

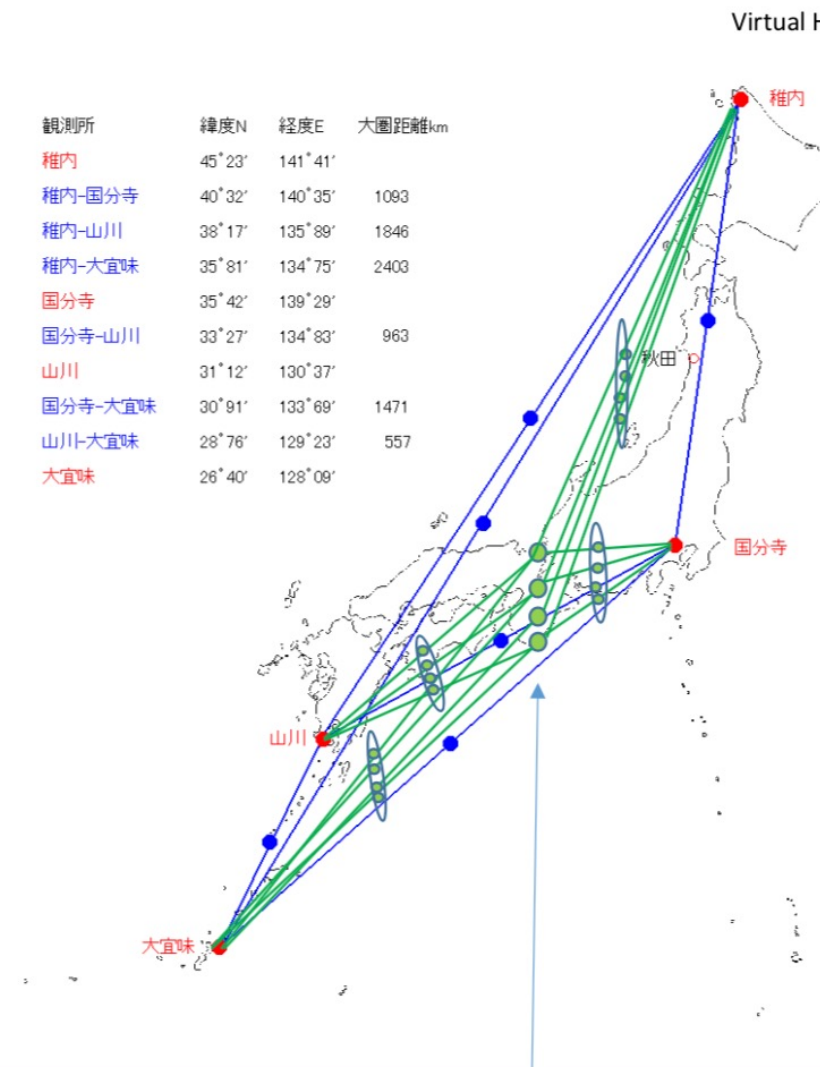
# On Ionospheric Anomalies Just before the M7.6 Ishikawa- Noto Earthquake on Jan. 1, 2024 (Oblique Ionogram Observation)

