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Solar cell degradation of Akebono satellite due to space radiation and effect of temperature variation

MIYAKE, Wataru[1*] ; MIYOSHI, Yoshizumi[2] ; MATSUOKA, Ayako[3]

[1]Tokai University, [2]Solar Terrestrial Environment Laboratory, Nagoya University, [3]Institute of Space and Astronautical Science

Solar cells on any satellite degrade gradually due to severe space radiation environment. We have analyzed the degradation of the solar cells of the Akebono satellite, and found a fair correlation between the decrease rate of the solar cell output current and the trapped proton flux between 1989 and 1996. The previous studies demonstrated that we can deduce information of proton radiation belt from degradation of solar cells of the Akebono satellite. The relationship cannot be discernible after 1996. The previous studies suggested more prominent temperature effect in the later years because of progress of the degradation. In order to expand studies by using solar cells as a radiation monitor, we must separate exactly the contribution of temperature and of proton radiation. Since the sensor for solar cell temperature failed in 1991 and no temperature is available after 1991, we try to model the temperature variation at solar cells from the temperature of other surface parts. Once we establish the method, we correlate the temperature with solar cell output current and deduce the contribution of proton radiation.

Keywords: Akebono satellite, proton radiation belt