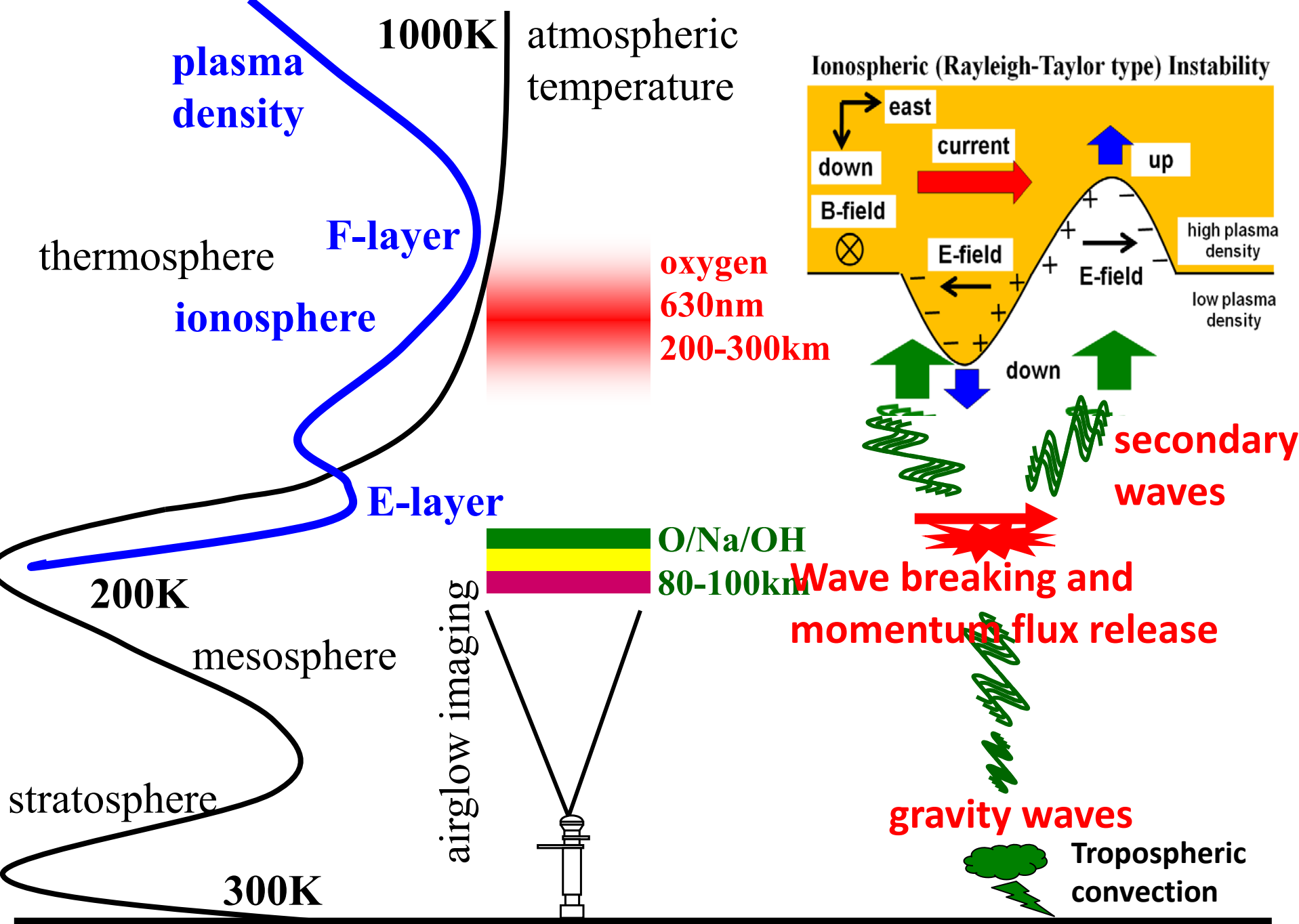


Current status and plan of the Optical Mesosphere Thermosphere Imagers (OMTIs)

