Mid-latitude neutral wind and temperature response to LSTIDs

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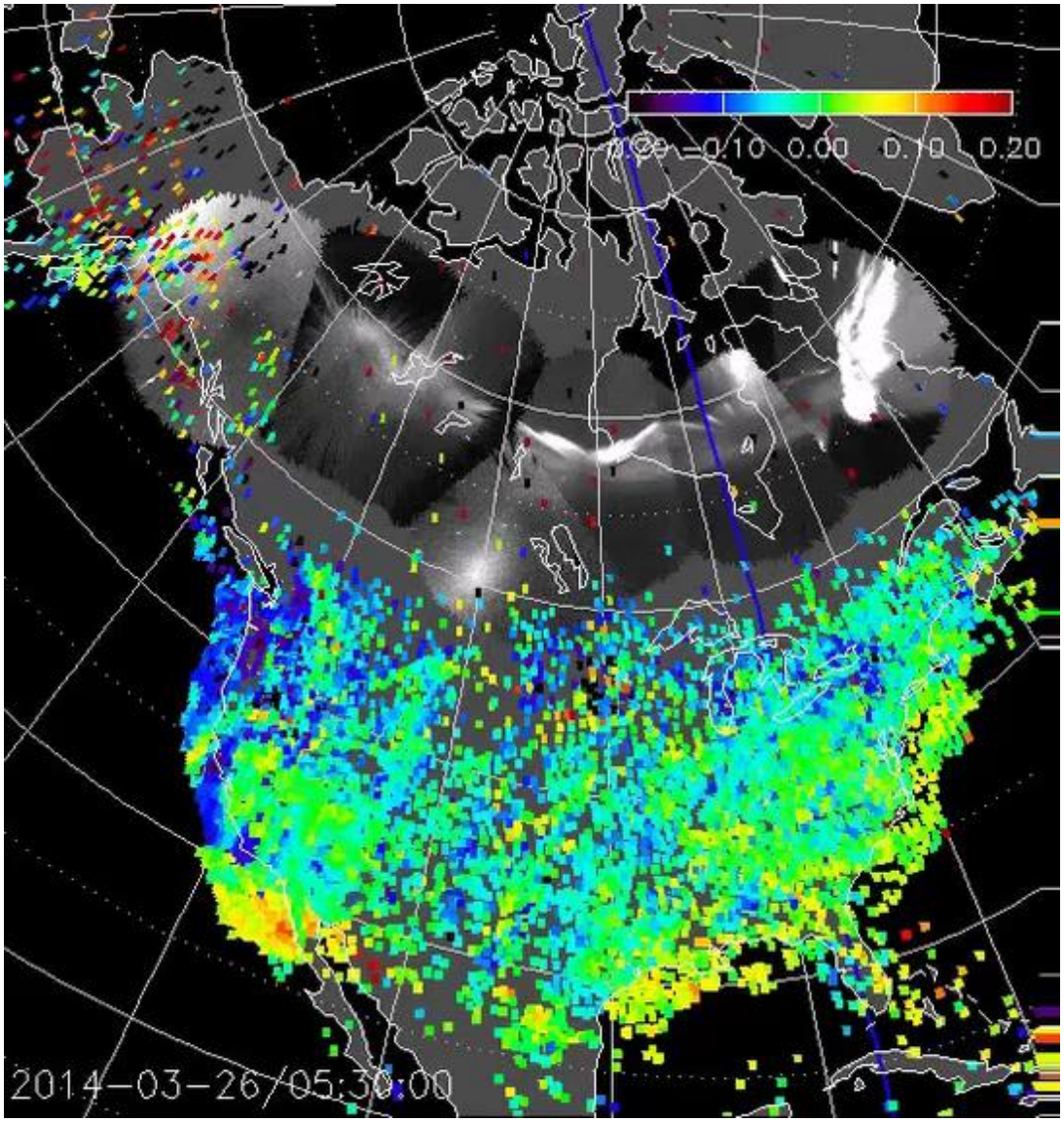
Mid-latitude LSTID triggered by substorms

