

Space weather usage in JAXA radiation exposure management for astronauts

MATSUMURA, Chiemi^{1*}, Yukiko Endo¹, Yoichi Aibe¹, Masaru Sato¹, Masafumi Yamamoto¹

¹Japan Aerospace Exploration Agency

The International Space Station (ISS) is a habitable artificial satellite that orbits the Earth at an altitude of about 400 km. Six astronauts regularly remain onboard the ISS, and conduct many experiments. Given the high altitude of the ISS, however, astronauts face health risks from space radiation in the form of galactic cosmic radiation, solar particle radiation, trapped radiation, and that from secondary eruptions. Astronauts onboard the ISS receive radiation exposure in one day that is equivalent to what humans on the Earth receive in six months. As these high-energy rays have high potential to adversely affect the health of astronauts, the Japan Aerospace Exploration Agency (JAXA) employs radiation exposure management for JAXA astronauts to minimize the health damage caused by space radiation exposure.

The important aspects of radiation management are space environmental monitoring and space weather forecasts. When a solar particle event and increasing the trapped radiation electrons occurs, astronauts are exposed to radiation several times greater than normal. As such events often occur unexpectedly, we must therefore constantly monitor the space environment. Based on this approach, we have established a system that can steadily monitor solar activity data from satellites in geostationary orbit, in collaboration with pertinent organizations. By using this system, we can receive space environment alerts and take action to minimize space radiation exposure before space radiation increases in the ISS orbit. Because this countermeasure is different based on the type and level of space environment, space weather offers us valid information to analyze the progress of a given situation.

Our system allows us to take action after receiving a space environment alert. By improving the accuracy of predicting space weather and taking action prior to the onset of some activities, we can help make missions safer and more reliable.

In this report, we introduce space radiation exposure management and space weather usage by JAXA.

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