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Mothership - Affordable Exploration of Planetary Bodies through Individual Nano-Sats and Swarms

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One concept to enable broad participation in the scientific exploration of small bodies is the Mothership mission architecture which delivers third-party nano-sats, experiments, and sensors to a near Earth asteroid or comet. Deep Space Industries' Mothership service includes delivery of nano-sats, communication to Earth, and visuals of the asteroid surface and surrounding area. It allows researchers to house their instruments in a low-cost nano-sat platform that does not require the high-performance propulsion or deep space communication capabilities that otherwise would be required for a solo asteroid mission. This enables organizations with relatively low operating budgets to closely examine an asteroid with highly specialized sensors of their own choosing, while the nano-sats can be built or commissioned by a variety of smaller institutions, companies, or agencies. In addition, the Mothership and its deployed nano-sats can offer a platform for instruments which need to be distributed over multiple spacecraft. The Mothership is designed to carry 10 to 12 nano-sats, based upon a variation of the Cubesat standard, with some flexibility on the specific geometry. The Deep Space Nano-Sat reference design is a 14.5 cm cube, which accomodates the same volume as a traditional 3U Cubesat. This design was found to be more favorable for deep space due to its thermal characteristics. The CubeSat standard was originally designed with operations in low Earth orbit in mind. By deliberately breaking the standard, Deep Space Nano-Sats offer better performance with less chance of a critical malfunction in the more hostile deep space environment. The first mission can launch as early as Q4 2017, with subsequent, regular launches through the 2020's.