



The Geomagnetic Responses for Throat Aurora Observed Under Quiet Solar Wind Conditions

Hui-ting Feng

Tongji University, Shanghai, China

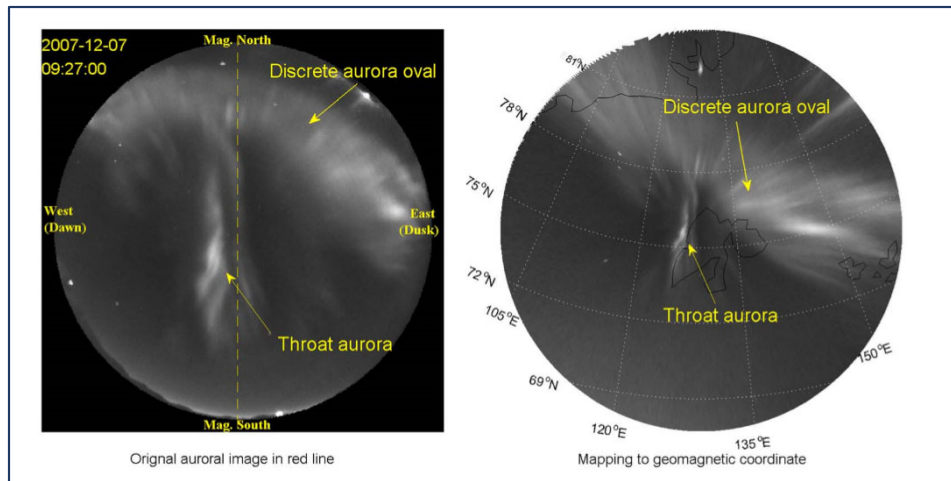
Co-author : De-sheng Han, Xiang-cai chen, Jian-jun liu, Zhong-hua xu

Abstract ID: [EGU22-1143](#)^{ECS}

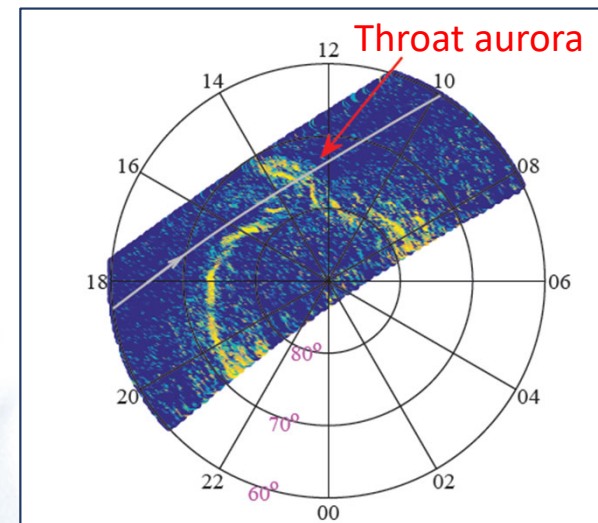


- ❑ Throat Aurora
- ❑ Geomagnetic Response of Throat Aurora on November 20, 2017
- ❑ Summary

