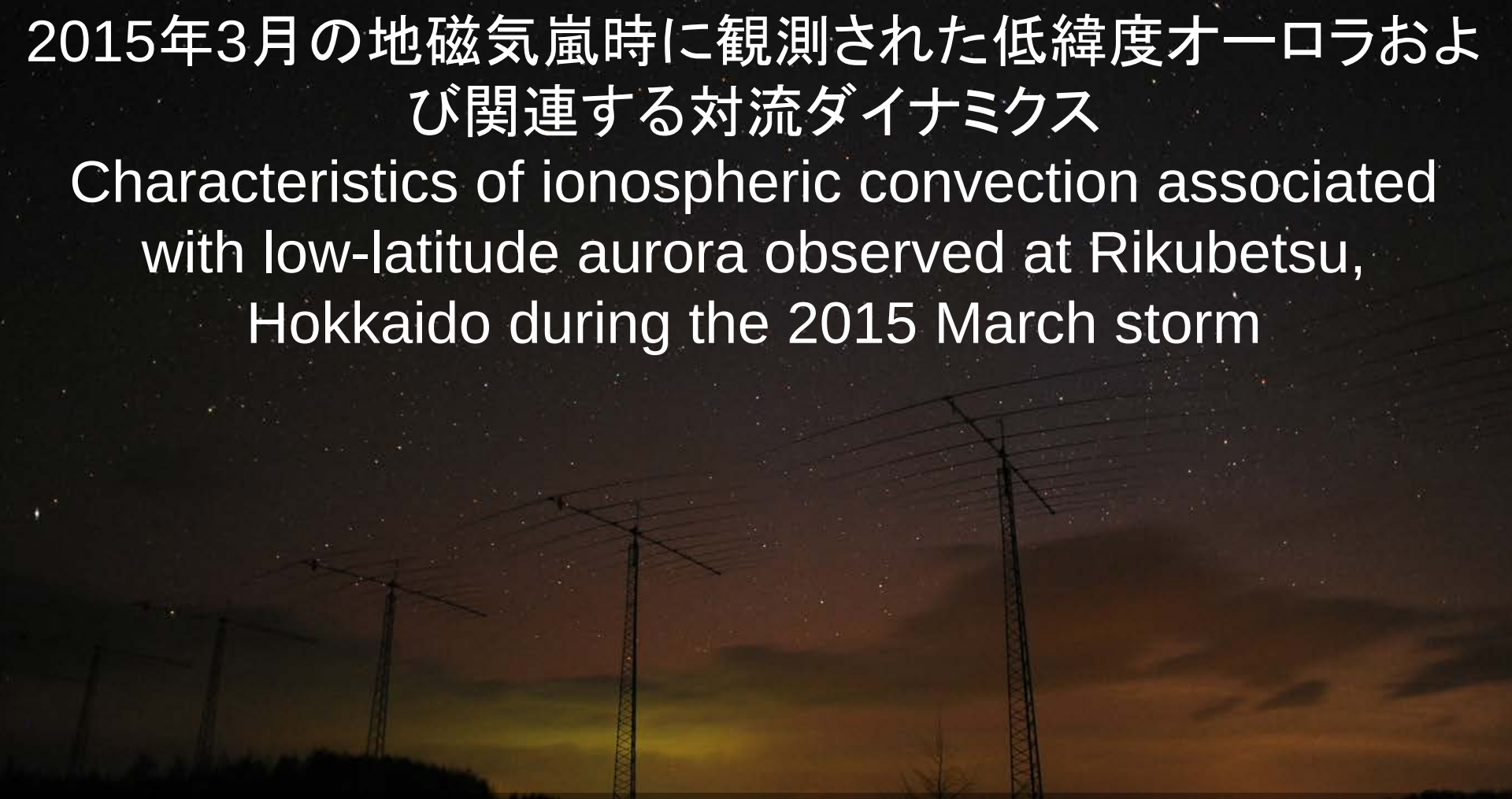
NLC at Rikubetsu
(further expanded, 1725 UT, 20 June 2015)

# 2015年3月の地磁気嵐時に観測された低緯度オーロラおよび関連する対流ダイナミクス

# Characteristics of ionospheric convection associated with low-latitude aurora observed at Rikubetsu, Hokkaido during the 2015 March storm



