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EXPLORATION OF ENCELADUS THROUGH CONSTELLATION OF CUBESATS

Abstract

The future of Titan and Enceladus is of high priority for the solar system exploration community as recommended by 2003 National Research Council (NRC) Decadal Survey and EAS's Cosmic Vision Programme themes. Recent Cassini – Huygens discoveries have shown that Enceladus is a world apart from Titan in many respects; however, the unexpected heat flow from Enceladus' South Pole and its eruptive, water plumes indicate that it, too, may harbor liquid water beneath its surface. This paper presents a futuristic case study of a Space Mission to Enceladus, consisting of a constellation of CubeSats to be placed in multiple orbits around the Saturn's Moon. The mission architecture has been developed to maximize the variety of data received. Comprehensive Trade and Selection of instruments and power supply of each satellite would be given to account for the power requirements and thus the lifetime of the mission. A systems level of architectural study, consisting of detailed instrumental study of each satellite would be given to depict the variety of data to be analyzed. An idea in terms of cost and time involved with the mission would also be given to argue the possibility of such an exploratory mission in the upcoming decade. The system design also includes the communication plans among the satellites to maximize the redundancy and minimize the data package loss after each burst of relayed data towards Earth. The purpose of this paper to provide an overview of the mission architecture, its elements and a path forward.