



## MSL-RAD Radiation Environment Measurements

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We present results from the Radiation Assessment Detector (RAD) obtained during MSL's cruise to Mars and during the first 150 sols after Curiosity's successful landing. RAD is designed to measure the energetic particle environment, which consists of Galactic Cosmic Rays (GCRs), Solar Energetic Particles (SEPs), and the secondary particles created by nuclear interactions of primary GCRs in shielding. During cruise, RAD was asymmetrically shielded inside the spacecraft. On the surface, RAD is shielded by the atmosphere, and the radiation dose rate is seen to vary slightly as the column depth of the atmosphere varies on a diurnal cycle. RAD's cruise measurements are a unique data set that provide a reasonable simulation of what might be encountered by a human crew headed for Mars or for some other destination in deep space. RAD successfully operated for 220 days of the 253 day journey to Mars. RAD has also operated stably on the surface of Mars, returning the first detailed radiation data from the surface of another planet. The data from the surface are also highly relevant for planning future crewed missions. We will present results for radiation dose and dose equivalent (the quantity most directly related to human health risk) obtained with both cruise and surface data. Dose and dose equivalent are dominated by the continuous GCR radiation, but five significant SEP events were seen during cruise and will be discussed.