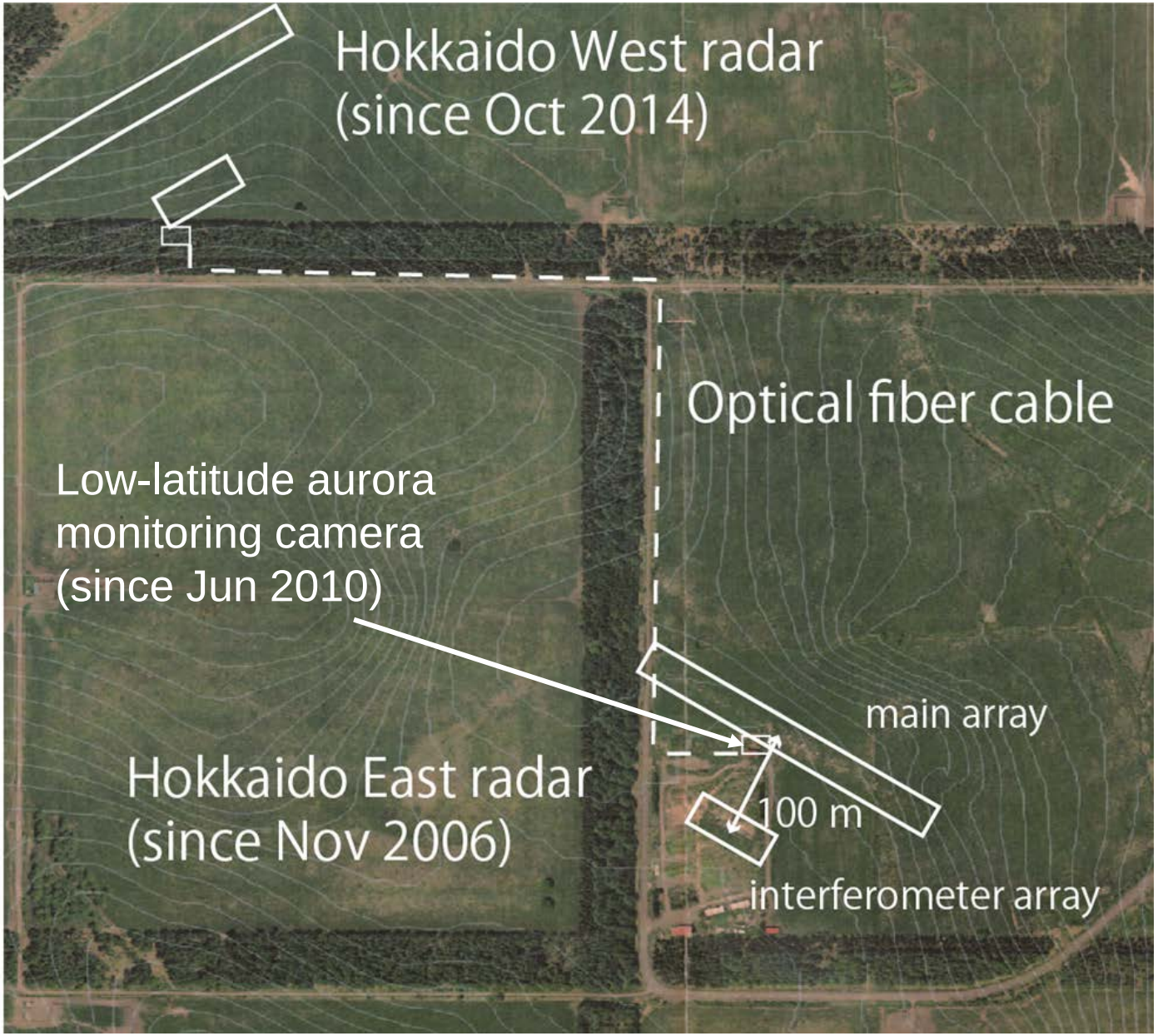
Nozomu Nishitani[1], Tomoaki Hori[1], Ryuho Kataoka[2], Yusuke Ebihara[3], Kazuo Shiokawa[1], Yuichi Otsuka[1], and Hidehiko Suzuki[4]