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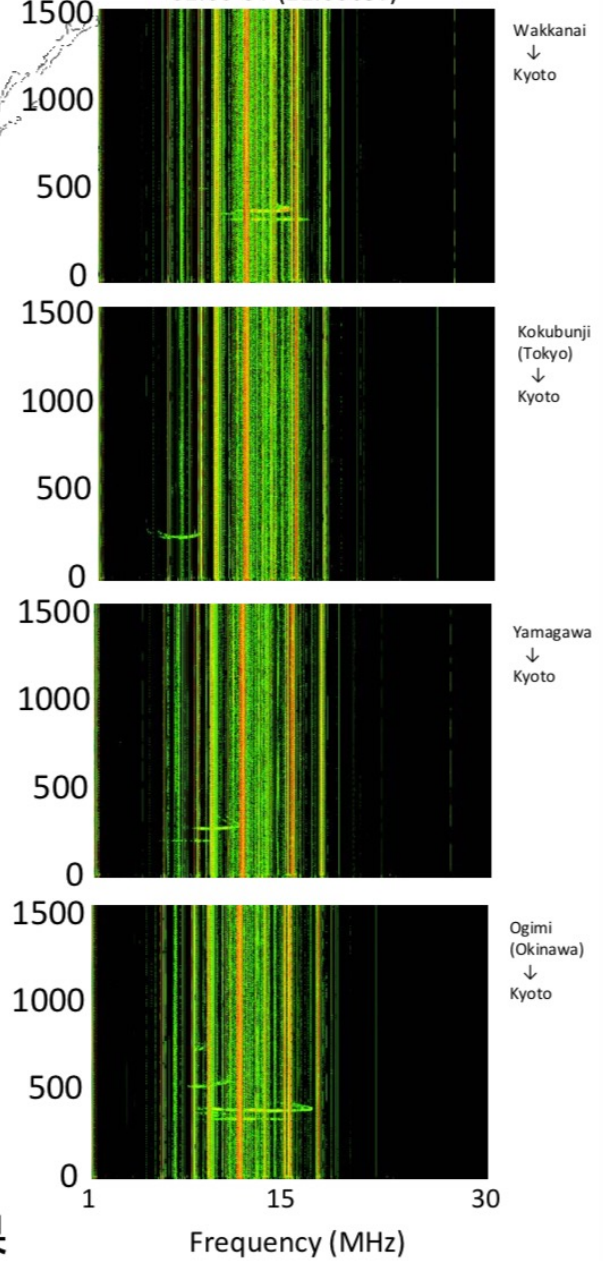
(JANUARY 1, 2024)

Wakkanai(NICT)→Shionomisaki(Kyoto U)Olique ionosonde  
observation clarifies ionosphere over Noto-Area, Ishikawa  
Prefecture, Japan.

観測所	緯度N	経度E	大圏距離km
稚内	45°23'	141°41'	
稚内-国分寺	40°32'	140°35'	1093
稚内-山川	38°17'	135°89'	1846
稚内-大宜味	35°81'	134°75'	2403
国分寺	35°42'	139°29'	
国分寺-山川	33°27'	134°83'	963
山川	31°12'	130°37'	
国分寺-大宜味	30°91'	133°69'	1471
山川-大宜味	28°76'	129°23'	557
大宜味	26°40'	128°09'	



Oblique Ionogram  
Kwasan, Nov. 7, 2018  
02:00 UT (11:00 JST)



