

**Signatures Of Life On Saturn's Giant Moon Titan?
Laying The Groundwork For Missions Beyond Cassini-Huygens**

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Abstract

Saturn's giant moon Titan is a planetary laboratory that conceals answers to a plethora of longstanding questions on pre-biotic earth conditions, origin of life scenarios and exobiological standpoints. With a thick atmosphere and possible hydrocarbon oceans, rain, and an ample supply of organics, it differs from the early earth, effectively, in one notable way – in its temperature. Although water-ice forms the chief constituent of Titan's mantle, its average surface temperature, at 94K, is too low to contain liquid water, even after nontrivial contamination from dissolved ammonia. Over Titan's geologic history, however, isolated water pools have unquestionably arisen due to impacts, volcanism and geothermal heating and existed for significantly long periods. If so, searching for amino acids, and perhaps, even life, on Titan's surface becomes a genuine scientific possibility.

Our group has been working on creating laboratory chemical simulations of Titan's atmosphere, and probing its ultimate significance to the questions of the origin of extraterrestrial and terrestrial life. We present in this paper our recent work on this issue along with some tantalizing findings on the astrobiological perspective.