

R006-P13

ポスター 1 : 11/24 PM1/PM2 (13:15-18:15)

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Variations of He⁺⁺ Ions in the inner magnetosphere at Different L-Shells: Arase LEP-i Observations

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He⁺⁺ ions in the inner magnetosphere mainly originate from the solar wind. He⁺⁺ in the inner magnetosphere can serve as a tracer of solar wind-origin ions. However, since there have been few satellites that continuously observed He⁺⁺ ions in the inner magnetosphere, the detailed variations of these ions are still not well understood. An ion analyzer LEP-i onboard the Arase satellite has high mass resolution and can discriminate different ion groups, including He⁺⁺. In this study, we analyzed Time-of-Flight (TOF) data from LEP-i with 10-min time resolution to investigate the long-term variations of He⁺⁺ ions in the inner magnetosphere as well as their dependence on L-shell, which covers the declining phase of Solar Cycle 24 through the rising phase of Solar Cycle 25. Analyzing the observational data LEP-i/TOF, we found the L-shell dependence of He⁺⁺ ion count. During the southward IMF, the He⁺⁺ ion count at $L < 4.5$ largely increase, suggesting that the enhanced convection causes transportation.

We will discuss how the geomagnetic and solar wind parametry dependencies of He⁺⁺ vary with the L-shell.