Geophysical Research Abstracts
Vol. 12, EGU2010-9879-1, 2010
EGU General Assembly 2010

Titan Mare Explorer (TiME) : A Discovery Mission to Titan's Hydrocarbon Seas

Ralph D. Lorenz (1), Ellen Stofan (2), and T.H.E. TiME Team (1)

(1) JHU Applied Physics Lab, Space Department, Laurel, United States (ralph.lorenz@jhuapl.edu, +1 443 778 8939), (2) Proxemy Research

The discovery of lakes in Titan's high latitudes confirmed the expectation that liquid hydrocarbons exist on the surface of the haze-shrouded moon. The lakes fill through drainage of subsurface runoff and/or intersection with the subsurface alkanofer, providing the first evidence for an active condensable-liquid hydrological cycle on another planetary body. The unique nature of Titan's methane cycle, along with the prebiotic chemistry and implications for habitability of Titan's lakes, make the lakes of the highest scientific priority for in situ investigation.

The Titan Mare Explorer mission is an ASRG (Advanced Stirling Radioisotope Generator)-powered mission to a lake on Titan. The mission would be the first exploration of a planetary sea beyond Earth, would demonstrate the ASRG both in deep space and a non-terrestrial atmosphere environment, and pioneer low-cost outer planet missions.

The scientific objectives of the mission are to: determine the chemistry of a Titan lake to constrain Titan's methane cycle; determine the depth of a Titan lake; characterize physical properties of liquids; determine how the local meteorology over the lakes ties to the global cycling of methane; and analyze the morphology of lake surfaces, and if possible, shorelines, in order to constrain the kinetics of liquids and better understand the origin and evolution of Titan lakes. The focused scientific goals, combined with the new ASRG technology and the unique mission design, allows for a new class of mission at much lower cost than previous outer planet exploration has required.