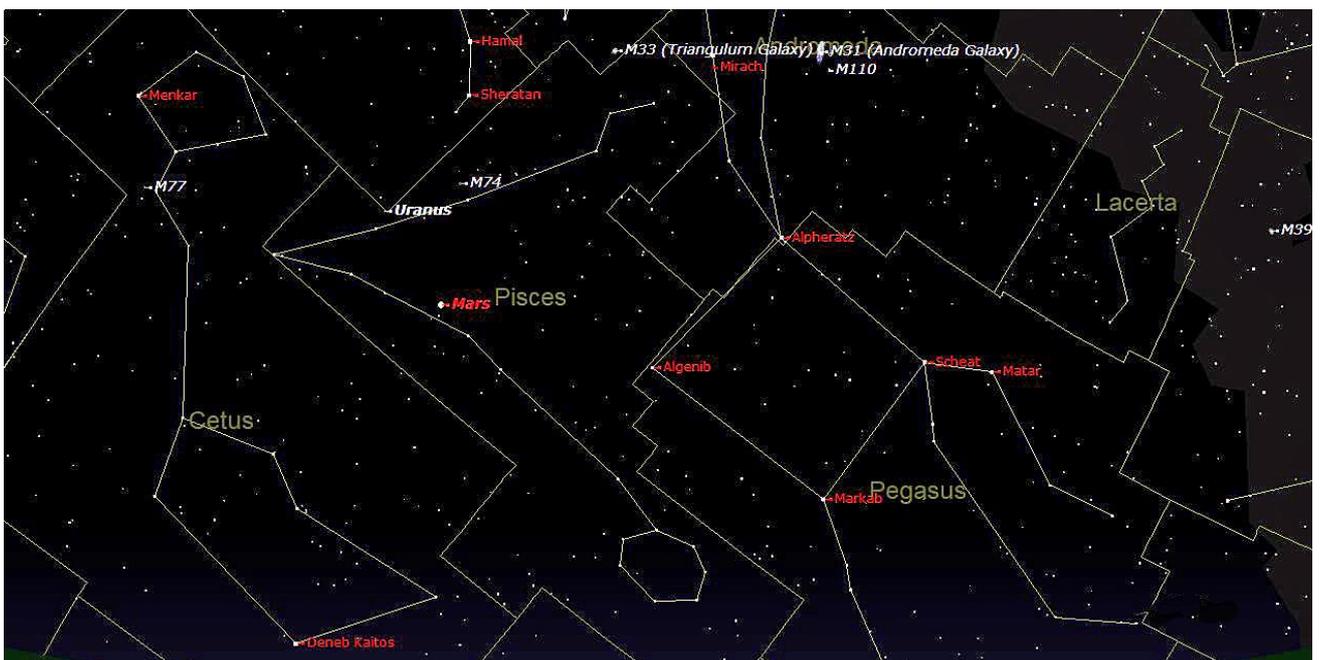
The star chart below shows the sky in the east at 02:00 on January 4th. The meteors will appear to come from a point in the sky known as the **radiant**. This point is near to a constellation called **Quadrans Muralis** – hence the name of the shower. This constellation is no longer one of the 88 officially 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**. I have highlighted Boötes in the chart below. The handle of the Plough is off the chart above it.



If some of you looked out in the early mornings in December, you will have seen a magnificent **Venus** shining brightly in the east. Venus will continue to shine at a magnitude of -4.0 in the morning sky throughout January. The chart below shows the sky in the southeast at 06:00 on the morning of January 30th. There you can see a beautiful alignment of **Venus, Jupiter and a crescent Moon**. To the right of this is the head of the constellation of **Scorpius** with its brilliant red star **Antares**. This will be a beautiful sight and a great photo opportunity. On the following night, these three objects will be even closer together



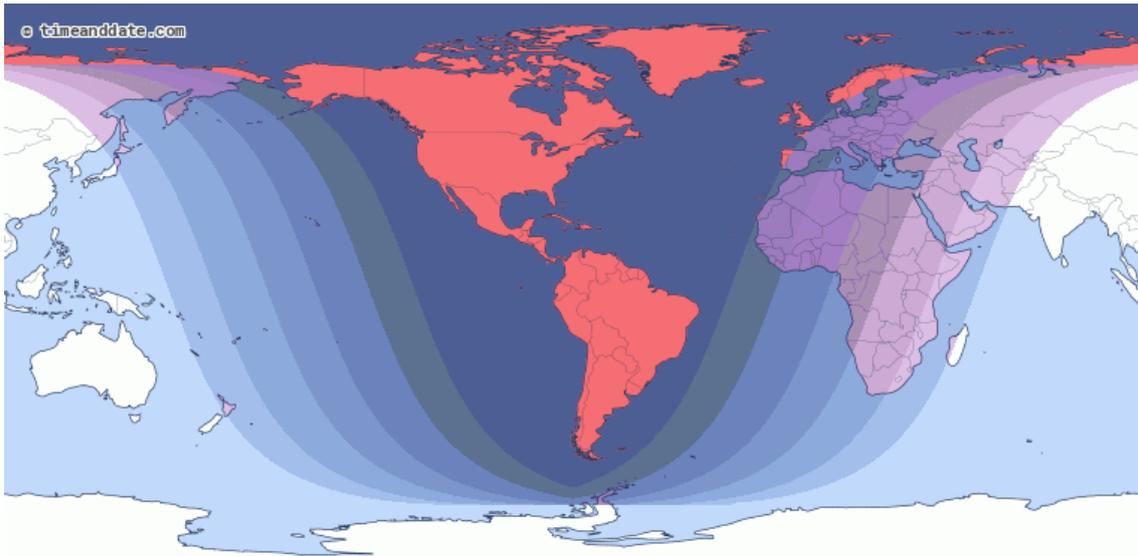
Antares is such a bright red star that its name means **rival to Mars**. But don't be misled. **Mars** is still an evening object. At the beginning of the month it will be in the west near the head of the fish in **Pisces**. By the end of the month it will have moved further to the southwest, but it will still be in Pisces. The chart below shows the sky in the southwest at 20:00 on January 31st. Note that above Mars is **Uranus** which you may be able to see in binoculars. To the right of Pisces is the **Great Square of Pegasus**. Above this is the constellation of Andromeda with the famous **Andromeda Galaxy M31**. There is plenty to see in the skies in January!



