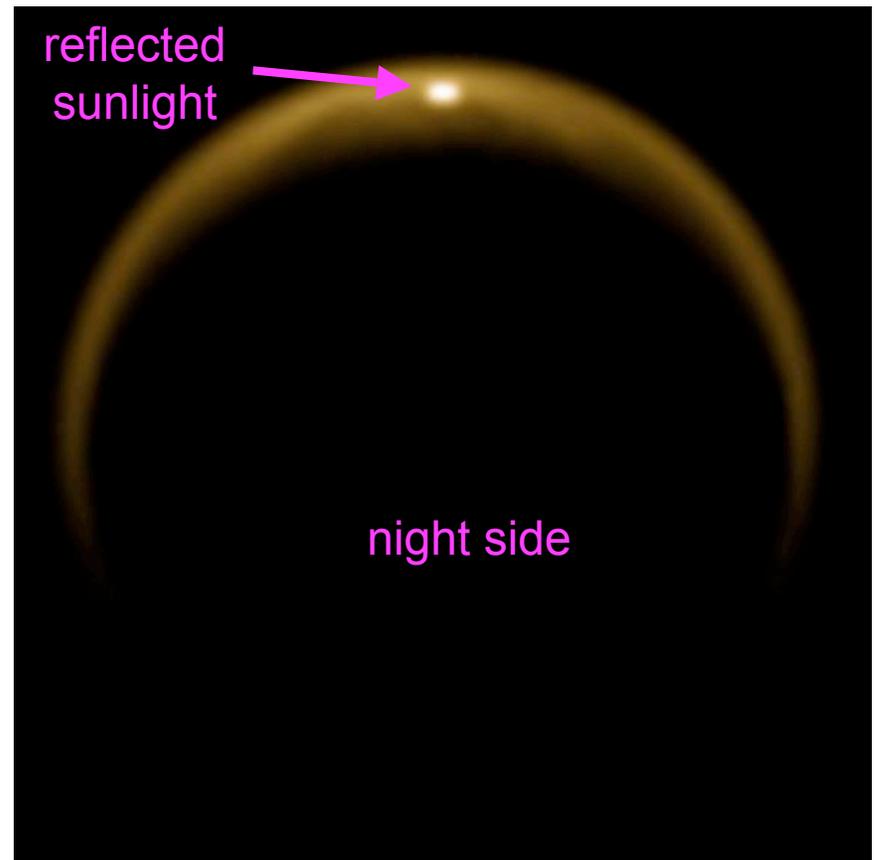


# A Sunlit Lake on Titan

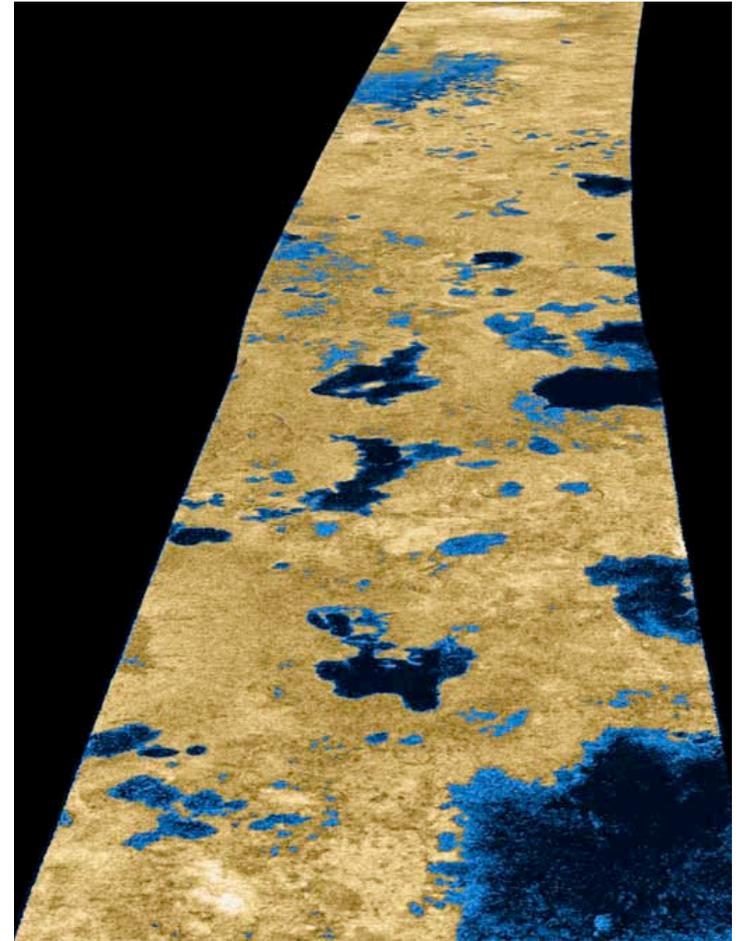
- The Cassini spacecraft recently recorded a flash of sunlight off a region of the northern hemisphere
- The reflection comes from a dark, smooth region suspected to be a large lake or sea
- Infrared and radar observations previously revealed hundreds of likely lakes near the north pole, and a few lakes near the south pole
- The lakes are filled with ethane, and probably methane



