

EVOLUTION OF LIGHTNING-GENERATED MAGNETOSPHERICALLY REFLECTING WHISTLER WAVES INTO AN INCOHERENT NOISE BAND

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We use a numerical method to simulate the frequency-time ( $f - t$ ) spectrogram as it would be observed at any location in the magnetosphere, that results from a lightning discharge at any given latitude on Earth. We model the lightning discharge as a short, vertical current channel with a double exponential return-stroke current, and then calculate the radiated wave power at the bottomside of the ionosphere (100 km). The wave power is then translated to the topside of the ionosphere (1000 km) using latitude and frequency dependent trans-ionospheric damping factors. Using a two-dimensional ray tracing code we then calculate the trajectories of 5330 whistler rays that effectively sample the lightning strikes frequency spectrum and latitudinal spread about the source, and then use these so-called "sample rays to create 120 million interpolated rays, each weighted with a measure of energy according to its frequency and injection latitude. This energy is progressively attenuated along the rays trajectory using a Landau damping calculation with realistic suprathermal electron fluxes [*Bell et al.*, 2002]. A detection area is defined in the plasmasphere, and rays that cross this area are used to construct the  $f - t$  spectrogram representative of what would be observed on a satellite located in that region. We investigate the role that the lightning source latitude, observation location, and plasmaspheric electron density structures have on the appearance of the simulated  $f - t$  spectrograms and focus specifically on the formation of the low-frequency incoherent noise band towards the end of the magnetospherically reflected whistlers lifetime, which may be related to plasmapheric hiss. We also recap open questions and suggest future directions of research associated with hiss.

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2. H - Waves in Plasma
3. (a) S-H/G1
4. I - Invited Paper, Program chair:  
Albert/Bortnik
5. I am co-chairing special session  
S-H/G1 and would like to  
present my work specifically in  
this session.