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First Results from the LIEFSI Campaign

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Electric field double probes are used on many satellite missions to provide high quality in-situ AC and DC electric field measurements. To achieve this accuracy the E-field instrument components and the surrounding surfaces have voltage and current biases applied to them, which mitigate errors due to factors such as the photoelectric effect and stray currents in the system. These measurements are vital for understanding the complex processes that occur in the wide range of plasma environments these satellites orbit through.

It has been found however, that in specific plasma regimes, electric field instruments with certain electrical and mechanical design have measured anomalous signatures that have so far gone unexplained. We propose a possible source of these strange signatures through the interaction of different sections of the double probe instrument due to the biasing that is applied. To test this theory, we are actively working on utilizing the Space Plasma Simulation Chamber at the Naval Research Lab (NRL) to quantify the coupling of various section of the double probes under a controlled set of plasma parameters. Through this quantification, we can determine how effective the coupling is, and if it is significant enough to be a source of these signals.

For this presentation, we will focus on the experimental setup, calibration procedure, the testing procedure and the analysis done on the first round of testing conducted at NRL. Key discuss points will be the methods used to extract the electric field probe measurements from the overall system through network analysis along with an overview of the design of the probe and supporting hardware, and discussion on the plasma parameters used in the experiment. We will discuss how the measured S-Parameters translate into meaningful terms. At the time of AT RASC, we plan to be working on the analysis of the data collected from the first round of testing conducted in Q1 of this year.