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Vortical nature of the flow burst in the cusp

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The ionospheric signatures of a flux transfer event have been examined for more than two decades by many researchers. For examples, in 80's Goertz et al. and Lockwood et al. used data from the radar, and related sporadic and spatially limited flow to its ionospheric signatures. Using high-resolution observation with the EISCAT radar, Oksavik et al. [2004] have presented an event in which the flow burst constitutes the central part of a twin vortex and that return flow exists both in the poleward and equatorward parts, which is consistent with the model proposed by Southwood et al. earlier. However, our recent event study [Taguchi et al., submitted to JGR] based on the simultaneous observation of a moving proton aurora spot from IMAGE spacecraft, flow burst from high time resolution mode of the SuperDARN radar, and ground magnetic perturbations has shown that the vortical nature of the flow burst is clear only on its equatorward side, i.e., a moving single vortex. In this study we present statistical results from the analyses of magnetic perturbation data from Greenland East/West coast stations to identify which type of vortex is fundamental. Results suggest that a single vortex is the fundamental nature of the flow burst.

Keywords: Cusp, plasma flow, ionospheric currents, ground magnetic perturbations, reconnection