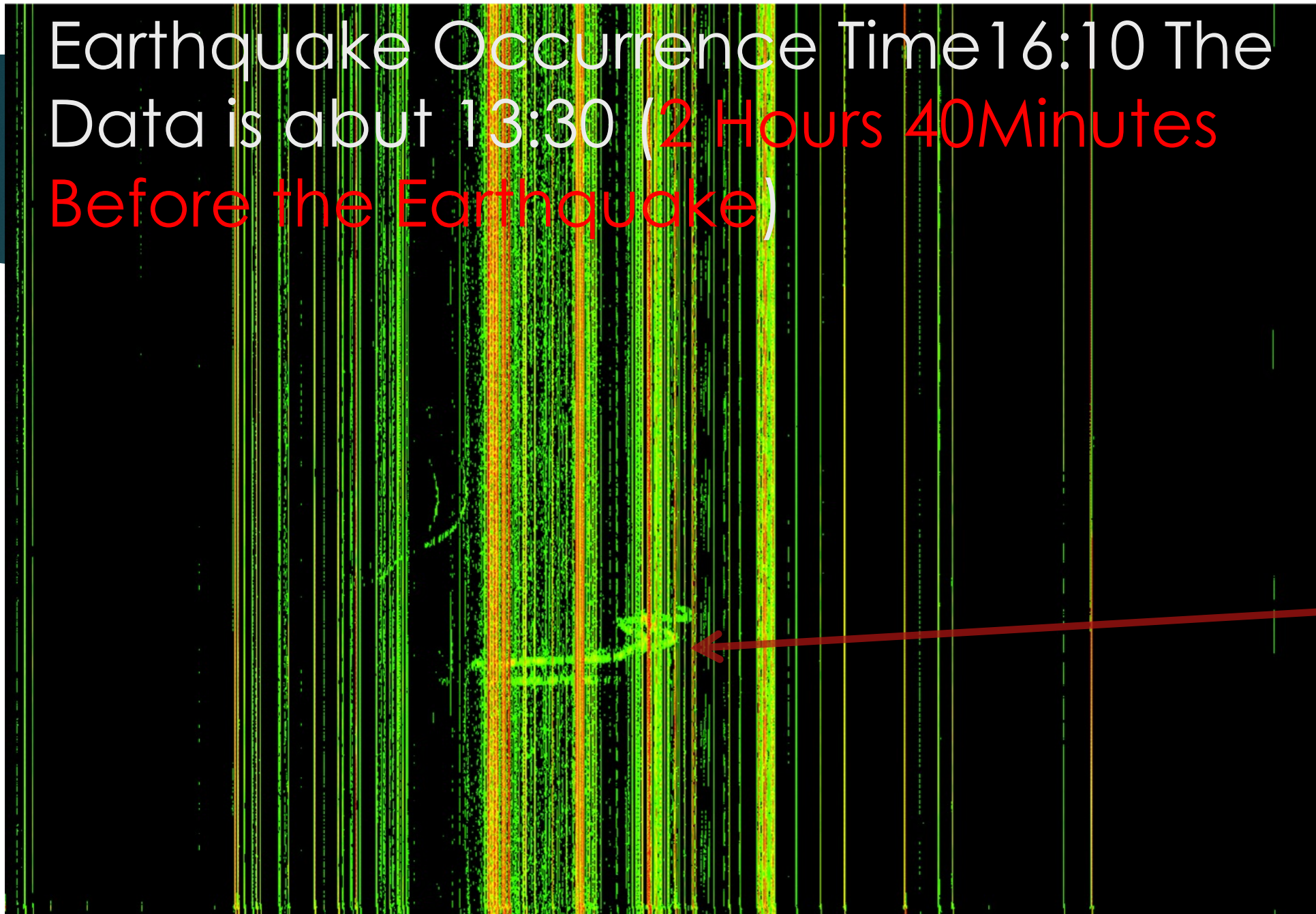
斜入射イオノグラム観測チェーン[135° E : ●]

花山天文台における斜入射電離圏観測結果



Earthquake Occurrence Time 16:10 The  
Data is about 13:30 (2 Hours 40 Minutes  
Before the Earthquake)

