

Technical Page

Proposal Type: Regular
 General Category: Terrestrial Aeronomy
 Sub-Category: Radar
 Observation Category: Ionosphere
 Total Time Requested: 96 Hours

Proposal Title: Measuring F1 region ion composition with plasma and ion line observations
ABSTRACT:

We propose to use the Arecibo 430 MHz dual-beam radar to unambiguously measure the ion composition in the F1 region. This parameter is not only important for understanding the chemistry of the F1 region, but it is also needed to analyze ISR ACFs to determine electron and ion temperatures from that region. Currently at Arecibo, we assume a fixed model for the height variation of the F1 region ion composition, in order to deduce electron and ion temperatures from the ISR ACFs. Since the model is the same for all times, the temperatures obtained in such fashion could deviate significantly at times from their actual values. With recent additions to the hardware used for aeronomy experiments (e.g., new digital receivers, the 1 terabyte datataking system, a 3 terabyte data processing server) and the wide bandwidth gregorian radar, we will be able to measure this parameter routinely during the day. The technique to do the measurement is based on the combination of simultaneous plasma and ion line components of the ISR spectrum. While similar ideas have been used before (see next section), the experiment we are planning combines all the information in a novel way, as we will fit new MRACF ion line data (a function of N_e, T_e, T_i , ion composition) along with the frequency information from the coded long-pulse (CLP) plasma line data (a function of N_e, T_e and the magnetic field) to determine temperatures and ion composition in a self consistent way. This approach will provide very accurate measurements in a very short time (less than 1 minute), with the possibility of incorporating this new mode to regular ISR observations.

| Name | Institution | E-mail | Phone | Student |
|---------------|---------------------|------------------|--------------------------|---------|
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Service Observing Request

- None
- All of the observing run.
- Part of the observing run.
- Queue Observing

Remote Observing Request

- No
- Maybe
- Yes

Instrument Setup

430 CH radar

Atmospheric Observation Instruments:

Ionosonde

Special Equipment or setup: This proposal is for a dual-beam experiment, so it will require the gregorian 430 MHz radar.

RFI Considerations

Frequency Ranges Planned

420-440

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