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VLF/LF 帯広帯域干渉計を用いた Narrow Bpolar Pulse の解析
Analysis of Narrow Bipolar Pulse by VLF/LF broadband digital interferometer

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Recent studies of radio frequency emissions from thunderstorms have noted a distinct class of very energetic pulses emitted from the upper troposphere. This pulse called narrow bipolar pulse (NBP) can be associated with a narrow bipolar event (NBE). This event is a large scale discharge of intracloud charge structures occurring in 10us.

We have been designing and developing a 3D lightning location system based on broadband digital interferometry technique in VLF/LF bands. The VLF/LF broadband digital interferometer (VLF/LF DITF) consists of four or more observation stations which detect electromagnetic (EM) waves in a wide frequency range from 400 Hz to 500 kHz associated with lightning discharges. The VLF/LF DITF is able to locate lightning discharges such as return strokes, K events, and NBP, which are energetic breakdowns within thunderclouds several hundred kilometers away from the VLF/LF DITF.

During the summer season in 2009, we had conducted lightning observation campaign with a use of a prototype of the VLF/LF DITF, which consisted of four stations in Darwin, Australia, to validate the system.

The observation results are compared with Doppler radar data operated by the Bureau of Meteorology (BOM) and the observations of VHF broadband digital interferometers (VHF DITF) which enable us to visualize leader developments associated with lightning discharges.

In this paper, we focus on the statistical altitude distribution of narrow positive bipolar pulses (NPBPs) and narrow negative bipolar pulses (NNBPs) in tropical regions.

キーワード: Narrow Bipolar Pulse, 雷放電, 位置標定, 広帯域干渉法
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