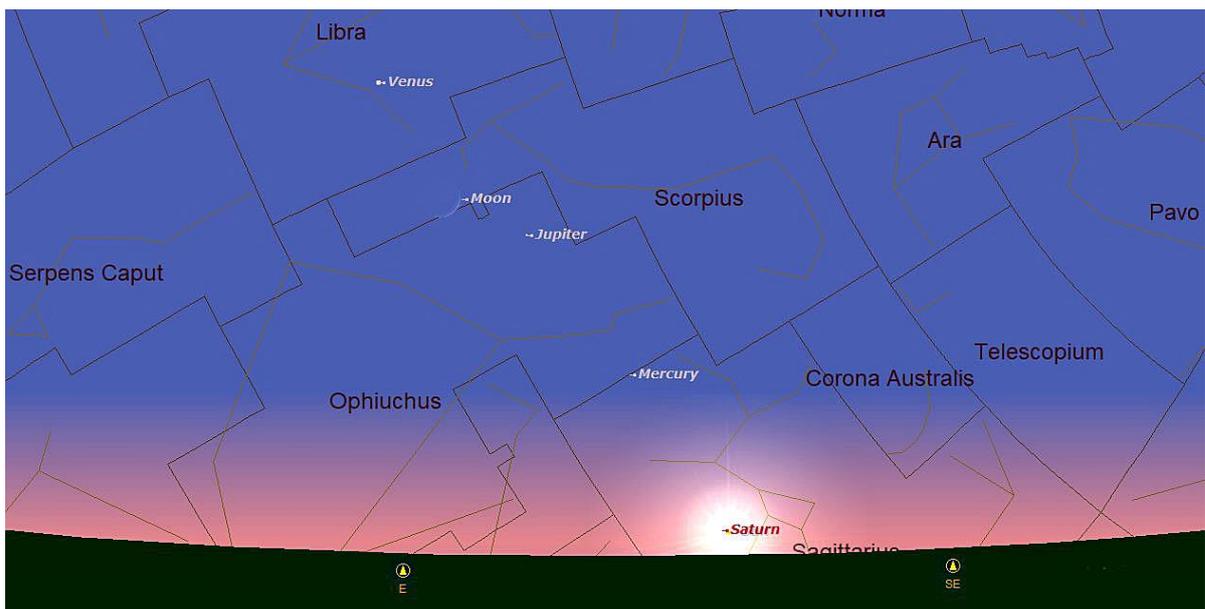
Now to the Southern hemisphere!

What's Up in the Southern Hemisphere?

Sadly, you will not be able to see the total lunar eclipse in Australia and New Zealand. The image below shows the regions where a total or partial eclipse can be seen. The red regions are where the total eclipse can be seen in its entirety. This includes North and South America, the UK and parts of western and northern Europe. The white regions are where nothing can be seen at all. In between are regions where part of the eclipse is visible. You can see that in the north island of New Zealand part of the penumbral phase is visible but not the total or partial phases. If you want to read more detail about this chart then go to www.timeanddate.com/eclipse/lunar/2019-january-21. You will see an animation of this map is available there.

