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SPACE RADIATION CHALLENGES POSED TO SMALL /NANO SATELLITE SYSTEMS AND LONG DURATION SPACE HUMAN MISSIONS

Abstract

A new historic era is unfolding with the advent of small and nano satellite systems, commercial human spaceflights, as well as deep space interplanetary mission, bringing forth a new set of challenges in particular the ones posed by space radiation. Posing a set of highly complex challenges particularly to both small and nano satellite systems, and within human deep space missions to crews safety, spacecraft on board avionics, and lastly to overall mission design and operations. In order to tackle the set of challenges in an effective manner, complex tradeoff analysis must be performed already during the mission definitions phase in order to reach optimal solutions, however even optimal solutions remain largely untested specially regarding deep space/long duration and/or frequent space missions, due largely to the fact that space radiation is an entirely different phenomenon to that of indigenous Earths or nuclear type man made radiations, and data is not readily available for the space radiation effects on human crews in deep space operations. Due to this, large uncertainties lie within the risk estimates for the effects of space radiation on human crews. The uncertainties exist as well when applied to small and nano satellite systems a challenge that must be tackled. The solutions to be found for these complex challenges will no doubt shape the future of human spaceflight.