AOGS 2006

Modelling of Aircrew Radiation Exposure from Galactic Cosmic Rays and Solar Particle Events

M. TAKADA[1], B. J. LEWIS[2], L. G. I. BENNETT[2]

[1] *National Institute of Radiological Sciences, Japan*

[2] *Royal Military College of Canada*

The PCAIRE code was based on empirical correlations, which were developed from 160 scientific measurement flights during solar cycle 23, for prediction of the ambient dose equivalent rate. However, the extremum conditions of solar modulation and altitude could not be fully explored. As such, bounding correlations have been further developed with the LUIN transport code and incorporated into the model. This theoretical and experimental analysis therefore covers all possible environmental conditions. For interpolation between the bounding solar-cycle conditions, the new NASA solar modulation model has been used. Since a conversion ratio of effective dose to ambient dose equivalent must be applied to the (measured) PCAIRE estimate for the legal regulation of aircrew exposure, a new scaling ratio was therefore re-evaluated in this work to take into consideration the new ICRP-92 radiation weighting factors and different possible irradiation geometries of the source cosmic-radiation field. A computational analysis with MCNPX was further developed to estimate additional aircrew exposure that may result from sporadic solar particle events, considering GOES satellite data. Proton and helium spectra measured by the GOES-11 satellite during GLE 65 were transported through the atmosphere and compared to the ambient dose equivalent rates measured with a TEPC on board an aircraft prior to and during the event. This latter analysis was further compared to count rate data observed at various neutron monitors on the ground.