

Lower troposphere radar and VHF broadband digital interferometer observations of thunderclouds in Gifu Prefecture

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Lightning Research Group of Osaka University has conducted thunderstorm observation campaigns during summer seasons from 2004 to 2007 in Gifu Prefecture. The main purpose of our observation is to examine the relationship between the initiation of lightning discharges and the characteristic of the atmospheric condition. Our measurement systems in this paper are composed of a VHF broadband digital interferometer for visualizing the lightning channels in 3D and a 1.3GHz lower troposphere radar. The time period with most heavy lightning activity corresponds to the period when the atmosphere instability is recorded over the bright band height. In this period, ice crystals must collide with graupel in the melting layer and be electrified. Since the breakdowns initiated in this layer developed downward, the highest peak of VHF impulse sources correlates strongly with the altitude of the layer of the bright band. Therefore lightning activities are intimately related to graupel that is main component of the layer of bright band.