



3rd Asia-Pacific Conference on Plasma Physics, 4-8,11.2019, Hefei, China

Anisotropic Electron Distributions and Whistler Waves in a Series of the Flux Transfer Events at the Magnetopause

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With the measurements of the Magnetospheric Multiscale mission at the magnetopause, we investigated the electron distribution and the whistler waves associated with a series of six ion-scale flux transfer events (FTEs). Based on the magnetic field signature, each FTE can be divided into the core region and the draping region. In the draping regions of the most FTEs, the low-energy electrons displayed a bidirectional field-aligned distribution. The medium-energy electrons showed a field-aligned or beam distribution in the leading part, while a pancake distribution was presented for the electrons in the trailing part of the draping region. The close correlation between the pancake distribution and the compression of the localized magnetic field suggests that the pancake distribution may be due to the betatron acceleration. The whistler waves associated with the FTEs were observed and categorized into the lower and upper bands according to the frequency range. The lower band whistler waves propagated in variable

directions and therefore could be generated locally. The trailing part of the draping region with the electron pancake distribution was considered to be one possible source region. On the contrary, the upper band whistler waves were all found in the core region and propagated antiparallel to the magnetic field and therefore originated from the same source region. The observations confirmed that the FTEs are important channels for the mass and wave transport between the magnetosheath and the inner magnetosphere, and the electron dynamics can be modified during the FTE evolution.

References

Wang, S., Wang, R., Yao, S. T., Lu, Q., Russell, C. T., & Wang, S. (2019). Anisotropic electron distributions and whistler waves in a series of the flux transfer events at the magnetopause. *Journal of Geophysical Research: Space Physics*, 124.