

Pradiphat

Muangha

Department of Physics, Faculty of Science, Mahidol University, Bangkok 10400, Thailand; National Astronomical Research Institute of Thailand (NARIT), Chiang Mai 50200, Thailand

David Ruffolo, Department of Physics, Faculty of Science, Mahidol University, Bangkok 10400, Thailand

Alejandro Sáiz, Department of Physics, Faculty of Science, Mahidol University, Bangkok 10400, Thailand

Chanoknan Banglieng, Division of Physics, Faculty of Science and Technology, Rajamangala University of Technology Thanyaburi, Pathum Thani 12110, Thailand

Paul Evenson, Department of Physics and Astronomy, University of Delaware, Newark, DE 19716, USA

Surujhdeo Seunarine, Department of Physics, University of Wisconsin, River Falls, WI 54022, USA

Suyeon Oh, Department of Earth Science Education, Chonnam National University, Gwangju 61186, South Korea

Jongil Jung, Department of Astronomy, Space Science and Geology, Chungnam National University, Daejeon 34134, South Korea

Marc L. Duldig, School of Natural Sciences, University of Tasmania, Hobart, Tasmania 7001, Australia

John E. Humble, School of Natural Sciences, University of Tasmania, Hobart, Tasmania 7001, Australia

Poster

Neutron monitors (NMs) are ground-based detectors of the secondary particles produced in atmospheric cascades from primary cosmic rays. Using neutron time-delay data from neutron monitors (NMs), we can extract the leader fraction, L , of neutron counts that do not follow a previous neutron count in the same counter tube due to the cosmic ray shower. L is the inverse of the neutron multiplicity and serves as a proxy of the cosmic ray spectral index over the rigidity range of the NM response function. We present a comparative analysis of L from four Antarctic NM stations: South Pole (SP), McMurdo (MC), Jang Bogo (JB) and Mawson (MA). To first order L varies in concert with the count rate C , reflecting unrolling of the Galactic cosmic ray (GCR) spectrum as part of solar modulation during the declining phase of solar cycle 24 and during solar minimum. We use wavelet analysis to study the periodicity of L , the count rate C , and heliospheric parameters to consider their relationship with the 27-day variations. Variation in C was much more variable over 27 days due to high-speed solar wind streams (HSSs) and corotating interaction regions (CIRs), also in strong combination with the higher harmonics, while L usually had a very weak variation. Near the solar minimum of 2019-2020, we observed almost no 27-day variation in C . In contrast, during 2015-2016, near solar maximum, the 27-day variation in L and C was much stronger and fluctuating. Our results indicate weak GeV-range GCR spectral variation due to HSSs and CIRs, relative to the flux variation, in contrast with the strong observed spectral variation due to solar modulation. We acknowledge logistical support from Australia's Antarctic Program and support from the National Astronomical Research Institute of Thailand and grant RTA6280002 from Thailand Science Research and Innovation.

[Download to PDF](#)