Distribution of electron temperature anisotropy in the inner magnetosphere observed by Arase (ERG)

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Recently, it is becoming apparent that cyclotron acceleration by whistler chorus waves plays an important role in generating relativistic high-energy electrons in the outer radiation belt. Numerical simulations have shown that electrons are accelerated by wave-particle interactions associated with the nonlinear evolution of chorus waves excited near the magnetic equator. It is believed that electron temperature anisotropy is the free energy of chorus wave excitation and is provided by injections from the magnetotail. However, since there are fewer plasma observations in the inner magnetospheric region, the reality of the distribution of the electron temperature anisotropy is not well understood. In this study, we statistically investigate the distribution of temperature anisotropy in the inner magnetospheric region using data obtained from low-energy and medium-energy electron instruments (LEP-e and MEP-e) for a period from March 2017 to December 2019 and compare the results with the stability condition of the temperature anisotropy instability. As a result, we found that the boundary of the temperature anisotropy distribution is consistent with the marginal condition of the instability from the data obtained near the magnetic equator as in the previous study of the RBSP satellite (An et al., 2017) and that the temperature anisotropy tends to be stronger at high latitudes. Furthermore, we also examined the contribution of injections to temperature anisotropy by focusing on data obtained during injection events. However, we could not find a trend of strong temperature anisotropy during the injection events. In this presentation, we will discuss the statistical properties of the distribution of temperature anisotropy in the inner magnetosphere, including these results.

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