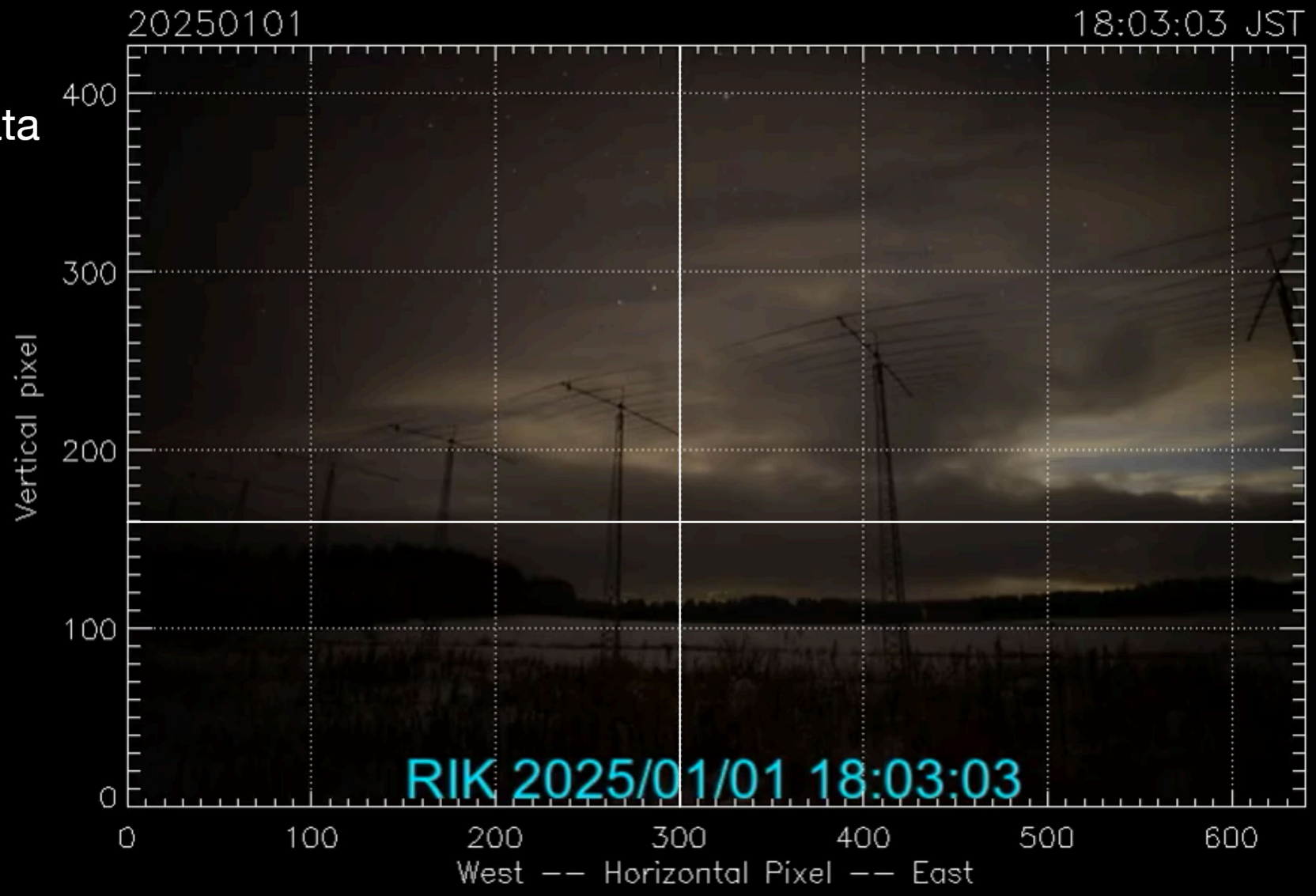
Low-latitude Aurora on Jan 1, 2025

Preliminary Analysis

Keisuke HOSOKAWA, UEC

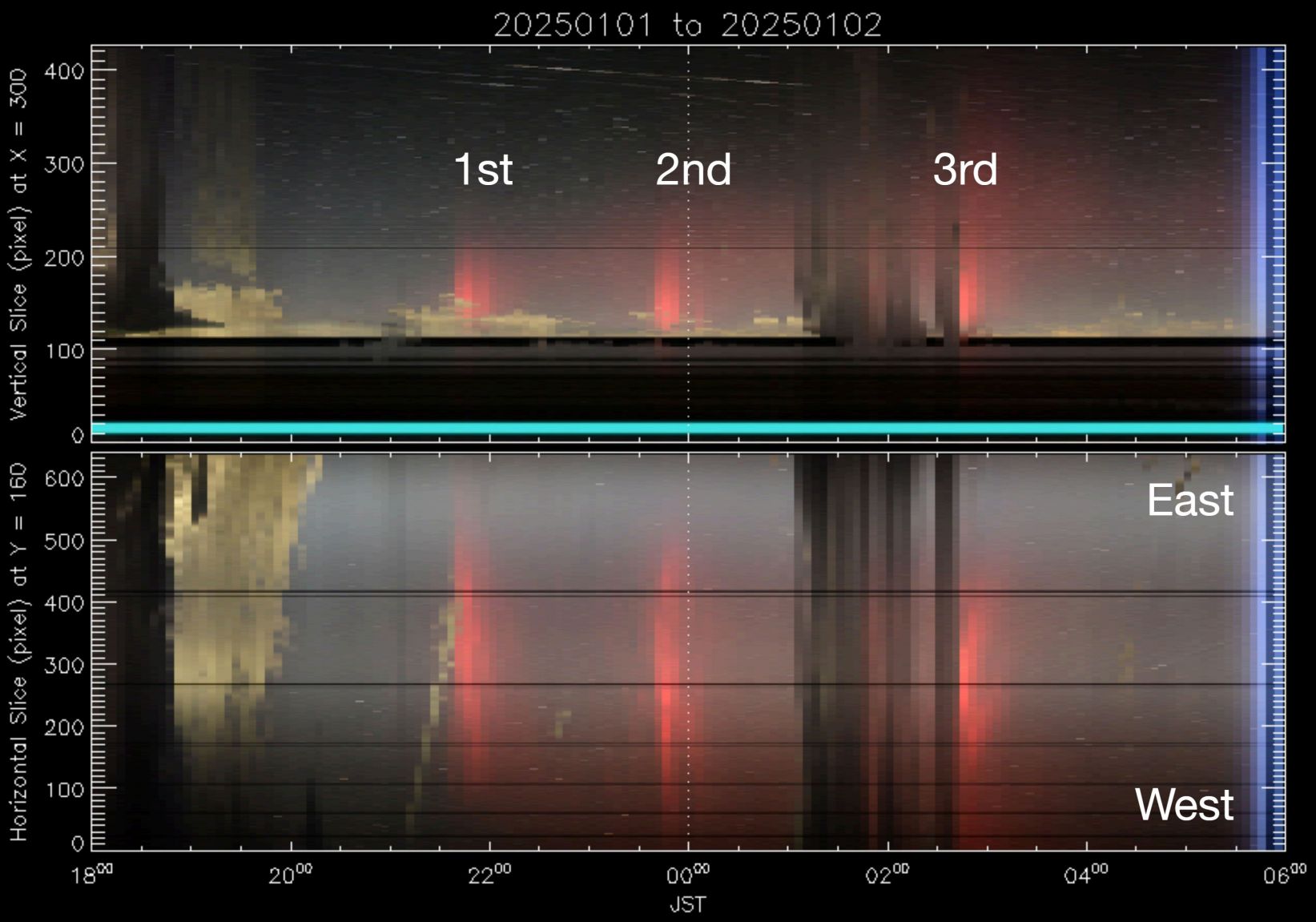
Overview

- Digital camera data from Rikubetsu
- 18-06 JST on Jan 1-2, 2025
- Reddish aurora with relatively less cloudy condition