1 STEL, Nagoya Univ. 2. NIPR 3. RISH, Kyoto Univ.

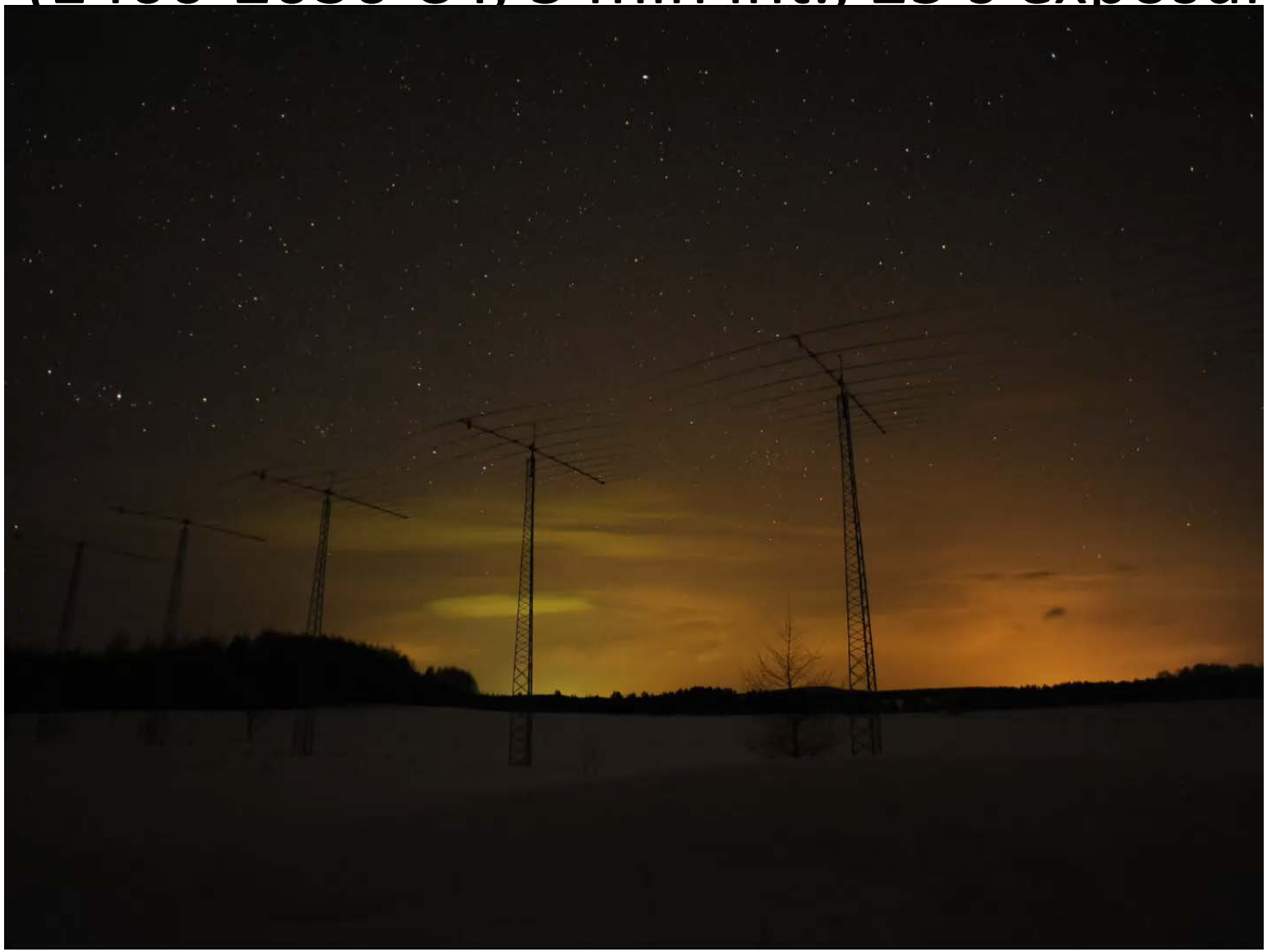
4. Meiji Univ.

Low latitude aurora behind the SuperDARN HOP East radar (2015.3.18 0110 JST)