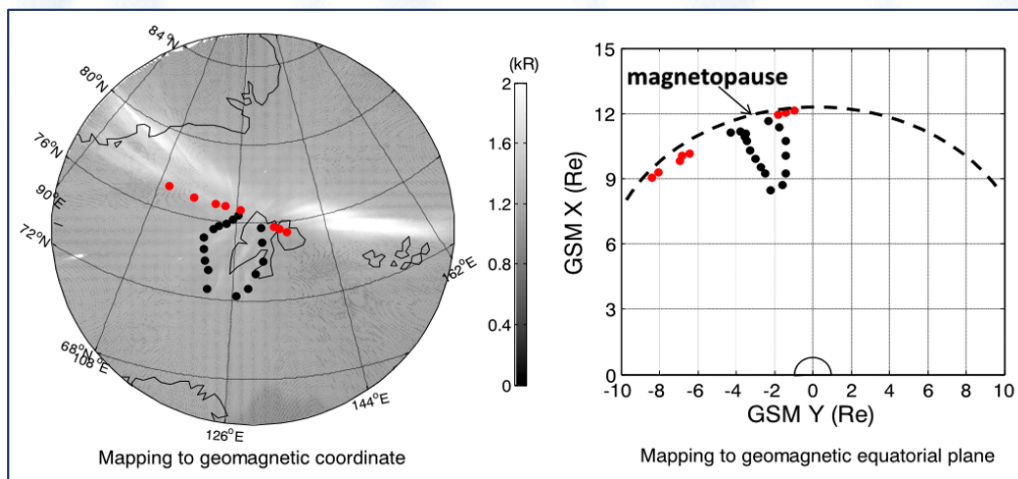
- 1) Occur near magnetic local noon.
- 2) North-south aligned arcs extending from the equatorward of auroral oval



(Han et al., 2018)



(Zhou et al., 2020)

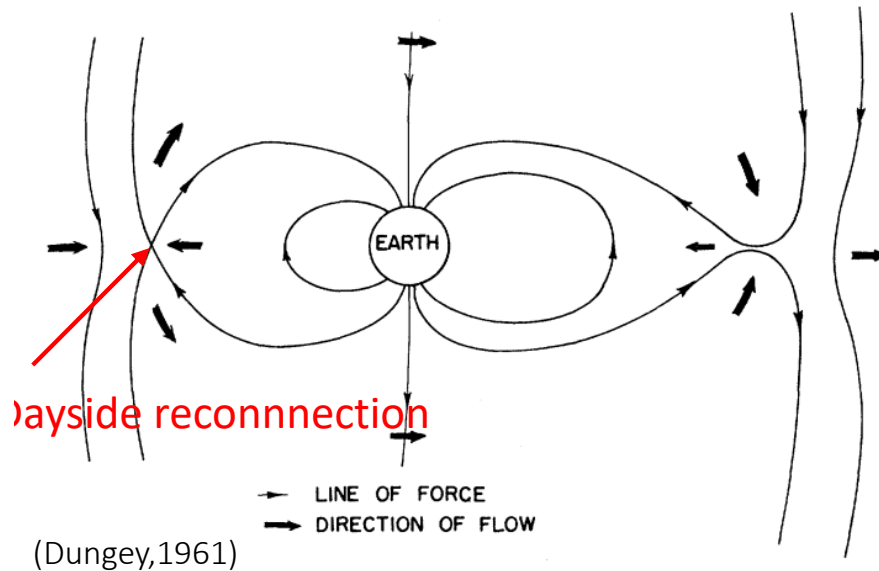


2022/5/11

(Han et al., 2017)

- 3) Corresponds to magnetopause indentation
- 4) Caused by the low latitude reconnection

Lack of direct evidence!



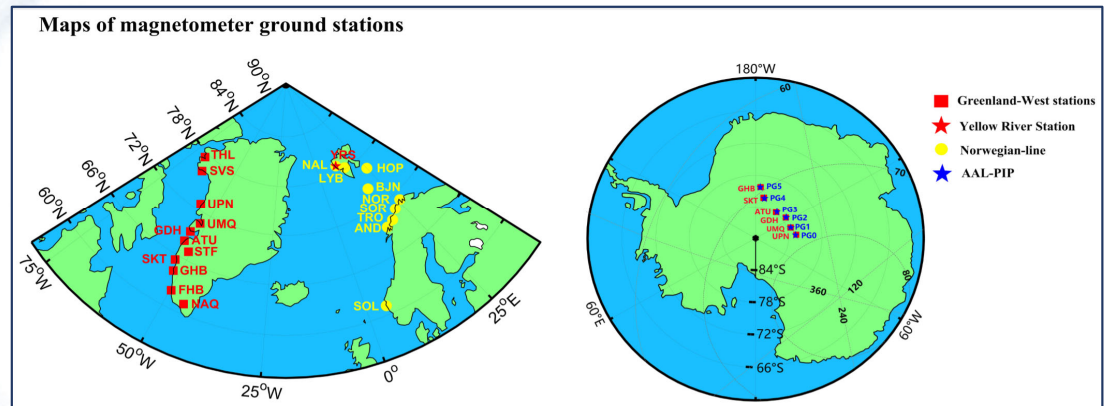
Geomagnetic station chains:

