P/SS Department Special Colloquium

Lightning: Experiments, Physics, and Modeling

Experimental observations are key to understanding the physics of lightning processes. Lightning flashes, both cloud and cloud-to-ground, may have durations of a second or more, while individual processes within a particular flash may last from a few hundred milliseconds to a few microseconds or less. These processes produce electromagnetic signatures in the range from a few hertz (long continuing currents) to 10^{20} Hz (hard X-rays). Gamma ray emissions (terrestrial gamma-ray flashes) have been observed to occur in association with lightning. The peak radiated power in the radio frequency range from lightning is expected to be at about a few to 10 kHz and to fall off linearly with increasing frequency. Due to the wide range of rates and amplitudes of electromagnetic emissions from different lightning processes, different frequency ranges are best suited for observing them and gaining insights into their mechanisms. In this presentation, experimental set ups used to observe a wide variety of lightning processes will be discussed and the measured characteristics of lightning processes will be presented. Finally, modeling of these processes and inferences drawn about their mechanism by comparing modeled and observed waveforms (see, for example, Figure 1) will be discussed.

Dr. Amitabh Nag

Vaisala Inc.

Wednesday September 23, 2015

Meet and Greet

3:15 - 4:00 pm

Crawford Building, Room 402

Colloquium

4:00- 5:00 pm

Crawford Building, Room 402

Light Refreshments to be served

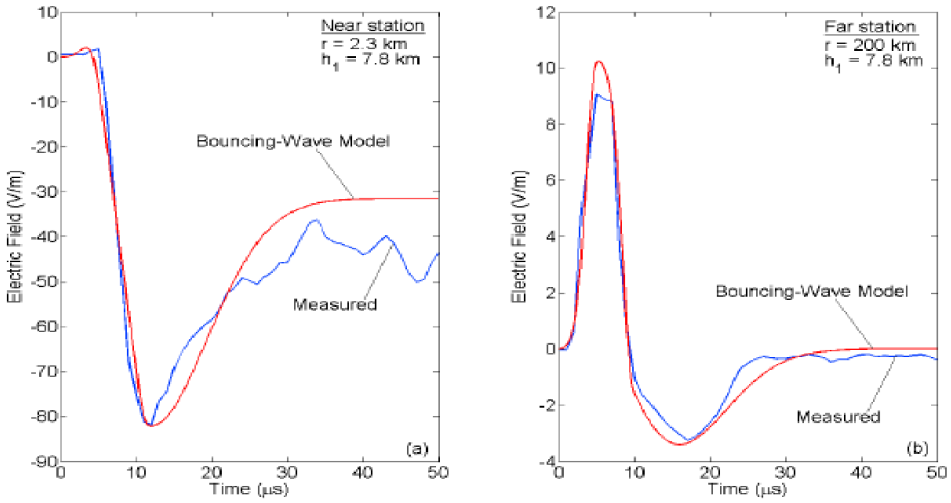

Figure 1. Measured (in blue) and model computed (in red) electric field waveforms of compact intracloud discharges at (a) near and (b) far distances.