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**TITLE:** Whistler Observations on DEMETER Compared with FWM Numerical Simulations

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**ABSTRACT BODY:** Terrestrial Very Low Frequency (VLF) electromagnetic radiation, which plays an important role in the Van Allen radiation belts, is injected into Earth's plasmasphere from two primary sources: man-made VLF transmitters and lightning discharges. Recent studies have called into question some of the numerical models that simulate radiation injection into the plasmasphere by VLF transmitters: specifically, said models have been shown to overestimate the electromagnetic fields by at least 10 dB when compared to satellite measurements. In this study, we compared lightning-induced whistlers on the low earth orbiting DEMETER satellite with an electromagnetic, frequency domain Full Wave Method (FWM) finite element numerical code. By correlating lightning discharge time, location, and peak current data from the National Lightning Detection Network (NLDN) in the United States with burst mode electromagnetic field measurements of the whistlers on DEMETER, we were able to make an accurate estimate of the field strengths on DEMETER from the FWM simulation results for over 5000 lightning discharges over more than 10 different DEMETER passes during both the day and night. The FWM field estimates match the DEMETER measurements to less than 5 dB.

**KEYWORDS:** [6934] RADIO SCIENCE / Ionospheric propagation, [2487] IONOSPHERE / Wave propagation, [0644] ELECTROMAGNETICS / Numerical methods, [3324] ATMOSPHERIC PROCESSES / Lightning.

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### **Additional Details**

**Previously Presented Material:** I previously presented the method used to correlate NLDN data with DEMETER data in order to get the source lightning location and amplitude for input into the FWM simulation and some initial FWM simulation results at the 2011 AGU Fall Meeting and the 2012 URSI National Radio Science Meeting.

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