

Cosmic Ray Modulation and Radiation Dose of Aircrews During the Coming Solar Cycle

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The variation of the galactic cosmic ray (GCR) spectrum, the so-called cosmic-ray modulation, is caused by the heliospheric environmental change. In the current weak solar cycle 24, it is expected that the flux of GCRs is getting higher than that in the previous solar cycles, leading to the increase in the radiation exposure in the space and atmosphere. In order to quantitatively evaluate the possible solar modulation of GCRs and resultant radiation exposure at flight altitude during the coming solar cycle, we develop the time-dependent and three-dimensional model of the cosmic-ray modulation. We consider physics processes such as the curvature-gradient drift motion of GCRs and therefore our results reproduce the 22-year variation of the cosmic-ray modulation. By modeling the variation of the solar wind velocity, the strength of the interplanetary magnetic field, and its tilt angle, we predict the possible solar modulation of GCRs and resultant radiation exposure at flight altitude. The effects of the drift motion on our results of prediction will be discussed in this presentation.