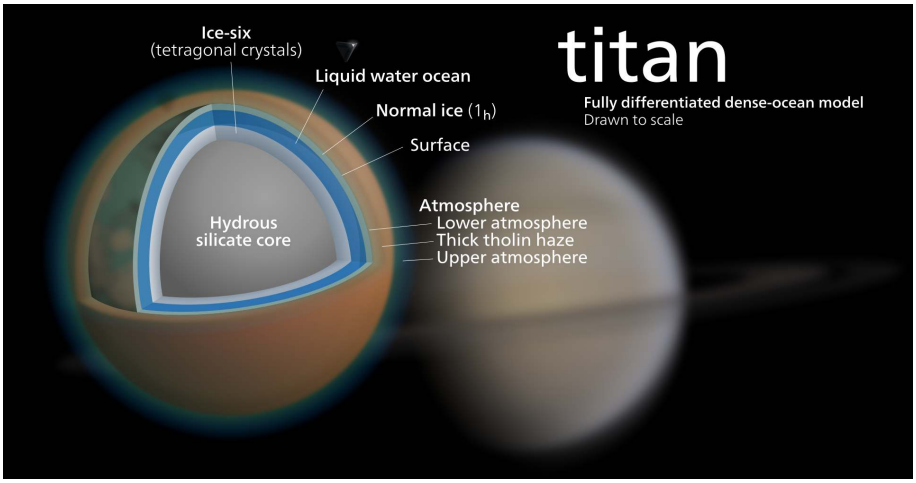
OCEAN INSIDE TITAN



Titan is the largest moon of Saturn. It is the only natural satellite known to have a dense atmosphere, and the only object other than Earth for which clear evidence of stable bodies of surface liquid has been found.

Titan is the sixth moon of Saturn. Frequently described as a planet-like moon, **Titan (5152km) is 50% larger than our Moon (2,960km) and 0.404 Earth's diameter (12,600km). It is the second- largest moon in the Solar System, after Jupiter's moon Ganymede, and is larger by volume than the smallest planet, Mercury**. Discovered in 1655 by the Dutch astronomer **Christiaan Huygens**, Titan was the first known moon of Saturn, and the fifth known satellite of another planet (the first four were **Galileo's** Jupiter moons). The name Titan, and the names of all seven satellites of Saturn then known, came from **John Herschel** (discoverer of Mimas and Enceladus) in his 1847 publication Results of Astronomical Observations. He suggested the names of the mythological Titans, sisters and brothers of Saturn. In Greek mythology, the Titans were a race of powerful deities, descendants of Gaia and Uranus, that ruled during the legendary Golden Age.

Christiaan Huygens, FRS (1629 – 1695) was a prominent Dutch mathematician and a leading scientist of his time. He is known particularly as an astronomer, physicist, probabilist and horologist. His work included early telescopic studies of the rings of Saturn and the discovery of its moon Titan, the invention of the pendulum clock and investigations in timekeeping. He published major studies of mechanics and optics, and a pioneer work on games of chance.

Titan is primarily composed of water ice and rocky material. Much as with Venus prior to the Space Age, **the dense, opaque atmosphere prevented understanding of Titan's surface until new information accumulated with the arrival of the Cassini–Huygens mission in 2004**, including the discovery of liquid hydrocarbon lakes in Titan's polar regions. The geologically young surface is generally smooth, with few known impact craters, although mountains and several possible cryovolcanoes have been found. **The atmosphere of Titan is largely composed of nitrogen**; minor components lead to the formation of methane and ethane clouds and nitrogen-rich organic smog. The climate—including wind and rain—creates surface features similar to those of Earth, such as dunes, rivers, lakes, seas (probably of liquid methane and ethane), and deltas, and is dominated by seasonal weather patterns as on Earth. With its liquids (both surface and subsurface) and robust nitrogen atmosphere, Titan's methane cycle is viewed as an analogy to Earth's water cycle, although at a much lower temperature. On June 23, 2014, **NASA claimed to have strong evidence that nitrogen in the atmosphere of Titan came from the Oort cloud, associated with comets, and not from materials that formed Saturn**.

On July 2, 2014, NASA with new data from the Cassini mission reported the ocean inside Titan may be "as salty as the Earth's Dead Sea". It may change the way we view oceans as a possible abode for present-day life. **The new results come from a study of gravity and topography data collected during Cassini's repeated flybys of Titan during the past 10 years**. Researchers found that a relatively high density was required for Titan's subsurface ocean in order to explain the gravity data.

The data also touches on a major mystery: The presence of methane in Titan's atmosphere. Scientists have long known that Titan's atmosphere contains methane, ethane, acetylene and many other hydrocarbon compounds. But sunlight irreversibly destroys methane, so something is replenishing methane in Titan's thick air.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency.

AK - from NASA Notes