観測

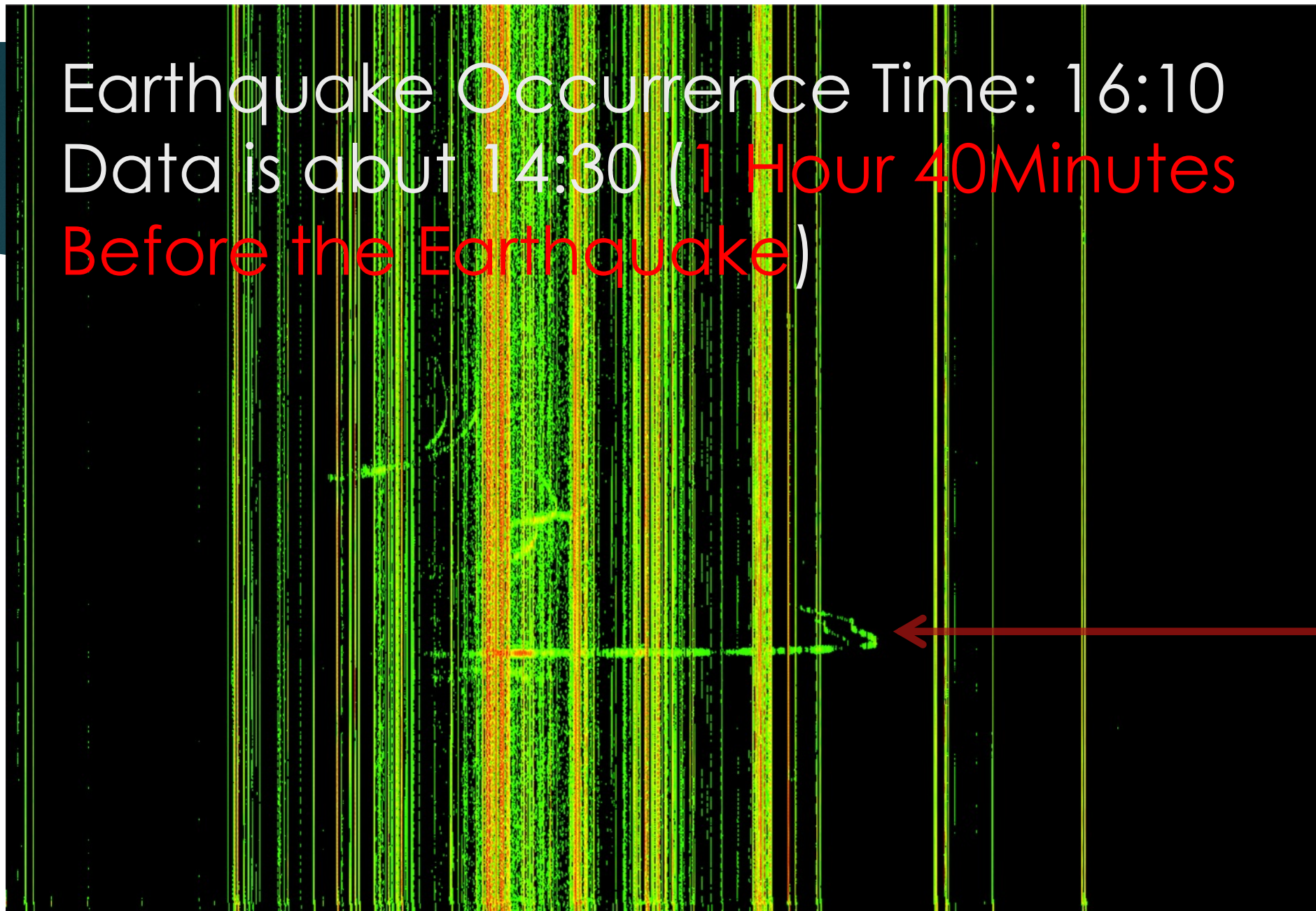


Anomaly  
(Double Linear  
Slope Shapes)

周波数 1MHz—30MHz

Earthquake Occurrence Time: 16:10  
Data is about 14:30 (1 Hour 40 Minutes  
Before the Earthquake)

