

# Briefing Space Weather - 2022/01/31

## Sun

### Responsible: Douglas Silva

Active Regions:

- Six active regions (12934,12935, 12936, 12939, 12937, 12938)

Solar Flares:

- Solar flare start time 2022-01-17 13:48, Class C2.8 (RA 12930) Associated with the CME

2022-01-29T23:36Z.

CME:

- Two coronal mass ejections type II halo (2022/01/26 21:24 UT, 2022/01/29 23:36 UT) were observed on the LASCO coronal images.

WSA-ENLIL (CME 2022-01-26T21:23:00)

- No or little impact to Earth.

WSA-ENLIL (Prediction for CME 2022-01-29T23:36Z)

- The simulation indicates that the CME arrival forecast will occur on the following date:

2022-02-01T19:36Z (-7.0h, +7.0h).

Coronal holes (SPOCA):

- Coronal holes 34954 and 34943 were observed between January 24 and 25.
- Coronal hole 34950 was identified by SPOCA between then 25th and 26th of November.

### Responsible: José Cecatto

01/24 – Fast ( $\leq 500$  km/s) wind stream; No CME toward the Earth; Jan, 20-21

CMEs, assoc. eruptive filaments, SB Arrivals:

Jan, 24: 17:09Z (combined arrival !);

01/25 – Fast ( $\leq 550$  km/s) wind stream; 2 CME can have component toward the Earth;

01/26 – Fast ( $\leq 500$  km/s) wind stream; 6 CME can have component toward the Earth;

01/27 – Fast ( $\leq 550$  km/s) wind stream; No CME toward the Earth;

01/28 – Fast ( $\leq 550$  km/s) wind stream; 3 CME can have component toward the Earth;

01/29 – No fast wind stream; 5 CME can have component toward the Earth; one CME associated with M1.1 flare observed from AR 2936, peak at 23:32 UT and also elevated 0.035-0.065 MeV electron flux at STEREO A beginning 2022-01-30T00:15Z and elevated 2.2-12 MeV proton flux at STEREO A beginning 2022-01-30T00:59Z;

01/30 – Fast ( $\leq 550$  km/s) wind stream; 3 CME can have component toward the Earth;

01/31 – Fast ( $\leq 550$  km/s) wind stream; No CME toward the Earth;

Prev.: Fast wind expected on December 15-16; for while low (1% M, 1% X) probability of M / X flares next 2 days; also, occasionally some other CME can present a component toward the Earth.

