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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Comment on "Comparative study on earthquake and ground based transmitter induced radiation belt electron precipitation at middle latitude" by Sideropoulos et al. (2011)" *by* J.-A. Sauvaud et al.

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This manuscript explains and establishes the connection between energy-dispersed electron bursts, i.e., the wisps, observed by DEMTER and VLF signals from ground transmitters. Using both case and statistical study results, this work convincingly demonstrates that those observed electron wisps are not caused by earthquake-related VLF waves but due to monochromatic signals from ground transmitters. This paper is properly organized and well written, so I would recommend its publication with

some minor modifications suggested as below:

1) Is it possible for the earthquake-related VLF waves to cause observable electron bursts? This is one question not addressed by this manuscript. In the case that earthquake-related VLF waves are broadbanded, as the example shown in Figures 1b, then electron burst signature should has a wide energy range at one time, i.e., a vertical structure if plotted in an electron energy time spectrogram, instead of the energy-dispersed, i.e., wisp structure, caused by monochromatic transmitter signals. In addition, if earthquake-related VLF waves are mainly between 10-20 Hz, the vertical structure should locate above the NWC caused wisp structure in a spectrogram plot since electron resonance energy increases with decreased wave frequency. Indeed, in the middle panel of Figure 4a at time 10:58, besides the wisp structure, there seems to have a vertical feature, is it possibly related to some broadbanded VLF waves? Of course, how significant this kind of electron signature can be depends on the wave strength, as pointed out in the manuscript. Comparing waves in Fig 1b to Fig 6, it appears that the two have similar wave powers. In the case that earthquake-related VLF waves have stronger power than the one shown in Fig 1b, I would expect to see some discernible related electron bursts.

2) Electron bursts or electron bursts with the wisp structure? The previous study by Sideropoulos et al. (2011) examined electron bursts from the integral energy channels, while this work uses high-energy resolution electron data. Therefore, how many electron burst events selected by Sideropulos et al. do have the wisp structure is an open question. Probably this is the reason authors here uses “many, if not all, electron bursts. . .” in the beginning of the abstract. I would still suggest to emphasis that all electron bursts containing wisp structure are due to cyclotron resonance of electrons with monochromatic waves, but electron bursts with other structures are due to other reasons even the earthquake-related VLF waves. However, how often electron bursts contain non-wisp structures calls for further examine of the electron data.

Three minor issues:

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–P3559, line 11, should be “electron bursts. . .”

–P3561, line 9, should be “upper panel of Fig. 9.”.

–Same page, line 24, “. . .Note in Fig. 9. . .”

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