# Hokkaido East / West radars

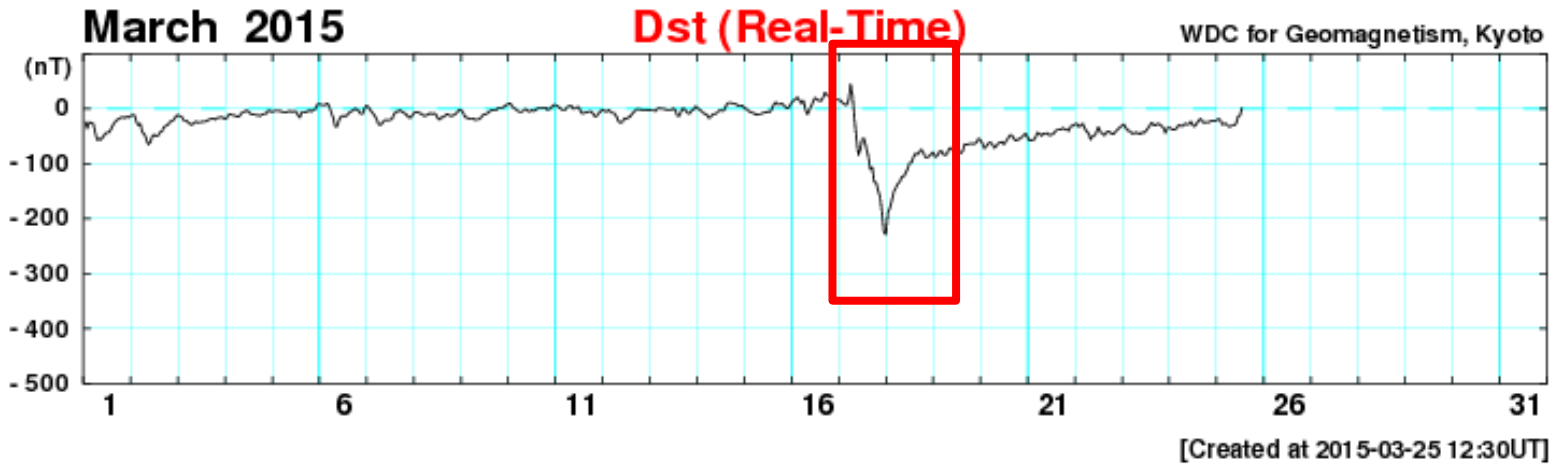


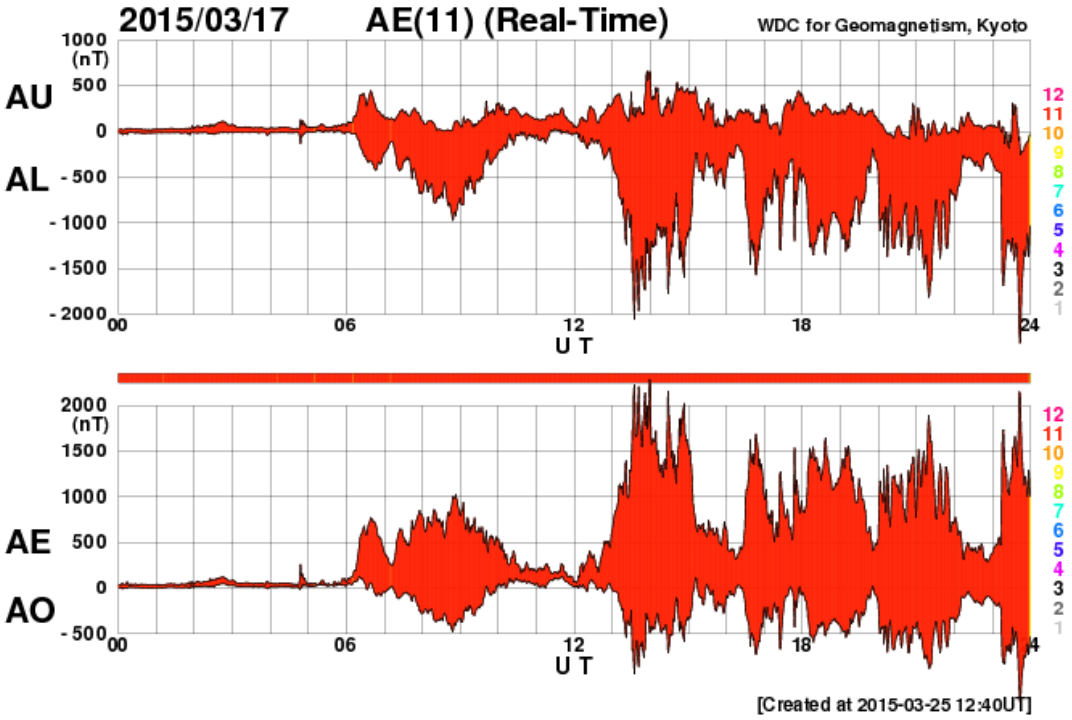
# Aurora photographed at Rikubetsu radar site (1400-2030 UT, 5 min int., 25 s exposure)