## **Radiation Belts**

**Responsible: Ligia Alves Da Silva**

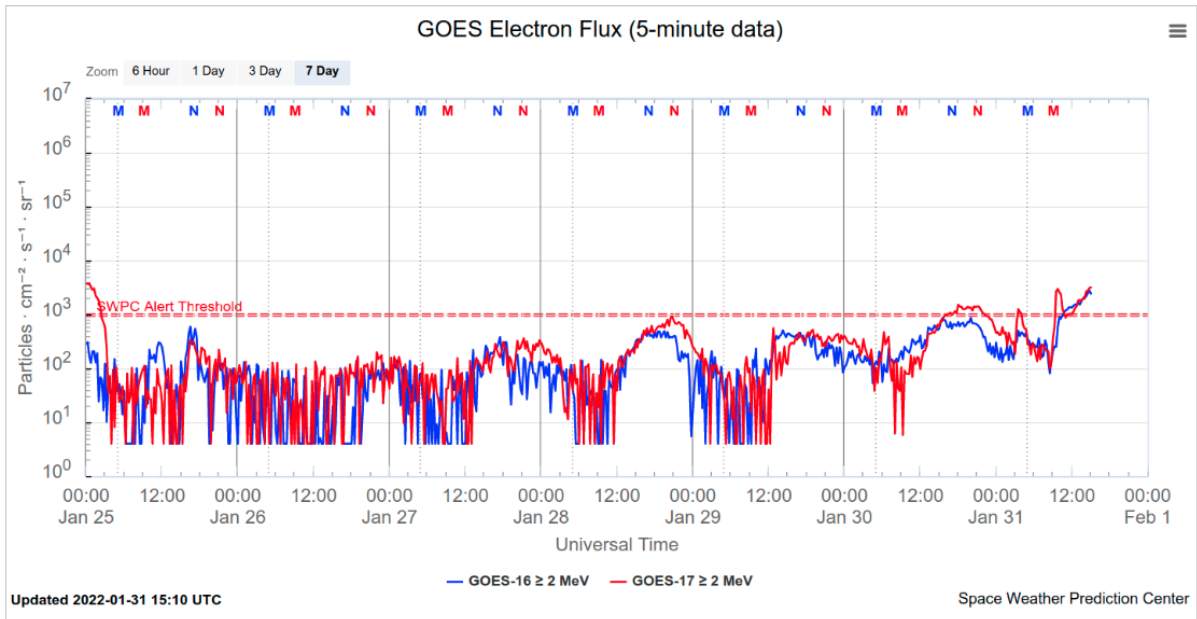


Figure 1: High-energy electron flux (> 2MeV) obtained from GOES-16 and GOES-17 satellite.  
 Source: <https://www.swpc.noaa.gov/products/goes-electron-flux>

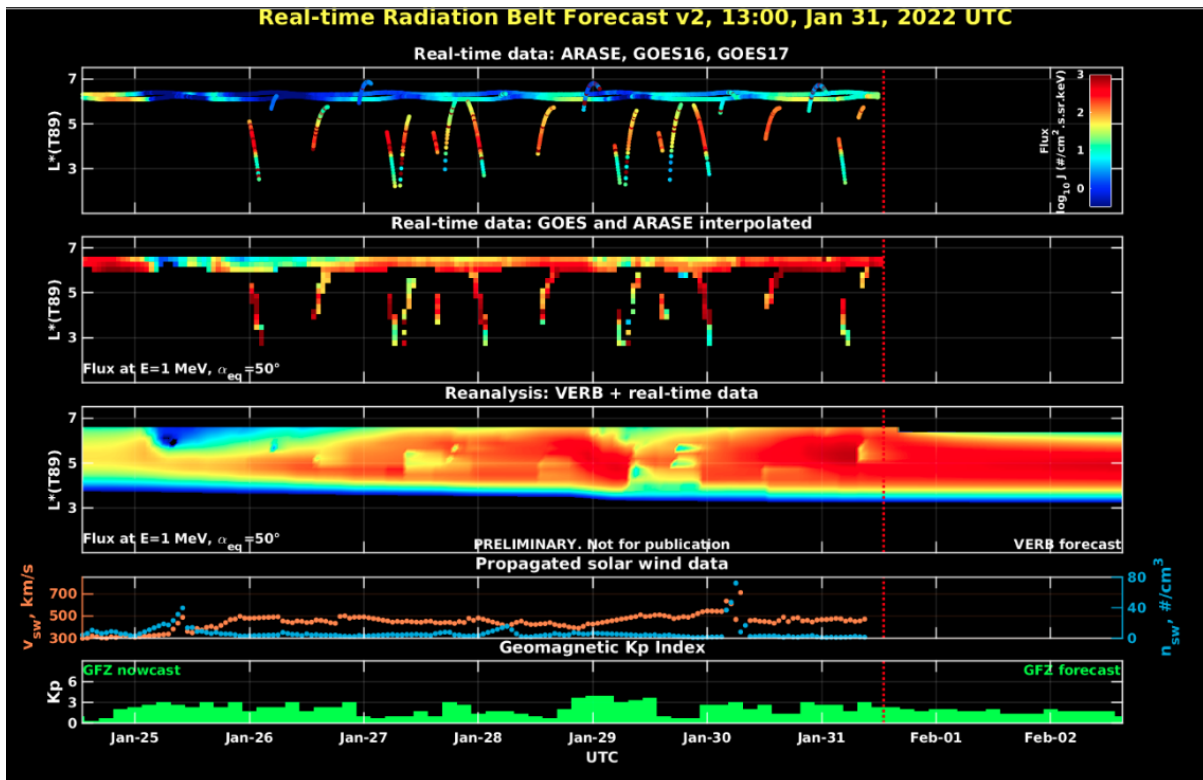


Figure 2: high-energy electron flux data (real-time and interpolated) obtained from ARASE, GOES-16, GOES-17 satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: <https://rbm.epss.ucla.edu/realtime-forecast/>

