

## GEOTAIL/LEP calibration using solar hard X-ray photons and solar energetic particles

# Yasuyuki Tanaka[1]; Toshio Terasawa[2]; Yasuhiro Takei[3]; Kyoko Watanabe[4]; Ichiro Yoshikawa[5]; Yoshifumi Saito[6]; Toshifumi Mukai[7]

[1] Earth and Planetary Sci., Univ of Tokyo; [2] Dept. Earth Planetary Sci., Univ. of Tokyo; [3] University of Tokyo; [4] STE Lab, Nagoya Univ; [5] Univ. of Tokyo; [6] ISAS; [7] ISAS/JAXA

As reported in the fall conference, we found that GEOTAIL/LEP background (bkgd) increases were caused by the solar hard X-ray photons (HXR) above 50keV, which penetrated the wall of GEOTAIL and directly came into detectors.

Based on this, we compared LEP bkgd with hard X-ray fluxes above 50keV, which were calculated from YOHKO/HXT observations, and found that the quantum efficiency of MCP was about 2%. This is consistent with the previously performed observational result. Next, we examined the angular dependence of solar HXR signals detected by GEOTAIL. We found that, because GEOTAIL is a spin-stabilized satellite whose period is about 3 seconds, detected HXR signals were modulated as the attenuation inside spacecraft and the effective detection area of MCP changed. Finally, using SEP events accompanied by large solar flares, we quantitatively examine secular variations of MCP and CEM. From the preliminary analysis, we found that the ratio of MCP counts to CEM against SEPs is increasing, that is, the sensitivity of CEM is declining year by year. It is generally thought that the degradation of CEM is faster than that of MCP because more electrons are counted than ions, so this preliminary result is consistent.

These responses of MCP and CEM to HXRs, taking into consideration the inner structure of GEOTAIL, have to be confirmed by numerical simulations using such as Geant4 in future.

In addition to these analyses, we present the GEOTAIL observation of the SGR1806-20 giant flare on December 27, 2004.