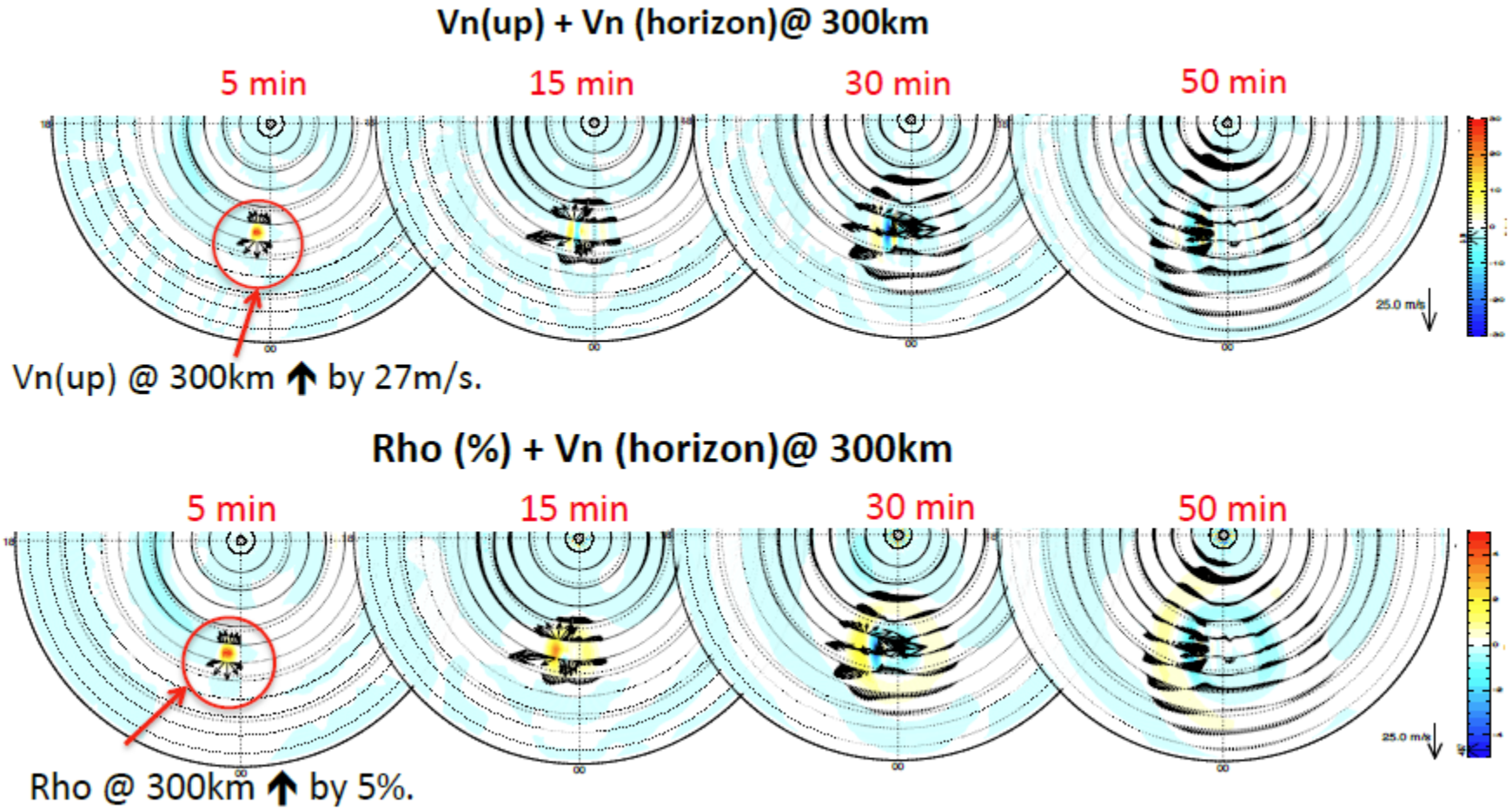


Large-scale traveling ionospheric disturbances (LSTIDs)

Ionosphere density disturbances of 1000 km horizontal scale and 400–1000 m/s propagation speed [Hunsucker, 1982]

An isolated substorm triggered LSTIDs.

