



Variations of the geomagnetic field and cosmic ray flux in relation to the variability modes of the mid-latitude troposphere

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The Principal Component Analysis (PCA) of meteorological parameters (air temperature and geopotential heights) at different pressure levels in troposphere, tropopause and lower stratosphere regions was used to extract variability modes which strongly resemble variations of space weather parameters. The study is based on the analysis of locally measured parameters at the mid-latitude regions. The time scale of the atmospheric variations analysed in this study is from weeks to months.

The main mode of the atmospheric variability correlates very well with the pressure corrected neutron monitor data. This mode is located in the tropopause-lower stratosphere – the region where most of the ground measured neutrons are generated. This mode results from the changes of the conditions in the high and middle latitude stratosphere.

Another mode of the atmospheric parameters' variations shows similarities with the variations of the geomagnetic field. These variations can be observed at most of the tropospheric pressure levels, but are more intense in the upper troposphere. No significant correlation was found between this atmospheric mode and CR flux. To our mind, these variations result from ionospheric disturbances and ionosphere-stratosphere interactions.