Cross Calibration of Omnidirectional Orbital Neutron Detectors LPNS of Lunar Prospector and SETN/LEND of Lunar Reconnaissance Orbiter. J. Murray[1], J.J. Su[1] (jjsu@umd.edu), R. Sagdeev[1], G. Chin[2], T. McClanahan[2], T. Livengood[3] , R.D. Starr[4], L.G. Evans[5] [1]University of Maryland College Park, Physics, College Park, MD, United States, [2]NASA Goddard Space Flight Center, Greenbelt, MD, United States, [3]CRESST/UMD/GSFC, Greenbelt, MD, United States, [4]Catholic Univ. of America, Washington DC, [5]Computer Sciences Corporation, Lanham MD

Introduction: The lunar neutron spectrum is sensitive to hydrogen-bearing volatiles such as water or hydroxyl in the Moon's regolith. Monte Carlo (MC) simulations have been used to investigate neutron production and leakage from the lunar surface to assess lunar surface compositions [1-2]. Orbital neutron spectroscopy has become a standard technique for access of planetary chemical composition from orbit. The Lunar Prospector Neutron Spectrometer (LPNS)[3] of the Lunar Prospector mission and the Lunar Exploration Neutron Detector (LEND)[4] of the Lunar Reconnaissance Orbiter mission were the most recent orbital measurements with similar omnidirectional helium-3 neutron proportional counters. These two instruments have different angular sensitivities and neutron detection efficiencies because of the geometries and helium 3 pressures. In addition, the Lunar Prospector's spin-stabilized design makes its detection efficiency latitude-dependent, while the SETN instrument faces permanently downward toward the lunar surface.

We use the GEANT4 Monte Carlo simulation code[5] to investigate the leakage lunar neutron energy spectrum, which follows a power law of the form $E^{-0.9}$ in the epithermal energy range, and the signals detected by LPNS and SETN in the LP and LRO mission epochs respectively. Using the lunar neutron flux reconstructed for LPNS epoch, we calculate the signal that would have been observed by SETN at that time. The subsequent deviation from the actual signal observed during the LEND epoch is due to the significantly higher intensity of Galactic Cosmic Rays during the anomalous Solar Minimum of 2009-2010.

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