

On correlation of galactic cosmic ray intensity changes and tilt angles of the heliospheric neutral sheet

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Abstract. Up to present remains uncertainty about the parameter of solar activity which can be considered as an important one playing a decisive role in the long-period modulation of galactic cosmic rays (GCR). For a long time it is very well established that there exists the negative correlation of the intensity of GCR with the relative sunspot numbers and the intensity of the coronal green line emission of the Sun. Since 1976 there exists data about the tilt angles of the heliospheric neutral sheet (HNS) showing a deviation of the HNS with respect to the helioequator. It seems that the tilt angles data must play an important role in the understanding of the drift effect depending on the spatial location of the HNS. In connection with this there is interesting to study the relation of the changes of the tilt angles of the HNS and GCR intensity using neutron monitors data for different solar magnetic cycles of the $q_A > 0$ and the $q_A < 0$. There were considered the periods of 1976-1979 and 1991-1997, when $q_A > 0$, and of 1981-1989, when $q_A < 0$. The cross correlation analyses between the tilt angles and GCR intensity for the Climax neutron monitor data have been done.

It is shown that there is not significant differences between the correlation coefficients for the periods of the $q_A > 0$ ($r = -0.89 \pm 0.1$) and the $q_A < 0$ ($r = -0.80 \pm 0.1$). More, it is important to underline that even for the similar $q_A > 0$ solar magnetic cycles of 1976-1980 and of 1991-1997 the correlation coefficients are not the same. The similar results are obtained, e.g. for the Roma neutron monitor data. Generally, it is impossible to revealed separately the role of the changes of tilt angles and the sunspots in the modulation of GCR, as far as they act together. So, the separate correlations between the intensity of GCR on the one hand and the relative sunspot numbers and the tilt angles on the other, can lead to the incorrect conclusion. It is not practically possible to ascribe the changes in the intensity of GCR to any one parameters, e.g. to the sunspots, tilt angles or others. Thus, the question to what directly measured parameter or group of parameters of solar activity and solar wind are responsible for the GCR

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modulation, up to present remain open.