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Radiation Fields, Effects and Risks in Human Space Missions (4)

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ESTIMATES OF CARRINGTON-CLASS SOLAR PARTICLE EVENT RADIATION EXPOSURES ON  
MARS

**Abstract**

Radiation exposure estimates for crew members on the surface of Mars are made for solar particle event proton radiation environments comparable to the Carrington event of 1859. We assume that the proton energy distributions for these Carrington-type events are similar to those measured for other, more recent large events. The fluence levels of these hypothetical events are normalized to the value for the Carrington event, as reported from measurements in ice core data. In this work we use the BRYNTRN radiation transport code, originally developed at NASA Langley Research Center, and the Computerized Anatomical Male and Female human geometry models to estimate exposures for aluminum shield areal densities similar to those provided by a spacesuit, a surface lander, and a permanent habitat located at various altitudes in the Mars atmosphere. Comparisons of the predicted organ exposures with current NASA Permissible Exposure Limits (PELs) are made.