

THE NIGHT SKY

DECEMBER 2013

The Milky Way glows a little more softly at this time of year than it does in winter, when the bulge of the galactic centre is directly overhead. That's because we're looking away from the galaxy's crowded centre and toward the thinly settled edge of its disk. And beyond that edge is the halo; an extended volume of space that contains the galaxy's oldest stars.

Astronomers classify the stars in the halo as Population II, while most of those in the disk are Population I. The difference isn't just where the stars reside; it's what they're made of.

All stars consist mainly of hydrogen and helium, which were created in the Big Bang. But they also have a smattering of heavier elements. These elements were created in the hearts of other stars, then hurled into space as the stars died, where they could be incorporated into new stars.

Population II stars formed when there were almost no heavier elements around, so they have only tiny amounts of them. But Population I stars, like the Sun, are younger, so they have higher proportions of heavy elements. It's still not much, but it's enough to set these stars apart from their older kin. And it is because of these heavier elements, that our solar system formed as it did, and we've got an Earth with all the right conditions for life.

The stars that shine at night do so from immense distances. In fact, stars are so remote that astronomers rarely use kilometres to express their distances. That's because even the brightest stars aren't millions or even billions of kilometres away, but trillions or quadrillions.

To avoid such cumbersome numbers, astronomers use a different unit of distance: the light-year. That is, the distance that light travels in one year. Since light travels fast, at 300,000 kilometres per second, even a single light-year is an immense distance; over 9,000,000,000,000 kilometres!!

The brightest star in the night sky, Sirius, which rises in the early evening at this time of the year, is more than eight light-years away. And Aldebaran, the orange "eye" of Taurus, the bull, found in the northeast in the early evening, is about 65 light-years away.

Even our nearest star system to the Sun, Alpha Centauri, is more than four light-years away; a reminder of the vast gulf that separates us from even our closest stellar neighbours.

Between Sirius and Aldebaran, another bright star beckons us. This is Rigel, which at 900 light years away, is more than 100 times further away than Sirius. Yet, if we swapped the two, then Rigel would shine so bright that it would produce about a fifth the light of the full moon. Rigel is, then, in reality the brighter of the two stars. Sirius appears brighter because it is so much closer. Viewed through binoculars in a dark sky, Sirius is a breathtaking sight, sparkling with the fire of a brilliant diamond.

Of course, I wouldn't be forgiven if I didn't mention brilliant Venus in the western sky after sunset. How could you miss it! It's almost bright enough to cast shadows. Just remember that, whilst it may look alluring as it hangs in the orange pastel colours of late twilight, Venus is the closest we can get to our vision of Hell in the solar system. Venus is engulfed in a very dense atmosphere of carbon dioxide gas so thick that we can never directly see the surface. Because of this, heat accumulated during the day cannot escape at night, so temperatures on Venus are more than 600 degrees C all year round; hot enough to melt lead. And if that's not enough, there's a layer of sulphuric acid clouds in the atmosphere.

Look for the thin crescent Moon and Venus in the evening twilight of December 6. Perhaps we should refer to it as the Night of the Two Crescents. Both the Moon and Venus will exhibit similar crescent phases. However, whilst the Moon's crescent is visible with the unaided eye, you will need a telescope to see the crescent of Venus.