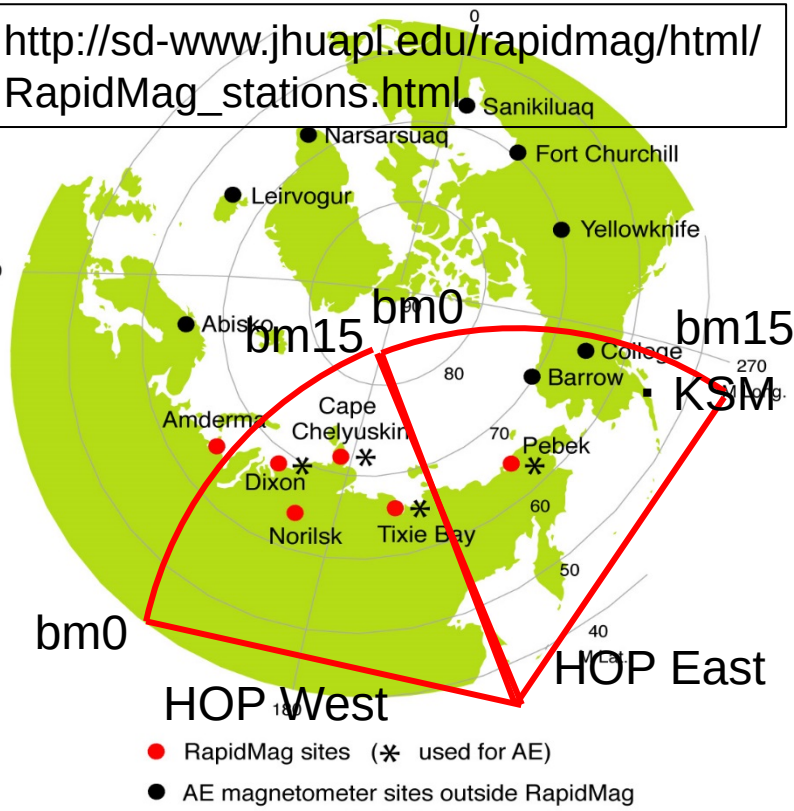
Camera: Nikon D700 ISO-3200, F/2.8

# Rikubetsu aurora Event: 17 Mar 2015

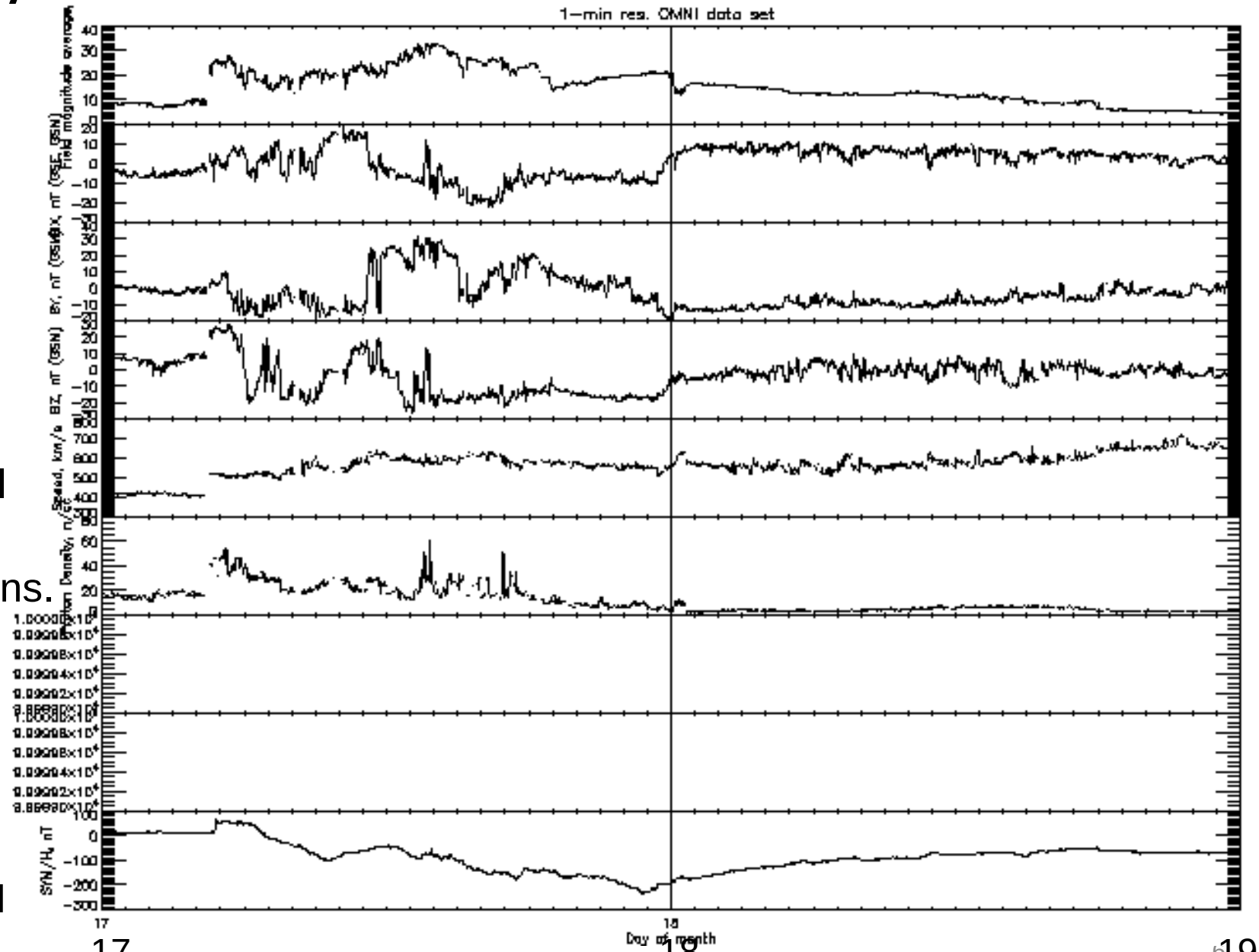


