2nd URSI AT-RASC, Gran Canaria, 28 May – 1 June 2018

Global Model of Plasmaspheric Hiss from Multiple Satellite Observations

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Gyroresonant wave particle interactions with plasmaspheric hiss play a fundamental role in the dynamics of the Earth's radiation belts and inner magnetosphere, affecting the loss of radiation belt electrons. Knowledge of the variability of the wave power of plasmaspheric hiss as a function of both spatial location and geomagnetic activity, required for the computation of pitch angle and energy diffusion rates, is thus a critical input for global radiation belt models. To build a comprehensive model of plasmaspheric hiss in the inner magnetosphere we combine plasma wave data from eight satellites, equipped to measure wave magnetic field intensities. Specifically, we use approximately 3 years of data from Dynamics Explorer 1, 1 year of data from Double Star TC1, 10 years of data from Cluster 1, 17 months of data from each of THEMIS-A, THEMIS-D and THEMIS-E, and 3 years of data from the Van Allen probes, RBSP-A and RBSP-B. The new model extends the coverage and improves the statistics of existing models based on data from individual satellite missions, particularly at mid to high latitudes. We develop geomagnetic activity dependent templates to separate plasmaspheric hiss from chorus emissions enabling us to isolate the plasmaspheric hiss emissions. In this presentation the global morphology of the average plasmaspheric hiss wave power will be examined as a function of frequency and geomagnetic activity. Implications for the source of plasmaspheric hiss and radiation belt modelling will be discussed. The results will also compared with previous models of plasmaspheric hiss based on wave electric field measurements.