

Enceladus – Saturn’s 6th Largest Moon - By Jay Nair

We have looked at 5 moons of Saturn so far, and in order of size they are Titan, Rhea, Iapetus, Dione and Tethys. We now come to the 6th largest, and probably one of the most interesting of all the Moons, which is Enceladus.

Enceladus, pronounced (EN – SELL – AH – DUS) has a diameter of 505Kms and is only 14% the size of our own Moon and can fit into the State of Arizona in the USA. It is the second moon in distance from Saturn, orbiting every 1.37 earth days at a distance of 238,000Km.

Enceladus was discovered by William Herschel in 1789 and was named by his son, John Herschel. Very little was known besides the actual discovery of this moon until the Voyager probe flew nearby in the 1980s. One feature that Voyager reported was that Enceladus reflected almost all its sunlight and was seen as a very bright object and was deduced to be ice on the surface. The deduction was that it is mostly covered in ice with surface temperatures of -198Deg C.

It was not until 2005 when the Cassini probe did a number of flybys that more detailed information emerged about this most fascinating moon, which it is hypothesised, could even harbour life of some sort.

So where is Enceladus in relation to the other Moons? The picture below shows the orbit of Enceladus identified by the red path.

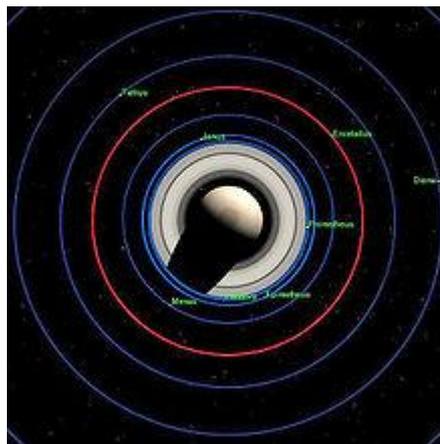


Fig 1. Orbit of Enceladus

The most interesting feature of this Moon is its “tiger stripes” which are prominent particularly on the south polar region. There are fissures that seem to appear on the warm ice field below. They also display tremendous eruptions of water and ice which appear from time to time and which it is postulated feeds Saturn’s E ring. Based on this theory, Enceladus is regularly losing its mass to Saturn’s E Ring.

The Cassini Probe also discovered a water-rich plume to erupt from the South Pole of Enceladus. This was sourced from cryovolcanoes, and besides water vapour, solid materials were also detected. The most interesting chemical in these solids was found to be Sodium Chloride or common salt!! That has led to the belief that beneath the icy surface there must be an ocean with salt water and the excitement of possible existence of life forms. These eruptions have been calculated to be about 200Kg/sec and over 100 of these geysers have been detected. A portion of the eruptions seem to fall back to the surface as snow, but some of the material is also the source for Saturn’s E ring. Cassini has now found evidence that an ocean of up to 10Km in depth exists below the icy surface of Enceladus.



Fig 2. Tiger Stripes on Enceladus.

Observing Enceladus through a telescope can be difficult. It was first discovered when the earth was in the same plane as the Rings of Saturn, which makes the rings almost disappear. So if you are thinking of observing this moon you may be advised to wait until that event occurs.

In August 1981, the Voyager was the first spacecraft to observe the surface of Enceladus in detail. The highest-resolution imagery received back revealed at least five different types of terrain, including several regions of cratered terrain, regions of smooth (young) terrain, and lanes of ridged terrain often bordering the smooth areas. Given that there were very few craters and the surface appeared to be smooth, it has been concluded that the moon is no more than a few hundred million years old. Enceladus must have had numerous recent water eruptions which resulted in the surface being renewed giving the bright shiny surface. Enceladus is reported to be the brightest moon in the solar system based on its reflectivity.

The Cassini Probe in 2005 carried out several flypasts and further confirmed Voyager's findings of it being a young surface and definite proof of water by actually flying through the geysers. These geysers were ejecting vast quantities of water vapour at up to 2189Km/hr high into space. Cassini also discovered a warm region in the South Pole, which has been concluded to be some form of internal heating from within the surface. This also led to the final conclusion of a liquid ocean existing under the surface.

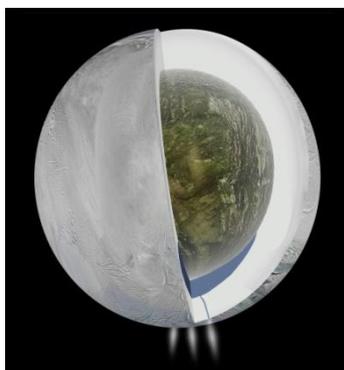


Fig3. Expected internal Structure of Enceladus