**Kazuo Shiokawa
Solar–Terrestrial Environment
Laboratory, Nagoya University**

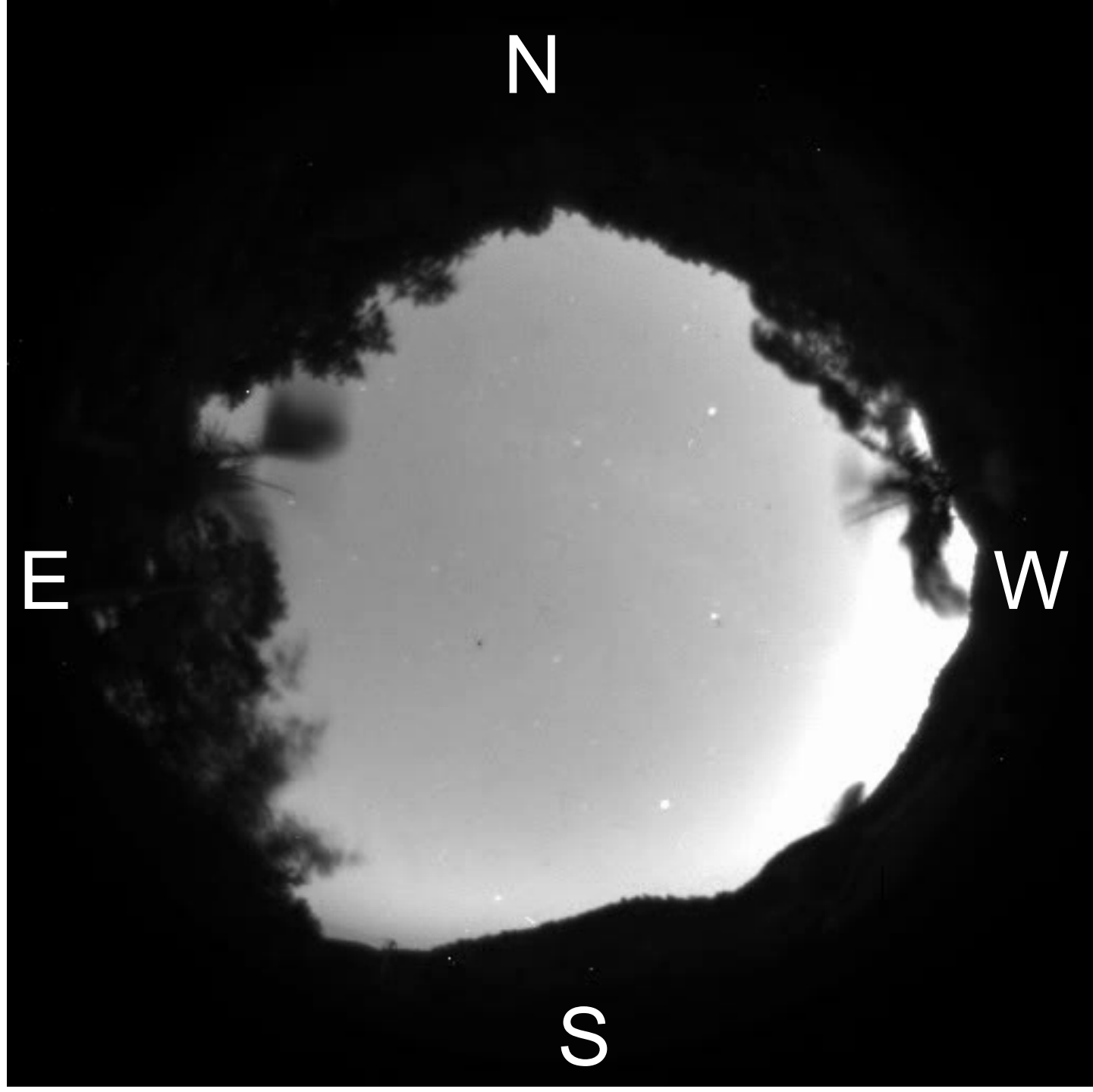


**plasma
bubble**

**Sata,
Japan**

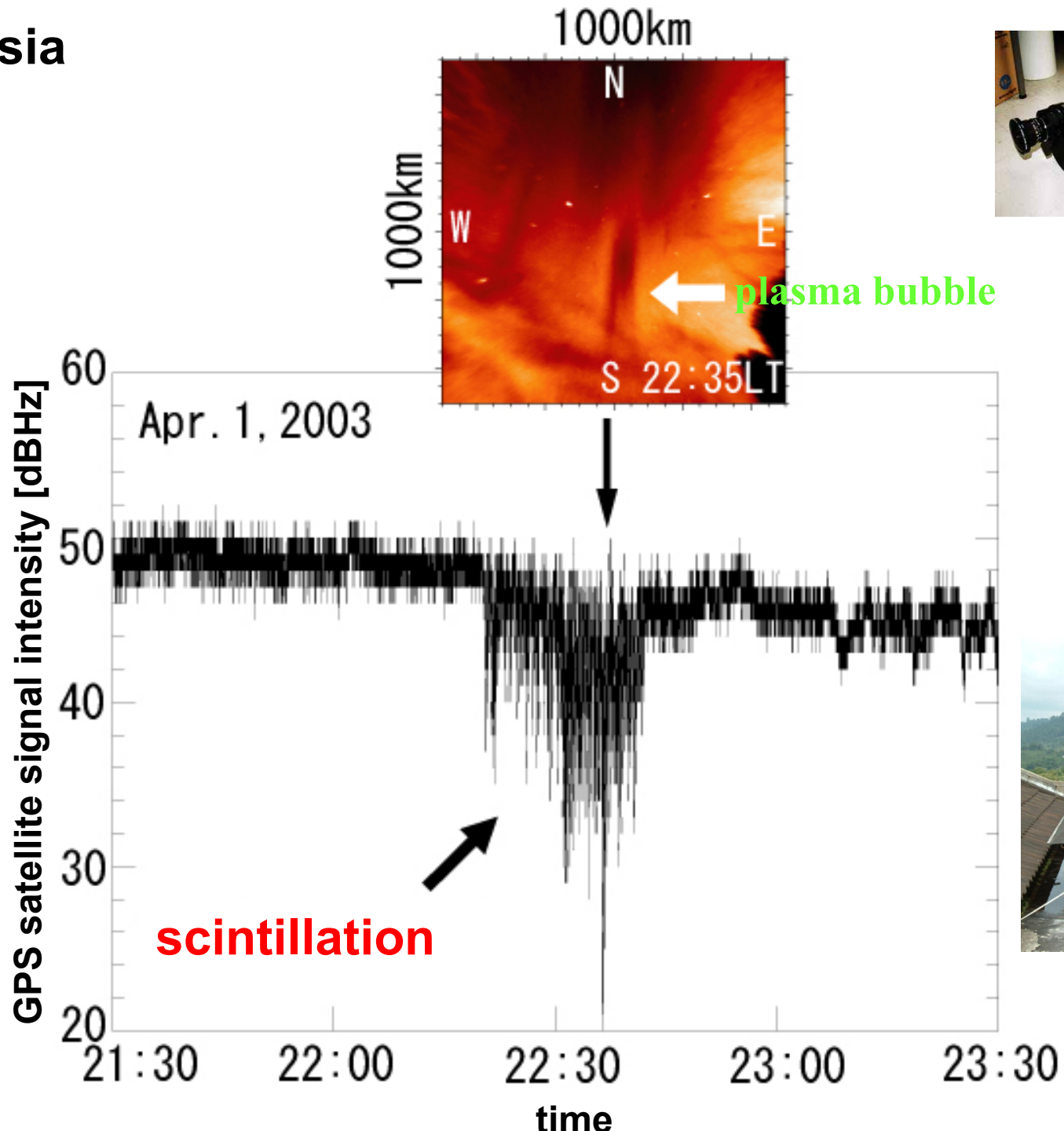
**November
12, 2001**

