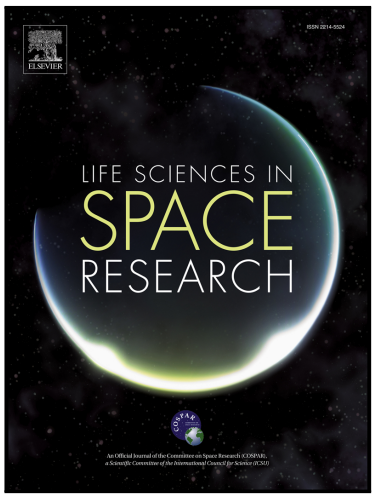

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The charged particle radiation environment on Mars measured by MSL/RAD from November 15, 2015 to January 15, 2016

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Abstract

The Radiation Assessment Detector (RAD) on board the Mars Science Laboratory (MSL) *Curiosity* rover has been measuring the radiation environment in Gale crater on Mars since August, 2012. These first in-situ measurements provide an important data set for assessing the radiation-associated health risks for future manned missions to Mars. Mainly, the radiation field on the Martian surface stems from Galactic Cosmic Rays (GCRs) and secondary particles created by the GCRs' interactions with the Martian atmosphere and soil. RAD is capable of measuring differential particle fluxes for lower-energy ions and isotopes of hydrogen and helium (up to hundreds of MeV/nuc). Additionally, RAD also measures integral particle fluxes for higher energies of these ions. Besides providing insight on the current Martian radiation environment, these fluxes also present an essential input for particle transport codes that are used to model the radiation to be encountered during future manned missions to Mars. Comparing simulation results with actual ground-truth measurements helps to validate these transport codes and identify potential areas of improvements in the underlying physics of these codes. At the First Mars Radiation Modeling Workshop (June 2016 in Boulder, CO), different groups of modelers were asked to calculate the Martian surface radiation environment for the time of November

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