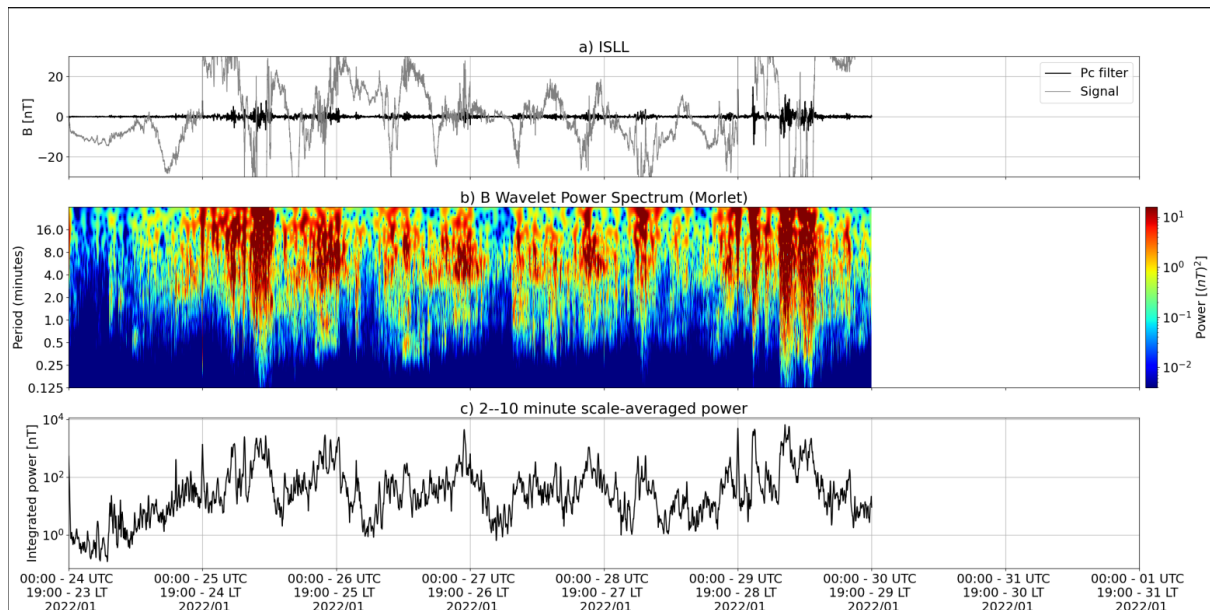
High-energy electron flux (>2 MeV) in the outer boundary of the outer radiation belt obtained from geostationary satellite data GOES-16 and GOES-17 (Figure 1) shows up with significant variability during this week. A dropout of more than two orders of magnitude is observed in the early hours of January 25th. An electron flux increase is observed from 12:00 UT on January 27th, reaching 103 particles/(cm<sup>2</sup> s sr) on January 28th, followed by a rapid dropout in the early hours of January 29th.

From 12:00 UT on January 29th, a new electron flux increase is observed, which persists at 103 particles/(cm<sup>2</sup> s sr) until today.