630nm

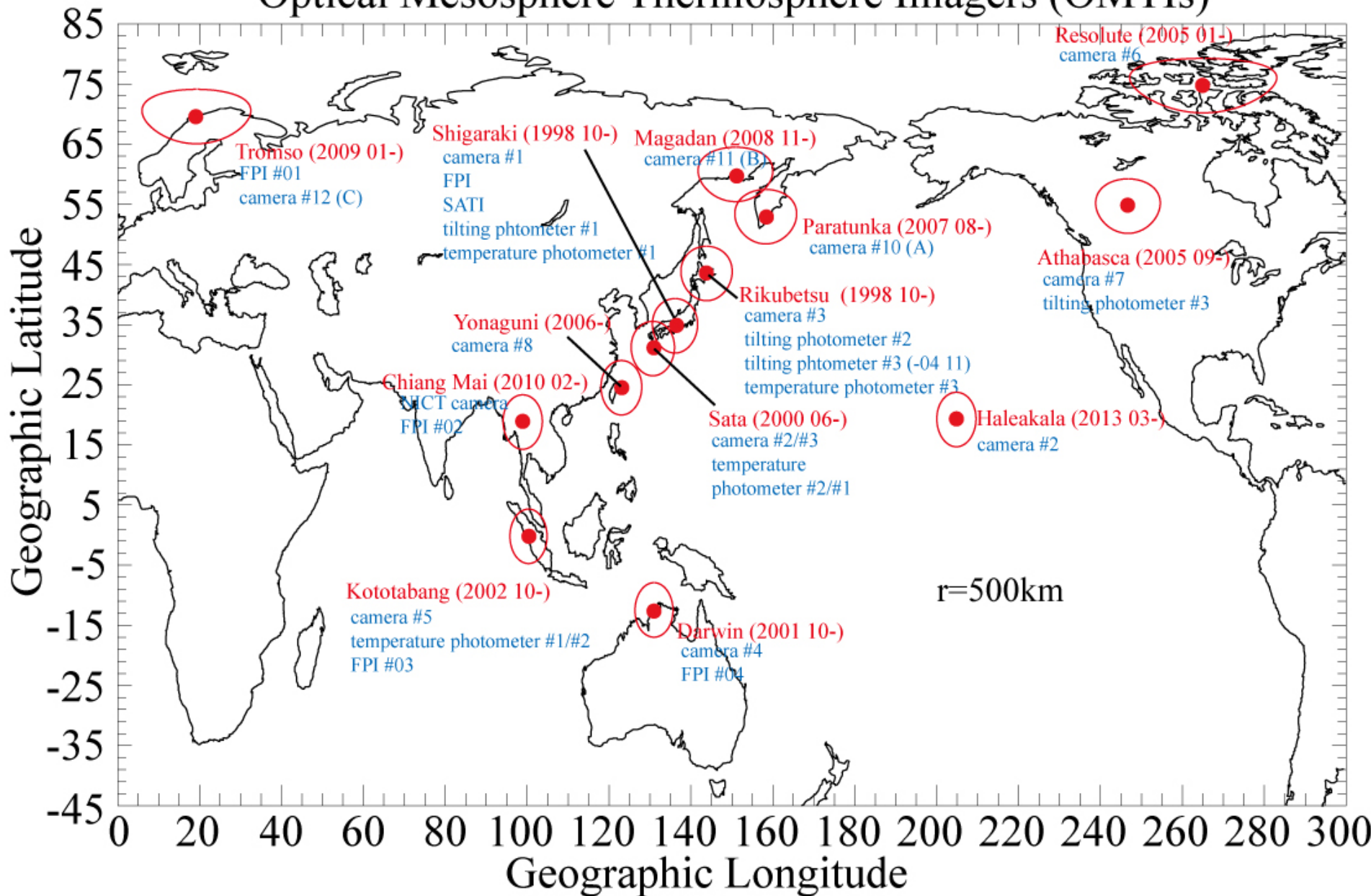


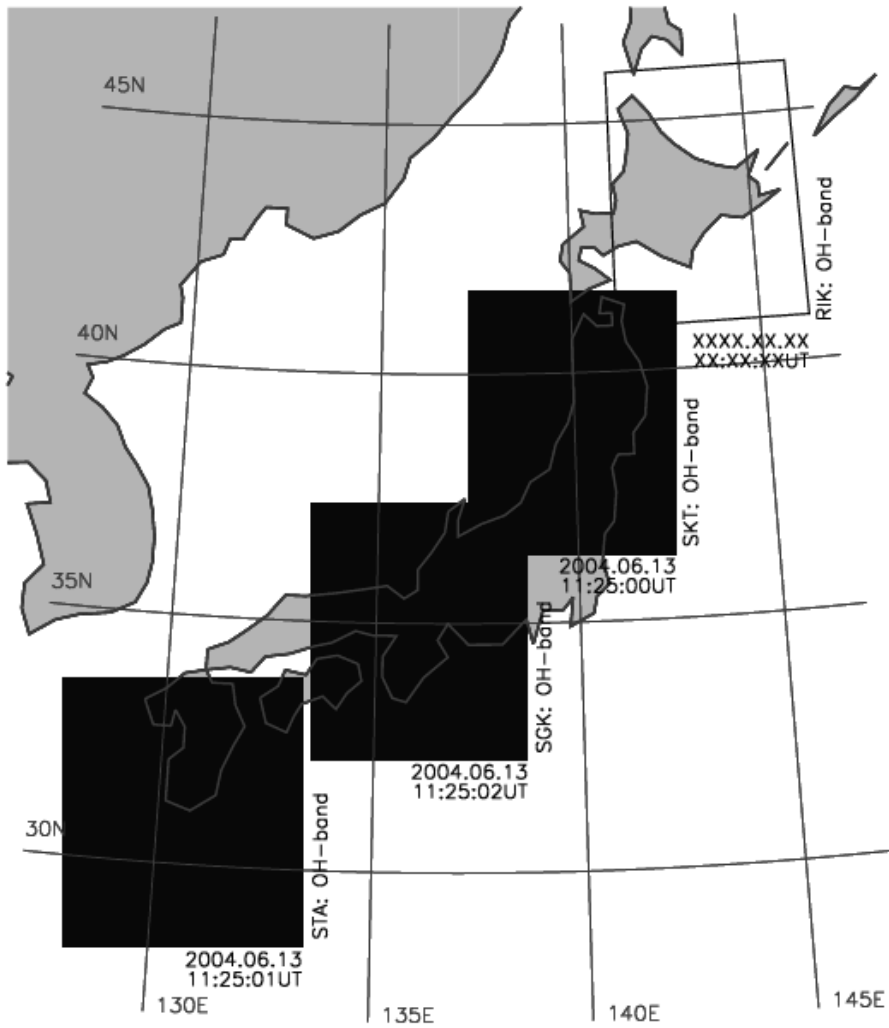
Otsuka et al.
[GRL, 2002]

Indonesia

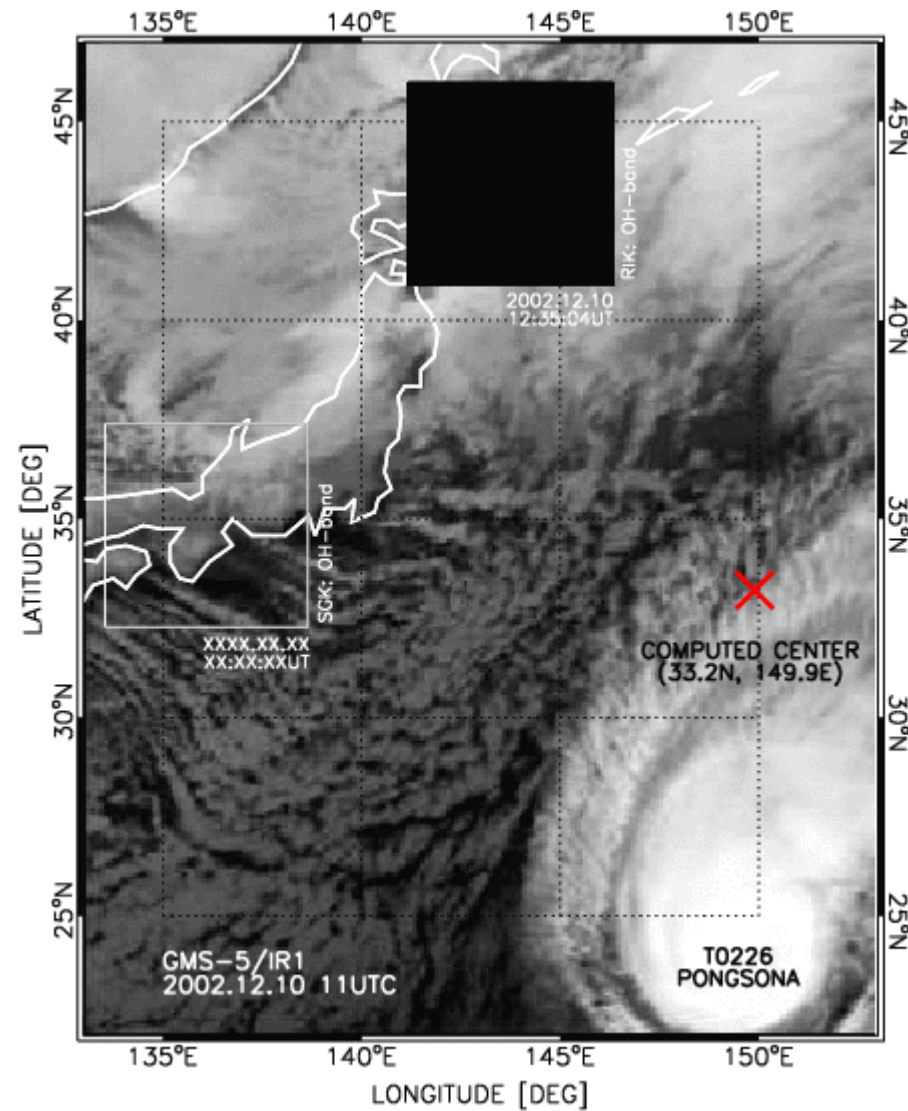


Optical Mesosphere Thermosphere Imagers (OMTIs)