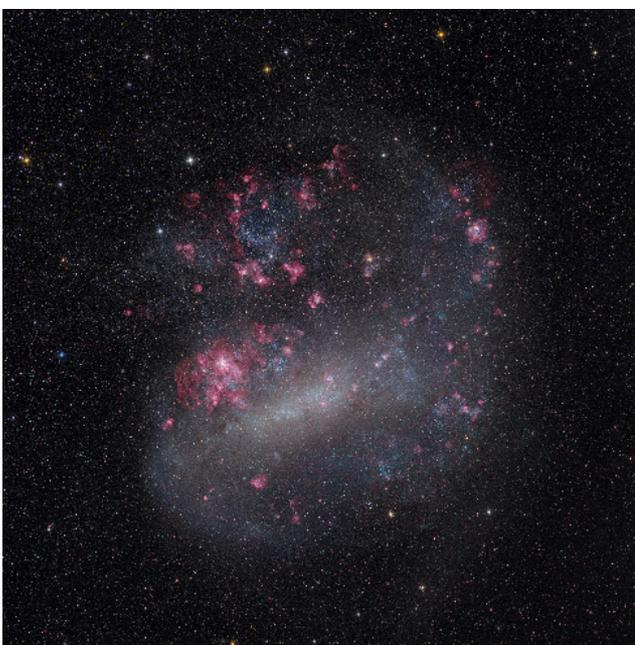
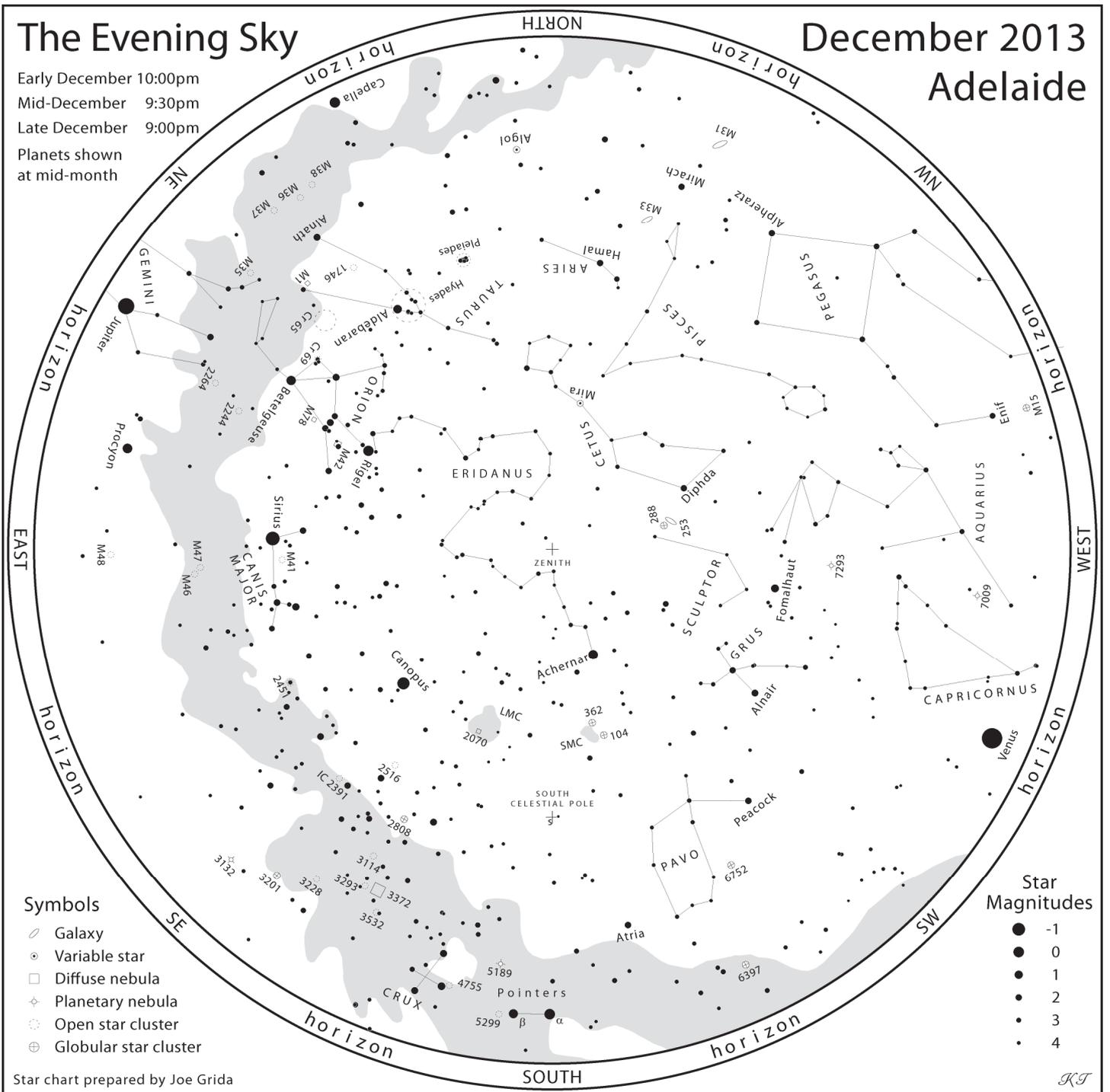
There's another planet also vying for your attention in the evening sky. Look low in the north-eastern sky, and the colossus of the solar system greets you. This is Jupiter, the largest of all the planets. If we could fill Jupiter with planets the size of the Earth, we would need over 1300 of them!

The Moon is New on December 3rd, at First Quarter on the 10th, Full on the 17th, and at Last Quarter on the 26th.

The Evening Sky

December 2013
Adelaide

Early December 10:00pm
Mid-December 9:30pm
Late December 9:00pm
Planets shown at mid-month



Large Magellanic Cloud

Distance: 163,000 light years
Right Ascension 05 : 23.6
Declination -69 : 45

The Magellanic Clouds are named for the explorer Ferdinand Magellan who noted their presence in 1519. The clouds represent a binary system of dwarf irregular galaxies that orbit the Milky Way. The Large Magellanic Cloud (LMC) measures some 20,000 light years across making it the fourth largest member of the Local group followed by the Milky Way, M31, and M33. The LMC is about 1/20th the diameter of our galaxy and contains about 1/10th the number of stars. Although it is an irregular galaxy it has traces of spiral structure and even contains an off-centred bar. Regarding the origin of the LMC one possible scenario is that the LMC was once a barred spiral that became disrupted in a close encounter with the Milky Way.

On February 24, 1987 supernova 1987A occurred in the LMC. It was the nearest observed supernova since the invention of the telescope.