Annales Geophysicae Discussions

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Comment on angeo-2021-17

Anonymous Referee #2

Referee comment on "Reflection of low-frequency fast magnetosonic waves at the local two-ion cutoff frequency: observation in the plasmasphere" by Geng Wang et al., Ann. Geophys. Discuss., https://doi.org/10.5194/angeo-2021-17-RC2, 2021

This study presents two case studies utilizing observations from two Van Allen Probes, and showed a distinct boundary at f_cHe+ where magnetosonic waves cannot penetrate inward. This gives direct evidence for the theoretical reflection of magnetosonic waves in space plasmas that consists of at least two ion components. The Poynting flux angle information measured by the two satellites gives support to the scenario of wave reflection at cut-off frequency. Ray tracing simulations using Neural network-based Empirical (PINE) density model and the TS05 magnetic field model, as well as simulations using the observed density and magnetic field, well demonstrate the reflected ray-path under certain initial azimuthal angles.

I only have a few comments.

- In the simulation results shown in Figures 4s-4x, the ray slowed down near the reflection point. It is not “trapping”.
- The “Conclusion and Discussion” section is basically descriptions of the two event studies. I suggest the authors briefly summarize the two event studies and draw more generalized conclusions.

Minor issues:

Line 35: “as seen by the low-frequency hiss observed in the high latitude region”: this sentence does not make sense.

Line 89: for both probes - > at locations of the two probes.

Line 101: a lack of the right bracket)

Line 139: as the increase of B0 , k decreases gradually, leading to the moderate -> as B0 increases, the k decreases gradually, leading to a moderate …

Line 153: The second event was observed on 20 July 2015 -> We show a second case that occurred on 20 July 2015 to show the reflection xxx.

Line 153: display-> exhibit

Line 155: Similarly with - > similar to

Line 155-157: this sentence needs to be reorganized.

Line 157: Waves of Probe-A: Waves observed by Probe A