Northern Hemisphere:

- Greenland- West stations, $\sim 40.0^\circ$ E
- Norwegian stations, $\sim 110.0^\circ$ E

Southern Hemispheres:

- AAL - PIP stations, $\sim 40.0^\circ$ E

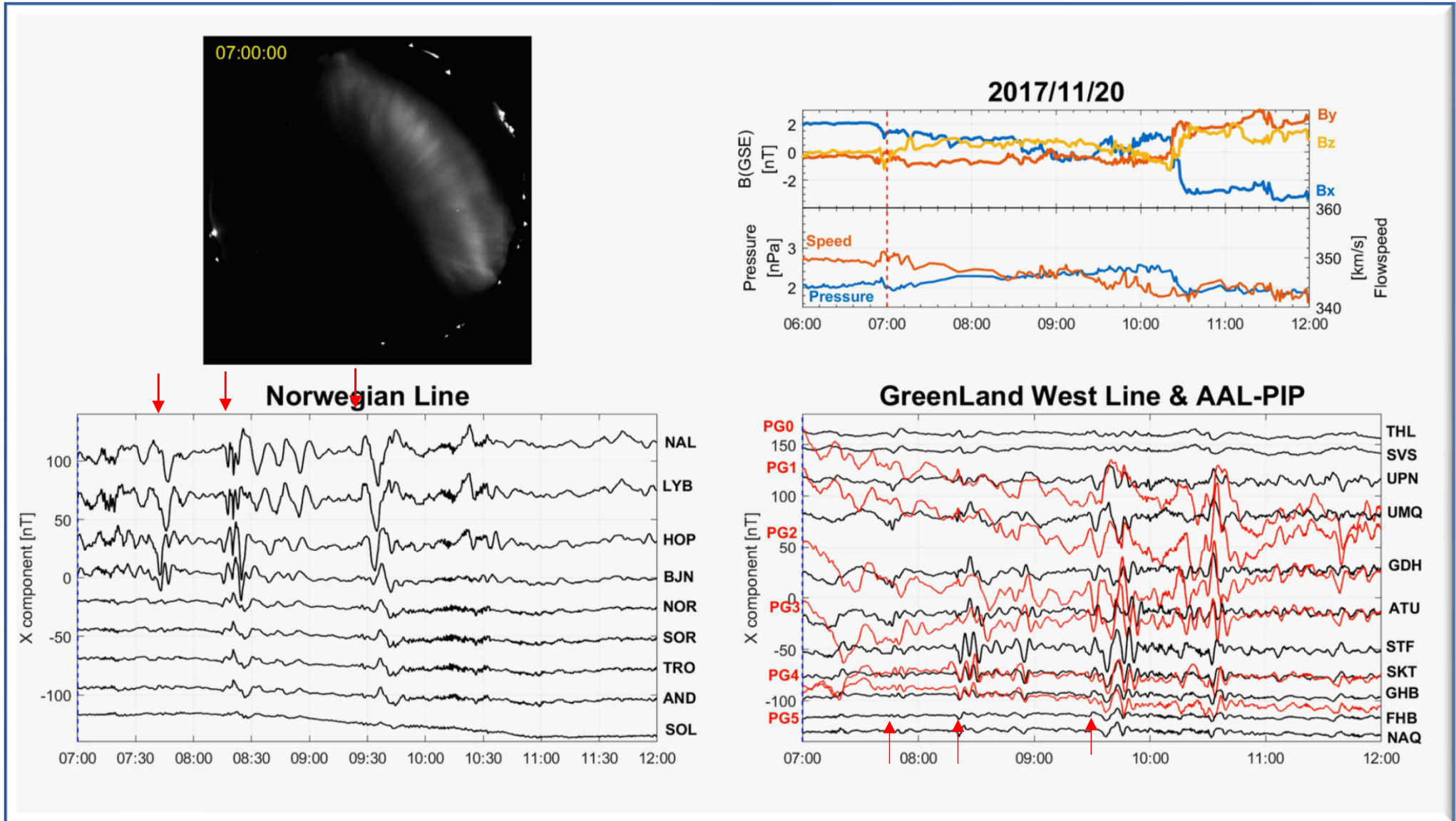


Greenland-west stations and AAL-PIP are on the same