A statistical study of thunderstorm characteristics associated with acoustic waves

Lightning Effects on the Middle and Upper Atmosphere

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Acoustic waves with periods between 3 and 5 minutes have been detected at ionospheric heights (250-350 km) and associated with severe thunderstorms. Modeling results support these findings, indicating that waves with such a period should be able to reach 250-350 km within ~250 km horizontally of the source. However, the mechanism by which the waves are generated and the ubiquity of occurrence is unknown. We perform a statistical study from 2005 May – July to compare the occurrence rate and horizontal extent of acoustic waves as detected by GPS total electron content measurements to storm size and convective height from NEXRAD radar measurements. In order to better determine the mechanism associated with the acoustic waves, we have located their source location using a phase differential method. The storm characteristics associated with such waves together with the source location within the storm can provide evidence for the source of the variations.