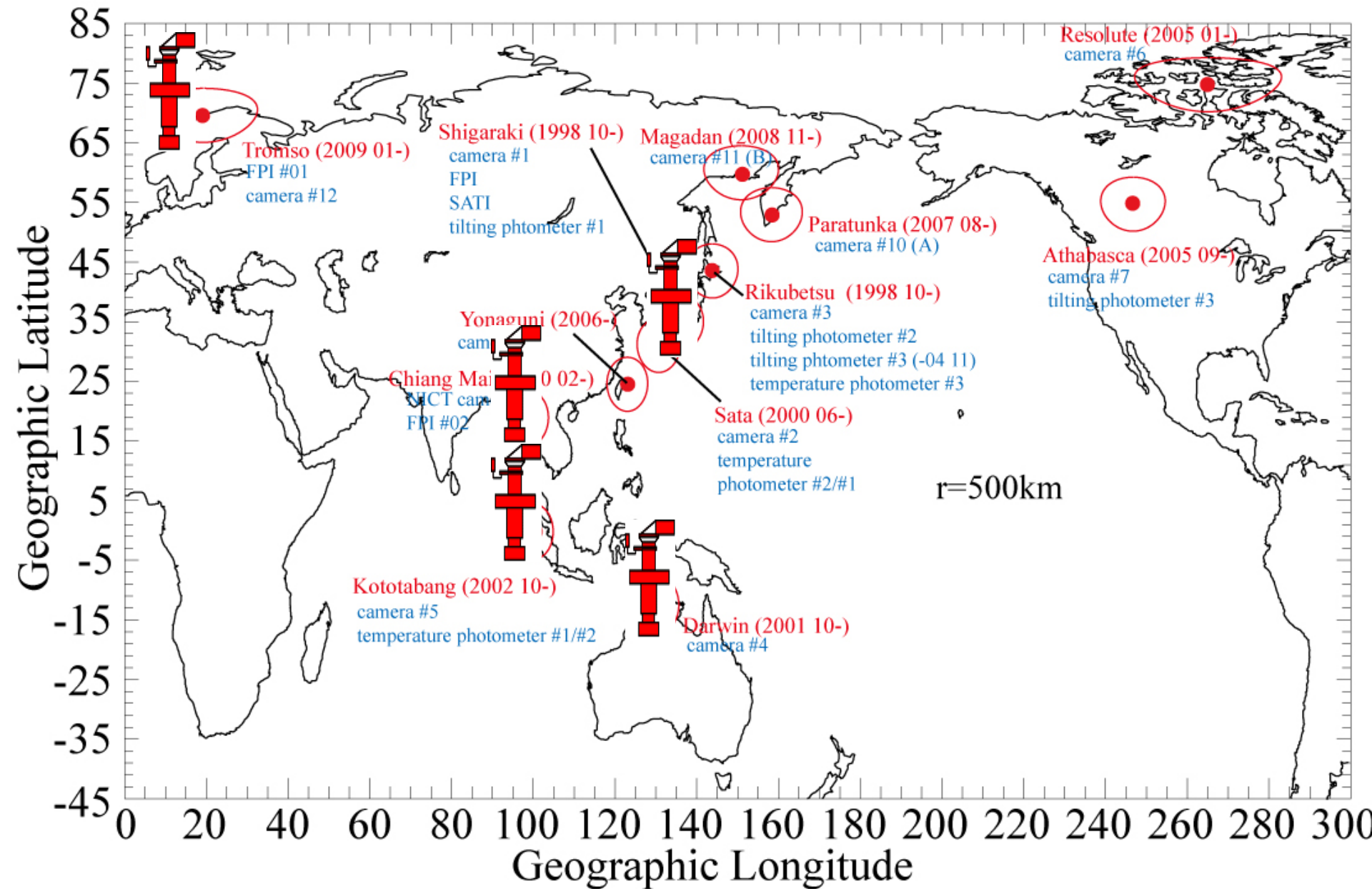


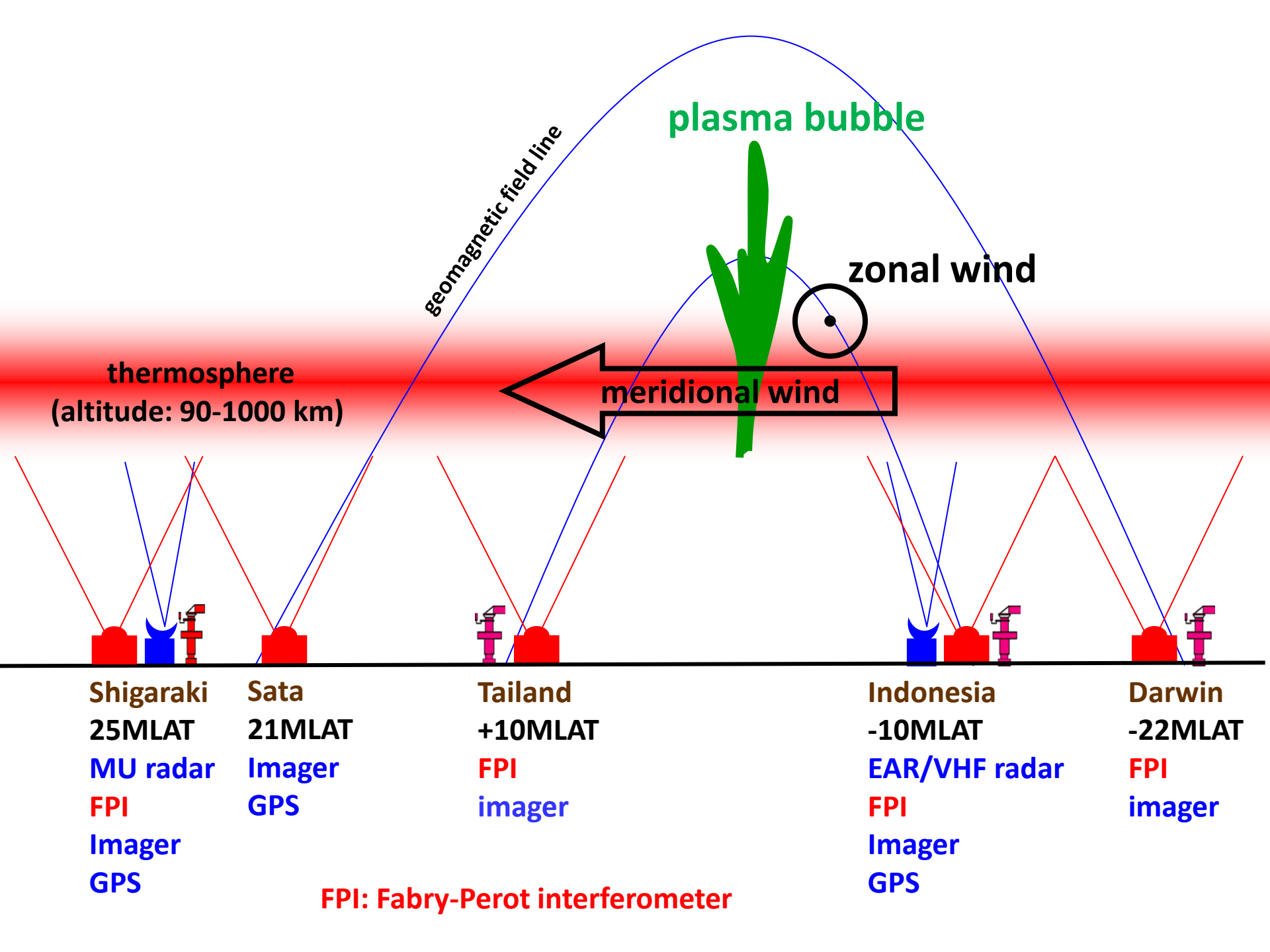
Suzuki et al. (GRL, 2013)



Suzuki et al. (in preparation)

Development of Fabry-Perot interferometers





thermosphere
(altitude: 90-1000 km)

geomagnetic field line

plasma bubble

zonal wind

meridional wind

Shigaraki
25MLAT
MU radar
FPI
Imager
GPS

Sata
21MLAT
Imager
GPS

Thailand
+10MLAT
FPI
imager

Indonesia
-10MLAT
EAR/VHF radar
FPI
Imager
GPS

Darwin
-22MLAT
FPI
imager

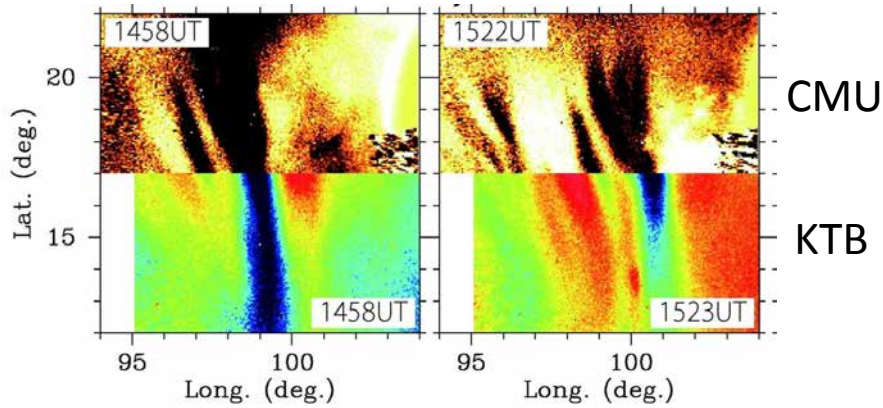
FPI: Fabry-Perot interferometer



Setup of an all-sky imager and a Fabry-Perot interferometer at Kototabang, Indonesia in collaboration with Kyoto Univ., Japan and LAPAN, Indonesia.

