

## Spider-like cloud flash observation using VHF broadband digital interferometer

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Lightning Research Group of Osaka University (LRG-OU) has been developing the VHF broadband digital interferometer since 1995. This is a two- (2D) and three-dimensional (3D) VHF source mapping system for electromagnetic (EM) waves emitted by lightning discharge progression based on a unique technique of the broadband digital interferometry. LRG-OU carried out field observation campaigns with the VHF broadband digital interferometers during monsoon seasons in Darwin, Australia. Through these campaigns a lot of lightning channels were visualized. The bi-directional leader progression, possible charge distribution related to the leader initiation, and the speed of the leader propagation are studied by the 3D imaging. At 0943:13 UT on 13 December, 2006, a spider-like cloud-to-cloud (CC) flash is recorded. In this flash, 4 groups of leaders are clearly visualized simultaneously. All leaders initiate from similar location, but develop to 4 different directions. One of these goes up to over 9km height, while the others progress horizontally between 2 and 5 km high. According to the weather radar observations by BOM, the bright band is noticeable at about 5 km high. It means the lower leaders progress under melting snow layer and positive charges exist in this region. It is considered that the lower leaders develop as long as 8 km horizontally neutralizing freckled positive charge. The leaders resembling dart leaders that propagate through the exact same channel as previous leader are also seen in this flash. The precedent leader proceeds with a speed of about  $10^4$  m/s, and then subsequent leaders proceed at a speed of about  $10^6$  m/s. In the presentation, we would like to discuss about the details of this spider-like CC flash.