*Cassini infrared image of Saturn's moon Titan taken from above the night side of the planet. The bright region in the sunlit northern polar region was predicted, and results from sunlight reflected off a methane lake.*

# Lakes without Water

- Titan is 94 K - too cold for liquid surface water, but not too cold for liquid methane and ethane
- Sunlight should rapidly convert atmospheric methane to ethane and other species. But methane is abundant, so must be replenished.
- Methane and ethane should be exchanged between the atmosphere and lakes through evaporation and precipitation (similar to water on Earth)
- These processes can help maintain the high atmospheric methane abundance and contribute to observed seasonal variations in the lakes



*False color Cassini image showing the amount of radar signal reflected from a region of Titan's northern hemisphere. Dark regions are likely lakes.*

# The Big Picture

- Earth and Titan are the only two objects in the solar system that have stable bodies of liquid at the surface
- Similar processes help maintain surface liquids and atmospheric compositions, despite very different temperatures and materials at each body
- Surface liquids facilitate erosion, and can create 'Earth-like' landscapes (e.g. sedimentary layers, river beds, ...)
- Surface liquids may exist on a variety of bodies orbiting other stars, and not be restricted to 'Earth-like' bodies



*Photograph taken from the space shuttle of glinted sunlight from Earth's oceans.*

# For More Information...

## Press

- NASA - 12/17/09 - "Sunlight Glint Confirms Liquid in Titan Lake Zone"  
[http://www.nasa.gov/mission\\_pages/cassini/whycassini/cassini20091217.html](http://www.nasa.gov/mission_pages/cassini/whycassini/cassini20091217.html)
- Planetary.org - 12/17/09 - "Cassini VIMS sees the long-awaited glint off a Titan lake"  
<http://www.planetary.org/blog/article/00002267>

## Images

- Slide 1 image courtesy NASA/JPL/U. Arizona/DLR  
<http://photojournal.jpl.nasa.gov/catalog/PIA12481>
- Slide 2 image courtesy NASA/JPL/USGS  
[http://www.nasa.gov/mission\\_pages/cassini/multimedia/pia09102.html](http://www.nasa.gov/mission_pages/cassini/multimedia/pia09102.html)
- Slide 3 image courtesy NASA/JSC  
<http://tinyurl.com/DPSDisc-TitanLakes-Slide3>

## Source Articles (on-campus login may be required to access journals)

- Stofan et al., 'The Lakes of Titan', *Nature*, 445, doi:10.1038/nature05438, 2007.  
<http://www.nature.com/nature/journal/v445/n7123/full/nature05438.html>
- Brown et al., 'The identification of liquid ethane in Titan's Ontario Lacus', *Nature*, 454, doi:10.1038/07100, 2009.  
<http://www.nature.com/nature/journal/v454/n7204/full/nature07100.html>

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