

Empirical model of hiss and chorus distribution in the outer radiation belt

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Work package specific tasks

Task 4.1 Collection of data and the development of software for automatic identification of Chorus, hiss and equatorial magnetosonic emissions

Task 4.2 Preparation of data sets for Error Reduction Ratio analysis Month 3-6 (LPC2E, USD)

Task 4.3 Error reduction analysis. Month 7-10 (USD)

Task 4.4 Development of the Statistical Wave Models and corresponding tensors of diffusion coefficients. Month 11-24 (LPC2E, SIST)

Wave amplitudes $B_w(\lambda)$ and $E_w(\lambda)$ as a function of K_p

$$B_w(\lambda, K_p)[nT] = \sum_{i=0}^4 \sum_{j=0}^4 a_{ij} K_p^i \lambda^j$$

$$E_w(\lambda, K_p)[mV/m] = \sum_{i=0}^4 \sum_{j=0}^4 b_{ij} K_p^i \lambda^j$$

$$Q(\lambda, K_p) = \log_{10} \left(\sum_{i=0}^4 \sum_{j=0}^4 c_{ij} K_p^i \lambda^j \right)$$

$$Q = \sum_{\theta=\theta_{gen}}^{\theta=\theta_{res}} N(\theta) / N_{total}$$

Agapitov et al. (2015), Empirical model of lower band chorus wave distribution in the outer radiation belt, J. Geophys. Res.

Model incorporation into diffusion rate codes

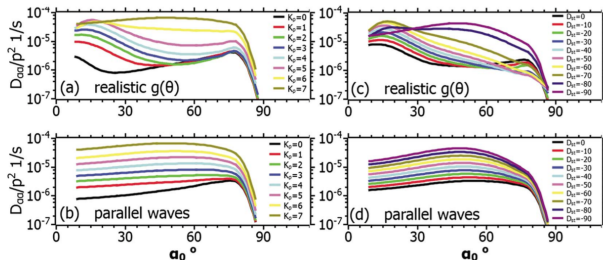
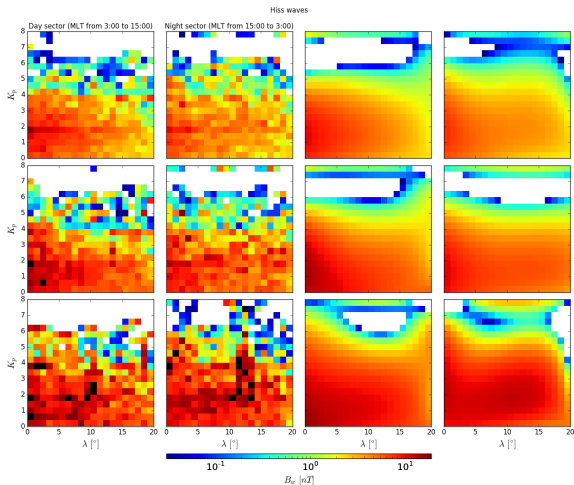


Figure: Bounce-averaged pitch angle diffusion coefficients for 100 keV electrons. Modelled variations of wave amplitude and Q factor with K_p and D_{St} are used. (a and c) Diffusion coefficients calculated for realistic distribution of θ angle (with approximated Q factor). (b and d)

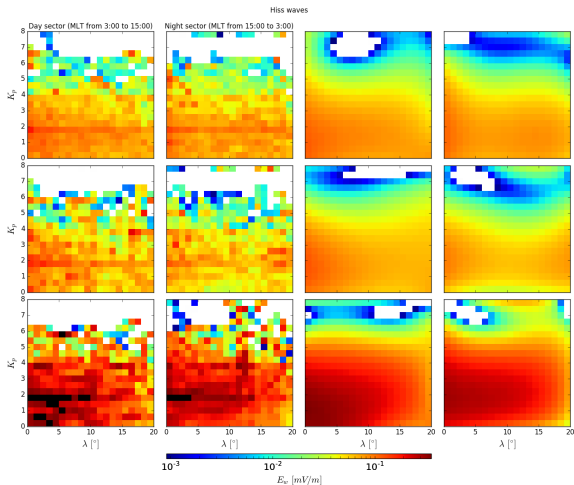
Orbit parameters

Mission	Perigee	Apogee	Inclination
Cluster	17200 km	120500km	90°
RBSP	6900 km	41700 km	19°