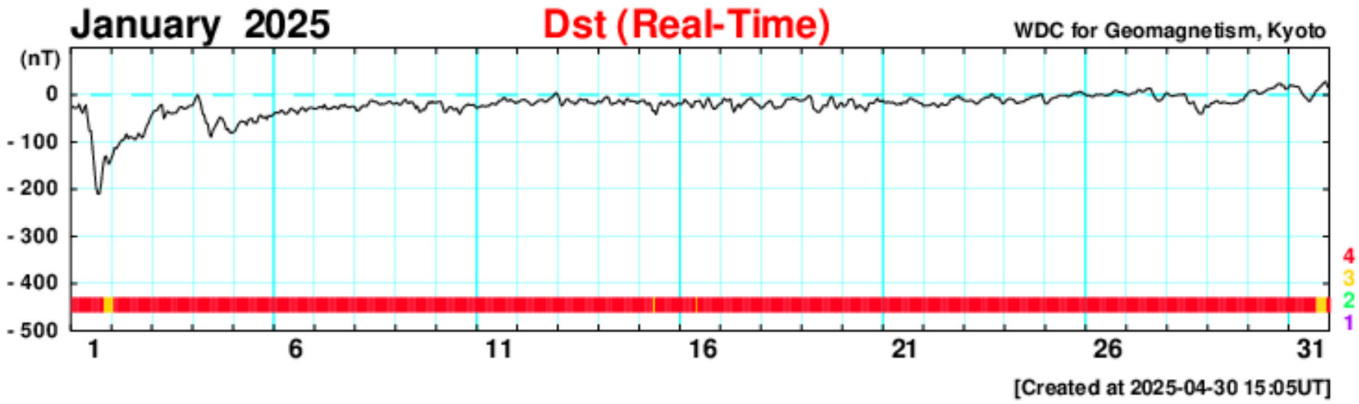
Keogram

- Reddish aurora got intensified three times
- 1st intensification: 2140-2200 JST (1240-1300 UT)
- 2nd intensification: 2340-2400 JST (1440-1500 UT)
- 3rd intensification: 0230-0300 JST? (1730-1800 UT)



