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Investigating the relationship between Ground level enhancement events and radiation enhancement at aviation altitude

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Cosmic particle flux is significantly higher on-board aircraft than at ground level. The radiation field at aviation altitude is very complex in terms of particle composition and particle energies and as such, the dose assessment is a very difficult task. The dose is usually estimated using numerical codes validated by experimental data. Ground-level enhancements (GLEs) are sudden, sharp, and short-lived increases in cosmic ray intensities registered by neutron monitors. These enhancements are known to take place during powerful solar eruptions such as solar flares, coronal mass ejections (CMEs), and solar energetic particle (SEP) fluxes. In this project, the idea is to analyze neutron monitor data during a solar storms that lead to a Forbush decrease and subsequently a GLE. The idea is to see how much these series of events can influence or contribute to increasing dose at aviation altitude. The Dose rate will be computed along certain chosen route by using Model for Atmospheric Ionization Radiation Effects (MAIRE), the Sievert and EpCard online calculator, to see if during an events there is a significant increase.
The neutron monitor data (from four neutron monitors in Southern Africa: Hermanus (oldest in the world), Potchefstroom, Sanae (Antarctica), and Tsumeb (Namibia)) will also be utilized as this data gives the information about GLEs. The standard geomagnetic activity parameters (Kp, Bz the southward component, Solar wind data and Dst) will be used as an indicator to show the level of disturbance.

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