Design of Lightning Flash Observation and Ranging System

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We have operated summer thunderstorm observation project by X-band Doppler radar and LPATS since 1997 in Kanto plain, Japan. We expressed characteristics of generation and evolution of summer thunderstorms by Doppler radar, 2-D distribution of Cloud to ground (CG) flash by LPATS and relation between radar reflectivity and CG flash near the mountain area in Kanto plain on the 11th ICAE. We can observe a lot of interesting thunderstorms and analyze the detail of them (3-D). For example some of them were with rotation. But we couldn’t get the details of lightning flash by LPATS because the only data that we can get is 2-D CG flash point and there is no 3-D lightning mapping system in Kanto plain. Thus, we designed the lightning flash data acquisition system and 3-D mapping system in order to investigate the detail of lightning flash event.

Followings are outline of our system.
(1) Long time data acquisition: (sampling rate 1M - 10M, acquisition time 1-2 s)
(2) Broadband: ELF - MF (300Hz-500KHz) and HF-UHF (20MHz - 500MHz)
(3) Maximum range: ELF-MF band is 400 ` 500km and HF-UHF band is 100 ` 200km
We will observe the waveform of ELF-MF and the RF power of HF-UHF.
Presently, ELF-MF system was nearly finished and an experimental system has operated since this summer. HF-UHF system is under development. We hope to get many useful comments for our new observing system.