

## Cosmic ray modulation and radiation dose of aircrews during the solar cycle 24/25

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Weak solar activity and high cosmic-ray flux during the coming solar cycle are qualitatively anticipated by the recent observations that show the decline in the solar activity levels. We predict the cosmic-ray modulation and resultant radiation exposure at flight altitude by using the time-dependent and three dimensional model of the cosmic-ray modulation. Our galactic cosmic ray (GCR) model is based on the variations of the solar wind speed, the strength of the heliospheric magnetic field (HMF), and the tilt angle of the heliospheric current sheet. We reproduce the 22-year variation of the cosmic-ray modulation from 1980 to 2015 taking into account the gradient-curvature drift motion of GCRs. The energy spectra of GCR protons obtained by our model show good agreement with the observations by BESS and PAMELA except for a discrepancy at the solar maximum. Five year annual radiation dose around the solar minimum at the solar cycle 24/25 will be approximately 19% higher than that in the last cycle. This is caused by the charge sign dependence of the cosmic-ray modulation, such as the flat-top profiles in a positive polarity. In this presentation we further discuss our recent progress.