



Observation of intense lightning whistlers associated with the hurricane Harvey

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Hurricane Harvey, one of the most devastating hurricanes which hit the US, exhibited the highest total storm rainfall amounts in the US history. The enormous lightning activity associated with the hurricane was monitored by a geostationary near-infrared optical transient detector placed on the GOES-16 satellite, while the most active areas of lightning production were found in the outer bands of the storm in the intense convective updraft spots. Electromagnetic signals emitted by the lightning strokes can escape from the Earth-ionosphere waveguide, penetrate the ionosphere, and propagate toward higher altitudes in the form of dispersed right-hand polarized whistler waves. These whistlers are carrying energy into the inner magnetosphere, where they can influence energetic particles in the Van Allen radiation belts.

In this study we combine electromagnetic wave measurements performed by the pair of Van Allen Probes spacecraft during their hurricane overpasses with the data provided by the World Wide Lightning Location Network (WWLLN). We use the list of WWLLN lightning discharges detected up to 1000 km from the hurricane eye to get an overview about the spatial, temporal and energetic distribution of the lightning activity associated with the hurricane. We analyze the properties of lightning whistlers recorded by Van Allen Probes within 3000 km from the magnetic field line footprints chasing the hurricane eye movement.