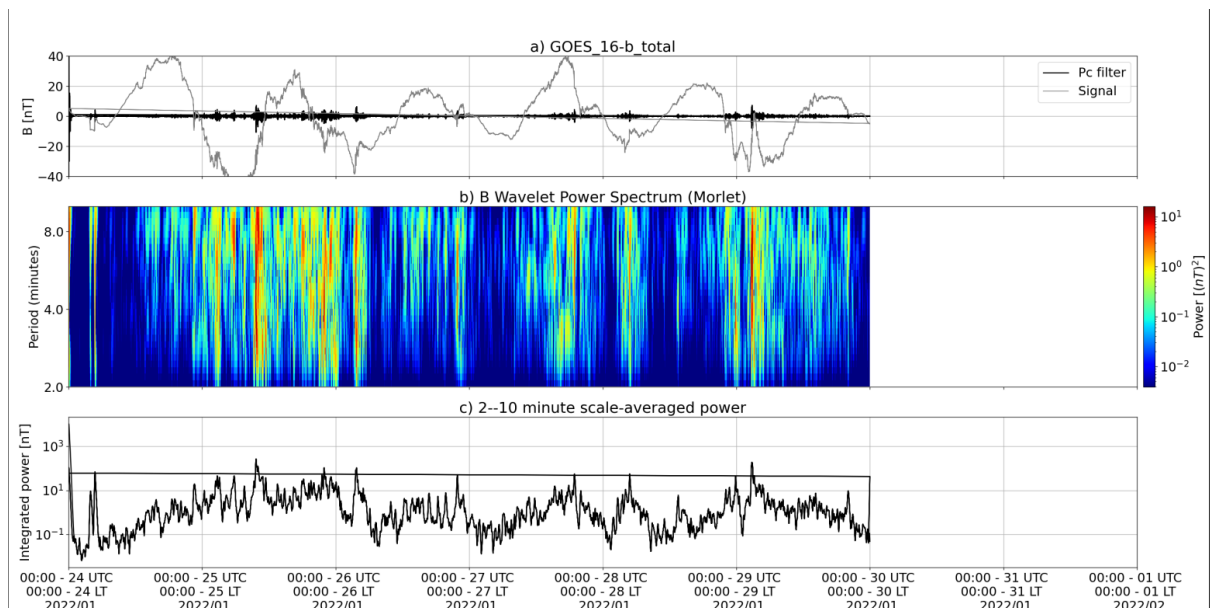
The GOES-16, GOES-17, and Arase satellite data are analyzed and interpolated to observe the high-energy electron flux variability (1 MeV) in the outer radiation belt (Figure 2). Additionally, the VERB code rebuilds this electron considering the Ultra Low Frequency (ULF) waves' radial diffusion. The dropouts and enhancements observed during this week are associated with the arrival of high speed solar wind streams. The dropout observed on January 25th reached L-shell > 5.5, while the dropout observed on January 29th reached L-shell > 3.5. These observed variabilities occurred concomitantly with ULF wave activity.

## **ULF waves in the Magnetosphere**

**Responsible: José Paulo Marchezi**



a) signal of the total magnetic field measured in the ISLL Station of the CARISMA network in gray, together with the fluctuation in the range of Pc5 in black. b) Wavelet power spectrum of the filtered signal. c) Average spectral power in the ranges from 2 to 10 minutes (ULF waves).



a) signal of the total magnetic field measured by the GOES 16 satellite, together with the fluctuation in the range of Pc5 in black. b) Wavelet power spectrum of the filtered signal. c) Average spectral power in the ranges from 2 to 10 minutes (ULF waves).

The week starts with a high activity of geomagnetic pulsations, on the 25th and 26th of January there is an interaction with a CME, which is related to the increase in activity at the beginning of the 25th/Jan, which continues until the 26th/Jan, mainly at high latitudes, as we did not have data for the magnetometers of the EMBRACE network. The GOES satellite also shows an increase in activity on 25/Jan. Another ULF activity is on the 28th and 29th of January.