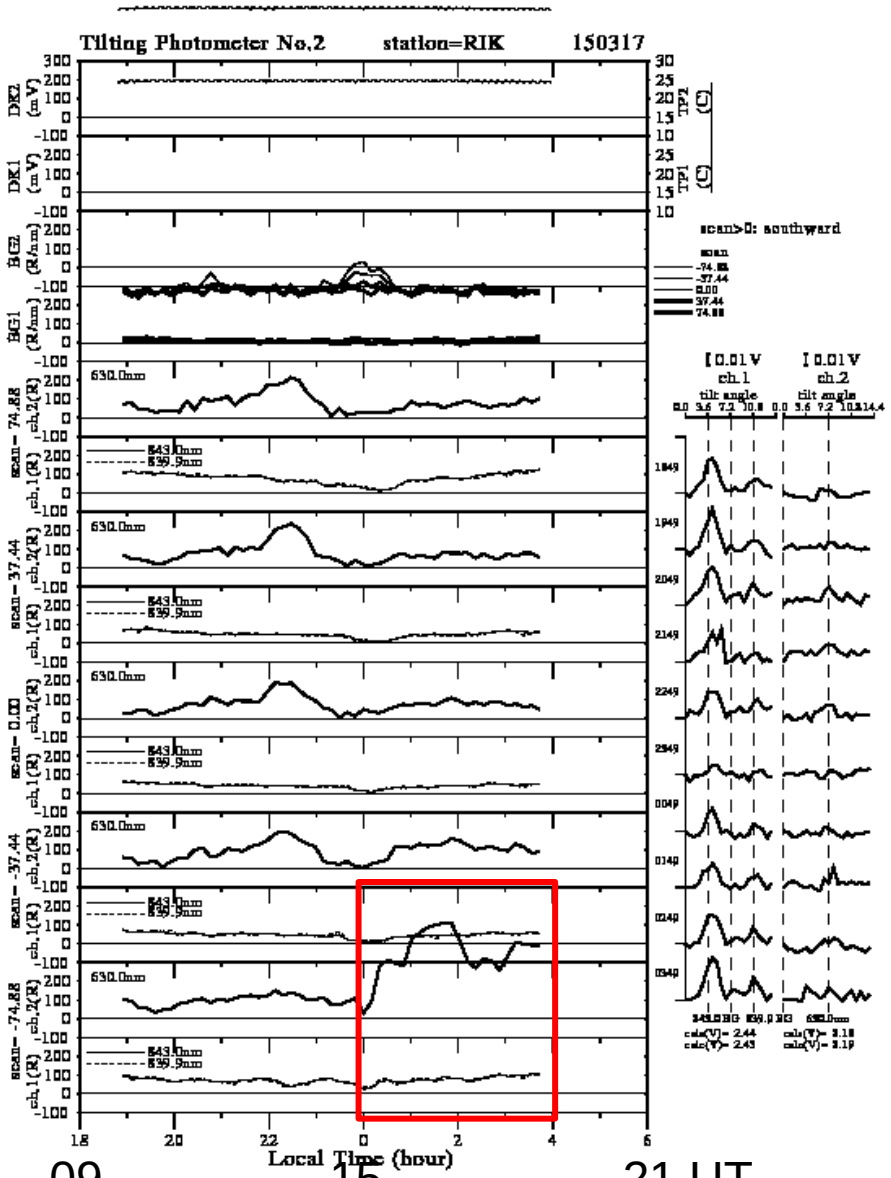

http://sd-www.jhuapl.edu/rapidmag/html/RapidMag_stations.html



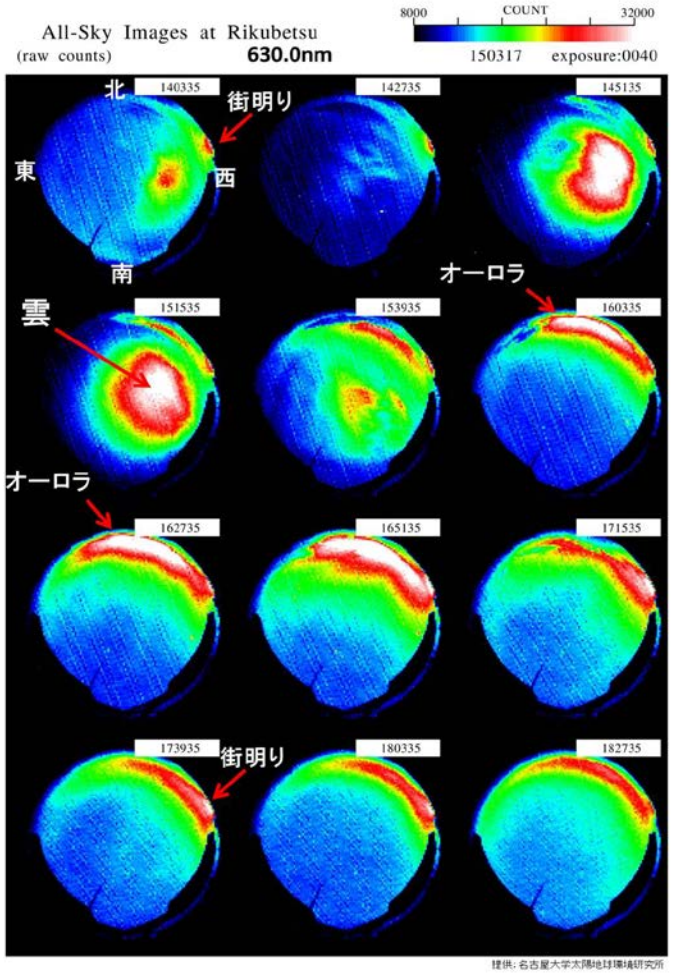
# IMF / solar wind data for 17-18 March 2015



