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Interactive comment on "The current sheet flapping motions induced by non-adiabatic ions: case study" *by* Xinhua Wei et al.

Anonymous Referee #2

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This is a brief comment to your partial response. I don't think that by drawing simple two-color cartoons or showing some particular slices of distribution function you can prove that a specific ion population exists on top of up/down convecting plasma sheet distributions (VZ-shifted Maxwellian ot Kappa).

When analysing shifting Maxwellian for realistic temperature/density/flow one can understand that measurable angular asymmetry due to the flow appears in the high-energy part of spectrum, where the energy flux drop fast with the increasing energy. This was known for a long time, particularly Roelof et al JGR 1976 (https://doi.org/10.1029/JA081i013p02304) used the instrument, only capable to measure the ions above 50keV, to detect rather weak flows of 50km/s or comparable (this is due to rather soft proton spectra at those energies, so that a 20-50km/s shift of velocity

distribution causes a measurable angular anisotropy). No such effect would be seen at smaller energies near the peak of E-flux distribution near the thermal energy. Particularly, this explains your Phi/Theta plots. I believe this is a very probable explanation of your NS asymmetric particle flux plots.

Again, I reiterate that in order to demonstrate "a specific ion population existing on top of up/down convecting plasma sheet distributions" you need to work with the distribution functions. Ideally you have to show that a significant (asymmetric??) population remains after subtraction of the shifted Maxwellian/kappa (with realistic n,T,V) from the measured distribution. The error analyses should be important part of the story, you also may try E-field observations at Cluster to evaluate/confirm the true convective velocity. Without such analyses the paper is a discussion of non-existing phenomenon.

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