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SMALL SATELLITE CONSTELLATION FOR WEATHER MONITORING: FROM MISSION ANALYSIS TO SATELLITE DESIGN

Abstract

Solar and space physics is one of the scientific domains, which can benefit from CubeSats. Space weather monitoring is one of the dominant applications in this domain – several CubeSat missions in the past have already addressed related topics. Space weather monitoring requires precise measurement and analysis of space radiation as well as monitoring of solar activity and understanding of its influence on the radiation environment in different Earth orbits. Ultimately, scientists will be able to predict the changes of the earth's magnetic field due to space weather events and thus assess the effects of space weather on terrestrial, air- and spaceborne technical systems.

Present paper addresses the challenge of designing a small satellite mission profile, optimal from costs and performance perspective, to achieve the goal of constant space weather monitoring. The discussed mission is dedicated to complex measurements of space weather using a 6 Unit CubeSat platform and a set of advanced payloads. The satellite is capable of measuring the Sun's behaviour, the radiation environment (Electrons Gamma Rays) in LEO as well as angle-dependent ultraviolet emissions in the Earth atmosphere. Main design drivers were overall platform costs, a very tight schedule as well as the maximization of scientific value of the mission through partial autonomy. This paper describes the platform architecture as well as budget estimates and expected mission results.