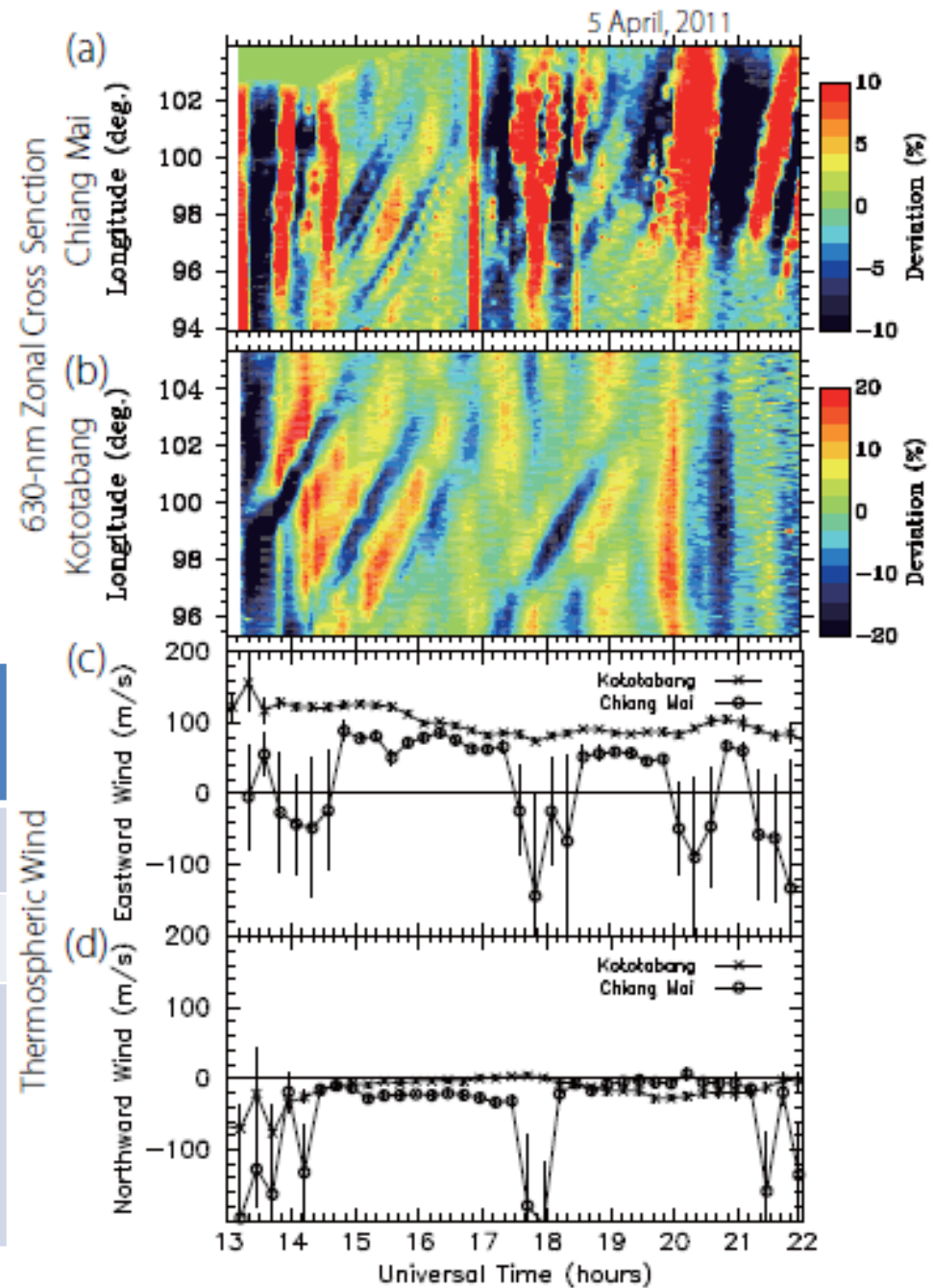


Setup of an all-sky imager and a Fabry-Perot interferometer at Chiang Mai, Thailand in collaboration with NICT, Japan and Chiang Mai Univ., Thailand.

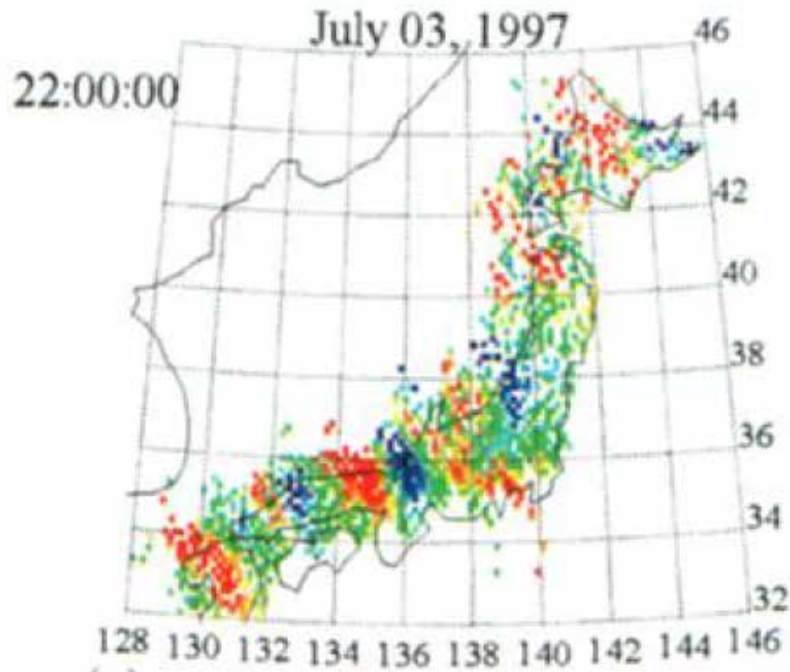


$$v' = \frac{\sum_N u_N + \sum_S u_S}{\sum_N + \sum_S}$$

	$\Sigma_N(S)$	$\Sigma_S(S)$	v' m/s	V m/s
200-300km	0.94	1.46	93	119
210-260km	0.38	0.71	94	119
210-260km (Ne from ionosonde observation)	1.79	2.03	92	119

