

The Development of the Puerto Rico Lightning Detection Network for Meteorological Research

M.D. Legault¹, C. Miranda², J. Medín³, L.J. Ojeda⁴, and R.J. Blakeslee⁵

1. Department of Physics, University of Puerto Rico at Bayamón, Bayamón, PR 00959, USA,
email marc.legault@upr.edu
2. Department of Physics, University of Puerto Rico at Bayamón, Bayamón, PR 00959, USA,
email carmelo.miranda@upr.edu
3. Department of Physics, University of Puerto Rico at Bayamón, Bayamón, PR 00959, USA,
email jmedin@prtc.net
4. Department of Computer Science, University of Puerto Rico at Bayamón, Bayamón, PR 00959, USA,
email exter7@gmail.com
5. NASA Marshall Space Flight Center, Huntsville, AL 35812, USA, email rich.blakeslee@nasa.gov

ABSTRACT: A land-based Puerto Rico Lightning Detection Network (PR-LDN) dedicated to the academic research of meteorological phenomena has been developed. Five Boltek StormTracker PCI-Receivers with LTS-2 Timestamp Cards with GPS and lightning detectors were integrated to Pentium III PC-workstations running the CentOS linux operating system. The Boltek detector linux driver was compiled under CentOS, modified, and thoroughly tested. These PC-workstations with integrated lightning detectors were installed at five of the University of Puerto Rico (UPR) campuses distributed around the island of PR. The PC-workstations are left on permanently in order to monitor lightning activity at all times. Each is networked to their campus network-backbone permitting quasi-instantaneous data transfer to a central server at the UPR-Bayamón campus. Information generated by each lightning detector is managed by a C-program developed by us called the LDN-client. The LDN-client maintains an open connection to the central server operating the LDN-server program where data is sent real-time for analysis and archival. The LDN-client also manages the storing of data on the PC-workstation hard disk. The LDN-server software (also an in-house effort) analyses the data from each client and performs event triangulations. Time-of-arrival (TOA) and related hybrid algorithms, lightning-type and event discriminating routines are also implemented in the LDN-server software. We also have developed software to visually monitor lightning events in real-time from all clients and the triangulated events. We are currently monitoring and studying the spatial, temporal, and type distribution of lightning strikes associated with electrical storms and tropical cyclones in the vicinity of Puerto Rico.

* Correspondence to:

Marc D. Legault, Department of Physics, University of Puerto Rico at Bayamón, #170 Road 174, Minillas Ind. Park, Bayamón, PR, 00959 USA. Email: marc.legault@upr.edu