Technical Page

Proposal Type: Regular
General Category: Terrestrial Aeronomy
Sub-Category: Radar
Observation Category: Ionosphere
Total Time Requested: 84 Hours

Proposal Title: Dual-Beam Scanning Studies of E- and F-Region Small-Scale Structures

ABSTRACT:

Recent high (time/range) resolution, azimuth-scanning (beam-swinging) ISR observations of the evening and nighttime E- and F-regions at Arecibo have revealed significant small-scale horizontal structure over the entire altitude region. Much of this structure appears to be electrodynamic in origin involving low-lying tidal ion layers, ion-rain, and the spread-F instability process. In particular, numerical simulations demonstrate the formation of horizontally thin, parallel sheets of ionization in a (non-vertical) plane oriented transverse to the bulk flow of the F-region that sweeps 1 mV/m amplitude E-fields quasi-periodically through a fixed location in the E-region. Surprisingly, ionization sheets have been observed in the 85-100 km altitude region (see narrative). We propose continued azimuth-scanning (beam-swinging) observations using the new dual-beam ISR observing mode in order to better understand horizontal structuring and the formation of ionization sheets in particular. Several observational modes are described in the narrative.

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I want to do remote observing.

Instrument Setup

430 CH radar

Atmospheric Optical Instruments:

Special Equipment or setup: This proposal is to use the new 430 MHz dual-beam radar system. We require the hardware/software modifications to use this system including the 88 baud code system. The data-taking/recording system needs to be modified such that the whole F-region is included. This would double the current capability of this system. Qihou Zhou can assist in specifications.

RFI Considerations

Frequency Ranges Planned

This proposal requires coordination with AFTWF within the band 425-435 MHz.