

26th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Small Spacecraft for Deep-Space Exploration (8)

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MOON CUBESAT HAZARD ASSESSMENT (MOOCHA) – PROPOSING AN INTERNATIONAL
EARTH-MOON SMALL SATELLITE CONSTELLATION

Abstract

Recent developments in space exploration have reinstated the Moon as a primary target for near future space missions. The principal reasons include the Moon being the closest test bed and analogue for planetary space missions and the prospect of a scientific lunar base within the next decade. Space missions have vastly improved our understanding on hazards of human spaceflights but not fully regarding the threats affecting a prospective lunar base. Micrometeorite hazard has been partially addressed as an issue which can potentially impact both astronauts health and safety and create issues for a lunar base, such as degradation or permanent damage of equipment and facilities. Current understanding is based partly on dust and micrometeoroid flux measurements and impact flash observations. However, observations with improved spatial and temporal resolution are imperative for advancing existing hazard models.

In this paper, a mission concept of a constellation of nano satellites is proposed – similar to the QB50 project – that can both observe larger parts of cis-lunar and trans-lunar space and provide higher temporal resolution. Nano satellite missions are a cost-effective solution providing data for significant improvement of our current understanding. Additionally, such a distributed constellation mission will offer countless opportunities for academia, students and young scientists worldwide.

The mission concept (Moon Cubesat Hazard Assessment - MOOCHA) is a result of the Nordic-European Astrobiology Campus Summer School 2018 themed “Microsatellites in Planetary and Atmospheric Research” and to be further developed during the upcoming 2019 follow-up summer school, both taking place in Tartu, Estonia and co-organized by the Stockholm University Astrobiology Centre, the University of Tartu, the European Astrobiology Campus and the Nordic Network of Astrobiology and supported by European Union’s European Regional Development Fund and Estonia.