magnetic field line, Yellow River Station station and NAL are on the same position

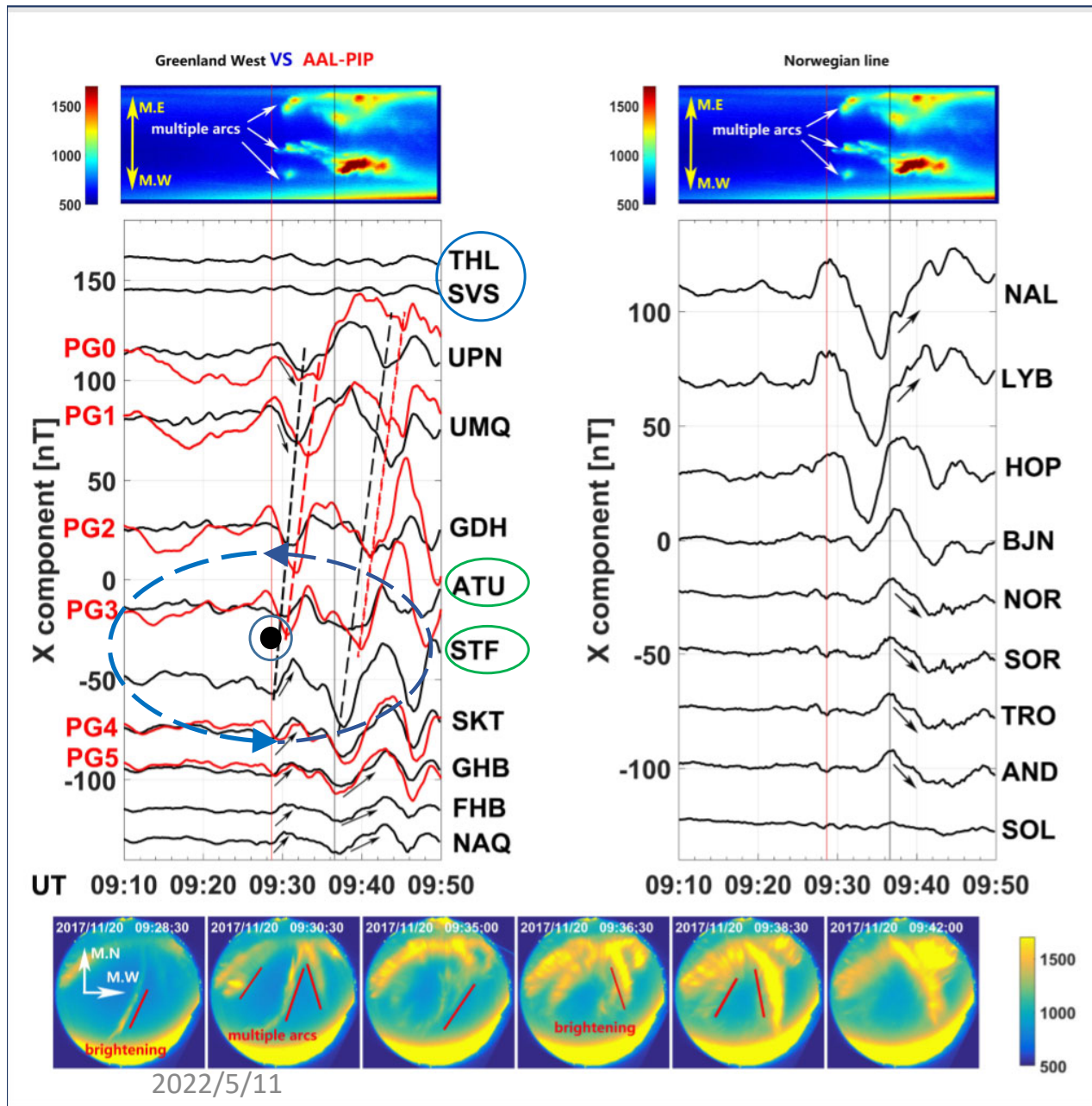
- Throat aurora, Dayside low-latitude reconnection, Conjugacy of the two hemispheres
- Synchronous Geomagnetic response, Poleward moving characteristics