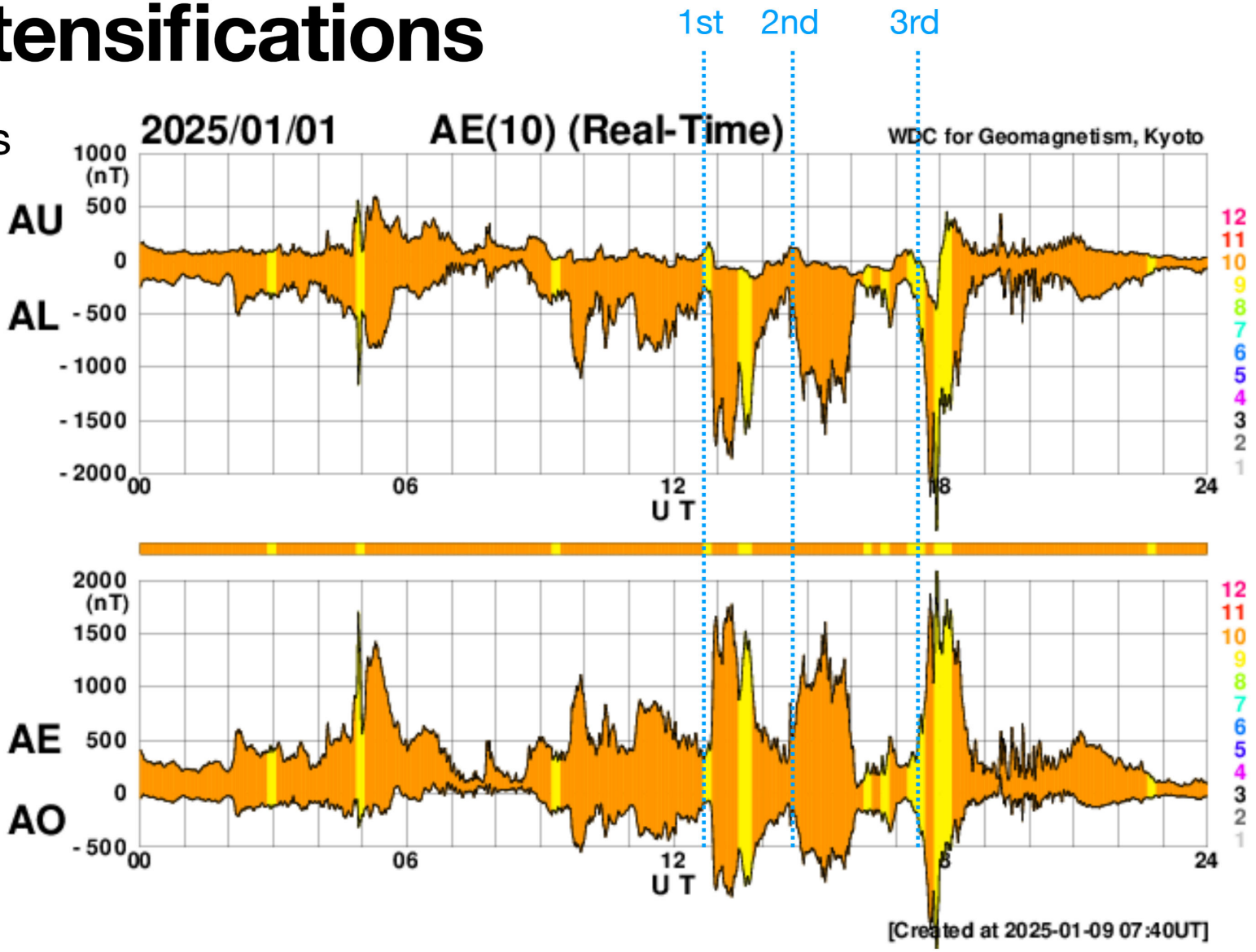
Dst index

- Minimum Dst was -210 nT

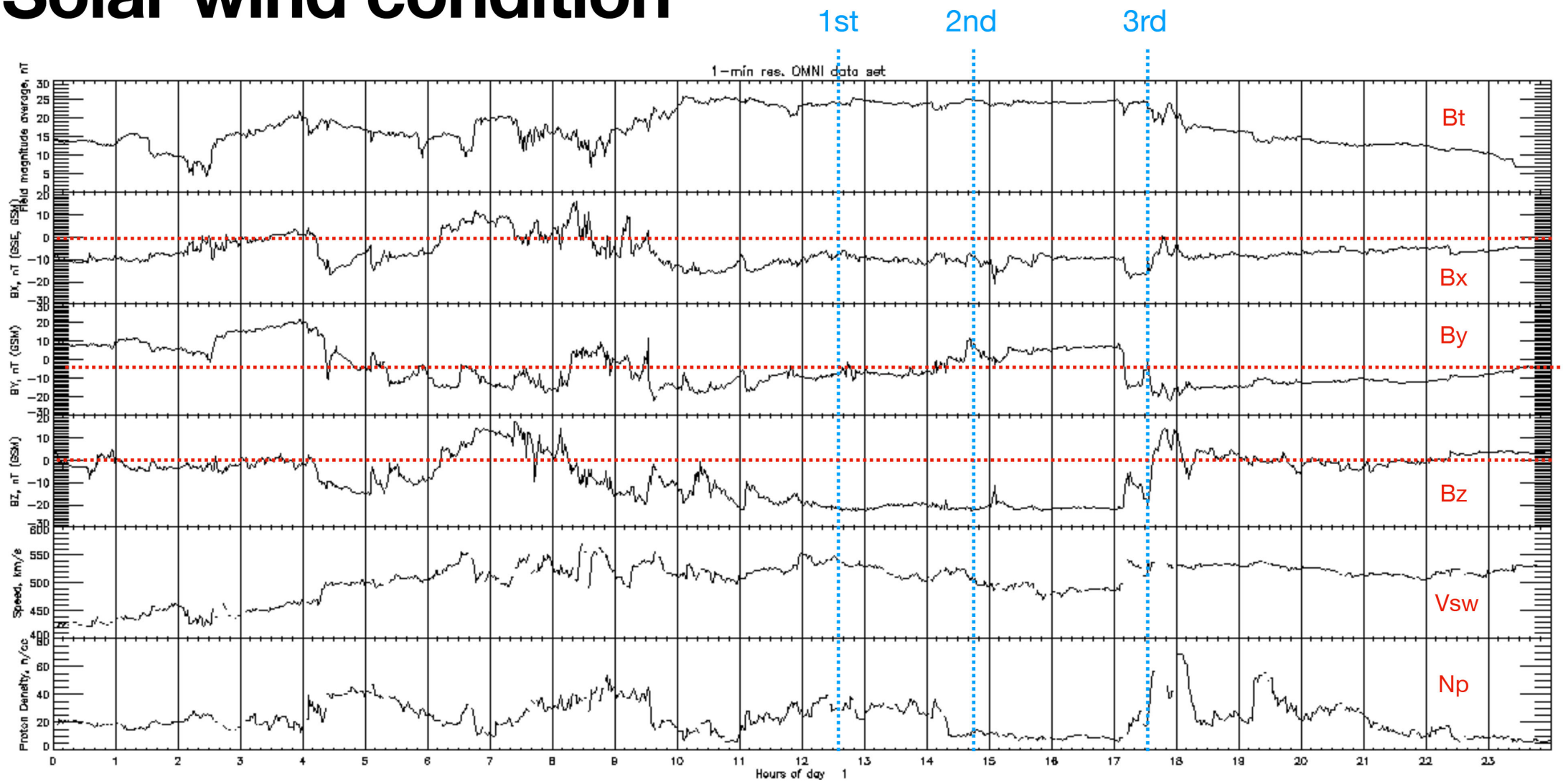


Timings of intensifications

- Three large substorms over 1000 nT AE inx.
- 3rd one: largest
  2nd one: smallest



