

**Abstract for 11<sup>th</sup> Low Cost Planetary Missions Conference  
June 9-11, 2015, Berlin, Germany**

## **Assessment of uSat Constellation for a Small Body Science Mission**

*William Frazier and Kim R. Reh, Project Formulation, Jet Propulsion Laboratory;*

This paper presents the results of a study comparing the performance, cost and risk of two different system architectures for a mission to a small body: (1) a traditional "mother ship" carrying several small landers, and (2) a distributed system comprised of a constellation of micro-satellites. It is noted that the current launch vehicle market presents a counter-intuitive trade that may favor a traditional launch trajectory rather than a low-energy escape. Remarkably, we find that the distributed system is capable of equal or better performance and science return than the baseline traditional approach, with virtually all necessary technologies already available at high TRL. The two exceptions are optical communications (under development by JPL) and flight software algorithms to support the high degree of system autonomy required. The open-ended nature of the autonomy question is bounded by constraining the system to meet the requirements of an existing Design Reference Mission (and no more). We find that the risk of the distributed constellation of microSats is moderate overall, with the exception of the two areas noted. It is also plausible that the constellation of microSats may be developed, launched, and operated at lower cost than the traditional system architecture, with the cost risk lying primarily in the flight software algorithm development (and containment of requirements creep).