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Modelling electron radiation belt variations with the BAS global radiation belt model using a new model for plasmaspheric hiss

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There is now substantial evidence to suggest that wave-particle interactions play a major role in the loss and acceleration of electrons in the earth's radiation belts. Here we present results from the BAS global radiation belt model which includes a new model for electron loss by plasmaspheric hiss. The hiss model is based on data from the CRRES satellite mission and takes into account variations in the frequency spectrum with magnetic activity, L shell and MLT. We show that during quiet periods after a storm plasmaspheric hiss results in the formation of the slot region, but that the results depend critically on the angular distribution of the waves. We use the HOTRAY ray tracing code to develop a model for the angular distribution of the waves with latitude. The change in wave normal angle with increasing latitude is found to make a substantial difference to the loss rates and the reformation of the slot region. The best agreement with data is found when the wave normal angle for hiss varies with latitude, and when whistler mode chorus is included. The results emphasise the importance of including accurate models of wave-particle interactions to reproduce electron flux variations during storms.