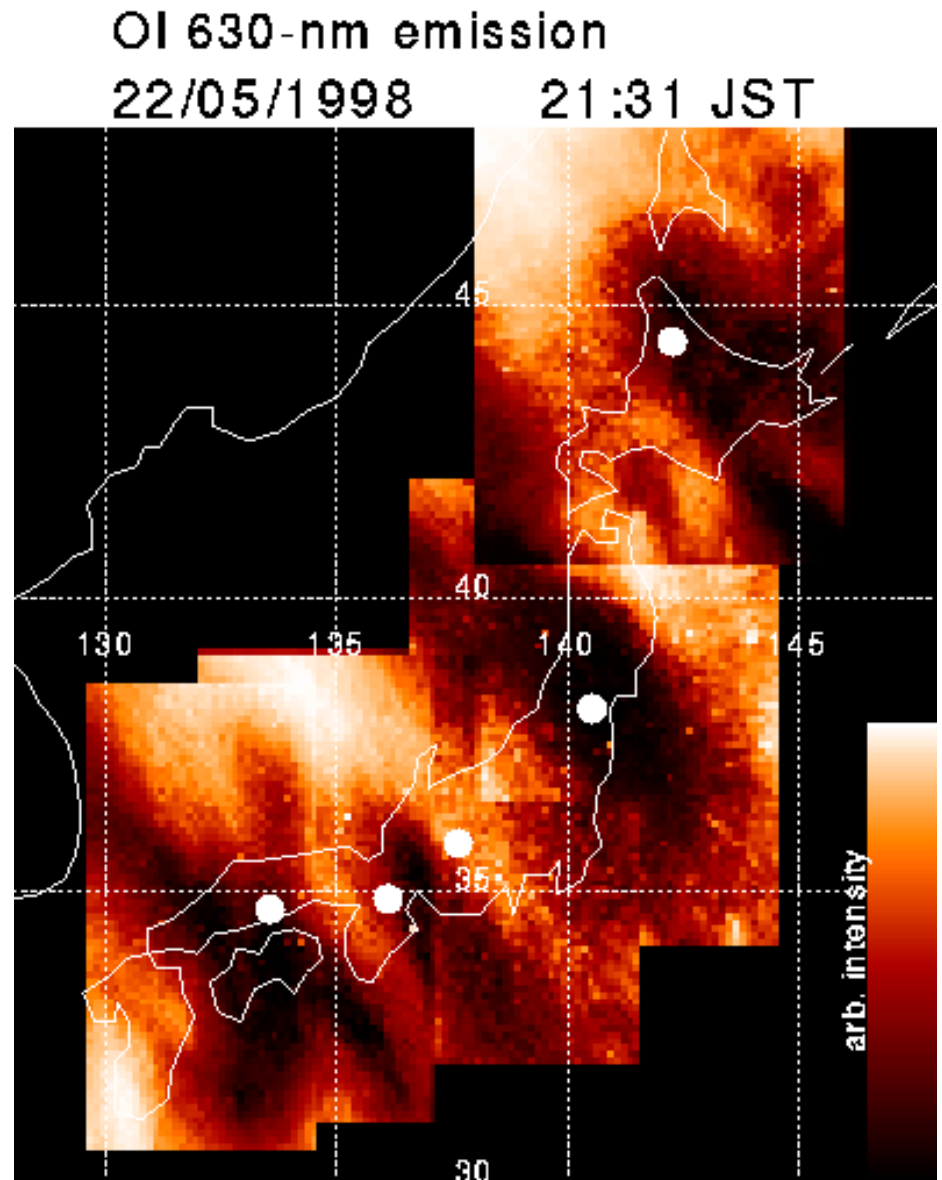


Medium-Scale Traveling Ionospheric Disturbances (MSTIDs)

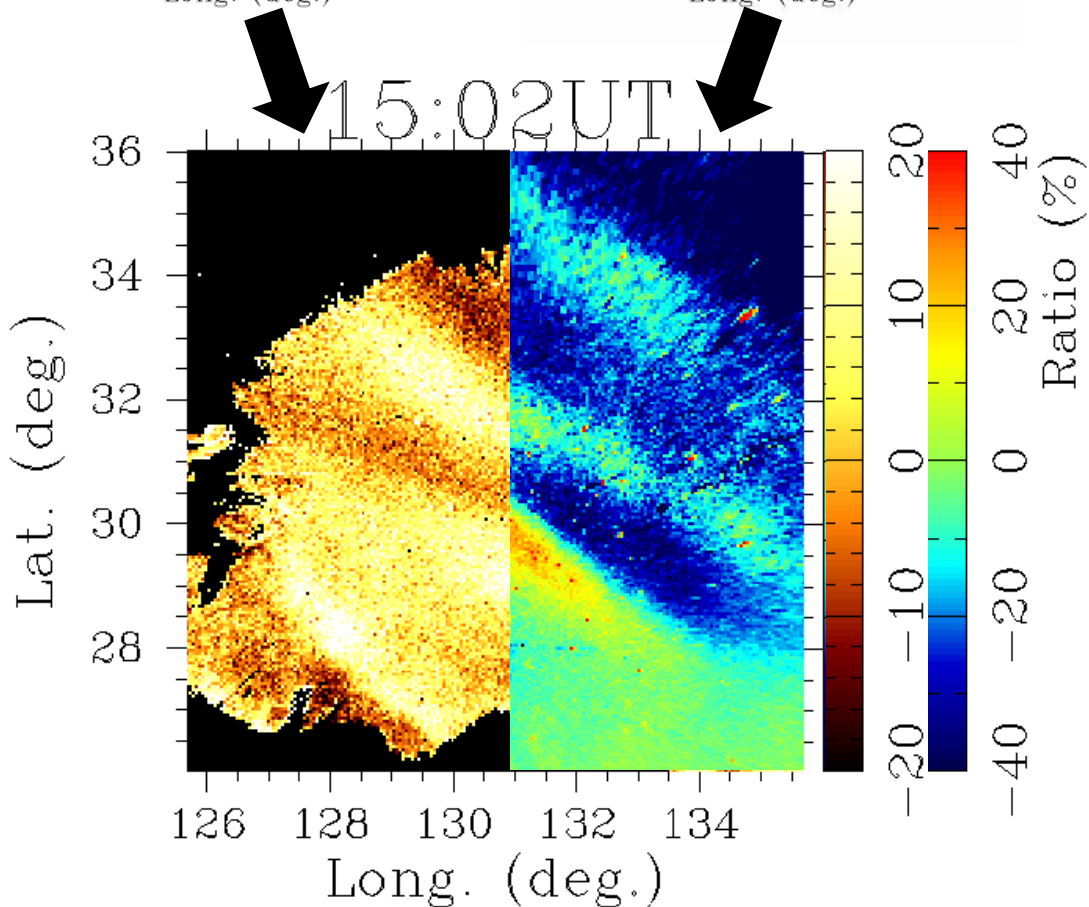
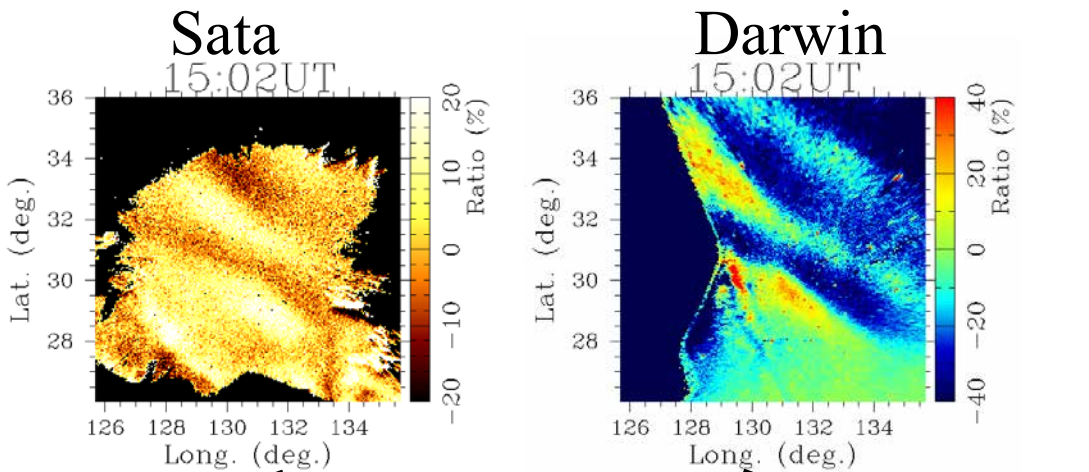


(c)

