Comparison study of Lightning Interfeometry via VHF Emission(LIVE)

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Lightning discharges radiate broad band frequency electromagnetic waves from ULF to UHF. Using sensors which detect this radiation is an effective technique to detect lightning flashes, even if they are in a cloud. Using multiple sensors, a lightning flash can be located using various techniques. At low frequencies, the power radiated by lightning is very high, but because the wavelengths are long, the location resolution is somewhat low. At very high frequencies, the wavelengths are much shorter allowing for much better location resolution, but the power radiation is also much lower, making it more difficult to detect. The VHF band is a good compromise between good location resolution, and good detection efficiency. One effective technique to locate VHF signals from lightning is interferometry. With this technique, the signals arriving at least three VHF broadband antennas are coherently combined to produce an 2D image of the lightning flash. The current generation broadband lightning interferometer being developed in Japan by RAIRAN and the University of Osaka called Lightning Interferometer via VlHF Emission (LIVE).
In 2016 summer season, LIVE is installed in Kaizuka, a city to the south of Osaka, near Osaka Bay to observe Japanese summer lightning with four VHF antennas. In the current study, we are tring to calibrate the detailed antenna locations and cable delays which is difficult to measure physically from cross correlate imaging, and comparing the high detail lightning maps produced by LIVE to the lower detail, 3D maps produced by a low frequency time-of-arrival system called the Broadband Observation network for Lightning and Thunderstorms (BOLT) which is spread around Kansai area in Japan.

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