観測



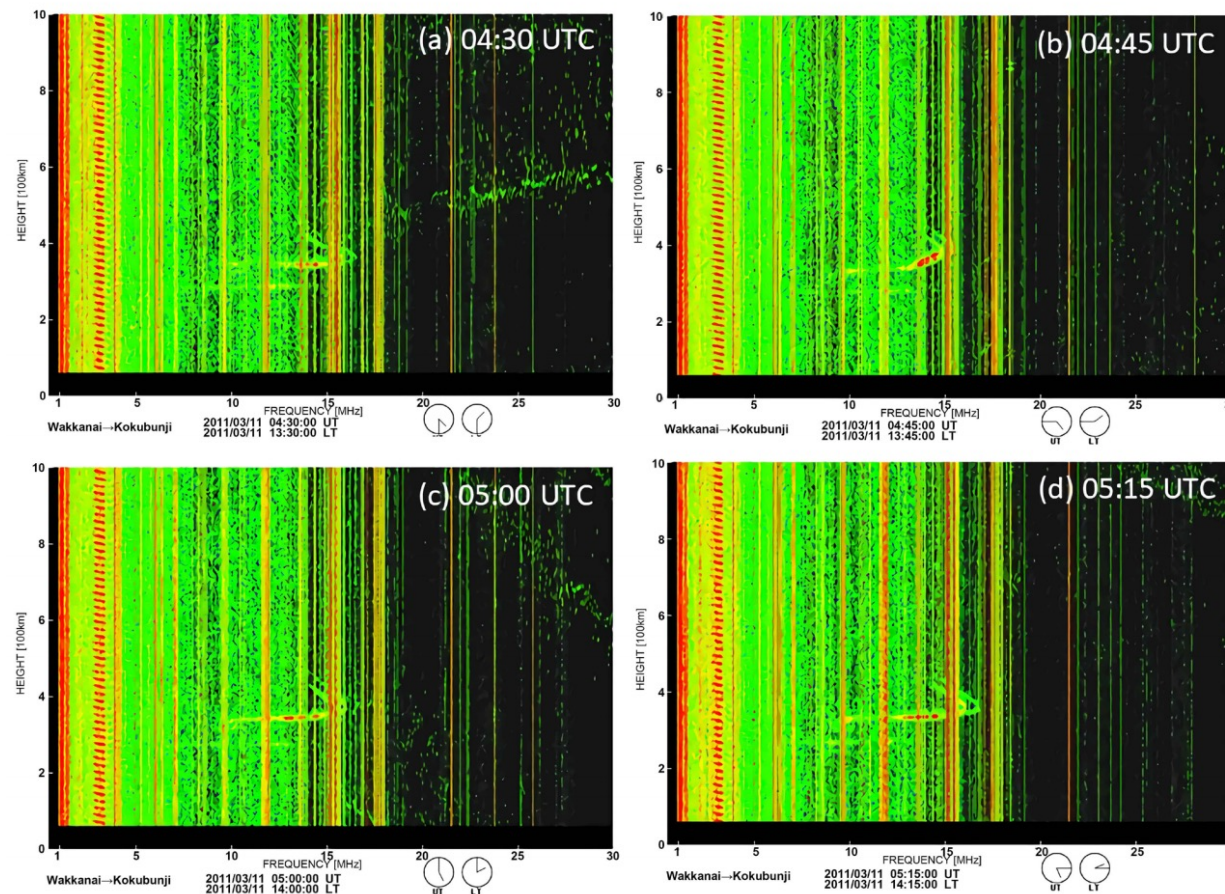
Anomaly  
(Double Wavy  
Shapes)

周波数 1MHz—30MHz



# Similar anomaly structure appeared before the 2011 Tohoku oki Earthquake (Wakkanai—Kokubunji Ionogram)

K. Igarashi *et al.*

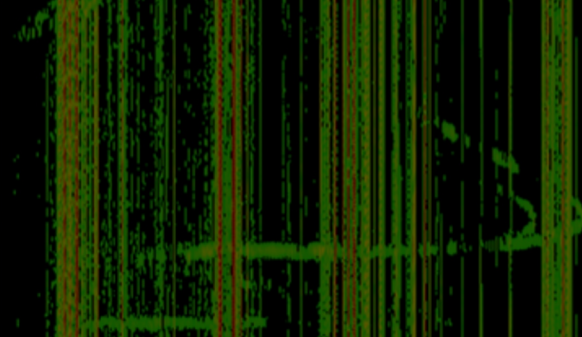


Double linear slope  
Structure on  
March 11, 2011

=Double linear slope  
structure on Jan. 1, 2024

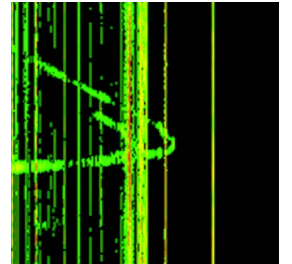
Figure 7. Four successive oblique ionograms at 04:30 UTC, 05:00 UTC, 05:15 UTC and 05:30 UTC on 11 March 2011 before the 2011 Tohoku-Oki earthquake. The vertical and horizontal axes are the same as Figure 4.

The data is about just before  
the 2023-5-5 Noto Earthquake  
at 13:15(JST)-1 hour and 27 minutes before-



# Similarity between the 2023 Noto earthquake and 2024 Noto earthquake

- ▶ Anomaly before the 2023 Noto Earthquake (around 13:15-14:30) on May 5.



- ▶ Anomaly before the 2024 Noto Earthquake (around 14:30) on Jan, 1, 2024 (Today).
- ▶ The same structure appeared before the both of the earthquakes.

