



Saturn's Titan Moon Has Greater Oil Reserves Than Earth

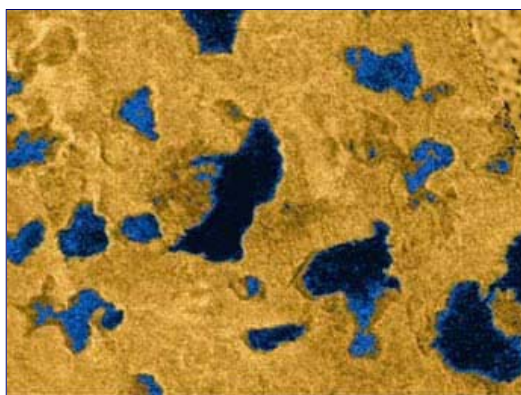
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*"Titan is just covered in carbon-bearing material --
it's a giant factory of organic chemicals."* - Ralph Lorenz, Ph.D.,
Cassini Radar Team, Johns Hopkins University Applied Physics Laboratory



Artist's illustration of hydrocarbon pools, icy and rocky terrain on the surface of Saturn's largest moon Titan. Image credit: Steven Hobbs, Australia.

February 13, 2008 Pasadena, California - Saturn's orange moon, Titan, has hundreds of times more liquid hydrocarbons than all the known oil and natural gas reserves on Earth, according to new data from NASA's Cassini spacecraft. The hydrocarbons rain from the sky, collecting in vast deposits that form lakes and dunes.



Several detailed images taken by Cassini's radar instrument, shows bodies of liquid hydrocarbons near Titan's north pole. Image credit: NASA/JPL.

NASA/JPL report that new findings have emerged from a study led by Ralph Lorenz, Cassini radar team member from the Johns Hopkins University Applied Physics Laboratory, Laurel, Maryland, that have been reported in the January 29, 2008, issue of *Geophysical Research Letters*.

"Titan is just covered in carbon-bearing material -- it's a giant factory of organic

chemicals,” said Lorenz. “This vast carbon inventory is an important window into the geology and climate history of Titan.”

NASA/JPL: At a balmy - 179 degrees Celsius (- 290 degrees Fahrenheit), Titan is a far cry from Earth. Instead of water, liquid hydrocarbons in the form of methane and ethane are present on the moon's surface, and tholins probably make up its dunes. The term "tholins" was coined by Carl Sagan in 1979 to describe the complex organic molecules at the heart of prebiotic chemistry.

Cassini has mapped about 20 percent of Titan's surface with radar. Several hundred lakes and seas have been observed, with each of several dozen estimated to contain more hydrocarbon liquid than Earth's oil and gas reserves. The dark dunes that run along the equator contain a volume of organics several hundred times larger than Earth's coal reserves.

Proven reserves of natural gas on Earth total 130 billion tons, enough to provide 300 times the amount of energy the entire United States uses annually for residential heating, cooling and lighting. Dozens of Titan's lakes *individually* have the equivalent of at least this much energy in the form of methane and ethane.

“This global estimate is based mostly on views of the lakes in the northern polar regions. We have assumed the south might be similar, but we really don't yet know how much liquid is there,” said Lorenz. Cassini's radar has observed the south polar region only once, and only two small lakes were visible. Future observations of that area are planned during Cassini's proposed extended mission.

Scientists estimated Titan's lake depth by making some general assumptions based about lakes on Earth. They took the average area and depth of lakes on Earth, taking into account the nearby surroundings, like mountains. On Earth, the lake depth is often 10 times less than the height of nearby terrain.

“We also know that some lakes are more than 10 meters or so deep because they appear literally pitch-black to the radar. If they were shallow, we'd see the bottom, but we don't,” said Lorenz.

The question of how much liquid is on the surface is an important one because methane is a strong greenhouse gas on Titan as well as on Earth, but there is much more of it on Titan. If all the observed liquid on Titan is methane, it would only last a few million years, because as methane escapes into Titan's atmosphere, it breaks down and escapes into space. If the methane were to run out, Titan could become much colder. Scientists believe that methane might be supplied to the atmosphere by venting from the interior in cryovolcanic eruptions. If so, the amount of methane, and the temperature on Titan, may have fluctuated dramatically in Titan's past.

“We are carbon-based life, and understanding how far along the chain of complexity towards life that chemistry can go in an environment like Titan will be important in understanding the origins of life throughout the universe,” added Lorenz.

Cassini's next radar flyby of Titan is on February 22, 2008, when the radar instrument will observe the Huygens probe landing site.

More Information:

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NASA Cassini: <http://www.nasa.gov/cassini>

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