



Cloud Lightning Observed with VLF/LF and VHF Networks

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Cloud lightning has been studied by comparing thunderstorm data from two independent networks, LINET and SAFIR-type systems, operating in the VLF/LF and VHF regime, respectively. Twelve storms have been studied, which occurred in Poland and Hungary during the lightning season 2007. Particular focus was the time correlation between the onset of VHF source trains and VLF/LF signals. A surprisingly large number of coincidences were found, although the two networks are sensitive to different types of EM-emission from the discharge. This finding opens the possibility for investigations of the initial breakdown phase and initiation processes. Also, the close time-coincidences of SAFIR cloud lightning with LINET events serve as confirmation that VLF/LF networks can detect cloud lightning and, thus, have total-lightning capability. Since the quoted time-coincident LINET cloud-events exhibit range-normalized current distributions that are very similar to the ones measured for ground strokes, the very strong cloud pulses deserve to be termed as cloud-strokes. Relations to so-called narrow bipolar events (NBE) will be discussed.