# Geomagnetism

## Responsible: José Paulo Marchezi

In the week of January 24 to 31, the following events related to geomagnetic activity stand out:

- The data from the Embrace magnetometer network showed instabilities throughout the period, with some highlighted events:

25th, fall in component H in all stations, up to -60 nT

- The highest Kp of the week was from 4- recorded in 01/14
- The auroral activity was intensified on the 25th, 29th and 31st

# Ionosphere

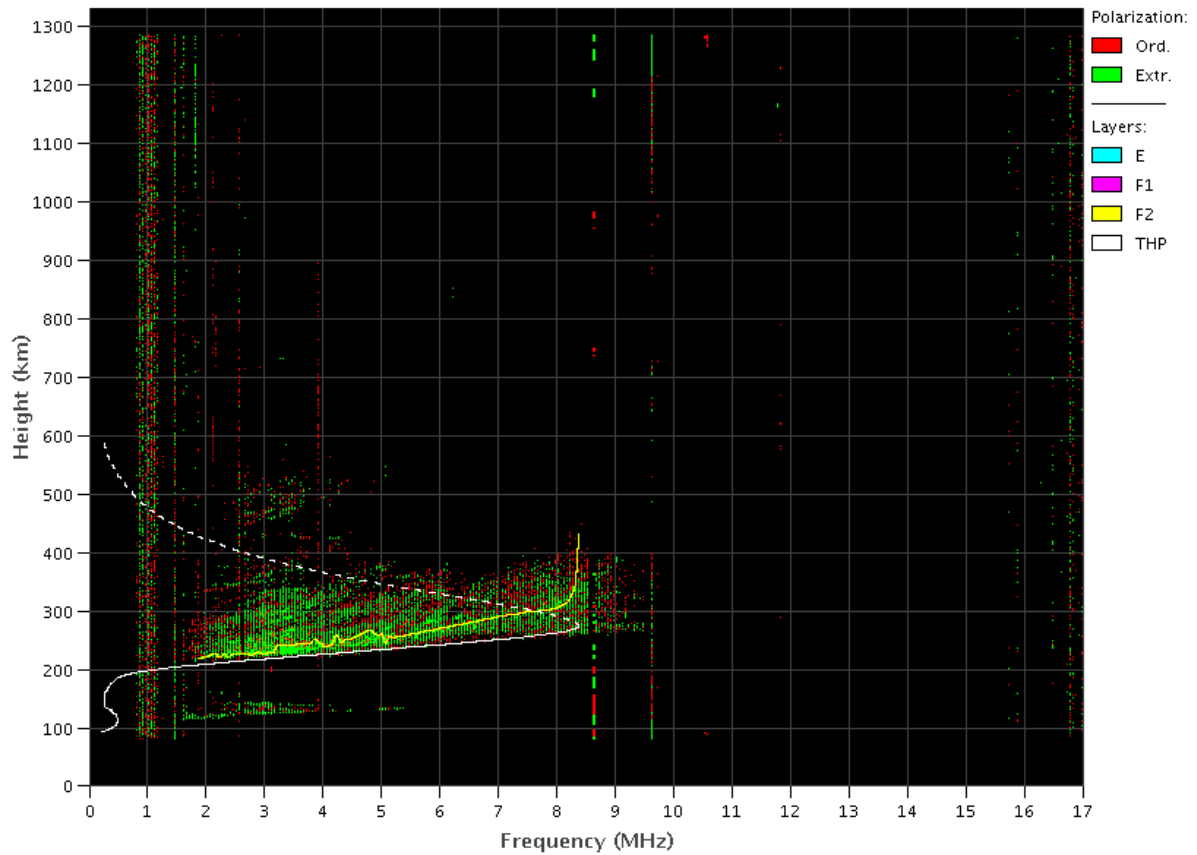
## Responsible: Laysa Resende

### Boa Vista:

- There were spread F during all days in this week.
- The Es layers reached scale 3 on days 29 and 30.

