



Challenges of exploring Titan and Enceladus with a single mission

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Both ESA, through its Cosmic Vision Program, and NASA, through its recent studies of flagship-class mission concepts, are considering missions that would explore both Titan and Enceladus, icy moons of Saturn. Many in the planetary science community hope for a collaborative mission involving both NASA and ESA, and possibly other space-faring nations such as Russia, Japan and India. If a single mission can provide significant science at both Titan and Enceladus, many anticipate that this would provide substantial cost savings compared to two separate missions.

Implementing a single mission that performs significant science investigations of both Titan and Enceladus is a challenging undertaking. There are several aspects in which attempting to optimize the science at one of those destinations negatively impacts science at the other. For instance, some of the instrumentation most appropriate for the scientific exploration of Enceladus' surface is only moderately useful for Titan's surface. Also, addressing Enceladus science from Titan orbit, and Titan science from Enceladus orbit, is very difficult, and most orbits that yield flybys of both satellites offer measurements not significantly better than those already provided by Cassini/Huygens. Mission architects attempting to design a mission to observe both will need to be both clever and resourceful to conceive a mission that is affordable. This paper will address areas where those architecting such a mission might encounter competing requirements, or requirements that could drive mission costs higher.

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