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VENUS

Ken Tapping, 21st November, 2017

If you live where you have a clear view of the dawn or sunset sky, you almost certainly have seen Venus. It appears in the sunset or sunrise glow as a brilliant starlike object, but not twinkling. It gets higher in the sky over the following weeks until it shines in the dark sky like an escaped aircraft landing light, then it sinks again until it finally disappears once more in the Sun's glow. Its appearance alternates between the dawn and sunset sky, which led long ago to it being called Phosphorus, the "Morning Star", or Hesperus, the "Evening Star". The beauty of this object in the deep blue of the sky before dawn or after sunset impressed our ancestors, leading them to naming it after Venus, the Roman goddess of love.

Venus is the second planet out from the Sun; we live on the third. It is only slightly smaller than Earth, with a diameter of 12,104 km compared with our world's 12,756 km. Being closer to the Sun it takes only about 225 days to complete an orbit, compared with our planet's 365.25. The Earth rotates on its axis once a day – of course. However Venus takes 243 days to rotate once on its axis. A Venusian day is longer than its year. Venus does not appear to have a moon. Until very recently we had never seen Venus' surface; it is hidden under a permanent layer of dense cloud.

This led to some rather fanciful ideas about what our sister world would be like. One was that Venus is like Earth but younger, and under those clouds lie steamy jungles and swamps similar to our world during the Carboniferous age, some 350 million years ago. Another idea was that because of all that carbon dioxide in its atmosphere, Venus would be covered with oceans of oil.

The first big hole in the idea that Venus is like the Earth but younger was blown in the 1960's when radio telescopes were used to measure the planet's temperature: about 400 degrees Celsius, hot enough to melt lead. At first scientists were reluctant to accept these values, but then, as other measurements were made it became clear that

Venus is an extremely hostile place. The atmosphere is a dense concentration of carbon dioxide, with a pressure at the surface of about 90 times the pressure at the Earth's surface. This drives a vigorous greenhouse effect, causing the high temperatures. To make things even worse, it periodically rains sulphuric acid.

In 1962 the American space probe Mariner 2 made a close flyby of the planet, confirming the high temperatures at the surface. A series of Soviet spacecraft failed to reach the surface, but confirmed the atmosphere is about 95% carbon dioxide. Finally they succeeded. In the 20 minutes or so before the spacecraft was destroyed by the heat, it sent back images of a surface paved with flat fragments of rock and gravel. In 1979 the US put a spacecraft on Venus's surface which lasted a record 45 minutes before succumbing. However, all we had seen was the landscape out to a few tens of metres around the spacecraft; we still knew nothing about the planet's large-scale geography.

This need was addressed by the Magellan spacecraft. Between 1990 and 1994 it mapped the planet using radar, which easily penetrated the clouds. This included stereo imaging. It revealed a mountainous surface with volcanoes and huge lava flows. We could also see how the rock softened due to the high surface temperatures, making the mountains slowly slump and become more rounded. There were no lakes of oil or Carboniferous jungles, just a world so hostile it is unlikely there will be a manned landing on its surface any time in the foreseeable future - an unlikely place to name after the goddess of love.

Saturn is lost in the twilight. Venus lies very low in the dawn glow, with Jupiter and then Mars, much fainter, above Jupiter. The Moon will reach First Quarter on the 26th.

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