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PLANET THREE

Ken Tapping, 28th November, 2017

The third planet out from the Sun is a little bit bigger than Venus. Its diameter is 12,756 km compared with Venus's 12,104 km. It is one of the four "rocky planets" orbiting the Sun in the inner Solar System. These planets are basically rock balls with relatively thin layers of atmosphere, whereas the outer planets: Jupiter, Saturn, Uranus and Neptune are giant balls consisting mostly of atmosphere, with comparatively small lumps of solid material in their centres, or maybe in some cases there could be no solid stuff in there at all.

When observed from space, Planet Three (let's call it P3) is conspicuously different from Venus. Instead of a thick, permanent layer of very slightly yellowish white cloud, the cloud is more broken and brilliant white, revealing a mostly blue surface beneath. One other immediately apparent difference from Venus is that this planet has a relatively large moon. With a diameter of 3475 km, it is more than a quarter of the diameter of the planet it orbits. For that reason P3 has been described as being more like a "double planet". Its moon has almost no atmosphere, whereas the planet has an extensive one. Consisting of bare, dark, basaltic rocks, P3's moon reflects only about 12% of the sunlight falling on it, compared with the planet's 37%. Despite this, the average temperature of the satellite is -48 degrees Celsius whereas P3's average temperature is +16 degrees, permitting the existence of liquid water on its surface. The higher temperature of the planet, despite the greater fraction of solar energy it reflects back to space, is due to the presence of greenhouse gases in its atmosphere: carbon dioxide, water vapour and methane. In the case of Venus, the high concentration of carbon dioxide in its atmosphere has led to a runaway greenhouse effect and surface temperatures high enough to melt lead and tin. In the case of P3, the concentrations of greenhouse gases are just right to maintain liquid water on its surface. It is widely believed, although there is no current consensus on this, that the extensive bodies of surface water

promote another phenomenon unique to P3, the continuous reconfiguration and recycling of its surface by plate tectonics. Heat from the core softens the rock making up the interior of the planet, so it slowly circulates, transferring heat to the surface by convection. Water gets dragged down as the material descends, acting as a lubricant and forming new, lighter rocks, such as granite, which float on top, forming continents.

P3 has a strong magnetic field, which plays a major role in keeping the solar wind away from the top of its atmosphere, stopping it from being scrubbed away. This magnetic field is generated by currents in the planet's core region, which is mainly made up of iron and nickel.

The atmosphere is odd. It contains about 20% oxygen, a highly-reactive gas. This is rapidly being removed by oxidizing carbon compounds and certain minerals, especially iron compounds. Parts of the planet are covered with mountains, deserts and soils coloured red by large amounts of iron oxide, harkening back to an era when there was more oxygen in the planet's atmosphere. The fact that oxygen has persisted over billions of years requires a mechanism whereby it is continually replaced. Therefore, the presence of oxygen or other highly-reactive gases, such as chlorine, is evidence of unusual processes. On our world the oxygen supply is maintained by living things. This is why we are searching for oxygen or other reactive gases in the atmospheres of planets orbiting other stars. However, as yet we know only one planet where there is oxygen and life: Planet Three, which is also called Earth.

Venus lies very low in the dawn glow and is getting hard to see. Jupiter, almost as bright lies higher, and above that, much fainter because it is on the opposite side of the Sun, lies Mars. The Moon will be Full on 3rd December.

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