Quasi-periodic variation of the galactic cosmic ray intensity related with the Sun's rotation

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We developed a new three dimensional (3-D) model based on the Parker's transport equation to describe the 27-day quasi-periodic variation of the galactic cosmic rays (GCR) intensity. Four general processes - convection, diffusion, drifts in the regular interplanetary magnetic field and on the plane heliospheric neutral sheet, and the energy change of the GCR particles in the radial diverged solar wind are included in the model. The 27-day changes of the solar wind velocity and the diffusion coefficient were assumed as the general sources of the 27-day variation of the GCR intensity. The expected amplitudes of the 27-day variation of the GCR intensity (obtained based on the numerical solution of the Parker's transport equation) are greater for the positive ($A>0$) polarity than for the negative ($A<0$) polarity periods of solar magnetic cycles. These features are caused by the direction-changeable radial component of the drift stream of GCR in different periods of solar magnetic cycles. In the $A>0$ period the stream of drift is directed outward from the Sun, while in the $A<0$ period of solar magnetic cycle the stream has a vice versa direction. Theoretically expected amplitudes of the 27-day variation for the energy of 10 GeV are comparable with the experimental results obtained based on the neutron monitors data.