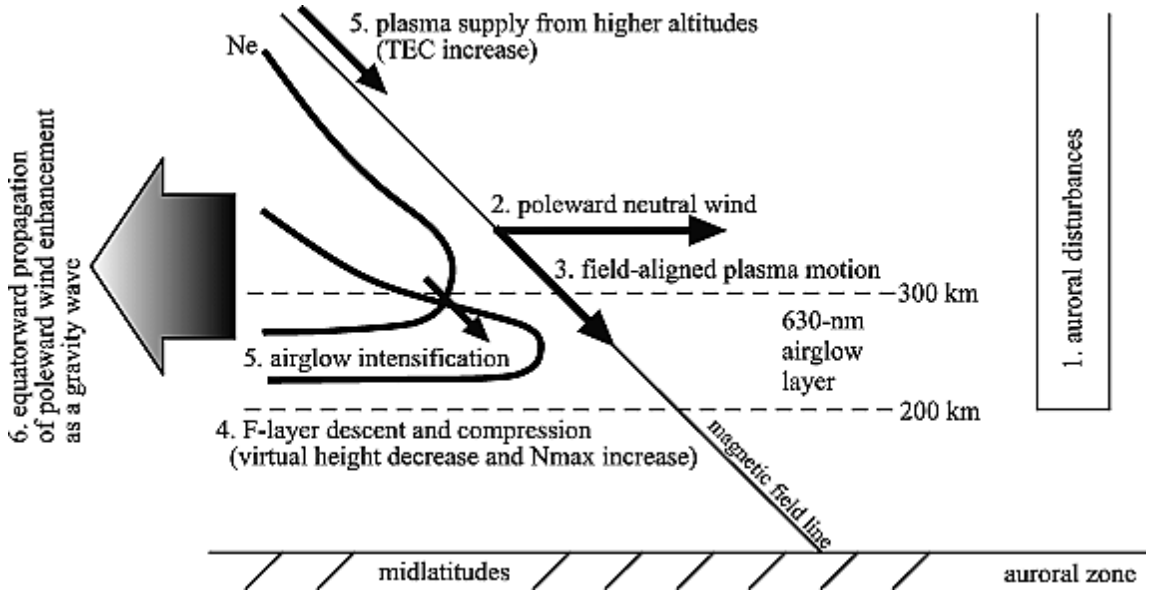
[Lyons et al., 2019]



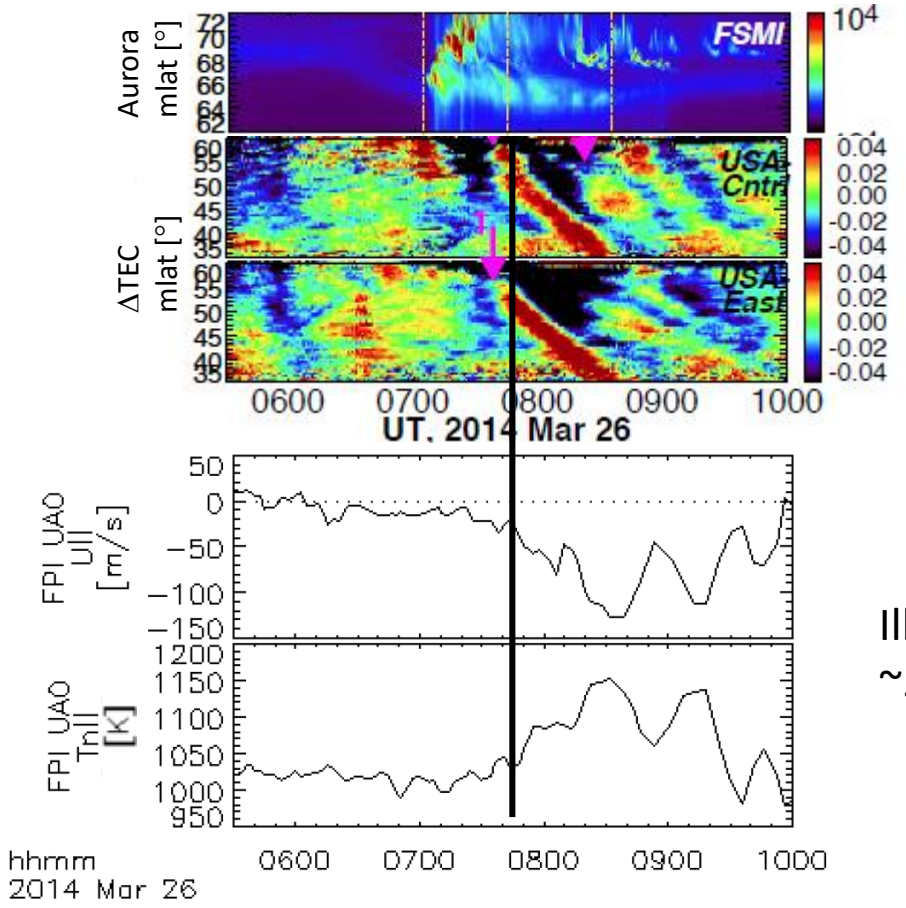
[Deng et al.]

Can we observationally quantify the thermosphere response to LSTIDs?