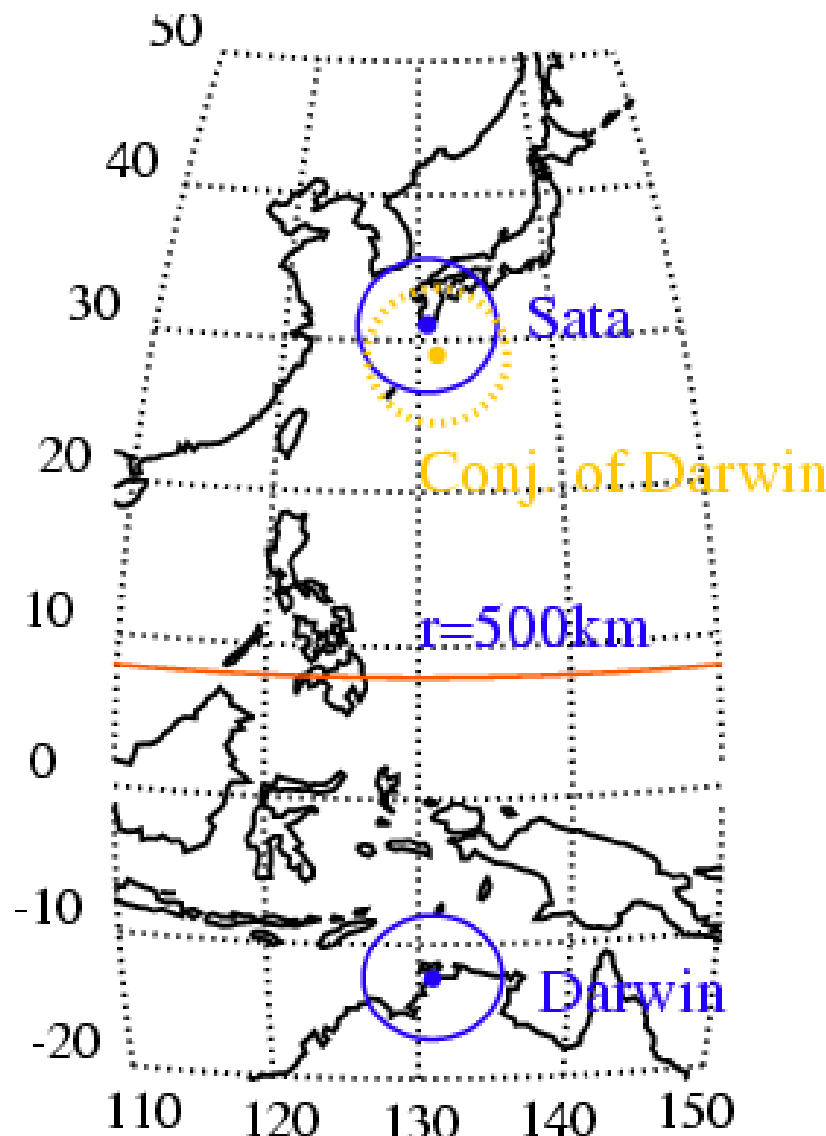
Saito et al. (GRL, 1998)



Kubota et al.(GRL, 2000); Saito et al. (GRL, 2001)