Solar wind condition



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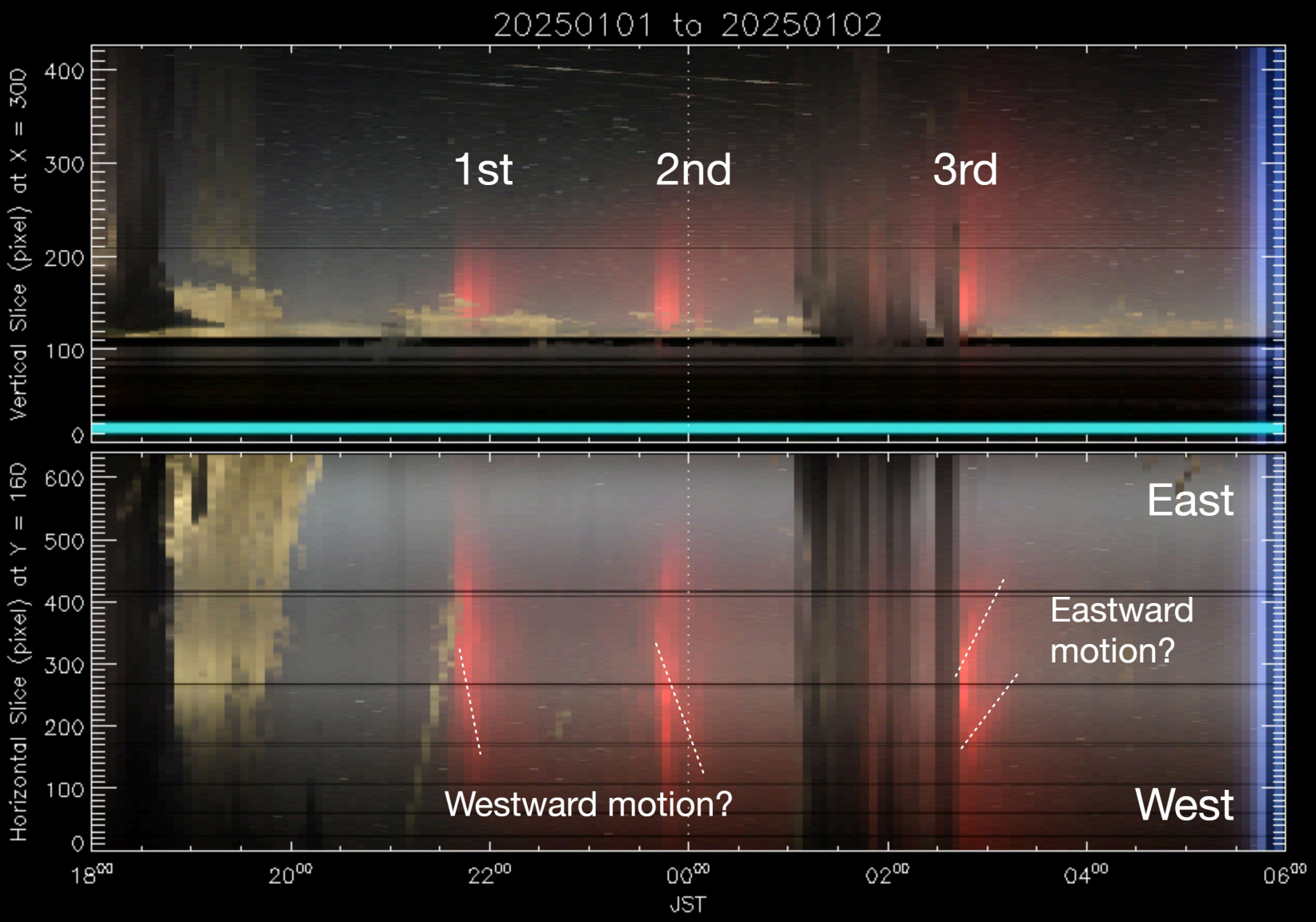

