SPACE LIFE SCIENCES SYMPOSIUM (A1)
Radiation Effects and Risks in Human Space Missions (4)

Author: Dr. Premkumar Saganti
Prairie View A&M University, United States, pbsaganti@pvamu.edu

RADIATION MODEL CALCULATIONS AND GCR PARTICLE FLUX VARIATIONS: ASSESSMENT FOR DEEP-SPACE HUMAN EXPLORATIONS

Abstract

Understanding and assessment of variations in the radiation particle flux - protons, alpha particles, and heavy ions in the GCR (Galactic Cosmic Ray) environment are essential for future intended deep-space human exploration missions. Over the past several years, we have been developing model calculated particle flux as a function of time (2001-2008) making use of NASA's HZETRN (High Z and Energy Transport) code along with the newly expanded nuclear fragmentation cross sections that are described by the quantum multiple scattering (QMSFRG) model.

Our model calculations radiation dose rates are compared with the first two years of measured data (2001-2003) of the MARIE (Martian Radiation Environment Experiment) instrument onboard the 2001 Mars Odyssey (MO) spacecraft at Mars. The dose rates observed by the MARIE instrument for those two years remained within 10% of the model calculated predictions. The particle flux predications for heavy ions are also compared with the measurements from the Cosmic Ray Isotope Spectrometer (CRIS) instrument on board the Advanced Composition Explorer (ACE) for about a decade (1997-2007). Model calculated particle flux showed high degree of accuracy (within 5% for Z=5-14 and within 15% for Z=17-28).

Model calculated particle flux predictions and comparisons with other observed measurement trends for the years 2001 through 2008 will be discussed and presented along with the biological consequences for the anticipated human explorations in the context of the space radiation risk assessment.