

## ***Interactive comment on “Non-linear Effects in Electromagnetic Wave Activity Observed in the RELEC Experiment on-board Vernov Mission” by Mikhail I. Panasyuk et al.***

### **Anonymous Referee #1**

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“Non-linear Effects in Electromagnetic Wave Activity Observed in the RELEC Experiment on-board Vernov Mission” by Mikhail I. Panasyuk et al.

Panasyuk et al. showed abnormal amplitude decay of whistler mode waves observed by Vernov satellite. The authors suggested that the abnormal wave decay can be caused by seismic activity. Also, the authors showed a specific wave structure of “swallow tail” type. If these unusual wave phenomena are related to seismic activity as suggested by the authors, I would encourage to validate the relation between these wave phenomena and seismic activity because the authors did not show a clear validation for the relationship. The author must show a clear no relation between the

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abnormal wave phenomena and non-seismic activity. I suggest further validation on the wave phenomena in periods for both seismic and non-seismic activities. I think that Section 4 “discussion” is not well discussed and Section 5 “conclusion” is not meaningful (just repeat). I suggest that both sections must be improved with more detailed explanations, discussions, and validation analyses. In my opinion, it requires major revision.

[Specific comments]

Abstract If “RELEC” is an abbreviation/acronym, please define accordingly. The figurative expression “swallowtail type” is not clear in abstract. Please modify using more suitable expression without no figure information.

Discussion As pointed out above, the authors must add the validity analysis for the abnormal wave phenomena related to the seismic activity using a long period including before and after the focusing seismic activity. If the authors do not show the validity analysis, the relation between the wave phenomena and seismic activity is not supported by any demonstration.

Fig. 10 Please describe Fig. 10 in more details. What are the red line, gray and aqua circles?

Fig. 11 Why is Fig. 11 important in this study? The results would be analyzed in a different satellite, different periods, different locations in contrast to the focusing event. If Fig. 11 is important in this study, please show the detailed information on the analysis (data period, observed location, data specifications etc.).

p.11 line 29 What is the nonlinear effect in this study? I could not find discussion on the specific nonlinear effects on the wave phenomena. If a nonlinear effect is important, the author must discuss the specific effects on the nonlinear effects on the wave phenomena.

[Technical corrections and typos] The reviewer mentions that the references on this

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study are inadequate. Please add adequate references. (For examples) p.1 line 36 Add a reference on TLEs. p.1 line 41 Add a reference on the effects of high energy particle on electric devices. p.1 line 42 Add a reference on precipitation of high energy particles. p.1 line 54 Add a reference on the wave-particle interactions. p.2 line 3 Add a reference on the whistler mode waves. p.2 line 29 Add a reference on sferics. p.2 line 34 Add a reference on frequency distribution of sferic spectra.

Please add the axis label and the unit for all figures with a sufficient font size. The font size looks like small in the most of present figures. Add the information on satellite location for Figs. 2, 3, 7a, 8, and 9ab as the same with Fig. 4.

p.9, line 13 superscript "1/2"

I hope these comments can help improve this manuscript.

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