

Technical Page

Proposal Type: Regular
 General Category: Terrestrial Aeronomy
 Sub-Category: Radar
 Observation Category: Lightning
 Total Time Requested: 80 Hours

Proposal Title: STUDIES OF LIGHTNING AND LIGHTNING INDUCED IONOSPHERIC EFFECTS WITH ARECIBO OBSERVATORY UHF AND VHF RADARS

ABSTRACT:

This proposal requests Arecibo Observatory (AO) observational time to perform correlative studies of lightning and lightning-induced ionospheric effects using the AO UHF and co-axial VHF radars, a VHF radio interferometer, and a VLF receiver. The proposed experimental campaign will be performed during a three-week period in August-September 2001. In order to thoroughly study the 40-100 km atmosphere/ionosphere at unprecedented resolution, we will record all data from each V/UHF radar pulse allowing utilization of well established short-integration time incoherent scatter radar (ISR) techniques at UHF as well as a search for various non-thermal scattering processes and the sorting/averaging of data in non-traditional manners such as into bins depending on the radial range of the lightning discharge from AO. AO offers by far the most sensitive radar for the proposed studies. In addition, we will measure lightning properties, location and time of occurrence (with 1 μ s resolution) using 274 MHz New Mexico Tech interferometer system. We will also perform broadband VLF recording of lightning generated radio atmospherics and will monitor lightning-associated lower ionospheric disturbances by recording a subionospherically propagating 28.5 kHz VLF signal from NAU transmitter (Aguadilla, Puerto Rico) using a VLF receiver of Stanford University. Both, the interferometer system and the VLF receiver are already developed and fully operational and will be shipped to Puerto Rico prior to the beginning of the campaign. The radar data taking modes necessary for the proposed effort exist as do the basic analysis and display routines. The proposed program will employ combination of instruments which has never been used before and can potentially lead to major discoveries in the fields of lightning physics and lightning induced lower ionospheric effects.

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I do NOT want to do remote observing.

Instrument Setup

47 CH receiver 47 radar 430 CH receiver 430 CH radar

Atmospheric Optical Instruments:

Description of Observer Equipment: (1) New Mexico Tech VHF interferometer (2) Stanford

University VLF receiver

Special Equipment or setup: none

RFI Considerations

Frequency Ranges Planned