Lightning Observation Network with LF Broadband Sensors around Toyama Bay

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It is well known that lightning flashes during winter thunderstorm seasons in the Japan sea coastal area show a number of remarkable features. Winter lightning causes serious damages in electric power transmission and distribution systems. All lightning processes can be studied by measurement of the EM fields associated with the charge transfer.

We have been designing and installing a lightning location system in 3D based on the broadband digital interferometry technique in LF bands. The LF band sensors consists of four or more observation stations which detect electromagnetic (EM) waves in a wide frequency range from 1kH to 150 kHz associated with lightning discharges. Since each station detects EM waves in LF, the lightning discharges several hundred kilometers away from the sensor are detectable.

During the winter thunderstorm season in 2016-17, we conducted lightning observation campaign with the LF sensors around Toyama bay. The locations for EM waves associated with return strokes, preliminary breakdown process, and continuing current are succeeded. Notable long lightning channels will be discussed in this talk.

Keywords: Winter thunderstorm, Lightning discharges, EM observations

