

### **Reply to the Referee**

We are grateful to the referee for his/her useful comments and appreciate very much his/her efforts in improving our paper. The authors note that the referee has carefully and critically evaluated our paper. We have provided answers to all the issues raised in this report below. In addition, our revisions within the manuscript are highlighted in black colour to assist the reviewer.

### **Referee report**

Comments on the manuscript “Complex analysis of the middle-latitude ionosphere parameters during the geomagnetic storm at Jan, 20, 2010 based on the DEMETER satellite data analysed using DIAS Software” by A. Lozbin, V. Fedun and O. Kryakunova. The paper describes the software that may be useful for DEMETER satellite data processing and presents the case study using these data. This is an interesting article that I would recommend for publication after revision. The majority of my comments are minor.

### **Referee comment**

(1) My main recommendation is to state clearly whether the authors describe the software features or present the analysis of the particular magnetic storm effects on the ionosphere. Now it is confusing: the first part of the article seems to be a program manual and the second - a case study with a missing scientific focus. I recommend to state clearly the aim and the tasks of the study (p.2 line 14). There is a lot of work done, which is much appreciated. The authors just need to put in “frame”.

### **Our reply**

The main idea of this paper is to tell about an absolutely new instrument for researchers, using, maybe, not the best example. But, even in this case the complex analysis of parameters of the ionosphere was performed. The paper only with Software description will not look like a scientific paper. So, we decided to show how scientists can use this instrument for their research.

### **Referee comment**

(2) I have a doubt about the “DIAS” acronym. Up to my knowledge, it is widely used for European Digital Upper Atmosphere Server (DIAS) initiated in 2004. Please see the works of Belehaki et al. Probably, some clarification is needed here.

### **Our reply**

Sorry, but at the moment of Software development we don't hear anything concerning European Digital Upper Atmosphere Server (DIAS). So, at this moment it will be too hard to change the name of our Software. But, I think it is possible to remove the acronym “DIAS” from the paper.

### **Referee comment**

(3) The Acknowledgement of work of developers of the DEMETER satellite equipment is missed.

### **Our reply**

The acknowledgement of satellite developers is added, The links of scientific payload developers are present in the references.

**Referee comment**

(4) Where the developed DIAS software may be accessed?

In case that the authors would like to present a full research study:

**Our reply**

At this moment this Software is not available online, but anybody who wants to get it can send us a mail and we will be glad to send it personally.

**Referee comment**

(5) p.11 line 1 and further: Why do you discuss the interplanetary parameter variations? Is it important for your analysis of the ionosphere state change? I recommend only a brief description - a couple of sentences with citing the appropriate works.

**Our reply**

Agree. This part is removed.

**Referee comment**

(6) What exactly can be concluded on the changes in the ionosphere by your analysis? Over what area?

**Our reply**

During the maximum of the geomagnetic storm, electrons with an energy of 160 keV from the Earth's internal radiation belt are precipitated, but the reason (geomagnetic storm or radio transmitters or something else) of such even is not clear.

**Referee comment**

(7) I would expect some references to the papers that already discussed the considered magnetic storm. What new was found?

**Our reply**

This storm is not the biggest event, so there are not many papers about it.

**Referee comment**

(8) p.1 line 18. I would add that due to the fact that the satellite passes over the different parts of the Earth, it is impossible to take into account the diurnal variation of ionospheric parameters over some particular point of observation. The last is rather important when searching for the irregular parameter behaviour. I recommend discussing this in the text.

**Our reply**

Added

**Referee comment**

I suggest replacing “*disturbances in the ionosphere*” with “ionospheric variations” throughout the text.

Please replace *UTC* with “UT” throughout the manuscript.

Please note, that first the term should be mentioned and then its acronym should be introduced, not otherwise. For instance, p.3 line 5: *ULF (Ultra Low Frequencies)* Ultra Low Frequencies (ULF). Please revise carefully throughout the text.

Title: Please replace *Jan* with “January” and *Based on the* with “by”.

In general, the title is long and confusing. I recommend changing it according to the aim of the paper.

**Our reply**

Done

**Referee comment**

1-12: I am not sure that the *measurements* (these or that) are a *method*. These are two different concepts. I suggest calling them experiment/ obtaining data/ satellite measurements, but not a method.

**Our reply**

Done

**Referee comment**

1-19: *Man-made* -> artificial  
Eliminate *during active period*  
Eliminate *composition*,

**Our reply**

Done

**Referee comment**

1-20: *raw (raw)* - Eliminate repetition.

**Our reply**

Done

**Referee comment**

2-21: *Providing* ->provide

**Our reply**

Done

**Referee comment**

2-1: Why limited? What else is needed except for the time, coordinates and value?