Expected neutral response



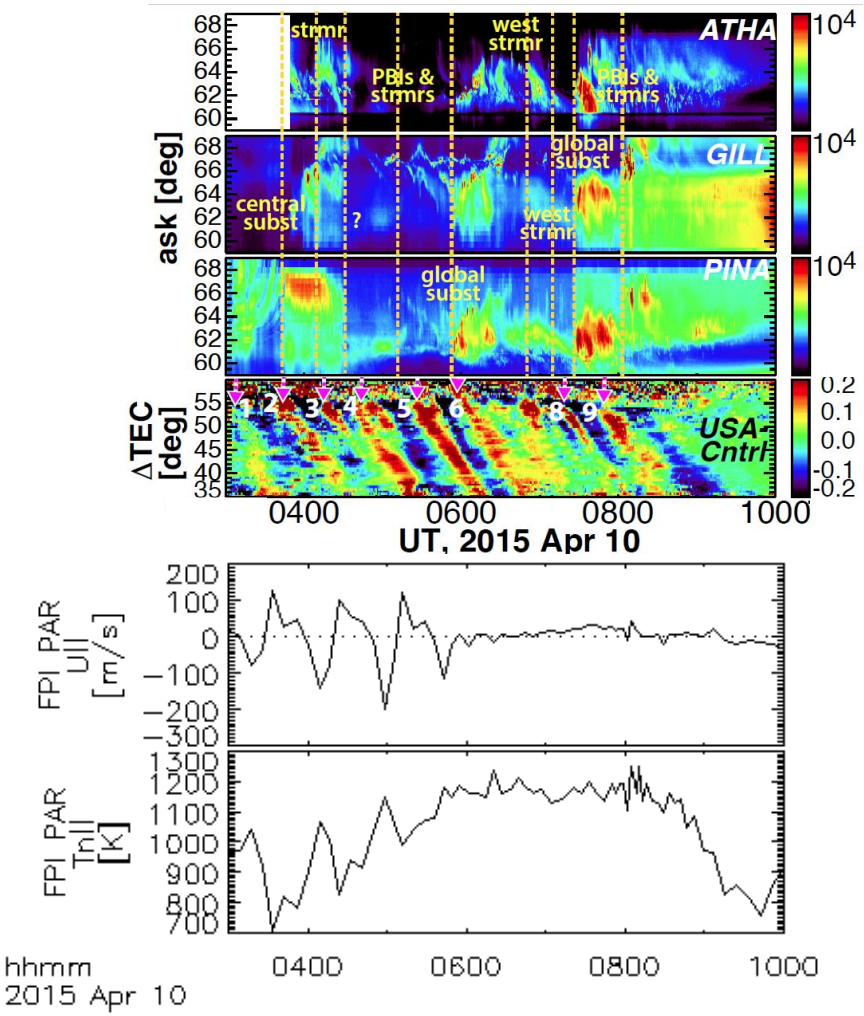
[Shiokawa et al., 2002]

