Paper ID: 58527
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27th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Virtual Presentations: 27th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (VP)

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SMALL SATELLITE CONSTELLATION FOR WEATHER MONITORING: MISSION RESULTS

Abstract

Changes on the surface of the Sun and the intensity of the solar wind lead to changes of Earth magnetosphere and ionosphere, which can affect the operation and reliability of terrestrial, air- and space-borne technical systems, as well as threaten the life and health of people, the safety of air and space flights. 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. The use of CubeSats for space weather monitoring missions has several obvious economic advantages as compared to larger platforms. The significantly reduced mission costs due to standardized satellite format have been discussed in several other papers over the last decades. One less obvious scientific advantage of the concept results from the reduced costs: by using several CubeSats to monitor space weather, simultaneous multipoint measurements of the phenomena become affordable. In perspective, this capability will revolutionize our understanding of space weather effects.

The main goal of current experiment was to analyze the space weather using multiple CubeSats at the same time. The mission objectives of the project were to develop, implement and test several satellite platforms and payloads, launch satellites and conduct the set of experiments, including the collection and analysis of data from different payloads, as well as automation of work with satellite platforms to ensure daily data transfer to the ground station. During the half-year mission, a set of data was collected from satellites and the model of radiation belts behaviour was updated. This work shares the satellite architecture specifics as well as preliminary results while the mission continues.