Ann. Geophys. Discuss.,
https://doi.org/10.5194/angeo-2018-2-RC2, 2018

Annales Geophysicae Discussions

Interactive comment on "Van Allen Probes observation of plasmaspheric hiss modulated by injected energetic electrons" *by* Run Shi et al.

Anonymous Referee #2

Received and published: 21 February 2018

Review of "Van Allen Probes observation of plasmaspheric hiss modulated by injected energetic electrons" by Shi et al. for Annales Geophysicae

The results described on this manuscript are of relevance to the community and interesting. It provides evidence, coming from one event, where local amplification of hiss waves is likely as opposed to other sources such as chorus waves. The reasoning and the analysis done are sound and complete for the most part. The manuscript is also mostly well-written and clear. I have a few suggestions to help make the paper more clear and a few minor points that should be addressed.

Minor points:

l. 149 – In the beginning of the paragraph, four parameters are mentioned (background,

magnetic field, plasma density, electron flux and electron pitch-angle anisotropy) and after discarding one of them, you continue to talk about "these two effects" meaning the plasma density and the electron flux in figure 2, but not the anisotropy. Why is the anisotropy being dropped from the subsequent analysis? Maybe the analysis should be done and briefly described, even if the results are not interesting or a justification for not doing the analysis should be given.

l. 195 – It is possible to estimate (using a dipole) the drift frequency of the electrons at this energy of 466keV, does it match with the ULF frequency measured by the azimuthal component of the electric field? In other words, are the electrons at these energies in drift resonance with these waves? Doing a calculation (which should be double-checked) of the drift period found on Roederer's book, I found the period for this energy to be $\sim$21 minutes. If this is not a drift resonance effect, why is the flux being modulated? Perhaps, it is more related to the plasmasheet population that was freshly injected, but some sort of reasoning should be given for the correlation between ULF waves and oscillations of low-energy electron fluxes.

Clarifications:

In the sentence starting in line 73, it is not clear if you are saying that low frequency hiss causes more changes to the electron pitch angle distribution than normal hiss or if it just causes some changes in the electron pitch angle distribution.

l.87 – "...energetic electrons can be modulated by ULF wave". Here and in other parts of the introduction, I assume you mean flux modulation, but it should be clarified.

l. 98 – Here and throughout the text you mention electron anisotropy. Again, I assume you mean the pitch angle anisotropy, but it should be clarified, because others unfamiliar with this specific topic may think you are referring to temperature anisotropy or pressure anisotropy.

l.131 – It should be noted that the modulation is not very clear, specially without the

guiding vertical lines, in the electron pitch angle anisotropy (Figure 1h). I can see some oscillations, but not with the period of 6 minutes as claimed here. I think the panel should be kept for reference but the description of the modulation should be different from the description of the electron flux (Figure 1g).

Interactive comment on Ann. Geophys. Discuss., https://doi.org/10.5194/angeo-2018-2, 2018.