Ann. Geophys. Discuss.,
https://doi.org/10.5194/angeo-2018-23-AC1, 2018


Annales Geophysicae Discussions Open Access EGU



# *Interactive comment on* "Multisatellite observations of the magnetosphere response to changes in the solar wind and interplanetary magnetic field" *by* Galina Korotova et al.

**Galina Korotova et al.**

gkorotov@umd.edu

Received and published: 9 August 2018

Dear Referee2, Thank you very much for your corrections and suggestions. We took your commemts seriously and it took some time to prepare our reply. Here is our reply.

The major one concerns the fact that it is quite difficult to find what is really new in this study. Of course the results are very interesting but they not provide perspectives or insights of what they could offer to inner magnetosphere scientists. First, the authors should highlight the main results in the abstract section. Then, at the end of the introduction section, it is not clear also what is the main purpose of this study and what it is new. Finally in the conclusion section, it is still not evident to find what is new compared



Printer-friendly version

Discussion paper

to previous studies. The authors should try to improve this.

We have now highlighted the main results in the abstract and in the introduction discussing the purpose of the paper . We rewrote the conclusion of the paper.

In this idea, I would like also to recommend the authors to analyze and discuss maybe a little bit more on the implications of their work regarding three directions:

Using the multi-events analysis and their conclusions, is there a way to deduce from solar wind precursors, what will be the response of the magnetosphere : could we be able to estimate / anticipate the induced electric ïňĄelds characteristics (directions, amplitudes, periods, ...) that could be of interest regarding space weather (intensity, plasma heating, time lag...) ?

We added a new Figure 10 and showed that the periods of the pulsations initiated by IP shocks increase with radius. We believe that most pulsations in the dayside magnetosphere at L < 6 are produced by field-line resonances. Regarding space weather we added three additional Figures 11, 12 and 13 and a new paragraph in the statistical study section to describe the response of the magnetosphere to IP shocks. In particular we have a much more extensive discussion of electric field direction, amplitudes and period. Electron perpendicular temperatures observed by HOPE were available for 30 events. 13 events showed an increase of temperature, 6 events showed a decrease of temperature and 11 events did not show any change. Proton perpendicular temperatures were available for 40 events. 24 events showed a decrease of T, 12 events showed an increase of T and 12 events did not show any change. We did not find any consistent pattern for behaviour of electron and proton tempoaratures after impact of IP shocks.

Based on this analysis (both the February 27th 2014 and the multicase study), some interesting perspectives / analysis could be made between the analyzed characteristics of the electrisc fields induced and the response of the radiation belts during these disturbed time especially regarding: dropouts at low energy induced by convection



ANGEOD

electric field (E < 100 keV) and radial transport trough typical radial diffusion for all energies?

Here we are studying the immediate response to IP shocks. Studies of diffusion would require determining ULF wave amplitudes, the extent of waves fields, and simulations which are beyond the scope of this paper.

We added a paragraph to the paper: Understanding and predicting such responses is important for reducing the risks associated with space exploration. We found that 55 events showed an electron enhancement at energies of 32-54 keV measured by MagEIS at all local time and three of them were accompanied by intensity decreases at higher energies. Five events showed a decrease of the 32-54 keV energy electrons observed in the nightside magnetosphere.

What is the impact of the plasmasphere in the dayside sector and in the nightside sector on induced electric fields at such times as the plasmasphere is no more circular (and conversely)?

The figure below presents the magnitude of Vx flow velocities as a function of plasmaspheric density obtained from electric potential on the Van Allen Probes. Consistent with expectations, the velocities induced by IP shocks can attain greater values in regions of low magnetosphere densities and are invariably small for regions where densities exceed 260 cm-3. .

We corrected minor errors. Thank you again for your help. G. Korotova

---

Interactive comment on Ann. Geophys. Discuss., https://doi.org/10.5194/angeo-2018-23, 2018.

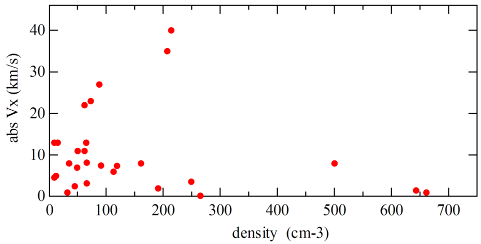


**Fig. 1.** Amplitudes of shock induced Vx flow velocities as a function of plasmaspheric density obtained from electric potential on the Van allen Probes.