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Study of heliospheric effects on galactic cosmic ray fluxes near Earth using low energy modes of the Pierre Auger Observatory

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Surface detector array (SD) of the Pierre Auger Observatory has the capability to observe variations in the flux of low energy secondary cosmic ray particles. Flux rates of low energy particles can be obtained either from particle count rates (scaler mode) or from charge distribution of the pulses (histogram mode), detected by individual water Cherenkov detectors (WCD). In scaler mode, SD is sensitive to particles that deposit energy between $\sim$15 MeV and $\sim$100 MeV in a WCD, while in histogram mode the deposited energy range can be extended up to $\sim$1 GeV.

These two low energy detection modes are excellent tools for monitoring modulations of the galactic cosmic ray flux, related to solar activity, such as Forbush decreases (with typical duration of several hours to weeks) and Solar cycle (with a duration of several years), as they provide fluxes of cosmic rays with different energies at the same detector.

In this contribution we present an analysis of the effects of space weather and space climate on low energy mode data collected by the Pierre Auger Observatory in the period between 2006 and 2013. In particular, we focus on the long term trend of the cosmic ray flux. In addition to the standard corrections for atmospheric effects such as pressure, the analysis takes into account also the corrections for the long term evolution of the response of the surface detectors. Results show good correlation of the corrected low energy mode Auger data with neutron flux measurements by the global neutron monitoring network (NMDB).