

Initial Results from the mini Ion and Neutral mass Spectrometer on the NSF Exocube and NASA Dellingr missions.

Nikolaos P. Paschalidis, Sarah L. Jones, Marcello Rodriguez, Paulo Uribe, Timothy Cameron, Dennis J. Chornay, Edward Sittler, Alex Glocer.

NASA Goddard Space Flight Center, Greenbelt, MD, 20771
Corresponding author: Nikolaos P. Paschalidis (nikolaos.paschalidis@nasa.gov)

A mini Ion and Neutral Mass Spectrometer (INMS) has been developed for in situ measurements of ionospheric ion and neutral densities and composition. The INMS has a symmetric configuration of two independent sensors, one for ions and one for neutrals sharing common electronics. The mass analysis is based on gated time of flight. An acceleration voltage focuses ionized particles through an electric gate towards the detector. Particle species are identified based on the time of flight measurement. Neutral particles are ionized with electron impact ionization at the entrance of the neutral aperture before they are processed in a similar way with the ions. The technique allows for simultaneous measurements of densities of all species. The instrument is designed for a mass range of 40 amu, mass resolution $M/dM \sim 10$ and 1sec spectra sampling. The mini INMS occupies a volume $10\text{cm} \times 10\text{cm} \times 15\text{cm}$, weights ~ 560 grams and dissipates $\sim 1.8\text{W}$ peak power. This instrument has flown on the NSF Exocube 1 and on the NASA Dellingr Cubesat missions both on LEO orbits and it is scheduled to fly on the upcoming NSF Exocube 2 and the NASA PetitSat missions. This presentation will report on the technology demonstration of the mini-INMS with laboratory and flight measurements.