Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

PEM30-P06 Room:Convention Hall Time:May 20 18:15-19:30

Simulation on the IMF Bz control of the chorus wave excitation during the high-speed coronal hole streams

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Electron flux of the outer belt tends to increase when the high-speed solar wind interacts with the magnetosphere. The flux enhancement depends not only on the solar wind speed but also on the offset in the north-south component of the interplanetary magnetic field, i.e. the southward offset causes larger flux enhancement than the northward offset, although large-amplitude Alfvenic fluctuations always exist in the high-speed solar wind. If the acceleration process of the outer-belt electrons via the whistler-wave particle interaction is dominant, the populations of hot electrons, plasmasphere, and whistler waves enhance all together during the SBz stream, while they weakens all together during the NBz stream. We have observationally shown the north-south IMF dependence. In this study, we use the relativistic-RAM electron model to confirm the north-south IMF dependences of the key parameters. The data measured by LANL/MPA is used as a boundary condition at L=6.6. As a result, in the SBz stream, there are enhancements of hot electrons of ˜30 keV and lower-band whistler mode waves around L=4 at dawn-side, while they are at L>5 in the NBz stream. It is found that, in our simulations, these differences are primarily originated from the magnetospheric convection. We further discuss an assessment of non-linear whistler wave growth based on the threshold of the non-linear growth and the optimum wave amplitude [Omura and Nunn, 2011]. The regions for the non-linear growth are different from that for the intense linear growth. The assessment of non-linear whistler wave growth is useful to identify when and where we can observe chorus waves.

Keywords: inner magnetosphere, whistler chorus, simulation, solar wind - magnetosphere coupling