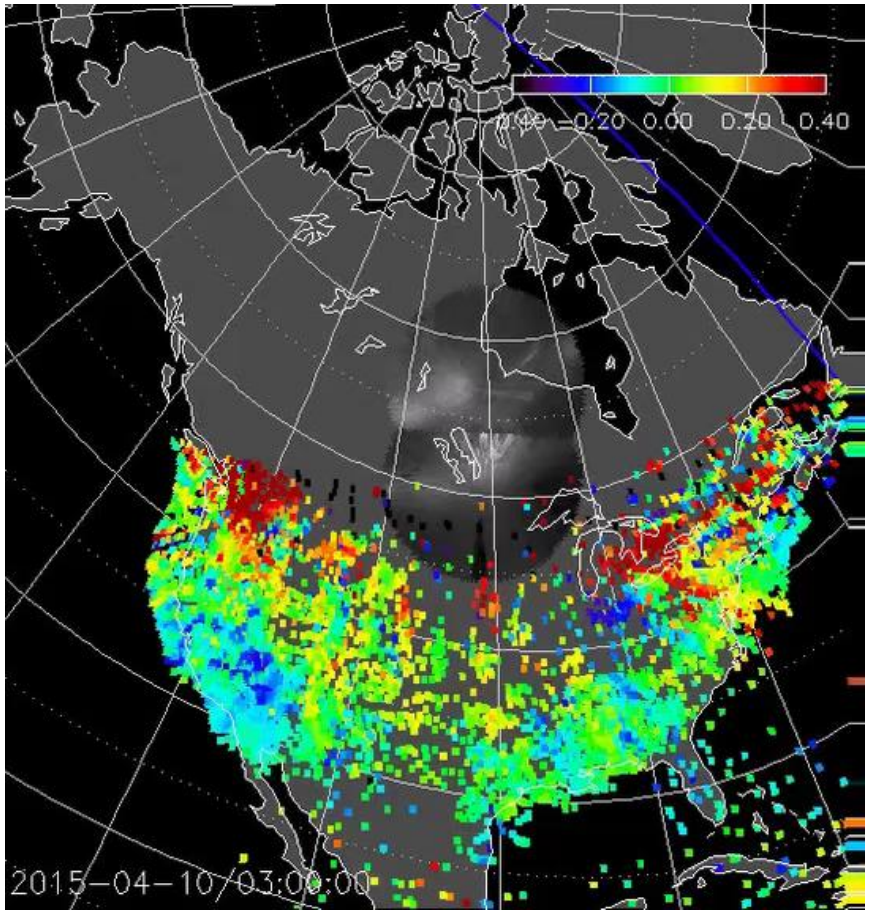


Illinois
~50 deg magnetic latitude

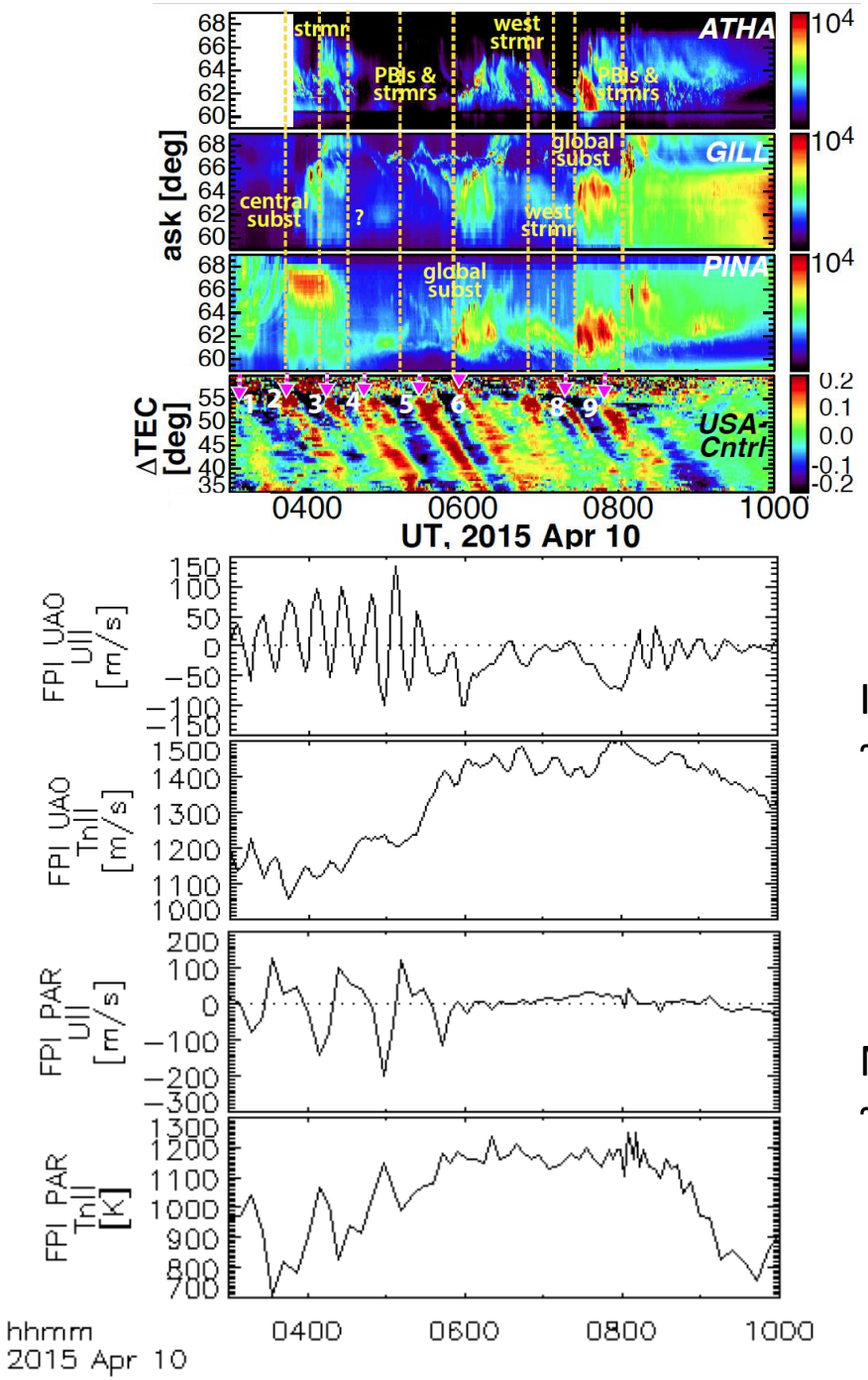
- An isolated substorm triggered LSTID.
- Also traveling atmospheric disturbances (TAD) occurred.

