

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Radiation Fields, Effects and Risks in Human Space Missions (5)

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SPACE RADIATION AND MAGNETIC FIELD ENVIRONMENT SPECIFICATION FOR THE  
RADCUBE SPACE WEATHER RELATED CUBESAT MISSION

**Abstract**

To study space weather environment in space, as a first step, it is necessary to develop and establish an advanced, real-time monitoring system. Such a monitoring system may be able to provide scientific data on space radiation (electron and proton spectra, flux of heavier ions) and the status of the magnetosphere in order to gain the possibility for a reliable forecast capability. The expansion of the CubeSat/SmallSat industry will make it possible in the near future to launch orbital constellations with relevant, miniaturised instrumentation in order to study the space weather environment in near real-time. Thus the development of RADCUBE, a 3U CubeSat demonstration mission lead by a Hungarian company, called C3S LLC, for space weather monitoring purpose, has begun within the European Space Agency (ESA) CubeSat programme. As part of the development a new, combined, space weather monitoring instrument package (called RadMag) has been initiated at the Centre for Energy Research, Hungarian Academy of Sciences in the framework of ESA General Support Technology Programme (GSTP) in collaboration with Imperial College London and Astronika. The RadMag measurement capabilities were defined by reconstructing the expected space radiation and magnetic field environments for different orbit scenarios. The space radiation environment was analyzed considering the following parameters: flux of Galactic Cosmic Rays,

trapped protons and electrons, solar particle events, corresponding Linear Energy Transfer (LET) spectra and Total Ionizing Dose (TID) levels. The expected magnetic field environment was modeled with the IGRF2015 + Tsyganenko-96 model both for quiet and stormy conditions. This paper addresses the results of these radiation and magnetic field environment reconstruction and calculations for the different possible orbital parameters of the RADCUBE mission in order to characterise the expected performance of the RadMag instrument during the RADCUBE mission. An overview of the RADCUBE project and CubeSat development is also given.