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Concept of a Lake Lander for a Future Mission to Titan

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Abstract

Following the selection of the Tandem proposal in response to ESA's Call for mission ideas for the Cosmic Vision 2015-25 programme, a mission to Saturn and Titan was jointly assessed by NASA and ESA in 2008. The baseline study scenario consisted of a NASA provided orbiter, which would carry two ESA provided *in situ* probes to Titan, a hot air balloon (Montgolfière and a lander) [1].

Complementary to the observations performed by Huygens, the lander considered in this study would be targeted at the northern polar region, where evidence of large lakes was provided by Cassini observations. Therefore the configuration of the lander had to be compatible with landing on a wet/liquid surface. An initial configuration was derived, and the key physical properties, such as mass and volume could be compiled, including an accommodation and interface for attachment to the orbiter. Based on the Huygens experience, initial values of the size and mass of the required aero-shell were calculated.

The lander operations would be limited to a total of about 9 hours. After its release by the orbiter it would perform atmospheric measurements during its ~6 hours descent. After landing, further measurements would be carried out through sampling and analysis of the liquid for 3 hours. The transmission of the collected data would be performed via the orbiter, which would act as a data relay. The orbiter would be performing a Titan flyby during the entire operational lifetime of the lander, thereby being at reasonably close distance.

The results of this assessment study were summarized in [2], and will be presented. A brief summary of the science case that led to the choice of the landing location will be given, the configuration of the lander, as derived during the study will be described, including the accommodation of the model payload. Finally the operational scenario will be discussed.

References

[1] TSSM ESA/NASA Joint Summary report (2009)

[2] TSSM In Situ Elements, ESA Contribution to the Titan Saturn System Mission, ESA-SRE(2009)4