Aurora Observations at Yellow River Station

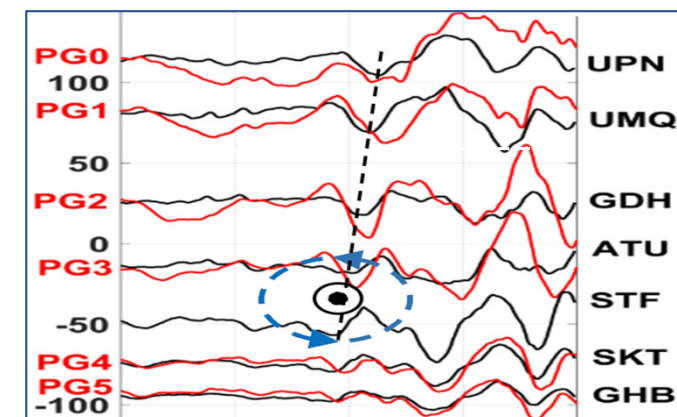
IMF **BX** **BY** **BZ**



The black curve is the geomagnetic change in the Northern Hemisphere, and the red curve is the geomagnetic change in the Southern Hemisphere



- The concurrent onsets for geomagnetic responses — reflect the first arrival of the reconnection signal at the ionosphere
- The amplitude of high latitude stations decreases and that of low latitude stations increases — Two Hall current vortices centered with the upward and downward FACs that are in anticlockwise and clockwise, respectively, in the Northern Hemisphere
- Characteristics of poleward moving at high latitude stations — The newly opened field lines will be dragged to move antisunward (poleward)
- Micropositive bay at low latitude stations associated with throat aurora. — Generated by a pair of FACs flowing downward in the east and upward in the west
- The stations in the polar cap area (THL, SVS) always have no response characteristics — Dayside low latitude reconnection



- We found that throat aurora and clear geomagnetic responses can be observed under quiet and stable solar wind conditions.
- We identified concurrent onsets at all of the stations along the same meridian associated with the brightening of throat aurora.
- We suggest that the concurrent onsets reflect the first arrival of the reconnection signal at the ionosphere, that the poleward moving signature reflect newly opened field lines dragging antisunward.

Feng, H.-T., Han, D.-S., Chen, X.-C., Liu, J.-J., & Xu, Z.-H. (2020). Interhemispheric conjugacy of concurrent onset and poleward traveling geomagnetic responses for throat aurora observed under quiet solar wind conditions. *Journal of Geophysical Research: Space Physics*, 125, e2020JA027995. <https://doi.org/10.1029/2020JA027995>

Thank You for Listening!