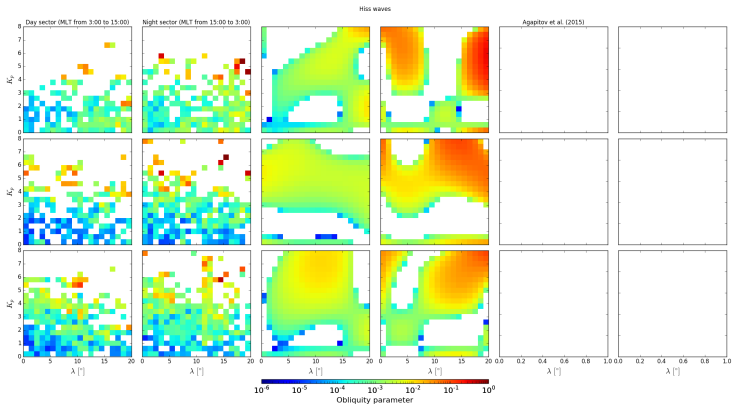
B_w distribution of hiss



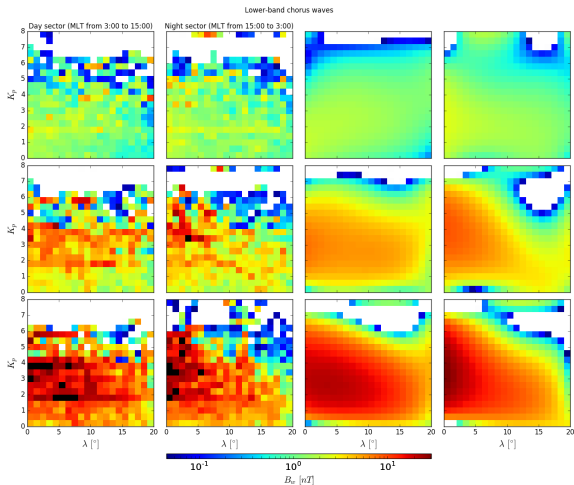
E_w distribution of hiss



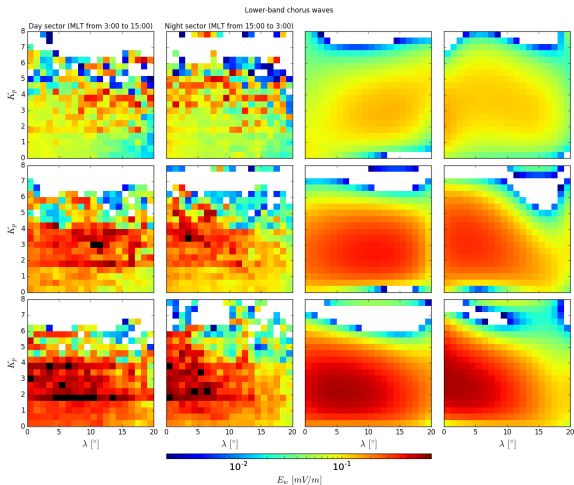
Obliquity parameter distribution of hiss



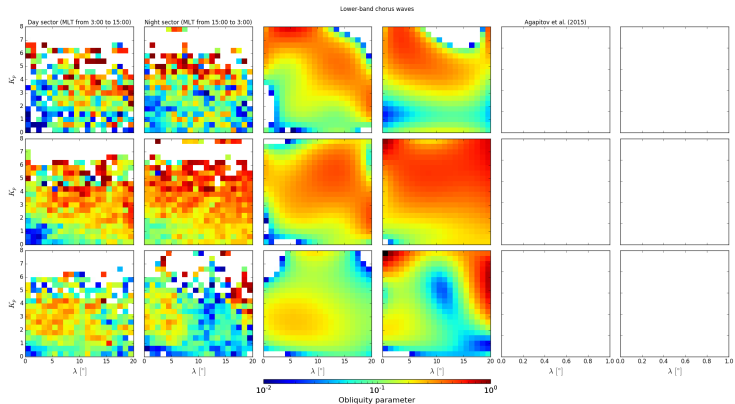
B_w distribution of LBC



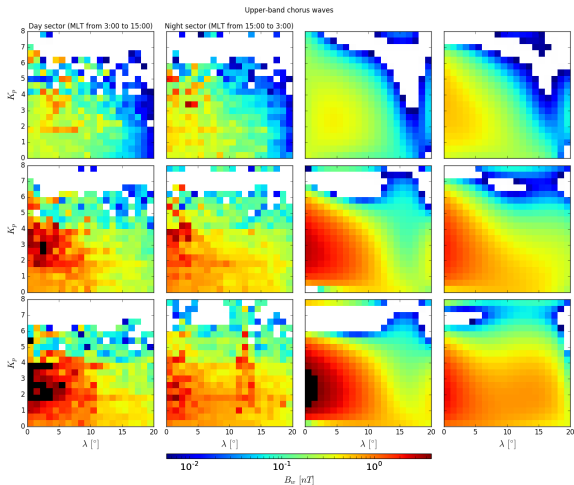
E_w distribution of LBC



Obliquity parameter distribution of LBC



B_w distribution of UBC



E_w distribution of UBC

