Contribution ID: 31

Transport of GV Rigidity Solar Energetic Particles in Turbulent and Non-turbulent Interplanetary Magnetic Field and SEP profiles at 1 AU

Tuesday 7 January 2025 11:35 (30 minutes)

Ground-level enhancement (GLE) is triggered by GV rigidity solar energetic particles (SEPs). In such high energies (a few hundred MeV/n to a few GeV/n), the characteristic of an SEP events differs from the more common low-energy SEPs at 1 au. We present several numerical studies on how the characteristics of an SEP event depend on parameters of the interplanetary magnetic field (IMF), pitch-angle scattering, energy, and ion mass charge ratio. We present that the large-scale turbulent IMF due to the random walk of the IMF footpoints can drastically change the time-intensity profiles and the pitch-angle distributions at 1 au. The GLEs characteristics will strongly depend on the location of the Earth or spacecraft. We provide another explanation for the unusual time-intensity profile and the pitch-angel distribution of the unusual GLE#44 on 1989 October 22 and conclude that such double-spike profiles are more common, however, the Earth was at the right place at the right time on 1989 October 22. We also investigate the importance of the mass-charge ratio on the onset time and decay phase of the intensity profiles of 4He, He3 and H ions at 1 au in both magnetically well-connected and weakly connected observers at 1au. We show that the HCS has the greatest impact on the observed He4 to H ratios at 1au and the asymptotic direction of the SEPs entering the magnetosphere.

Presenter: MORADI, Ashraf (University of Arizona)

Session Classification: Physics / Space Weather, Data Analysis, and Results