

Ionospheric flows near auroral breakup region before substorm expansion onsets: THEMIS and SuperDARN observations

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We have studied substorm-associated ionospheric flows and their correspondence with auroras and magnetotail changes, using the data from the THEMIS spacecraft and ground-based observatories (GBO) and from the SuperDARN radars. In the present study we have examined weak substorm events in which the ionospheric footprints of the THEMIS spacecraft were located near the auroral breakup region. It is found that ionospheric flows began to enhance a few minutes before the expansion onsets and remained strong during the expansion phase. Fast earthward flows and dipolarization were also observed near the corresponding magnetotail regions. Possible cause-and-effect processes will be discussed along with more detailed data analyses.