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On the causes and mechanisms of the long-term variations in the GCR characteristics

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There is a long-lasting controversy on the main causes of the long-term (11-year and 22-year) variations in the intensity and anisotropy of the galactic cosmic rays (GCR) observed for more than 50 years in the inner heliosphere. Some people believe that the 11-year variation is due entirely to the toroidal branch of solar activity (the area and number of sunspots, the strength of the heliospheric magnetic field etc) because of the diffusion, convection and adiabatic energy loss, while the much smaller 22-year variation is caused by the particle drift connected with the poloidal branch of solar activity. At the same time there were indications from some numerical experiments, both in the past and recent ones, that the contribution of the 22-year processes such as drift could be significant for both 22- and 11-year variations in the GCR characteristics.

In the paper we present the analysis of the causes of the first point of view and the reasons why one can expect the significant contribution of the processes connected with the poloidal branch of solar activity in both types of the long-term variations of the GCR characteristics. The latter considerations are strengthened by the calculations using the simple models.

Collaboration

– not specified –

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Primary author: KRAINEV, Mikhail (Lebedev Physical Institute, Moscow, Russia)**Co-authors:** KOTA, Jozsef (University of Arizona); POTGIETER, Marthinus (North-West University)**Presenter:** KRAINEV, Mikhail (Lebedev Physical Institute, Moscow, Russia)**Session Classification:** Parallel SH 09 Modulation II**Track Classification:** SH-TH