

## **Lightning generated electric field over land and sea at northern region of peninsular malaysia: Measuring setup**

### **Abstract**

Lightning electric fields can be characterized based on its origins which include the preliminary breakdown, stepped leader, return stroke, subsequent return stroke, dart leader, dart-stepped leader, narrow bipolar pulses, cloud activity between strokes, regular pulse trains, K and M changes, and chaotic pulse trains. The aim of this work is to describe a lightning measuring setup suitable for characterizing lightning electric fields and their propagation when the measuring sensors are close to the sea. A location close to the sea in Northern Malaysia was identified and prepared for the study. Parallel plate and vertical whip antennas are used as the main sensors, which are connected to a high-speed digital storage oscilloscope through customized analog filter buffer circuits. Noise-distortion effects in the recorded data are filtered using MATLAB computer simulation before further analyses are carried out. The 1-D wavelet technique is used in the signal denoising process. Preliminary results show that the installed setup and denoising method is adequate and potentially efficient for the pre-processing of lightning electric field signals, and hence can be used for the detailed characterization study including the effects of sea on lightning characteristics and propagation.

### **Keywords**

Broadband antenna; Denoising; Electromagnetic measurement; HF radiation; Lightning discharge