## EMBRACE - Digital Ionosonde

Boa Vista - 01/29/2022 02:00:00 UT

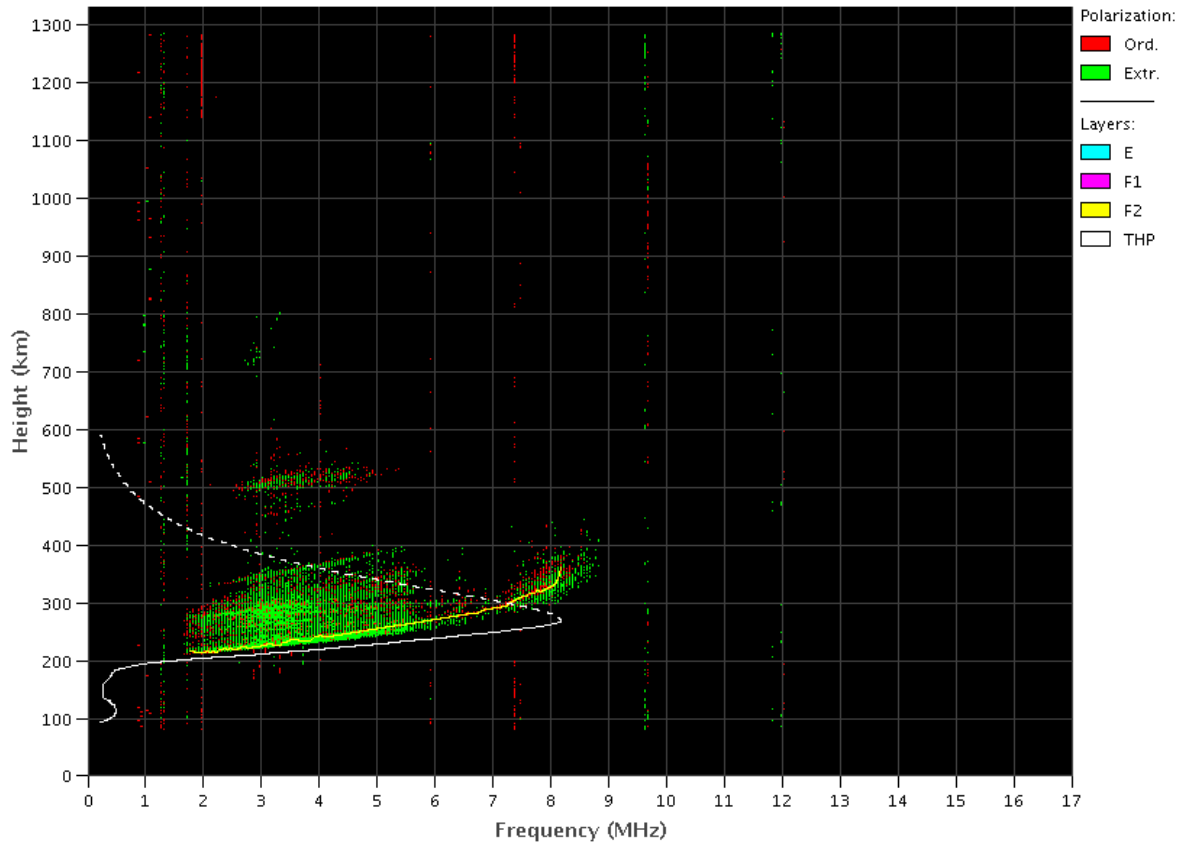


### Cachoeira Paulista:

- There were spread F on days 24, 27, and 28.
- The Es layers reached scale 3 between 27, and 30.

