Title: Lightning-Related Electromagnetic Wave Phenomena in the Earth's Magnetosphere

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Abstract:

The thesis focuses on lightning-related electromagnetic wave phenomena observed by spacecraft in the Earth's inner magnetosphere. Two different approaches are used to identify the frequency and spatial extent where lightning generated emissions significantly contribute to the overall wave intensity. First, whistler detections onboard the DEMETER spacecraft are used to sort the measurements according to the whistler activity. Second, we use a geographic distribution of lightning activity and analyze a dependence of the overall wave intensity on geomagnetic longitude. We show that, especially during the night, the overall wave intensity observed in the plasmasphere is well correlated with lightning activity. The other focus of the study is on special electromagnetic wave events consisting of alternating frequency bands of enhanced and reduced wave intensity formed in the ionosphere due to lightning. We analyze their occurrence and parameters, and we suggest a possible mechanism of their formation.

Keywords: lightning, waves in plasma, whistlers, plasmasphere