Contribution ID: **847** Type: **Poster**

Study of secondary cosmic ray variations during extreme space weather event on May 10-11, 2024

The Forbush decrease (FD) is a short-term decrease in cosmic ray flux observed during the passage of transient interplanetary disturbances such as interplanetary counterpart of coronal mass ejection (ICME) and Co-rotating interaction regions (CIR). On 8-13 May 2024, multiple ICMEs erupted from active region AR 13664. On May 10, 2024, after the arrival of ICME shock at 17:04 UT, deep FD is seen in various Neutron Monitors (NMs) stations located worldwide. We have done comprehensive analysis of neutron monitor data using high-resolution (2-minute) from 28 NM stations, along with gamma-ray flux data at Maitri, Antarctica, using a NaI (Tl) detector. Enhancement in neutron flux before FD commencement is noticed at stations located at higher altitudes (>1000 m) with geomagnetic rigidity 4-7 GV, and the variation of FD amplitude with rigidity shows a decreasing trend in general, with a minimum amplitude near 6-7 GV. During the recovery phase of FD, enhancement is observed between 1:50-3:00 UT on 11 May 2024, which is linked with Ground Level Enhancement (GLE#74). GOES satellite observations confirm the arrival of GLE, associated with an X5.8 solar flare that occurred on May 11 at 1:36 UT. The dependence of pre-FD, FD, and GLE amplitude on the rigidity and elevation height of the NM station will be discussed.

Collaboration(s)

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Session Classification: PO-1

Track Classification: Cosmic-Ray Indirect