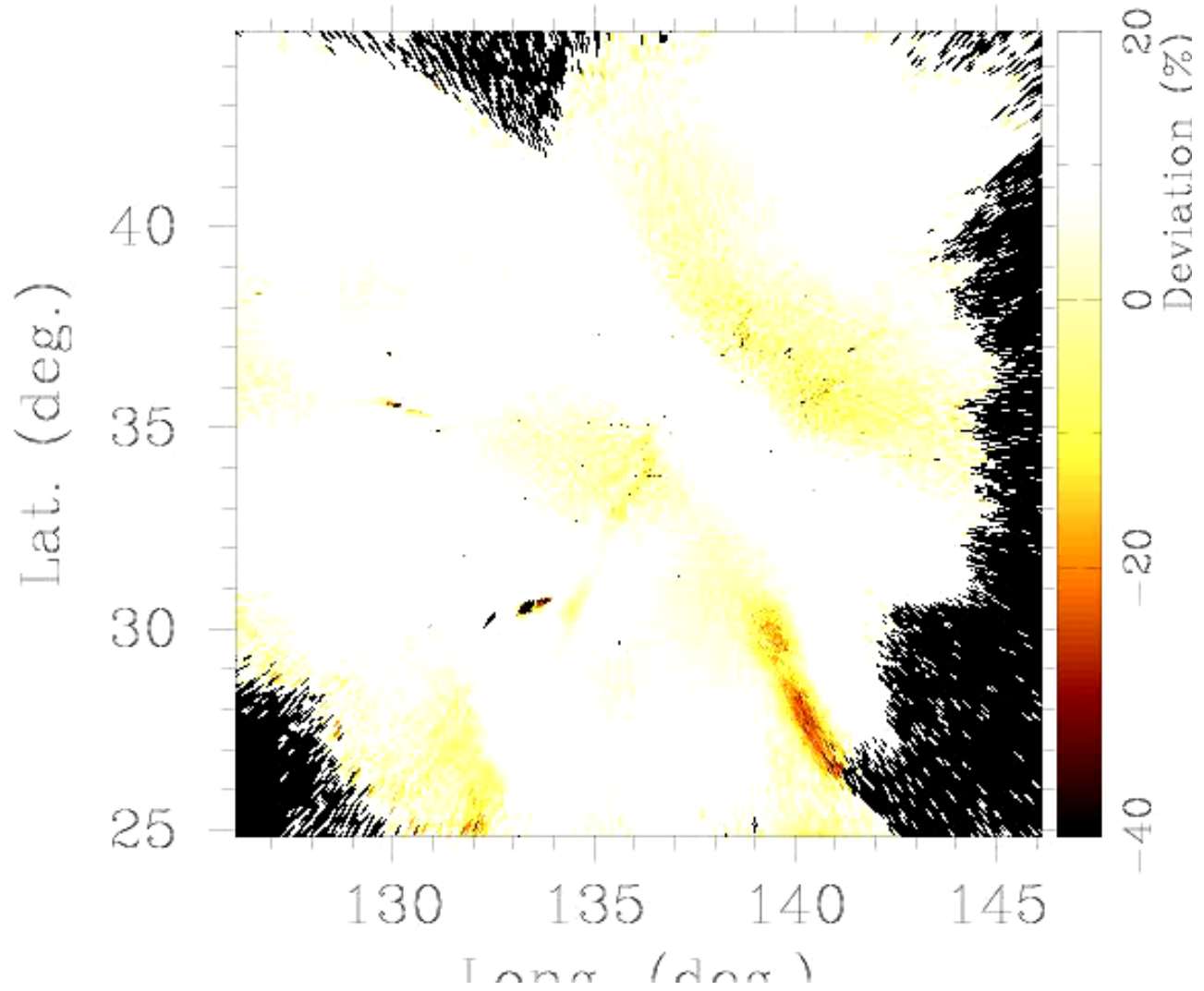
Conjugacy of MSTIDs



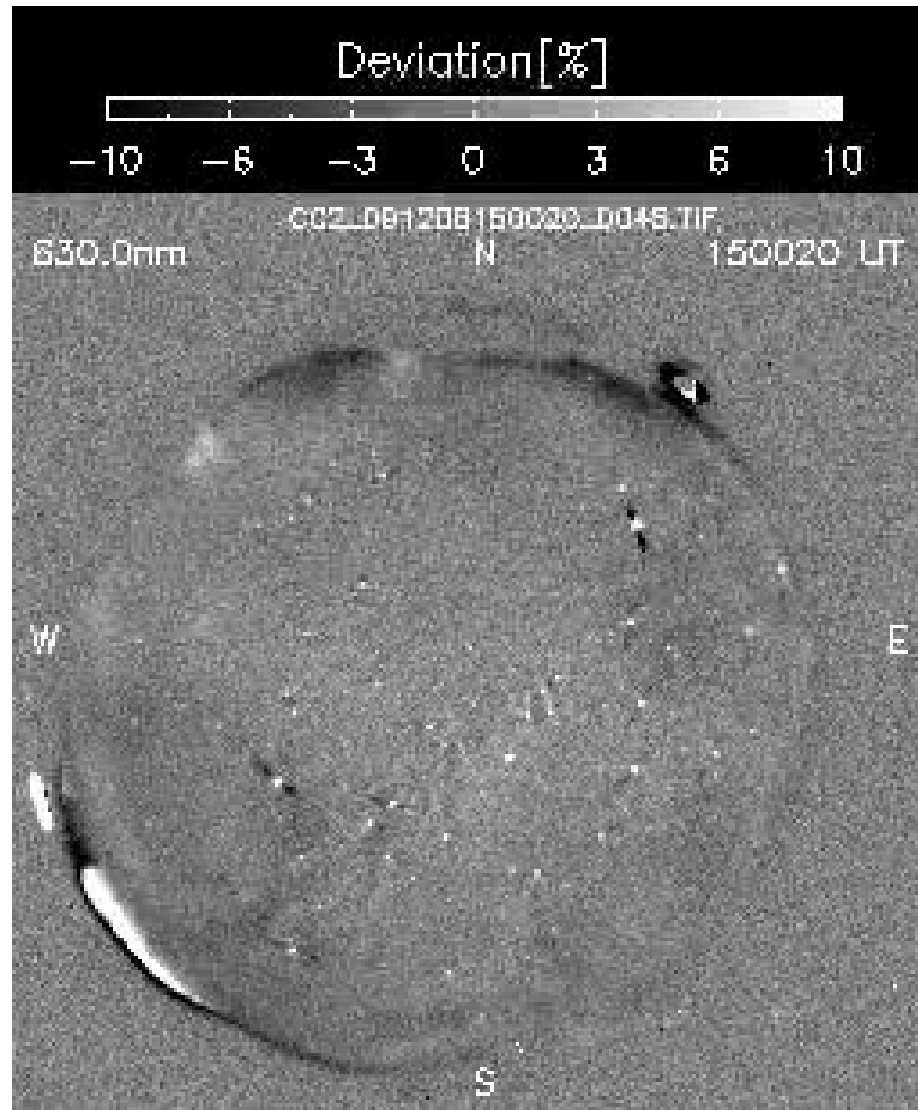
Otsuka et al. (GRL, 2004)

Collision between equatorial plasma bubbles and mid-latitude MSTIDs

11:57LT



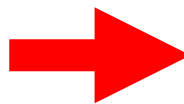
MSTID oscillation associated with auroral brightening at Tromsø, Norway



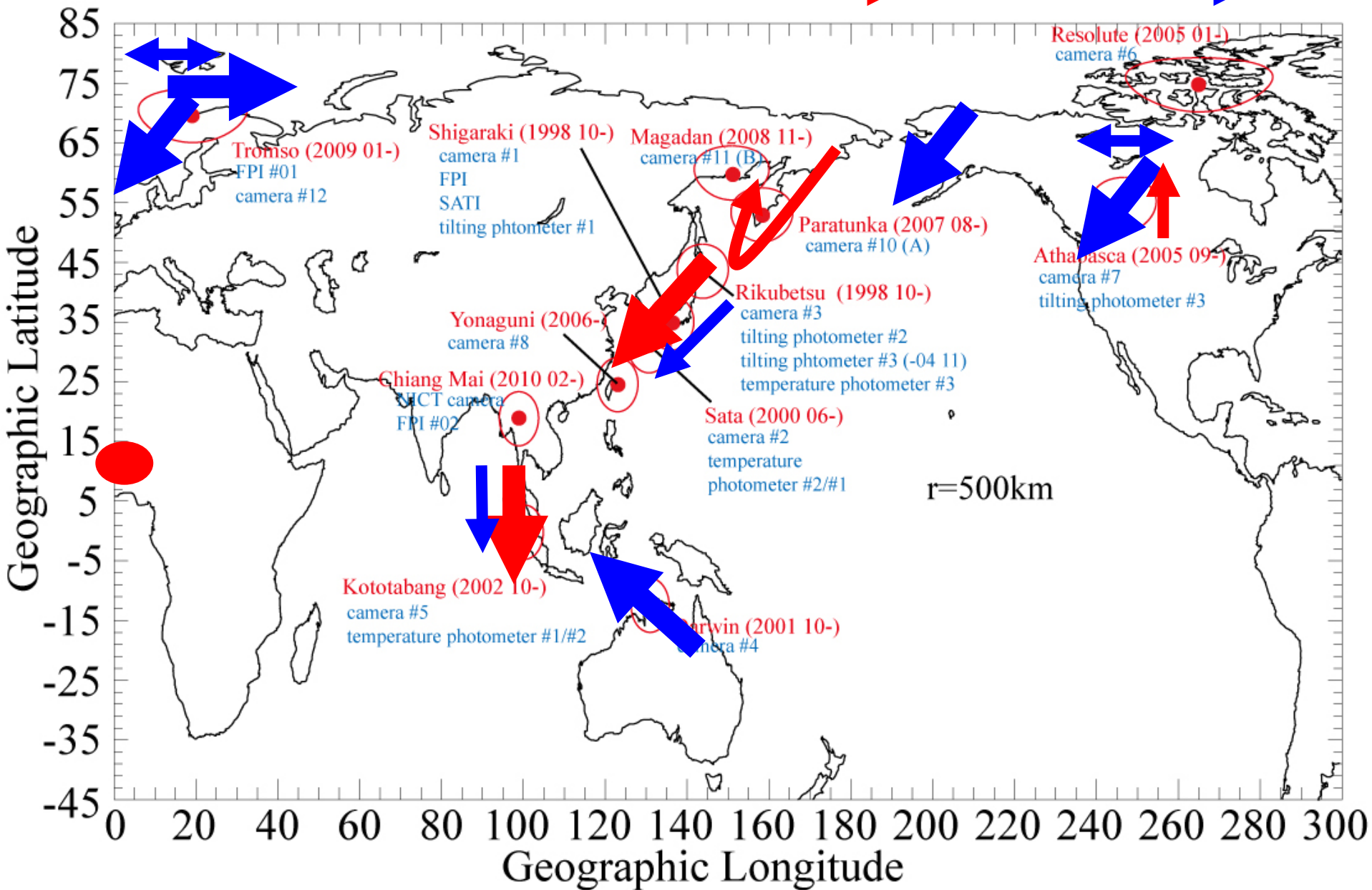
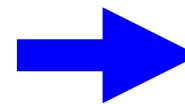
Shiokawa et al. (JGR, 2012)

MSTID direction of motion (summary)

summer



winter



Summary

- The **Optical Mesosphere Thermosphere Imagers (OMTIs)** consist of thirteen **all-sky cooled-CCD imagers**, five **Fabry-Perot interferometers (FPIs)**, three meridian scanning photometers, and four airglow temperature photometers.
- They measure **two-dimensional pattern, Doppler wind, and temperature** through airglow emissions in the **mesopause region (80–100 km)** and in the **thermosphere/ionosphere (200–300 km)**.
- They are in automatic operation at **13 stations** in Australia, Indonesia, far-east Russia, Japan, Canada, Norway, Thailand, and Hawaii.
- Various interesting results have been obtained for **equatorial plasma bubbles and traveling ionospheric disturbances**.
- Station information and quick look plots are available at <http://stdb2.stelab.nagoya-u.ac.jp/omti/>.
- We plan to install one airglow imager in **Nigeria in 2014**.

The Ionosphere (IRI model)

maximum electron density of the F₂-layer

F10.7 = 180.
MMDD = 0921
LT = 12.0

