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CR-SA hysteresis phenomenon on the basis of satellite data, 1. Expected relative role of convection-diffusion and drift mechanisms for small CR energies

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Abstract. The hysteresis effect for small energies of galactic CR is formatted by two causes: the first is the same as for NM energies - the delay of the interplanetary processes responsible for cosmic ray modulation with respect to the initiating solar processes, which correspond to some effective velocity of solar wind and shock waves propagation (that the observed intensity is formatted by solar activity variations during many month before the time of CR measurement), and the second is caused by the time delay of small energy CR diffusion from the boundary of modulation region to the Earth's orbit. We develop our model (Dorman et al., 2001) described the connection between solar activity variation and CR convection-diffusion global modulation for NM energies with taking into account also the time-lag of the small energy particle diffusion in the Heliosphere. We analyzed the theoretical results on drifts (e.g., Burger and Potgieter, 1999) and approximated the dependence of drifts from tilt angle by parabola, and take into account the dependence from the sign of primary particles, and from the sign of polar magnetic field (A$>$0 or A$<$0). We correct observed data on drifts and then compare with what is expected according to the convection-diffusion mechanism. We assume different dimension of the modulation region (that the solar wind propagated from the Sun to the boundary of modulation region during Xo from 1 to 60 average months by the step of one month) and for each value of Xo we determine the correlation coefficient between variations of expected and observed CR intensities. The dimension of modulation region will be determined by Xomax, at what the correlation coefficient reaches the maximum value. Then it can be determined the radial diffusion coefficient and residual modulation in small energy region.

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