Moving direction of the reddish aurora

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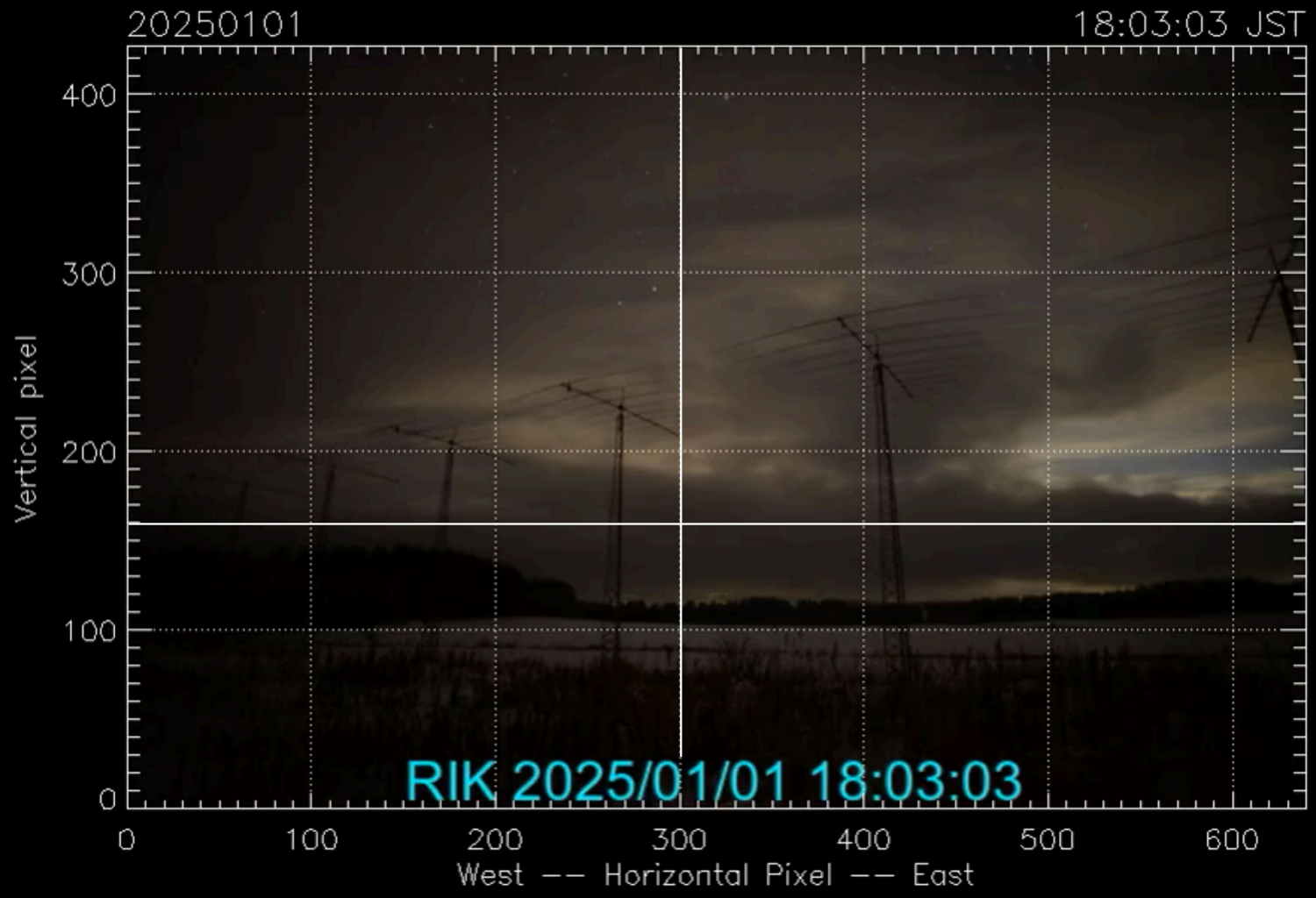
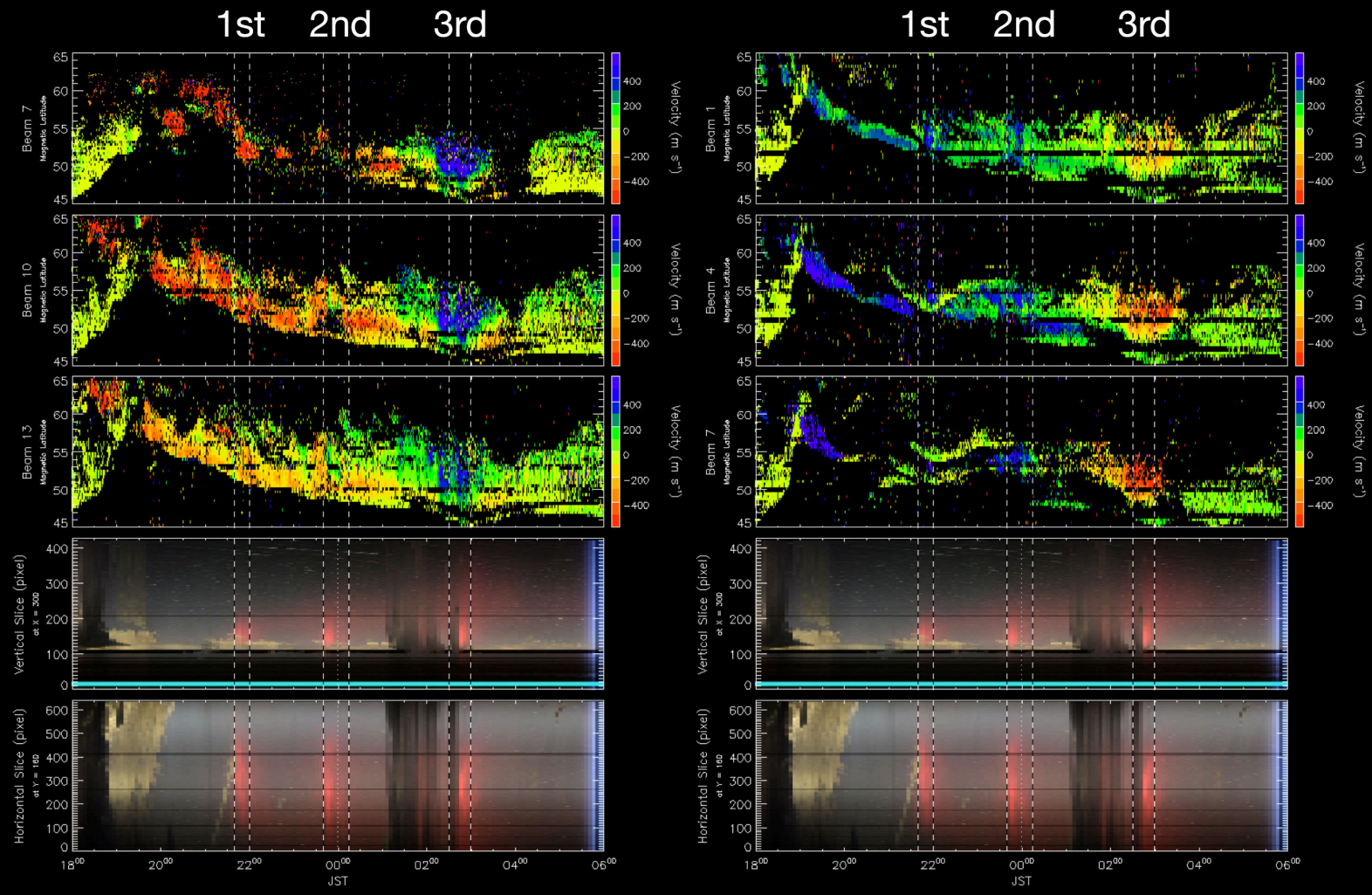


