NASA Space Cancer Risk (NSCR)

Exposure to solar particle events (SPE) and galactic cosmic rays (GCR) poses cancer risks to astronauts. The NASA Johnson Space Center-Space Radiation Program Element (JSC-SRPE) has developed cancer risk projection code and has evaluated the level of uncertainty that exists for each of the factors (parameters) that are used in the model. The model originated from recommendations of the National Council on Radiation Protection and Measurements (NCRP, 1997; 2000) with revisions from the latest analysis of human radio-epidemiology data. NASA-defined radiation quality factors are formulated with probability distribution functions (PDFs) to represent uncertainties in leukemia and solid cancer risk estimates. The model was reviewed by the National Research Council (NRC) in 2012. Monte-Carlo propagation of uncertainties from different sources is described with PDFs. Models of the space environment and the BRYNTRN and the HZETRN are used to determine organ exposures behind spacecraft shielding. The purpose of the NASA Space Cancer Risk (NSCR) web server is to provide seamless integration of input and output manipulations, which are required for operation of the sub-modules--BRYNTRN, SUMSHIELD, and the Cancer probabilistic response models. The main applications envisioned for NSCR are International Space Station (ISS) missions, and planning for future exploration missions to the moon, near earth objects (NEO), or Mars. In addition, cancer risk estimates for medical diagnostic and aviation radiation exposures are evaluated using similar methods.

System Requirements

The NSCR web server has been tested with Google Chrome, Microsoft Internet Explorer (IE) and Mozilla Firefox. For IE the progress of BRYNTRN, SUMSHIELD, and REID calculations cannot be displayed.

User Selected Environment(s):

• Galactic Cosmic Rays (GCR)
   Badhwar-O'Neil model
• Solar Particle Event (SPE)
   Type of energy distribution (Exponential and Weibull)
   Select historical events with pre-defined spectra
• Space Exploration Missions
   Interplanetary space
   Lunar surface
   Mars surface
   Low Earth Orbit (LEO)

• The online tools and models are available to authorized users. To request a username and password to access these tools, please contact   Dale Ward at the following address: ward@dsls.usra.edu.