# Tilting photometer / camera data

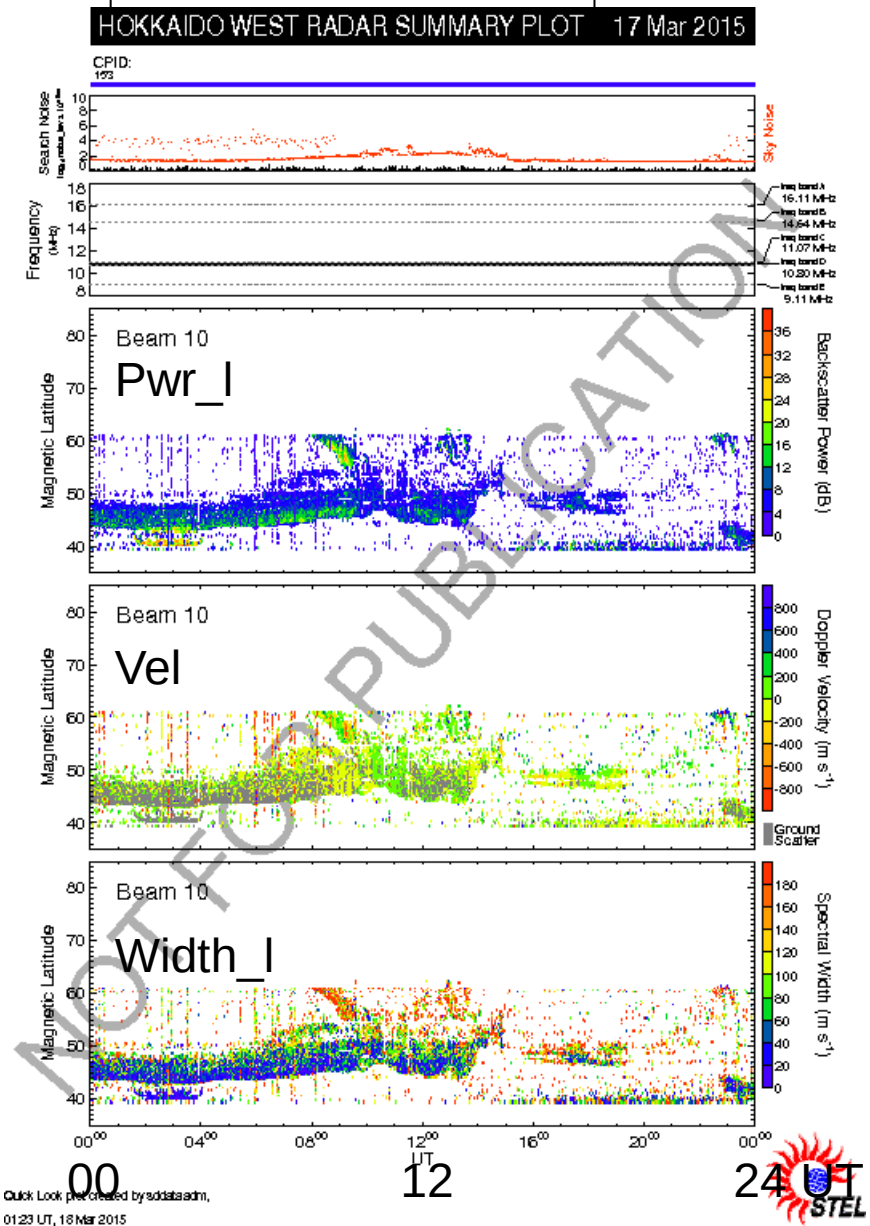



- Auroral emission enhancements at 15 elev occurred at about 1600 and 1800 UT

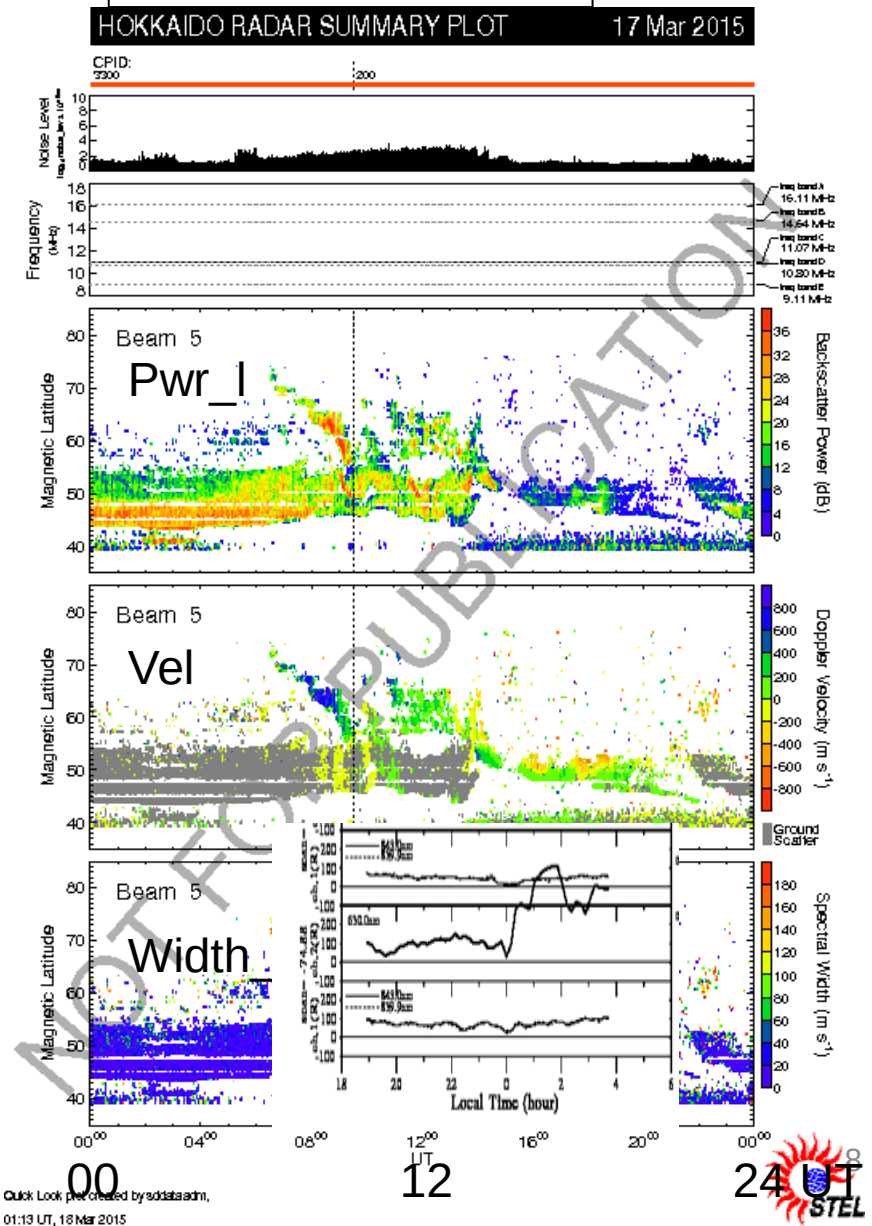


# HOP West / East quicklook plots

HOP West beam 10




HOP East beam 5



# Discussion

- Fast (500 – 1000 m/s) equatorward flow during the first appearance of low-latitude aurora
  - Dawn-dusk electric field penetration to < 50 ML
  - Plasma sheet electrons transported inward to ring current regions?
- Auroral emission boundary is located around the boundary between moderately fast (~500/s) westward flow region (equatorward side) and fast (1000 m/s) eastward flow (poleward side), sometimes accompanied by another westward flow further poleward of the eastward flow
  - Electric field structure maintained to keep the auroral emission?

JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 99, NO. A6, PAGES 11,429–11,439, JUNE 1, 1994

# Coordinated stable auroral red arc observations: Relationship to plasma convection

J. C. Foster and M. J. Buonsanto

Atmospheric Sciences Group, Massachusetts Institute of Technology Haystack Observatory, Westford

M. Mendillo and D. Nottingham

Astronomy Department, Boston University, Boston, Massachusetts

F. J. Rich and W. Denig

Geophysics Division, Phillips Laboratory, Hanscom Air Force Base, Massachusetts

out the local time range 18 - 02 MLT. The convection feature seen in association with the SAR arc had many of the characteristics of a subauroral ion drifts (SAID) event; we report here the first long duration observations of a colocated SAID/SAR arc event. A narrow ionospheric trough developed

The optical/radar study of *Mendillo et al.* [1987] clearly showed the SAR arc/trough association, but did not report any associated enhancement in the convection velocity. Millstone Hill azimuth scan data for that event (unpublished) show that the faint, morning-sector SAR arc (04 MLT) was colocated with a 3°-wide residual region of 250 m $s^{-1}$ westward convection, situated equatorward of the 500 m $s^{-1}$ eastward (sunward) convection at auroral latitudes.

# Summary

- Ionospheric / magnetospheric disturbances during the March 2015 storm event accompanied by low-latitude aurora in Hokkaido
  - Flow shear structure near the auroral emission boundary (equatorward side:~500 m/s westward flow, poleward side: ~1000 m/s eastward flow, sometimes accompanied by westward flow on the poleward side)
  - Fast(500-1000 m/s) equatorward flow around the initial appearance of low latitude aurora
  - Disturbance dynamo effects
  - Etc.
- Global dynamics of ionospheric convection (in combination with other SuperDARN radars) is very interesting (see the movie)