

Radiation Environments on Mars and their Implications for Terrestrial Planetary Habitability

Irene Schneider Puente

James Kasting,

Jennifer L. Macalady

The Pennsylvania State University

USA

sschneid@geosc.psu.edu

Francis A. Cucinotta

NASA Johnson Space Center

USA

The understanding of the surface and subsurface radiation environments of a terrestrial planet such as Mars is crucial to its potential past and/or present habitability. Despite this, the subject of high energy radiation is rarely contemplated within the field of Astrobiology as an essential factor determining the realistic parameter space for the development and preservation of life.

Furthermore, not much is known of the radiation environment on the surface of Mars due to the fact that no real data exist on this contribution. There are no direct measurements available since no surface landers/probes have ever carried nuclear radiation detection equipment to characterize the interactions arising from cosmic ray bombardment, solar particle events and the atmosphere striking the planetary surface. The first mission set to accomplish this precise task, the Mars Science Laboratory, is not scheduled to launch until 2009. Presented here are some of such simulations performed with the HZETRN NASA code offering radiation depth profiles as well as a characterization of the diverse radiation surface environments.

A discussion of the implications that these projected doses would have on terrestrial planet habitability on Mars is presented as well as its implications for the habitability of terrestrial planets elsewhere.