

Technical Page

Proposal Type: Regular
 General Category: Terrestrial Aeronomy
 Sub-Category: Radar
 Observation Category: HF Heater Usage
 Total Time Requested: 20 Hours
 Minimum Useful Time: 6 hrs

Proposal Title: HF Radar Observations of Meteors and Search for Mesospheric Partial-Reflections.
ABSTRACT:

The advent of the new on-dish ionospheric "heater" system offers unique observing possibilities that extend well beyond ionospheric modification. In particular, we propose deploying an off-dish active-antenna receive array that, together with the pulsed heater transmitters, permit HF radar observations of meteors and a search for possibly related partial reflections. In this application major issues to be studied include the recent discovery - using Arecibo V/UHF radar observations - that the majority of meteoroids visible as radar meteors significantly fragment rather than just undergo simple and/or differential ablation [Mathews et al., 2010]. This process is likely a source of considerable aeronomically important nanometer "dust" in the 80-130+ km meteor zone. The proposed HF radar would be used in conjunction with the 430 MHz radar (and possibly the 46.8 MHz radar) to not only explore fragmentation but would also yield information on the radio science of the radar meteor scattering mechanism and on the highest altitudes (>150 km) at which meteoroids begin interacting with the atmosphere thus depositing aeronomically important metals. We ask for two 10-hour nighttime observing periods in which to test our system and obtain scientifically useful initial data.

Name	Institution	E-mail	Phone	Student
John D Mathews	Penn State University	JDMathews@psu.edu	814-777-5875	no

Remote Observing Request

- Observer will travel to AO
- Remote Observing
- In Absentia (instructions to operator)

Instrument Setup

47 radar 430 CH radar

Atmospheric Observation Instruments:

Description of Observer Equipment: Imagers HF receivers with antenna array

Special Equipment or setup: Will need to identify a temporary space for the antenna array. This will require power, some shelter, and network access plus access to the HF xmitter clock, frequency standard, and control signals.

RFI Considerations

Frequency Ranges Planned