

Ann. Geophys. Discuss., referee comment RC4
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Reply on AC1

Anonymous Referee #1

Referee comment on "Multi-instrument observations of polar cap patches and traveling ionospheric disturbances generated by solar wind Alfvén waves coupling to the dayside magnetosphere" by Paul Prikryl et al., Ann. Geophys. Discuss.,
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Since I have not seen a revised manuscript, I just comment on one of the authors' replies.

>We agree that it may not be possible to strictly distinguish between MSTIDs and LSTIDs, because of a continuum of sizes and periods. But we disagree with the statement that LSTIDs with wavelengths greater than 1000 km cannot focus HF radio waves. The electron enhancements, particularly when slanted as in TIDs, would certainly refract the radio waves, and focus them to produce enhanced ground scatter power. Of course, we agree that TIDs can also be observed in the variations of Doppler velocities changes in the ground scatter data as shown and correlated with the GNSS TEC in the quoted paper by Hayashi et al. (2010, their Figs. 4 and 5). However, their equatorward propagating LSTIDs (Events 1 and 2) can also be clearly identified in the ground scatter power (https://cicr.ise.e.nagoya-u.ac.jp/web1/superdarn/sddata/hokql/gif/hok/2006/bm00/20061215_hok_bm00_ql.gif), although not shown or discussed by the authors. This is in contrast with their poleward propagating LSTID Event 3 that they observed both in TEC and Doppler velocity, but that does not seem to be observed in the ground scatter power.

I agree that LSTIDs can divert the radar waves forth and back owing to the tilted isopycnic surface. However, it does not mean the radar waves are focused or defocused. I can see that the plot the authors showed indicates maximum echo power region moves away and toward the radar in association with the LSTID. Still, it cannot be called focusing / defocusing of the radar wave packets at all because it does not show the propagating structure (just forth and back). It is thus appropriate to use words other than focusing / defocusing, such as diverting the maximum echo power region forth and back. If the authors disagree, they need to show that the focusing / defocusing can modulate the echo power significantly with the gravity waves with a wavelength of more than 1000 km using the HF ray path tracing technique.