

VARIATIONS IN THE GALACTIC COSMIC RAY FLUX AT THE MOON: EFFECTS OF THE MAGNETOTAIL AND SOLAR WIND STRUCTURES. A. W. Case¹, H. E. Spence², M. J. Golightly², J. C. Kasper³, J. B. Blake⁴, J. Mazur⁴, L. Townsend⁵ and C. Zeitlin⁶, ¹Boston University (tonycase@bu.edu), ²University of New Hampshire, ³Smithsonian Astrophysical Observatory, ⁴The Aerospace Corporation, ⁵University of Tennessee Knoxville, ⁶Southwest Research Institute

Introduction: Galactic Cosmic Rays (GCR) are an ever-present source of radiation outside of the protective atmosphere and magnetosphere of the Earth. This represents a challenge for human and robotic space-flight in coping with this harsh radiation environment. Many factors in the lunar environment can act to affect the local flux of GCR. The Moon itself blocks up to half of the incoming GCR radiation. Other large-scale magnetic structures also may be able to shield the Moon from these high energy particles. Recent modeling efforts [1,2] have conflicted in their conclusions as to whether the Earth's magnetotail at lunar distances is sufficiently strong to provide shielding from GCR with energies greater than 10 MeV. The Cosmic Ray Telescope for the Effects of Radiation (CRaTER) instrument [3] on the Lunar Reconnaissance Orbiter (LRO) [4] is now uniquely positioned to be able to directly test these modeling results.

Summary: This paper will use data from the CRaTER instrument on the Lunar Reconnaissance Orbiter (LRO) to investigate the magnetosphere's influence on the flux of GCR in low lunar orbit. We find that within our resolvable limits, there is no shielding effect by the Earth's magnetotail on the GCR flux from energies of 10 MeV up to 500 MeV and higher. Multiple incident energy channels are derived from the CRaTER data in order to investigate this phenomenon.

We will also investigate the effects of corotating interaction regions (CIR) and other solar wind structures on the total GCR flux. It has been observed that some solar wind structures cause small decreases in the GCR flux that are observable by CRaTER. This paper will investigate the causes of these flux decreases and associated changes in the linear energy transfer spectra.

References: [1] Winglee and Harnett (2007) *GRL*, 34, L21103. [2] Huang et al., (2009) *GRL*, 36, L09109 [3] Spence et al., (2009) *SSR*, in press. [4] Chin et al., (2007) *SSR*, 129

Additional Information: For information on CRaTER and LRO: <http://lunar.gsfc.nasa.gov/crafter.html> http://www.nasa.gov/mission_pages/LRO/spacecraft/