Weak (Dst ~ -50 nT) storm event





- A sequence of auroral activations
- Large-amplitude and continuous TID and TAD

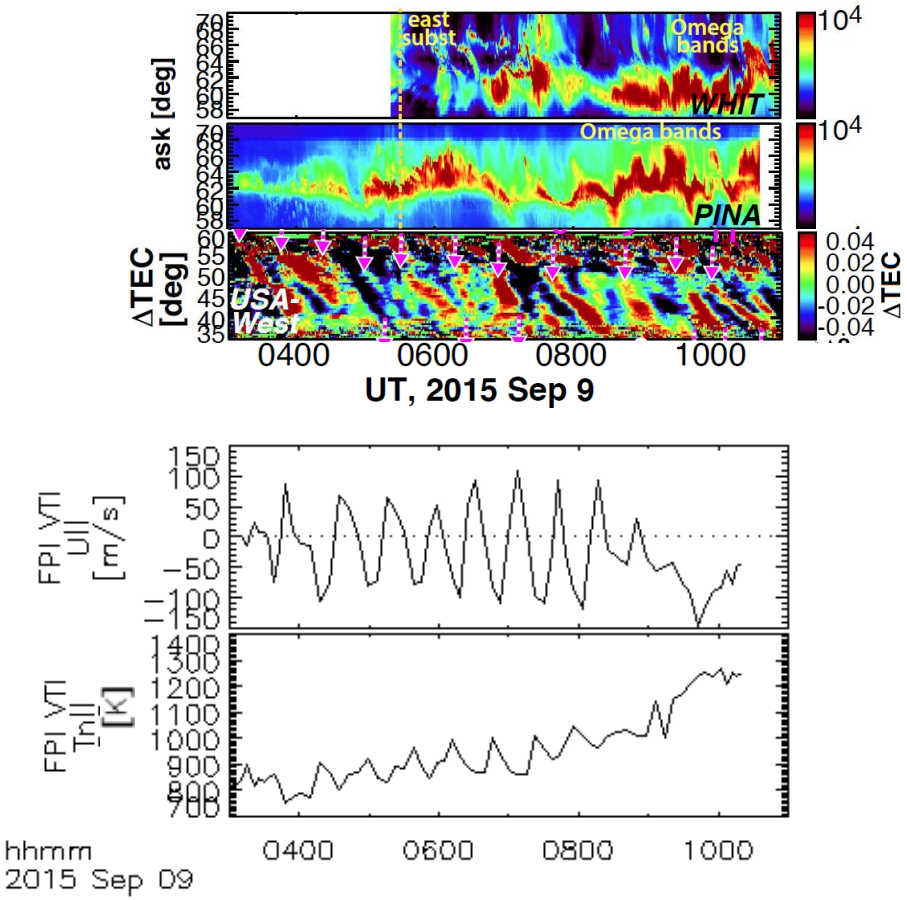


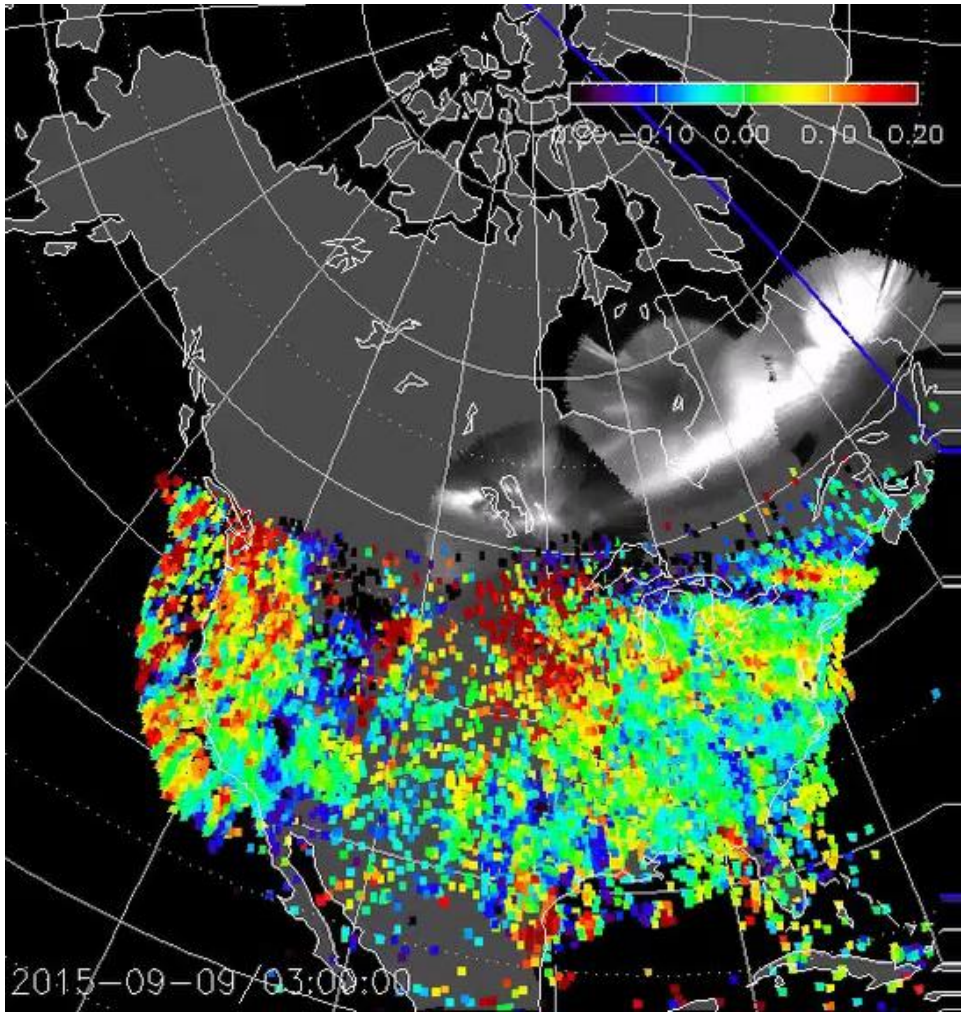
- The period becomes longer at lower latitudes.
- Wave dissipation?