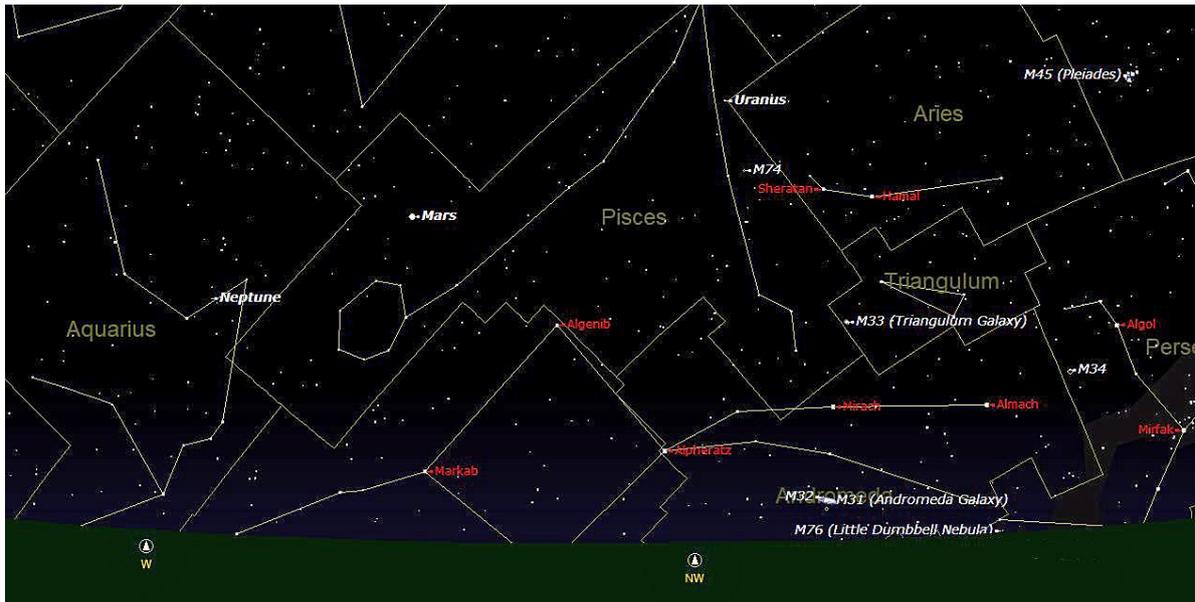


Sadly also, the Quadrantids meteor shower cannot be seen from southern skies. But the planets are very favourable for you as you can see in the chart below. This shows the sky over Sydney at 06:00 on January 3rd. You can see Venus, the Moon, Jupiter and Mercury in alignment just before sunrise. Note that Saturn is in conjunction with the Sun and cannot be seen by any of us.

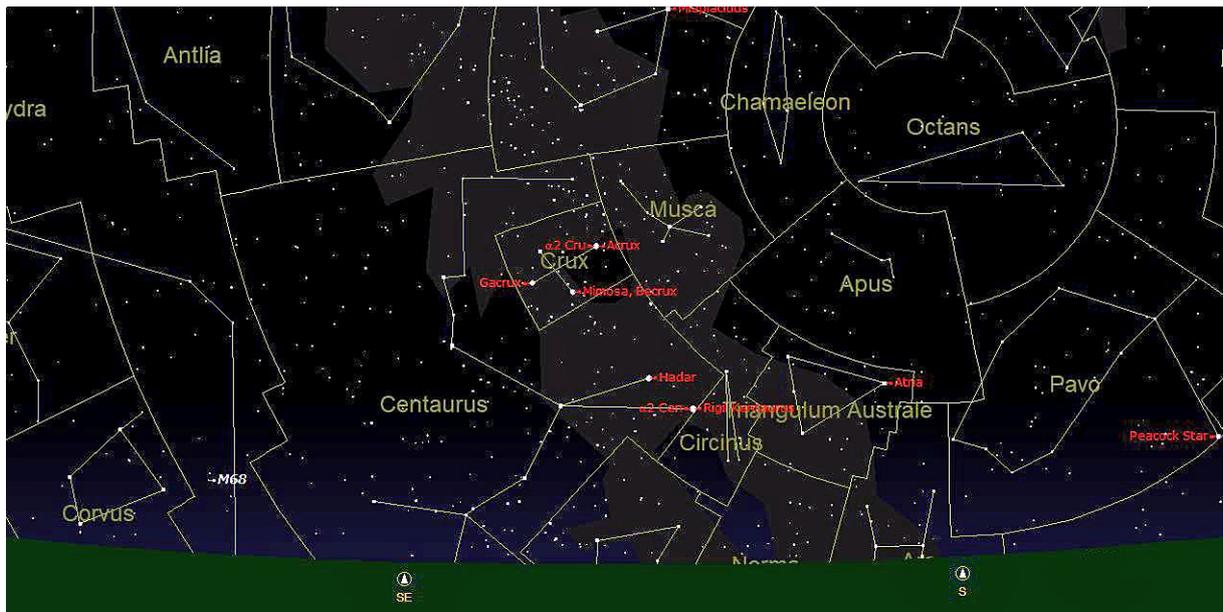


Mars can be seen in the early evening sky in Pisces as can be seen in the chart below. This shows the sky in the northwest over Sydney at 22:00 on January 3rd. To the left and below Mars is **Neptune** in **Aquarius**. To the right and above Mars is **Uranus** also in Pisces. In the top right you can see the

Pleiades and in the middle at the bottom you can see the **Great Square of Pegasus** with the **Andromeda galaxy** setting nearby.



As always, you get to see things we can't see! Below is the sky in the south over Sydney at 22:00 on January 31st. There you can see the **Southern Cross** with the **pointer stars** below it.



That's all for now! Until next month, happy stargazing and dark skies!

Valerie Calderbank FRAS