

The Status of Radiation Estimates for Human Missions to the Moon and Mars

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Astronaut exposure to ionizing radiation will be a primary concern for missions to the moon and Mars and may become a limiting factor for long duration missions. Methodologies for evaluating this risk in terms of radiation protection quantities are described. Environment models, vehicle/habitat shielding models, and transport codes are discussed. Here the environmental models include solar particle event (SPE) and time dependant galactic cosmic ray (GCR) models for free space, as well as lunar and Martian surface SPE and GCR models which are altitude and surface material dependant. Exposures are calculated for sample missions. Since radiation limits for missions beyond low Earth orbit (LEO) have not yet been defined, these exposures are compared to current LEO limits. Possible exploration mission limits are also discussed.