Ann. Geophys. Discuss.,
https://doi.org/10.5194/angeo-2020-10-RC1, 2020

Annales Geophysicae Discussions
Open Access
EGU

Interactive comment on "Ionospheric Pc1 waves during a storm recovery phase observed by CSES" *by* Xiaochen Gou et al.

Anonymous Referee #1

Received and published: 24 March 2020

Review of "Ionospheric Pc1 waves during a storm recovery phase observed by CSES: by X. Gou et al.

I. General Comments

This paper reports observations of an interval of electromagnetic ion cyclotron (EMIC) waves in the Pc1 band that was observed in conjugate hemispheres by low-Earth orbiting (LEO) satellites and on the ground in the northern hemisphere. These observations, at both ends of a flux tube near L $\sim$ 3 within $\sim$ 30 minutes of each other during what appears to be a two-hour long interval of waves in both hemispheres, confirm many suggested features expected for EMIC waves generated near the magnetic equator.

Printer-friendly version

Discussion paper

This paper reviews several earlier studies of Pc1 waves, presents data from both the China Seismo-Electromagnetic Satellite (CSES) and SWARM-A as well as data from three ground-based pulsation magnetometer stations in Finland, and shows the results of one model of the location of the plasmapause at the time the waves were observed.

The presentation is mostly up to international standards and mostly clear, but many inaccuracies or errors are noted below, as are instances where technical language and English usage need improvement. All but one figure is sized adequately.

This manuscript may have potential value to the space science community after numerous corrections are made and possibly some additional work is done

II. Specific Comments

Lines 27-29: The authors might consider using a comparison of satellite and ground wave amplitude data to estimate the distance from the footpoint of the flux tube in which the waves originated to the location of the nearest ground station. If this can be done, it would be an excellent use of their data.

Lines 43-44: The citation of Wentworth (1964) here should be removed. The Wentworth paper makes no mention of hot ion temperature anisotropy, plasmapause, or ring current.

Lines 71-74. Satellites at LEO are well known to be unable to clearly detect Pc1 waves in the auroral zone. This is clearly expressed in section 2.2 of the Park et al. (2013) paper that the authors cite, so the authors must correct their statement. This limitation applies to the SWARM data as well (the algorithm used to identify events by Kim et al. (2018) also excludes data from the auroral zone), so the authors must also correct this statement. Many studies of Pc1 waves using high altitude satellite data have shown an increase in occurrence probability of Pc1 waves with increasing L out to almost the magnetopause.

Lines 106-107: A plot of the OMNI IMF data on August 27 and 28 using CDAWEB

shows that the IMF Bz component was NOT northward during this interval. During these 2 days it oscillated irregularly between positive and negative values. The text on line 107 thus needs to be corrected. The panel in Figure 1 showing IMF data does not show the Bz data clearly because of the compressed vertical scale. It only shows that the IMF Bz magnitude is smaller than it was during the main phase of the storm.

Line 109 and Figure 1. The black vertical line in Figure 1 is positioned at the wrong UT time, so Figure 1 needs to be corrected.

Line 138: change "∼21:00" to "00:00" . Figure 6 shows 24 hours of data from each of the 3 stations listed.

Line 214: The Grison paper does not report "typical" magnetospheric EMIC waves. It presents 3 examples of EMIC waves that included triggered emissions, out of a total of only 4 such events observed during the entire Cluster mission from 2000 to 2008. The Pc1 waves reported in this manuscript have none of the characteristics of triggered emissions.

Line 220: The "CCMC model" needs to be better specified. Which model of the several models available at the CCMC was used in the study that is referenced here? Calling it a CCMC model is not appropriate.

Lines 219-224 and Figure 10: Figure 10 needs much more explanation. What distinguishes the blue and purple asterisks? What explains the rarity and large scatter of asterisks between 11 and 15 MLT? Are there 2 simultaneous plasmapauses between 02 and 05 MLT and between 16 and 21 MLT? How does this figure "show that the plasmapause moves outward at about UTC 23:00" ? Also, the "red asterisk" is actually a star, not an asterisk. The blue and purple symbols are asterisks.

Lines 302-306: Web addresses should be provided for each of the data sources listed here, and "CMCC" in line 305 should be changed to "CCMC"

References section: at least four reference citations are incomplete. They include, as

in line 322, the characters “n/a-n/a” but the actual page numbers are available on the appropriate JGR or Wiley web sites.

Lines 434-436: The pentagram, rhombus, and circle in Figure 1 are not visible unless this figure is greatly expanded. They instead appear as one oddly shaped dark blob. They may be visible if this figure is printed in a much larger format.

III. Corrections

Lines 17-18: Replace “satellites observed Pc1 waves exhibit” by “Pc1 waves observed by the satellites exhibited”

Line 49: Replace “magnetic activities” by “increased magnetic activity”

Line 72: Replace “dependence on the” by “dependent on”

Lines 75-76: Replace “preferable to occur during late recovery phase of the storm” by “and preferably occur during the late recovery phase of magnetic storms”

Line 123: Change “magnetometer HPM” to ‘HPM Magnetometer”

Line 156: Change “LPH” to “LHP”

Line 168: Insert “and the” before “parallel component”

Line 173: Change “Figure 8-9” to “Figures 8 and 9”

Line 176: Change “the” to “that” before “wave normal angles”

Line 177: Replace “almost parallel propagate with” by “propagated almost parallel to”

Line 187: The words “On the other hand,” do not seem to be appropriate here.

Line 197: Change “proves” to “confirms”

Line 286: Replace “activities” by “activity”

Lines 288-289: Change “by CCMC model and equation . . .” to “by the CCMC model

and the equation . . .", and clearly specify the model.

Interactive comment on Ann. Geophys. Discuss., https://doi.org/10.5194/angeo-2020-10, 2020.

Printer-friendly version

Discussion paper