

Titan: the name alone invokes the sense that this is one of the most important objects in the Solar System. Larger than Mercury, if it orbited Sol by itself it would surely be a planet. However it is relegated to the status of Saturn's largest moon, and the second largest moon in the solar system after Jupiter's Ganymede.

Titan is the only body in the Solar System, other than Earth, for which clear evidence has been found for surface liquid, albeit methane not water. Recent evidence that precipitation does occur on Titan suggests that a "methanological" cycle may operate, and investigating this further could be extremely interesting. Furthermore, it would raise the likelihood that other celestial bodies could have a complex climatological cycle based on substances other than water. It would also support the idea that the formation of Earth's atmosphere and hydrological cycle are not simply a one-in-a-million chance, but far more prevalent than that. This could well increase the likelihoods not only of finding extraterrestrial life but also finding targets for extrasolar colonisation in the future.

The atmosphere itself appears to contain many hydrocarbons, ranging from simple alkanes, to complex polycyclic aromatic compounds. The more complex compounds probably form from the methane and ethane being converted by sunlight. Observing this atmosphere to look for signs of such reactions could shed new light on the action of radicals in atmospheres, perhaps aiding us in our understanding of the actions of chlorofluorocarbons and similar chemicals in our atmosphere. Observing the hydrocarbon reactions could also provide us with new techniques for forming such compounds on Earth, thus enabling us to create many new and exciting other materials. Titan could also provide clues as to the formation of the building blocks of life on earth, as the key amino acids for life are all hydrocarbons, and so could form in Titan's atmosphere.

Titan is thought to harbour cryovolcanoes, erupting water and ammonia into the atmosphere in intense geophysical displays. This would imply that not only is Titan tectonically active, but that it has a mantle of water/ammonia mixture, compared to Earth's liquid rock mantle. This would be of extreme interest to geophysicists, but would also suggest that warmer areas near such volcanoes could provide locations for liquid water to exist on the surface. These warm spots could then provide potential locations for colonisation in later years, or even places where life could have developed on Titan.

In conclusion, Titan is the best target for Cassini, providing valuable insights into many areas of science. It could provide a location for colonisation in the future, the only way that the human race will be able to grow further, perhaps with the potential to utilise the vast quantities of hydrocarbons on Titan to replace the ever diminishing supplies on Earth. Titan could also provide valuable insight into the formation of life on Earth, or even harbour life of its own. For all these reasons we should, indeed we must, investigate Titan more closely.

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