Illinois
~50 deg magnetic latitude

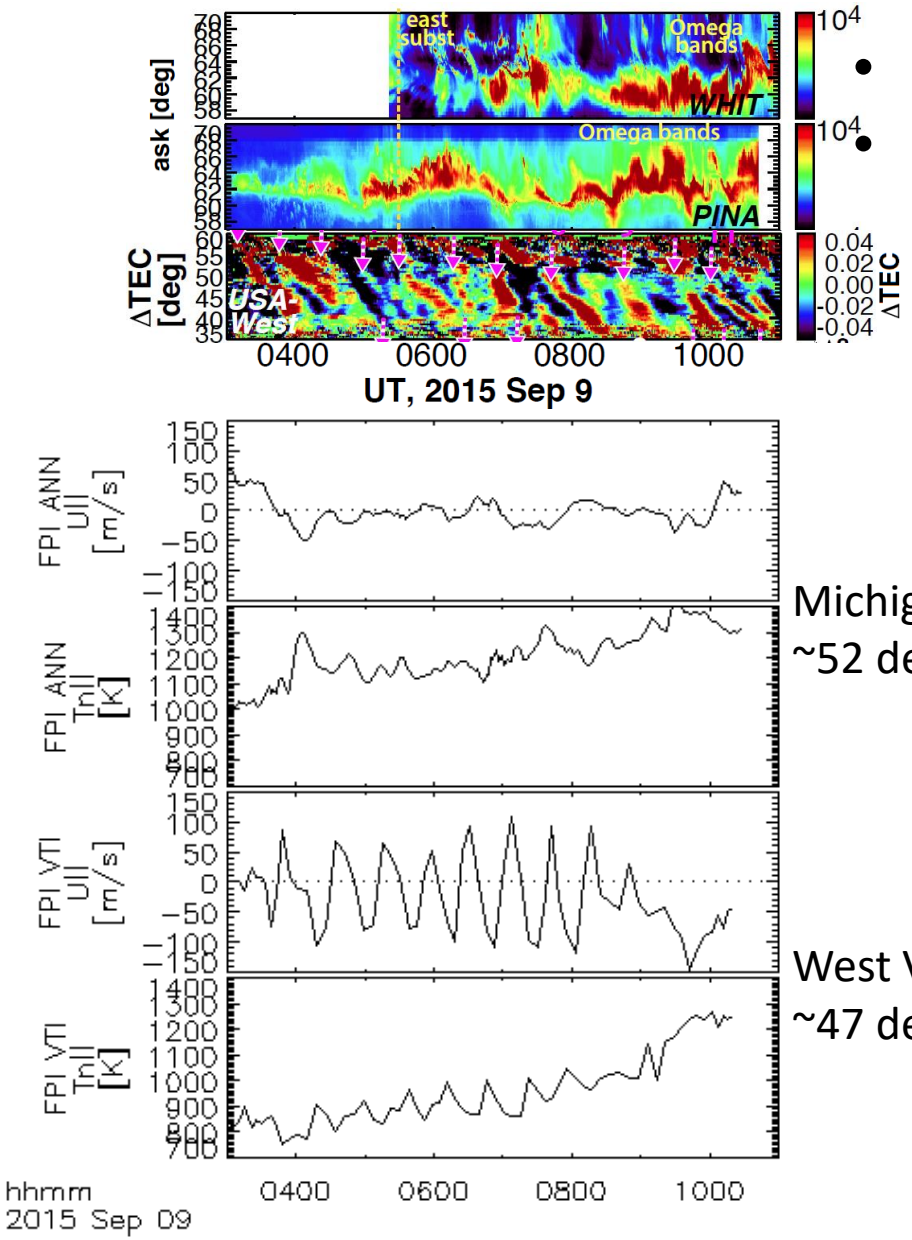
North Carolina
~45 deg magnetic latitude