**Our reply**

Here we means that sometimes scientists are not a programmers and data processing takes a time. However, I think it will be better to replace this by the word “raw” .

**Referee comment**

2-5: *In the of Scientific...*

The sentence is too large and difficult to follow. Please separate it into several sentences.

**Our reply**

[Done](#)

**Referee comment**

2-12: *Undoubtedly, that-* > It is known that

Eliminate *that*

**Our reply**

[Done](#)

**Referee comment**

2-22: *is devoted* ->was

**Our reply**

[Done](#)

**Referee comment**

2-25: *Events* ->hazards

**Our reply**

[Done](#)

**Referee comment**

2-29: *science payload* ->scientific payload

**Our reply**

[Done](#)

**Referee comment**

2-30: Five instruments are mentioned by their acronyms. The acronyms must be introduced.

**Our reply**

[Done](#)

**Referee comment**

3-3: *Data from scientific in...*

Please eliminate this sentence as it repeats the said above.

**Our reply**

[Done](#)

**Referee comment**

3-10 and further: I am not sure I follow the idea. It is stated that the detector works in two regimes: for seismic regions and for the rest of the Earth surface. Is it correct? The authors probably meant that the detector was capable of measuring different ranges of energies. Please explain clearly.

**Our reply**

The measurement frequency of the instruments are not changed. But due to the amount of data and transmission rate limit the numerical data can be obtained only under the seismic regions (for some instruments). For the rest of the world only the spectral data are available (performed by FFT).

**Referee comment**

3-25: *possibility of calculating the signal-to-noise ratio* ->signal-to-noise ratio calculation

Subsection 3.1: Please indicate how the discussed files can be accessed. Downloaded from some web-page?

**Our reply**

Done. [Webpage link is added.](#)

**Referee comment**

4-23: *Allow* ->allows

**Our reply**

Done

**Referee comment**

5-11: *Also,* ->In addition,

**Our reply**

Done

**Referee comment**

7-1: *There is possible to get a graph of* ->It is possible to plot

**Our reply**

Done

**Referee comment**

7-11: *result of such analysis may be a pattern* – I am not sure I understand the meaning of this sentence. Please rephrase.

**Our reply**

Done

**Referee comment**

7-12: *NWC transmitter* - Please introduce the acronym and provide the details on the transmitter (transmitter network?). Where is the receiver?

**Our reply**

Done

**Referee comment**

14-2: eastward of the transmitter location?

**Our reply**

Corrected

**Referee comment**

9-4: *One more important*-> Another

**Our reply**

Done

**Referee comment**

9-5: What do you mean by *physical map*?

**Our reply**

It means *geographical map*. Corrected.

**Referee comment**

10-2: I recommend explaining the meaning of the *right half-orbits* (what right or left half means) and what do you imply by choosing them.

The same for: 11-9.

**Our reply**

It means *half-orbit under the region of interest*. Corrected.

**Referee comment**

10-5: *Storm at* -> storm on

10-7:

*maximum of Kp index was on 15-18 hours by UTC.* ->Kp reached its maximum value between 15 and 18 UT.

*directions*-> magnetic field components (?)

**Our reply**

Done

**Referee comment**

11-1: If the authors use the data/information from some internet source, they should clearly state why and for what purpose. None web-page should be cited without a proper explanation about whose page is it and why the authors use its data/information.

**Our reply**

Clearly

**Referee comment**

12-4: On ->by

**Our reply**

Done

**Referee comment**

12-4: *zone of aurora polaris at various altitudes*  
Auroral zone? What latitudes do you mean?

**Our reply**

Here we mean latitude ~70 degree and more

**Referee comment**

12-5: *charge structures* - ?  
May be replace this with “disturbances” or “irregularities”?

**Our reply**

Done

**Referee comment**

12-8: *half orbits* - Please explain where it is exactly.

**Our reply**

Corrected

**Referee comment**

12-9: *right* ->lower ?

**Our reply**

No - right . Right part of bottom figure.

**Referee comment**

12-11: The word *apparently* is repeated several times.  
Eliminate *just*.

**Our reply**

Done

**Referee comment**

Figure 9: Please indicate with arrows the whistlers and the plasmospheric hisses in the figure

**Our reply**

Done

**Referee comment**

13-3: *magneto-conjugate point*

Magneto-conjugate point of what?

**Our reply**

That doesn't matter. Deleted.

**Referee comment**

13-6 and further:

It is important over which latitudes the electron precipitations of these or that energies are registered. Please be more specific about what the observed precipitations mean for the ionospheric effects (geophysically).

**Our reply**

Done

**Referee comment**

14-17: width latitude

**Our reply**

Done

We hope that after these corrections the referee will find our MS suitable for publication in *Annales Geophysicae*.

On behalf of all the authors

Sincerely Yours

Anatoliy Lobzin