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Abstract
The future exploration of Titan is of high priority for the solar system exploration community as recommended by the 2003 National Research Council (NRC) Decadal Survey [1] and ESA's Cosmic Vision Program themes. Cassini-Huygens discoveries continue to emphasize that Titan is a complex world with very many Earth-like features. Titan has a dense, nitrogen atmosphere, an active climate and meteorological cycles where conditions are such that the working fluid, methane, plays the role that water does on Earth. Titan's surface, with lakes and seas, broad river valleys, sand dunes and mountains was formed by processes like those that have shaped the Earth. Supporting this panoply of Earth-like processes is an ice crust that floats atop what might be a liquid water ocean. Furthermore, Titan is rich in very many different organic compounds—more so than any place in the solar system, except Earth.

The Titan Saturn System Mission (TSSM) concept that followed the 2007 TandEM ESA CV proposal [2] and the 2007 Titan Explorer NASA Flagship study [3], was examined [4,5] and prioritized by NASA and ESA in February 2009 as a mission to follow the Europa Jupiter System Mission. The TSSM study, like others before it, again concluded that an orbiter, a montgolfi`re hot-air balloon and a surface package (e.g. lake lander, Geosaucer (instrumented heat shield), . . .) are very high priority elements for any future mission to Titan. Such missions could be conceived as Flagship/Cosmic Vision L-Class or as individual smaller missions that could possibly fit within NASA's New Frontiers or ESA's Cosmic Vision M-Class budgets. As a result of a multitude of Titan mission studies, several mission concepts have been developed that potentially fit within various cost classes. Also, a clear blueprint has been laid out for early efforts critical toward reducing the risks inherent in such missions.

The purpose of this paper is to provide a brief overview of potential Titan (and Enceladus) mission techniques and to describe risk reduction efforts and recent advances toward enabling such future missions.

References
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[4] TSSM Final Report, 3 November 2008, NASA Task Order NMO710851

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