HOP radar data in comparison with digicam

- Corresponding increases of the Doppler velocity
- 1st and 2nd: westward flow maybe ~1 km/s
- 3rd: eastward flow
- Typical twin-cell convective motion
- Well matches the zonal motion of the reddish aurora



2D distribution of the Doppler velocities

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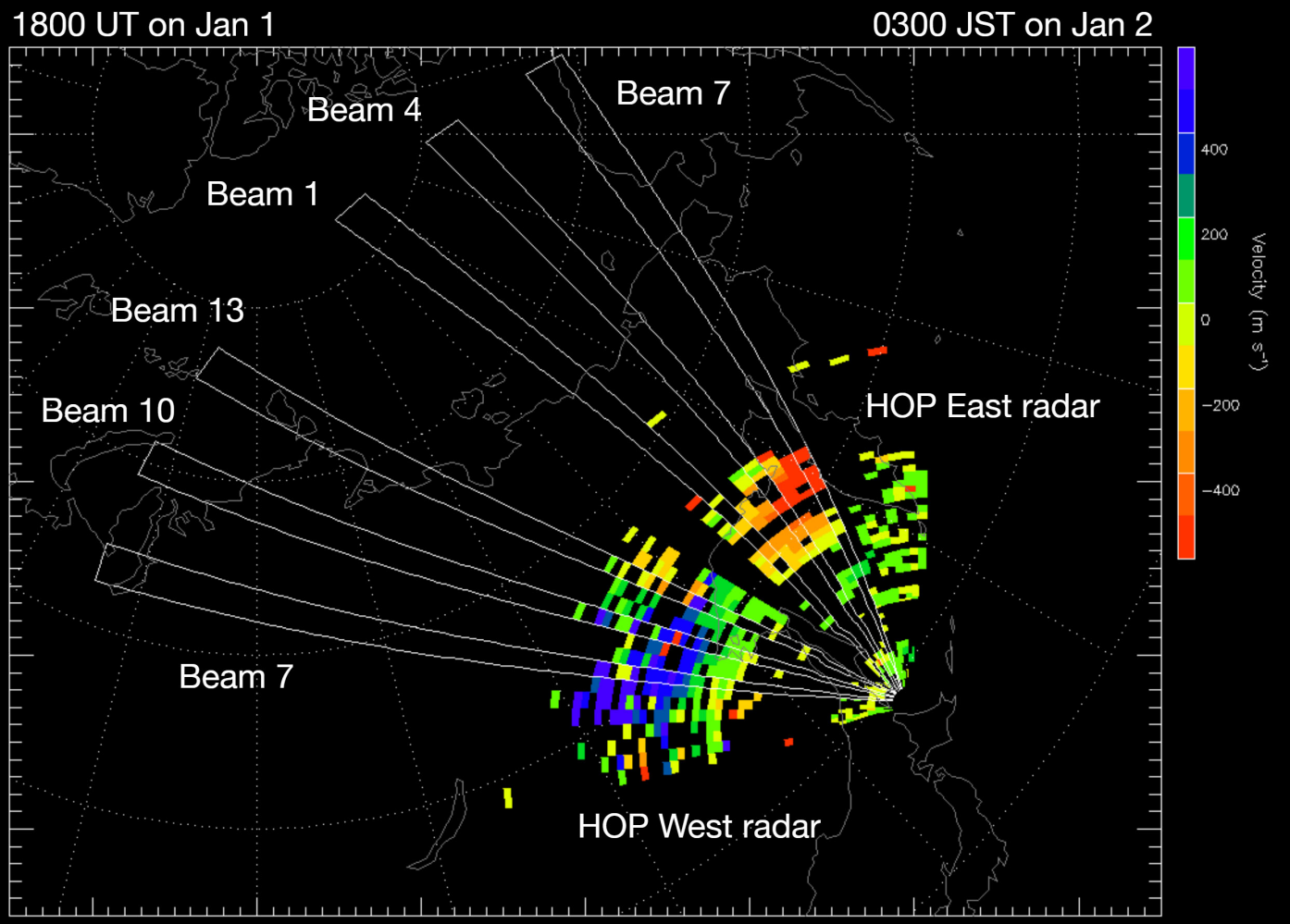

