Abstract Submitted
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Analyzing broadband electromagnetic pulses to geo-locate lightning THOMAS REMMERT, Texas State University — Lightning discharges are taking place globally on average of 100 times per second. Systems exist to detect the location of cloud-to-ground and cloud-to-cloud discharges, but have disadvantages. Commercial units are generally expensive, have short range, and are densely packed in a small geographic location. When the strike occurs, a large electromagnetic pulse is generated. This pulse encompasses a large portion of the electromagnetic spectrum, including ELF (extremely low frequencies) and VLF (very low frequencies). Because of the low signal attenuation in these bands, the pulse is able to travel between the earth and the ionosphere great distances. By using a minimum of two stations globally, we are able to geographically locate the strike and plot it on a map in real- time. Both stations are equipped with a ELF/VLF magnetic directional antenna, a pre-amp, and computer software to perform the calculations. When a strike occurs, a voltage is induced in the antenna due to Faraday's law. This voltage is sent to a pre-amp, which filters unwanted interference, amplifies the signal, and sends it to the sound card of a computer. Complex algorithms have been designed to remove unwanted emi, including the 60Hz hum from the power lines. The software is responsible for determining the direction of the strike and the time of the strike. Once these values are calculated, this information can be shared with your partner station, and a location can be determined.

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