

The solar modulation of galactic cosmic rays and radiation dose of aircrews during the solar cycle 24/25

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The variation of galactic cosmic rays (GCRs) in the heliosphere is caused by the solar-terrestrial environmental changes. Owing to this variation known as the solar modulation of GCRs, the counting rate of the ground-based neutron monitors and a radiation dose of aircrews at the top of the troposphere also change with the solar-terrestrial environmental changes.

We have developed the time-dependent and three-dimensional model of the solar modulation of GCRs, based on the stochastic numerical method. Our model can reproduce and predict the intensity of GCRs in the heliosphere by assuming the variation of the solar wind velocity, the strength of the interplanetary magnetic field, and its tilt angle. Moreover, we can calculate the neutron monitor counting rate and the radiation dose of aircrews at an aircraft altitude by using our model coupled with the results of air-shower simulation performed by PHITS (Particle and Heavy Ion Transport code System).

In this presentation, we report the results of the solar modulation of GCRs, neutron monitor counting rate, and the radiation dose at flight altitude from the solar cycle 22/23 until the cycle 24/25. We also discuss about the possibility of increase of the radiation dose of aircraft at the cycle 24/25.

Keywords: galactic cosmic rays, heliosphere, radiation dose, neutron monitor