Moderate (Dst ~ -100 nT) storm event





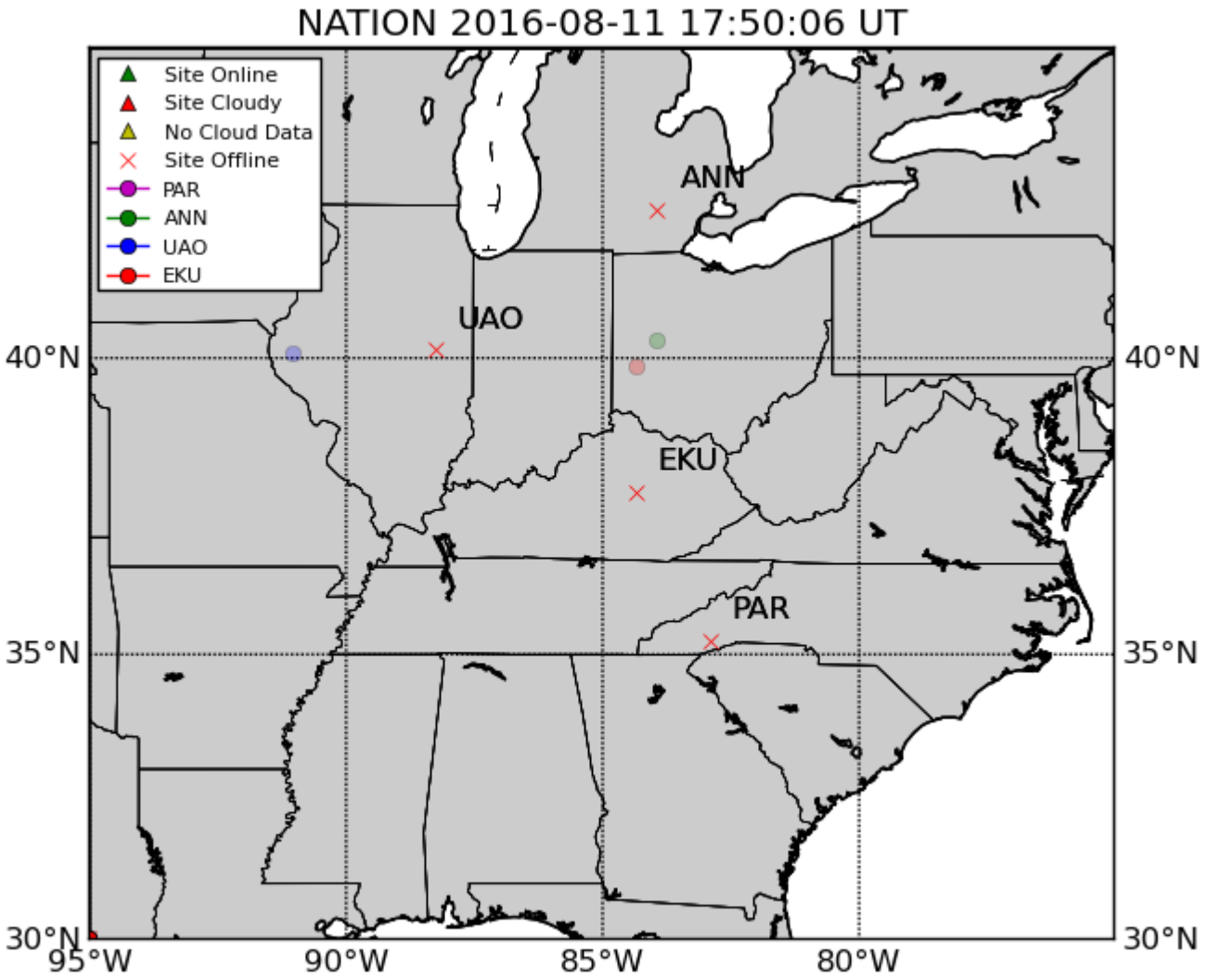
- A sequence of auroral activations, TID and TAD
- LSTIDs breaking at lower latitudes
- Also eastward propagating waves



- Larger activity at lower latitude
- Wave generation process?

Michigan
~52 deg magnetic latitude

West Virginia
~47 deg magnetic latitude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