

Interactive comment on “Tomographic Imaging of a Large Scale TID during the Halloween Storm of 2003” by Karl Bolmgren et al.

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The paper summarises the detection of a TID during the “Halloween storms” of October 2003 using a tomographic inversion of received GPS signals to produce 3-D maps of electron density in the ionosphere. These are compared with supporting data from two ionosondes and the CHAMP satellite which was observing at the time. The paper neatly describes the possibilities and limitations of using GPS tomography to detect TIDs and, inadvertently, the limitations of the supporting data available at that time. It is well-written and should be published subject to the, mostly, minor corrections listed below.

Line 23: Remove the phrase “travelling along the interplanetary magnetic field”. It is,

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at the very least, overly simplistic and a statement that is not needed in this sentence.

Line 69: algorithm → algorithm.

Line 92: What is meant to be in the brackets where “same” is written?

Figure 4: The possible TID wavefronts that the authors note are not immediately obvious in this figure without the reader looking very carefully. It would be very helpful to the reader if a 1-hour running mean is subtracted from each voxel to remove the background ionosphere, as performed for the simulations given in Figure 8.

Figure 6: As the authors note in the text, the 15 minute sampling period of the ionosonde data make it impossible to find periodicities of less than 30 minutes, and 30 minutes itself is right on the limit for Nyquist sampling of a wave with this period. The figure itself does not show very clearly even a 30-minute periodicity. Perhaps it might be seen more clearly if the y-axis limits are reduced (e.g., to 10-13MHz or even 10.5-12.5MHz) to better show this. I guess the red and blue circles denote peaks and troughs respectively, but this is not described in the figure caption.

Figure 8: The caption should also note that a background subtraction was performed, otherwise use of the vTEC term is not strictly accurate as it implies absolute values.

Lines 156-158: This sentence is not clear: It states that a discrepancy is observed, but not the nature of that discrepancy.

Lines 158-159: I suggest re-arranging this sentence to state, “However, this was identified from computer end-to-end simulation to be the result of poor receiver coverage available for the MIDAS inversion, as discussed in Section 5.”

Line 160: It might be useful to indicate at this point how the coverage of GPS receivers has improved since 2003, and whether it is now dense enough to be able to replicate the presence of a TID more accurately.

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