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VOYAGE TO PLUTO

Ken Tapping, 12th May, 2015

At the 2006 meeting of the International Astronomical Union (IAU), which is the international body which decides such things, there was, depending on your point of view, an “extensive and far-reaching discussion”, or an “angry and passionate squabble” about the status of Pluto. Until then, since its discovery in the 1930’s, Pluto had been described as the ninth and outermost planet from the Sun. The lineup was, starting at the Sun, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and Pluto. The vote at the IAU meeting produced a majority decision that Pluto would be demoted from “planet” to “dwarf planet”. This passed the “outermost planet” title to Neptune. The decision was neither unanimous nor subsequently fully accepted by the astronomical community, and the argument has been simmering ever since. However, 2006 was not a wholly bad year for Pluto. That same year a NASA spacecraft lifted off en route to Pluto to have a really close look at it.

The closest four planets to the Sun are “rock balls”, mainly balls of rock with relatively thin atmospheres. Mercury’s is extremely thin. The outer four are the opposite, huge objects that are mainly gas, with small rocky or icy cores in their centres. These planets are known as gas giants. The current idea is that when the Solar System formed, some 4.5 billion years ago, the inner planets were so close to the Sun that most of their atmospheres were blown away by the newborn Sun. The gas giant planets were far enough away to escape this. However, from studying planets orbiting other stars we are finding evidence that things are not that simple. Following the logic of rock balls close to the Sun and gas giants further out, what would we expect Pluto to be like?

Ground and space-based telescopes have enabled us to learn a few things about Pluto. It is small, about 2,400 km in diameter compared with our Moon’s 3,500 km. It lies about 40 times further from the Sun than we do, which means it receives

about 1/1600 of the Sun’s light and heat. As one would expect, it is extremely cold, about -229 degrees Celsius. It does have an extremely thin atmosphere, made up of nitrogen, methane and carbon monoxide. Pluto has seasons. As it wanders along its 250-year orbit around the Sun, its distance from the Sun varies a little; so the amount of heat it receives, and consequently its temperature varies. There are signs of wintry frosts of frozen gas on its surface, which evaporate again in “spring”. This tiny world has at least four moons: Charon, Hydra, Kerberos and Styx, appropriate companions for the god of the underworld.

Pluto is definitely not a gas giant, and it does not look like any of the four rock balls in the inner Solar System. It looks as though it is the first of another class of object that exists only in the cold, dark outer reaches of the Solar System, deep-frozen bits of unused construction material left over from the birth of the Solar System. Our desire to learn more about Pluto and where it lives was the reason for launching that spacecraft in 2006. It will arrive at its destination this July, after a nine-year journey. Due to weight restrictions the spacecraft will have neither the engine capabilities nor the fuel to slow down and go into orbit around Pluto, which would have been fantastic; it will just go flying past at high speed. Nevertheless, during the flyby, cameras and other instruments will be recording as much data as possible. After waiting 9 years for the spacecraft to get there, it will be hard to find additional patience to wait while the radio signals carrying the data cover their five hour journey from Pluto to the Earth. Maybe we will learn enough to justify launching an appeal of that 2006 IAU Meeting decision about Pluto.

Venus shines brilliantly in the west after sunset, like a searchlight, with Jupiter almost as bright, high in the southwest. Saturn rises at about 11pm. The Moon will be New on the 17th.

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