

Estimation of Astronaut Dose inside the Kibo Module during Large Solar Flare Events

SATO, Tatsuhiko^{1*} ; KATAOKA, Ryuhō² ; NAGAMATSU, Aiko³

¹Japan Atomic Energy Agency, ²National Institute of Polar Research, ³Japan Aerospace Exploration Agency

Forecast of radiation doses for astronauts as well as aircrews due to the exposure to solar energetic particles (SEP) is one of the greatest challenges in space weather research. In last 3 years, we have developed a warning system of aviation exposure to solar energetic particles: WASAVIES, which can predict the SEP doses at any flight conditions within 2.5 hours after the onset of ground level enhancements (GLE). In this system, the SEP fluxes incident to the atmosphere are calculated by physics-based models [1,2], and they are converted to radiation doses using a database developed on the basis of air-shower simulation [3]. In this study, we applied the same physics-based models to the estimate of the SEP fluxes on the orbit of International Space Station, and converted the fluxes to radiation doses for astronauts staying inside the Kibo module. For this conversion, we performed Monte Carlo cosmic-ray transport simulation, using the Particle and Heavy Ion Transport code System PHITS [4] in combination with the realistic 3D model of the Kibo module. A brief outline of WASAVIES together with the results of the astronaut dose estimation will be presented at the meeting.

[1] Y. Kubo, submitted to Space Weather

[2] R. Kataoka et al. submitted to Space Weather

[3] T. Sato et al. (2013) Radiat. Prot. Dosim. doi:10.1093/rpd/nct332

[4] T. Sato et al. (2013) J. Nucl. Sci. Technol. 50, 913-923. <http://phits.jaea.go.jp/>

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