

Topical Editor Decision: Publish subject to minor revisions (review by editor) (06 Apr 2021) by Johan De Keyser

Comments to the Author:

Dear authors

Both reviewers were very positive about your manuscript.

You have responded them appropriately.

I therefore judge your paper to be acceptable for publication,

subject to the following minor corrections:

Answer: We thank the editor for carefully reading our manuscript and providing constructive suggestions. Our revisions are indicated in red in the revised manuscript.

Below we respond to each comment point by point.

(1) In your proposed new text for lines 93-96:
change the last word from "identify" to "identified"

Answer: Thank you very much for your suggestion. In the new version of manuscript, the sentences have been revised as follows:

On lines 96: 'It supports that the hiss waves at higher L shells may be locally amplified.'

(2) In your proposed new text for lines 174-179: apply the following changes:
"... observed flux distribution of energetic electron" -> "... observed flux distribution of energetic electrons"

"... by 1 keV step" -> "at 1 keV steps"

"There may be temporal evolution of energetic electron ..." -> "There may be a temporal evolution of energetic electrons ..."

"in most time" -> "in most"

Answer: Thank you very much for your suggestion. In the new version of manuscript, the sentences have been revised as follows:

'In order to obtain the initial electron flux distribution function, the observed flux distribution of energetic electrons (at each energy channel measured by Probe A from ~14:00 UT to 16:10 UT) as a function of L shell is fitted with the summation of several Maxwellian functions. And then, the fitted flux distribution is interpolated at 1 keV steps. The distribution achieved by above method is considered as the initial energetic electron distribution. There may be a temporal evolution of energetic electrons within the time interval from 14:00 UT to 16:10 UT. However, we consider that the variation during this time interval is relatively smaller, because the E_{SW} is very low in most of this time interval.'

(3) In your proposed new text for lines 214-226:

"For the electron at energies ..." -> "From the electrons at energies ..."

"their velocity of ..." -> "their velocities of ... "

"supplement of electron ..." -> "supplement of electrons ..."

"around the orbit of Probe ..." : which probe?

"For the electron at energies ..." -> "From the electrons at energies ..."

"The extended slot region for the electrons covers the orbit of Probe, ...": which probe?

"which result in ..." -> "which results in a ..."

"for the electron" -> "for the electrons"

Answer: Thank you very much for your suggestion. In the new version of manuscript, the sentences have been revised as follows:

‘The result of test particle simulation is consistent with the observed distribution of electron flux from Van Allen Probes, showing decreased electron flux along the orbit of the Van Allen Probes after the enhanced convection and substorm. Furthermore, the electron flux is highly energy dependent, the decline of electron flux at the energies from 51 to 61 keV is more significant than that at energies from 11 to 21 keV. The electrons at energies from 11 to 21 keV have stronger sunward and outward motions, because their velocities of gradient and curvature drift (rotation around the Earth) are lower. However, under the supplement of electrons from lower L shells which are also owing to the convection, the electron fluxes around the orbit of Van Allen Probe at these energies decrease slower. There is a distinct slot region of electrons at energies from 51 to 61 keV around $L \sim 4$. The inner belt remains stable and changes little during the interval of evolution, because the motions of energetic electrons within $L < 3.5$ are mainly controlled by the relatively stable co-rotating electric field and magnetic field in the substorm. By contrast, under the action of enhanced convection electric field, the outer belt on the duskside clearly moves farther away from the Earth. The extended slot region for the electrons covers the orbit of Van Allen Probe, which results in a significant decrease of measured flux for the electrons at energies from 51 to 61 keV.’