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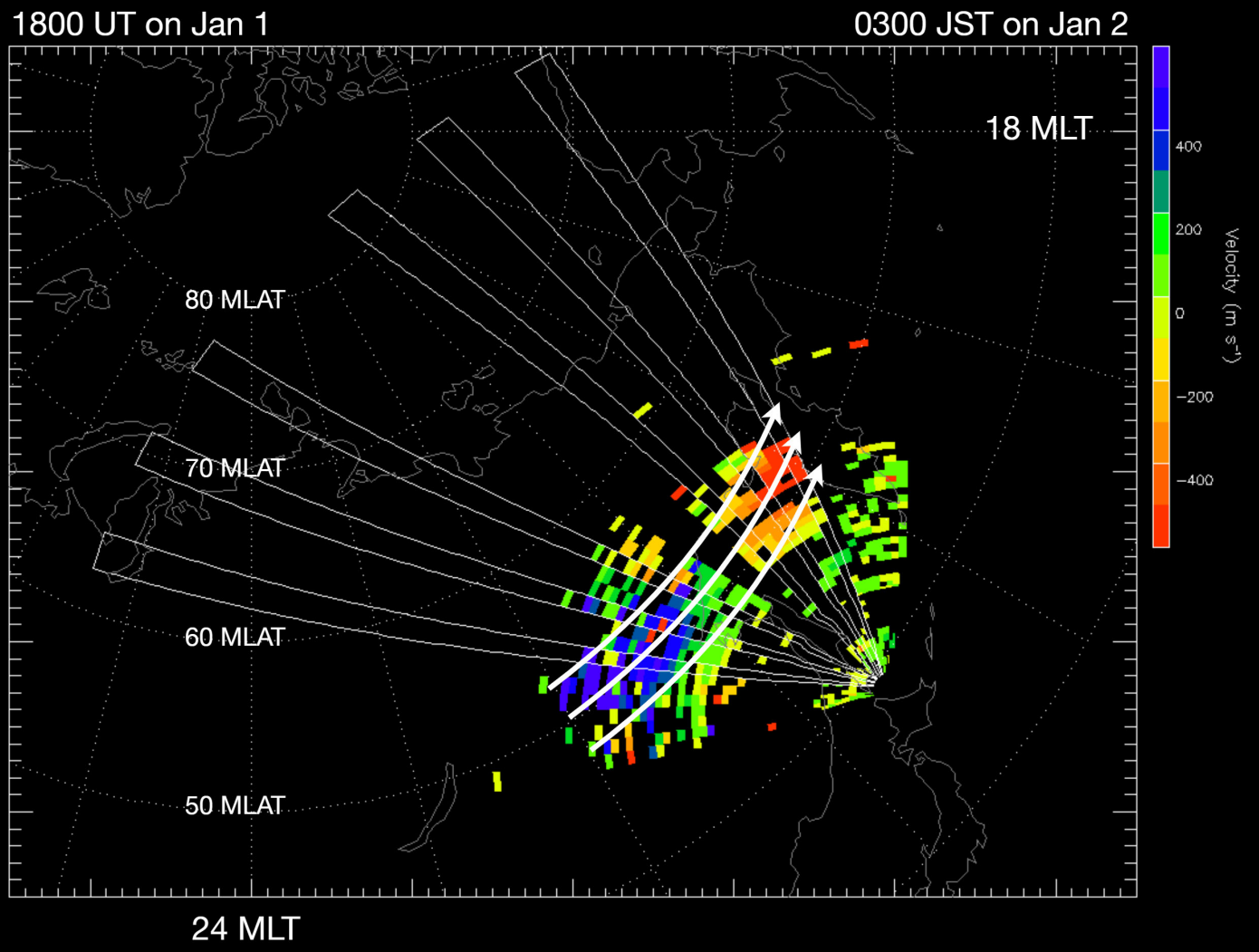

DMSP SSUSI data at 1724 UT (~30 min before)

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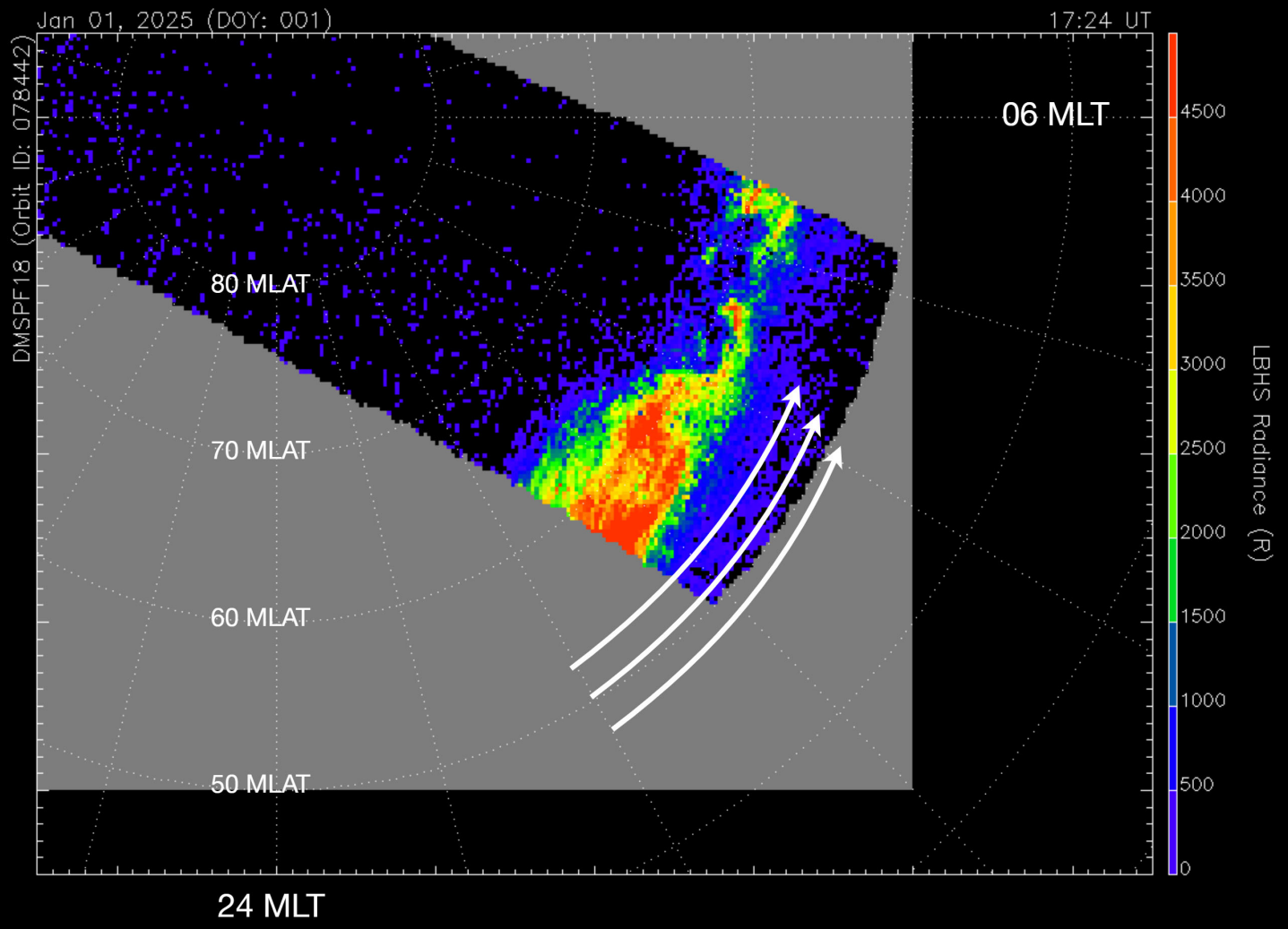