## EMBRACE – Digital Ionosonde

Cachoeira Paulista – 01/24/2022 02:40:00 UT



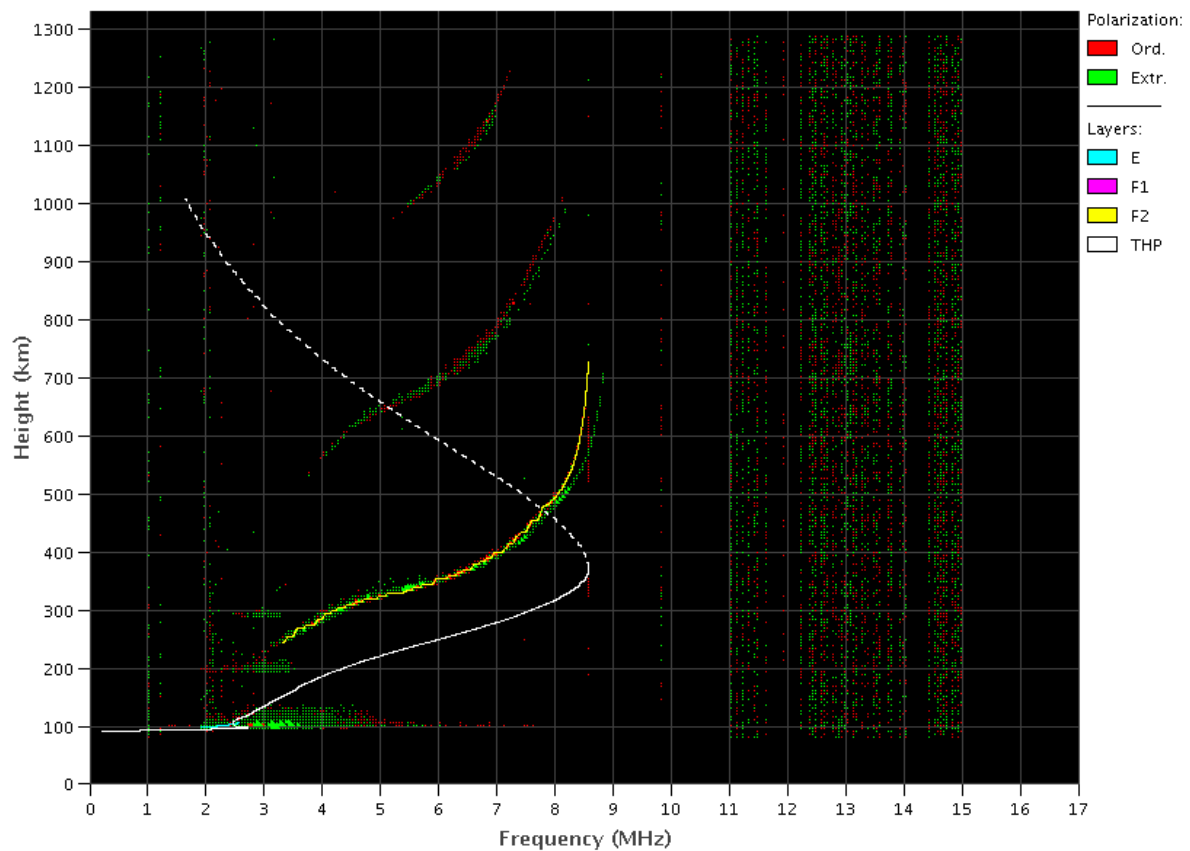
### São Luís:

- There were spread F during all days in this week.
- The Es layers reached scale 4 on day 25.



## EMBRACE – Digital Ionosonde

São Luís – 01/25/2022 19:20:00 UT



## Scintillation S4

Responsible: Siomel Savio Odriozola

## Imager

Responsible: Cosme Alexandre Figueiredo

Between January 24 and 30, 2022, plasma bubbles were observed every day in Brazil region.

Specifically, at the São João do Cariri observatory, plasma bubbles were observed every day.

At the Bom de Jesus da Lapa observatory, plasma bubbles were observed between the 24th and 29th. While on the 30th, the sky was cloudy and it was not possible to observe what happened to the thermosphere.

On the other hand, at the Cachoeira Paulista observatory, bubbles were observed on the 26th and 27th. On the 24th and 25th, there were no observations. Between the 28th and 30th, the sky was cloudy.

Finally, at São Martinho da Serra observatory, plasma bubbles were observed between the 27th and 30th. However, between the 24th and 26th, the sky was cloudy.

Between January 24th and 30th, 2022, TEC maps showed the plasma bubbles signature on all days. In addition, the equatorial anomaly is observed.