Paper ID: 54190
oral

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

Author: Mr. Marcin Kaczmarzyk
Rzeszow University of Technology, Poland, kaczmar@prz.edu.pl

Dr. Aleksander Wasniowski
Space Garden Scientific Council, Poland, aleksander.wasniowski@gmail.com
Dr. Christiane Heinicke
ZARM, University of Bremen, Germany, christiane.heinicke@zarm.uni-bremen.de
Dr. Tomasz Jakubowski
Poland, illaenus@gmail.com

ORDINARY CHONDRITE AS A POTENTIAL SHIELD FOR GAMMA RADIATION

Abstract

This paper explores the validity of the material obtained from S-type asteroids as a gamma rays shield for use in astronautics. Almost absent in primary cosmic rays, gamma rays contribute to secondary cosmic rays, as a result of the highly inelastic interactions of ultra-high energy primary particles with relatively dense media, e.g. spacecraft hulls. In terrestrial conditions, gamma rays shields use high density and high atomic number elements, which are sparse on undifferentiated asteroids. On the other hand, the very high costs of space transportation require the in situ resources utilization (ISRU) for the sustainable development of space exploration. Therefore, the ordinary chondrites, a material that builds S-type asteroids and very common meteorites, has been tested for its gamma ray attenuation properties. For the purpose of the experiment, a custom-made, shielded research workstation was constructed to analyse ionizing radiation absorption in the pulverized material. Using the workstation, the gamma ray attenuation experiments were performed using pulverized ordinary chondrite, which led to determining gamma ray mass attenuation coefficient of chondritic asteroid matter. We conclude that the S-type asteroids may be considered as rich source of material that very efficiently attenuates gamma rays per unit mass.