



Compositional Measurements within the Interstellar Focusing Cone made with the Magnetospheric Multiscale Mission Hot Plasma Composition Analyzer (MMS-HPCA)

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The composition of the Local Interstellar Medium (LISM) is still uncertain. Previous near-earth surveys in the interstellar focusing cone, from approximately mid-November to mid-December annually, focus on long acquisition periods made with a single instrument. These surveys yield measurements of hydrogen and helium (based on abundance) and limited measurements of more massive species like oxygen, carbon, neon, etc. Launched in March of 2015 the Magnetospheric Multiscale Mission deployed an instrument suite consisting of over 100 instruments meant for measuring magnetic reconnection in the near-Earth environment. Among those instruments were four Hot Plasma Composition Analyzers (HPCAs) capable of measuring the energy/charge (E/Q) and ion composition in the range $1\text{eV/e} - 40\text{keV/e}$. With their acquisition tied to the spacecraft spin, all four HPCAs measure this E/Q range in a 4π steradian field-of-view every 10 seconds. This results in a large number of acquisitions in a single focusing cone-encounter period, which lasts approximately one month. In addition, the HPCAs are equipped with a radio frequency (RF) proton attenuation system which is run in different configurations on the respective units. This allows all four HPCAs to be used as a super-sensor with ion measurements tuned simultaneously for high- and low-mass ion species. Results from the most recent encounter (Nov. 2018 – Dec. 2018) are the subject of this presentation. During this period the MMS units made prolonged surveys at apogee within the pristine solar wind. With all four instruments in the same environment, the compositional variance over the LISM cone encounter period is readily measurable on even a daily basis.