

Abstract Submitted
for the 4CF13 Meeting of
The American Physical Society

Utilizing Yagi antennas in Lightning Mapping Array to detect low-power VHF signals JULIA TILLES, RONALD THOMAS, HARALD EDENS, PAUL KREHBIEL, WILLIAM RISON, Langmuir Laboratory, New Mexico Institute of Mining and Technology — The New Mexico Tech VHF Lightning Mapping Array (LMA), operated by Langmuir Laboratory, is comprised of 22 stations, each utilizing a vertical half-wave dipole (azimuthally “omni-directional”) antenna. The stations detect RF impulses from lightning—from the multiple detection sites, a 3-D map of lightning can be constructed. LMA maps greatly aid research of the initiation and structure of lightning. In 2012, four higher-gain Yagi (“directional”) antennas were installed, co-located with four LMA stations. The purpose was to test if an array of higher-gain directional antennas would improve detection of low-power sources associated with the initiation of lightning, e.g. sources resulting from positive breakdown (a weakly radiating stage of lightning initiation) or from (weakly radiating) lightning precursor events. The greater detection sensitivity of the Yagi antennas (in the on-axis direction) was demonstrated. However, preliminary results show that the use of Yagi antennas provide no new significant insight into the flash structure for either positive or negative breakdown channels. This (negative) result may provide the LMA research community with new limits to the detection of weakly-radiating discharges; alternatively, it may be due to a need for more Yagi stations.

Julia Tilles
Physics Department, New Mexico Institute of Mining and Technology

Date submitted: 20 Sep 2013

Electronic form version 1.4