

## ***Interactive comment on “Geomagnetic pulsations in the Pc5/Pi3 frequency range and fluctuations of foF2 frequency” by Nadezda Yagova et al.***

### **Anonymous Referee #1**

Received and published: 6 January 2020

**General Comments** This paper presents the relationship between oscillations of foF2 and magnetic fields in space and on the ground. Individual cases are presented to illustrate coherent and noncoherent events and statistical analyses are conducted to gain insight into the cause of the difference between the two types. foF2 oscillations are an interesting phenomenon that merits investigation. However, the study presented in this manuscript does not provide much information on the cause of the foF2 oscillations except that they are usually non-coherent with magnetic field oscillations. I do not recommend publication of the manuscript in the present form. Specific comments are listed below.

**Major Comments** Line 161-204, Examples. The spacecraft and the ground station are vastly separated. Unless there are other observations at different locations in the

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magnetosphere and on the ground, it is difficult to evaluate if there is any causality between the oscillations in space and on the ground.

During event 4 (1350-1450 UT, 22 September (DoY = 265) 2015, THEMIS-D and THEMIS-E were in the postmidnight sector at radial distances of 12 Re, whereas the SOD station was in the postnoon sector. According to my calculation, the magnetic local time separation of the two spacecraft was 0.25 degrees. Therefore, the  $\pi/4$  phase difference of the b// oscillations at the two spacecraft (line 222) translates to an azimuthal wave number of 180. With such a high azimuthal wave number, it is impossible to have any coherence over the vast distance between SOD and THEMIS. I find the discussion on the space-ground coherence given in this section to be highly questionable.

### **Minor Comments**

Multiple lines. Please use the standard date format “24 October 2014”, or “24 October (day 297) 2014.” This makes it easy for the interested readers to look at other data for comparison.

Line 38-39. Consider revising the punctuation. “This makes routine techniques based on the estimates at a given frequency-altitude non-stable, even in cases when visual detection is possible.”

Line 51. What is 4-D cross?

Line 59. Where is the APPENDIX?

Line 70. “right-handed triplet?”

Line 75. Use a different symbol for dynamic pressure. “P” is already used for “signal power.”

Line 88-89. “The spectrum of foF2 variations has a maximum at a frequency  $f = 3.2$  mHz, i.e. at a f2 frequency.” This is incorrect. The maximum occurs at 3.8 mHz, well

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above f2.

Line 90. I suggest "...weather conditions for event 1"

Line 94-94. What is the spacecraft that measured the solar wind parameters? Where was the spacecraft located?

Line 112. Is the distribution normalized? The vertical axis of Figure 9 is labeled "P" Use a different symbol to avoid confusion with the "P" that is already used for other quantities.

Line 129. What are "background pulsations"? Are they all events excluding the coherent events?

Line 143. "Under highly disturbed ...the probability ... vanishes" This is misleading because the occurrence distributions shown in Figure 12 are not normalized by the occurrence distributions of Dst and AE.

Line 224 and Figures 21 and 22. The THEMIS-D b// waveform does not match between Figure 21a and 22d.

Figure 5. Place the axis label on the left of the panels (c) and (e). This comment applies to other similar figures. The label for the bottom axis of panel (f) should be "tau (Greek), min".

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Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2019-155>, 2019.