Space Plasmas in the Solar System, including Planetary Magnetospheres (D)
Cross-scale Coupling and Multi-point Observations in the Magnetosphere (D3.2)
Consider for oral presentation.

ON THE DISCREPANCIES OF MAGNETOSHEATH JET IDENTIFICATION AND STATISTICAL PROPERTIES DUE TO DIFFERENT TEMPORAL RESOLUTION AND PLASMA MOMENT DERIVATION

Savvas Raptis, savvra@kth.se
KTH Royal Institute of Technology, Stockholm, Sweden
Tomas Karlsson, tomask@kth.se
KTH, Stockholm, Stockholm, Sweden
Andris Vaivads, vaivads@kth.se
KTH, Stockholm, Stockholm, Sweden
Henriette Trollvik, trollvik@kth.se
KTH, Royal Institute of Technology, Stockholm, Sweden
P.-a. Lindqvist, per-arne.lindqvist(at)ee.kth.se
Space and Plasma Physics, School of Electrical Engineering, Royal Institute of Technology (KTH), Stockhom, Sweden

Magnetosheath jets are transient localized dynamic pressure enhancements, relative to the background, observed downstream of the Earth's bow shock. Their significance to space environment lies in their connection to various magnetospheric phenomena. Their generation has been associated to solar wind structures and foreshock-shock dynamical evolution. Closer to the magnetosphere, jets have been connected to magnetopause reconnection, excitation of surface eigenmodes and even impulsive plasma penetration through the magnetopause. In the inner magnetosphere region, jets may have an impact via increasing ionospheric flow enhancements and ground based magnetic field measurements.

Usually, jets are defined within a fluid plasma framework, as an enhanced bulk flow of plasma in the magnetosheath. Therefore, their definition and properties rely on the plasma moment derivation originating from the satellite measurements of the velocity distribution functions. Typically, particle moments are derived using the whole distribution, which results in "full" particle moments. However, transient events can represent a secondary plasma population for which only a part of the particle distribution is reflecting the jet phenomenon, while the background ('core') describes the ambient magnetosheath plasma.

Furthermore, due to the transient nature of the event, their statistical properties can also depend on the time resolution, which can vary significantly from one space mission to the other. If we take NASA's Magnetospheric Multiscale (MMS) mission, there are always "fast" measurements available that correspond to ion moments of 4.5-second resolution. However, the "burst" system, which is available only during specific intervals; corresponds to 0.15-second

time resolution.

In this work, we compare the jet identification process and their statistical properties between the low ('fast') and high ('burst') resolution MMS measurements. Furthermore, we investigate whether the full particle moments accurately describe the jet phenomenon, or if a partial moment derivation is required to fully capture its properties.