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Access to Space for Small Satellite Missions (5)

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DO NOT ABANDON YOUR CUBESATS!

Abstract

The year 2018, with the launch and successful operation of the Mars Cube One (MarCO) CubeSats, marked the beginning of a new paradigm of planetary exploration: the era of interplanetary CubeSats. The success of LiciaCube and the sought after results from the 10 more experiments placed in CisLunar space by the Artemis 1 mission, clearly demonstrated the capabilities of these small satellites to act both as primary and supporting exploration platforms, at a cost about 10 times lower than traditional missions. Due to the decreased probability of success of these missions, one in two, so far, is expected to fail, however, CubeSats missions are usually only scheduled for few weeks, leading, in case of mission success, to rushing meetings and brainstorming about possible re-scoping of the satellites before disposing them, usually on heliocentric graveyard orbits of about 1 AU. In this work the suitability of Distant Retrograde Orbits (DRO) for CubeSats missions rescoping is discussed. DROs, are heliocentric orbits, orbiting the sun in phase with our planet, and offering the unique possibility to CubeSats to continue to perform science around our planet, without the need of further DeltaV. A study on how these can be accessed using the typical DeltaV capabilities already on-board the CubeSats to accomplish its disposal is here presented. The two cases of LiciaCube and Argomoon are then considered in detail, showing the possibility to re-use them as sentinels for monitoring possible impacts of Near Earth Asteroids.