DMSP SSUSI data at 1811 UT - but, S.H.

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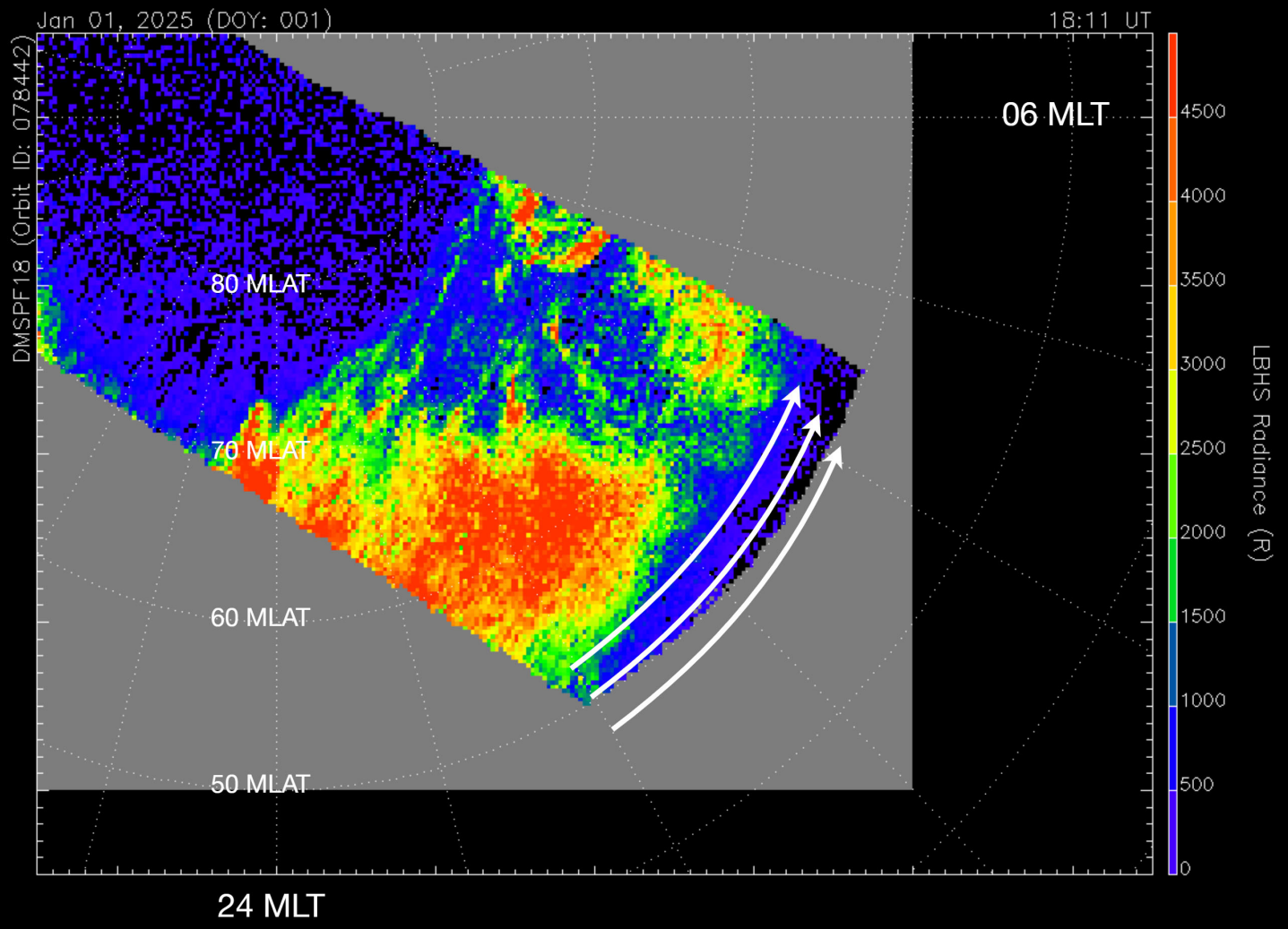

Things to do

- Making a dawn-dusk or day-night keogram of the DMSP SSUSI images
- Field-of-view calibration of the Rikubetsu digital camera
- Plot ground-based magnetometer data, for example, those from Memanbetsu
- Plot the solar wind conditions
- Do the L-shell fitting (beam-swinging technique) or use map potential data
- Do the similar comparison between SD and DMSP/SSUSI for 1st and 2nd ones
- Punch-line of the paper:
  1. SAPS (eastward/westward) at very low latitudes at times of very strong substorms
  2. Low-latitude reddish aurorae moved sunward in the return flow region
  3. Need to find one more or two is enough?