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Radiation exposure estimation and information service using the Korean Radiation Exposure Assessment Model for aviation route dose (KREAM)

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In general, the radiation originated from galactic cosmic rays (GCR) or/and solar energetic particles (SEP) are estimated by numerical models because every commercial aircraft could not embed an instrument for measuring the radiation dose rate. Regular and systematic monitoring of radiation exposure is required to protect aircrew and passengers' health from the adverse effect of ionizing radiation. KMA estimates and services the effective radiation dose using the Korean Radiation Exposure Assessment Model for aviation route dose (KREAM). The KREAM can estimate the radiation dose considering both GCR and SEP. We intercompared the KREAM model results with those of NASA's NAIRAS and FAA's CARI-7 models. The coefficient of determination (R2) of models with ARMAS data measured air craft-based in situ are CARI-7 (0.92), NAIRAS (0.91), and KREAM (0.88), respectively. The root mean square error (RMSE) in μSv of NAIRAS, KREAM, and CARI-7 are 5.58, 5.44, and 3.77, respectively. The bias in μSv of NAIRAS, KREAM, and CARI-7 are -7.44, -8.04, and -11.18, respectively. All models tend to underestimate the total cumulative dose in cases with high dose rates.