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Small Spacecraft for Deep-Space Exploration (8)

Author: Ms. Rebecca Axén
Julius Maximilians Universität Würzburg, Germany, rebecca.axen@uni-wuerzburg.de

Prof. Hakan Kayal
University Wuerzburg, Germany, hakan.kayal@uni-wuerzburg.de

NACOMI - A COMMUNICATION SYSTEM STUDY FOR INTERPLANETARY NANOSATELLITES

Abstract

Nano-satellites are gaining importance for interplanetary space missions. In order to communicate with nano-satellites in deep space, a communication system that is able to operate under deep space conditions needs to be developed. Within the phase A study NACOMI (NANO-satellite COMMunication technologies for use in Interplanetary space), different deep space mission scenarios for a three unit CubeSat are analysed. Based on the mission analysis, boundary conditions for an early communication system prototype shall be constrained. The targeted nano-satellite communication system should be smaller than half a unit CubeSat and fulfill the power requirements derived from the mission scenarios. The deep space scenarios cover possible Moon and Mars missions. For all scenarios the according radiation environment and therefore the TID (Total Ionization Dose) per year is estimated using SPENVIS (ESA's space environment information system). By estimating detailed link budgets, different combinations of on-board antennas and possible ground stations will be compared and a suitable modulation technique selected in order to minimise the data loss for a 512 byte/frame communication link. Furthermore, the current status of the study as well as the outcome of the gathered results will be presented.