Briefing Space Weather - 2022/01/24

Sun

Responsible: Douglas Silva

Active Regions:
● Eight active regions (12925, 12927, 12929, 12930,12931, 12932, 12933, 12928)
Solar Flares:
● Solar flare start time 2022-01-17 13:48, Class C2.8 (RA 12930)
● Solar flare start time 2022-01-18 17:01, Class M1.5 (RA 12929)
● Solar flare start time 2022-01-20 05:41, Class M5.5 (RA 12929)
Solar Energetic Particle:
● On the date 2022-01-20 between 07:20 UT and 08:10 UT event of solar energetic particles ¡ 10 MeV and ¿ 100 MeV were detected
CME:
● Two coronal mass ejections type II halo (2022/01/20 06:12UT, 2022/01/21 08:48UT) were observed on the LASCO coronal images.
WSA-ENLIL (CME 2022-01-18T18:23Z)
● The simulation indicates that the CME arrival forecast will occur on the following date: 2022-01-21T11:00Z (-7.0h, +7.0h).
WSA-ENLIL (Prediction for CME 2022-01-19T06:23:00Z)
● The simulation indicates that the CME arrival forecast will occur on the following date: 2022-01-23T03:00Z (-7.0h, +7.0h).

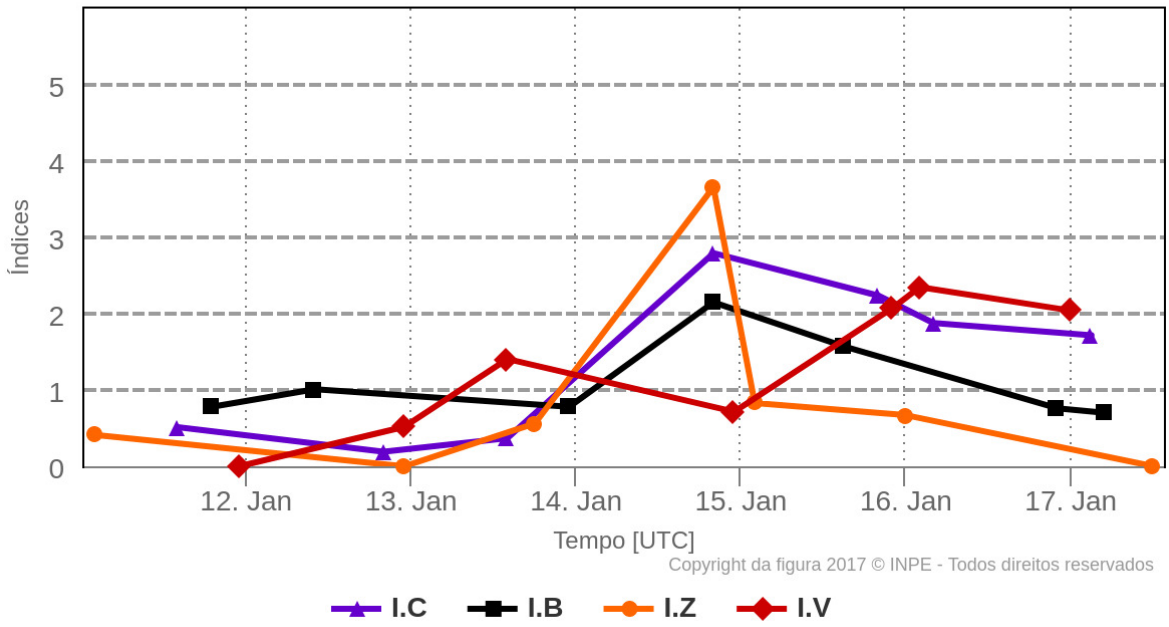
WSA-ENLIL (Prediction for CME 2022-01-20T06:12Z, 2022-01-20T09:09Z)
● The simulation indicates that the CME arrival forecast will occur on the following date: 2022-01-24T06:00Z (-7.0h, +7.0h)
WSA-ENLIL (Prediction for CME 2022-01-20T22:12Z, 2022-01-21T09:53Z)
● The simulation indicates that the CME arrival forecast will occur on the following date: 2022-01-24T12:00Z (-7.0h, +7.0h).
WSA-ENLIL (Prediction for CME 2022-01-23T10:53Z)
● The simulation indicates that the CME arrival forecast will occur on the following date: 2022-01-26T18:30Z (-7h, +7h).
Coronal holes (SPOCA):
● Coronal holes 34938 (disk center) and 34857 (south polar extension) were observed between January 17 and 20.
● Coronal hole 34909 was identified by SPOCA on the 17th of November.

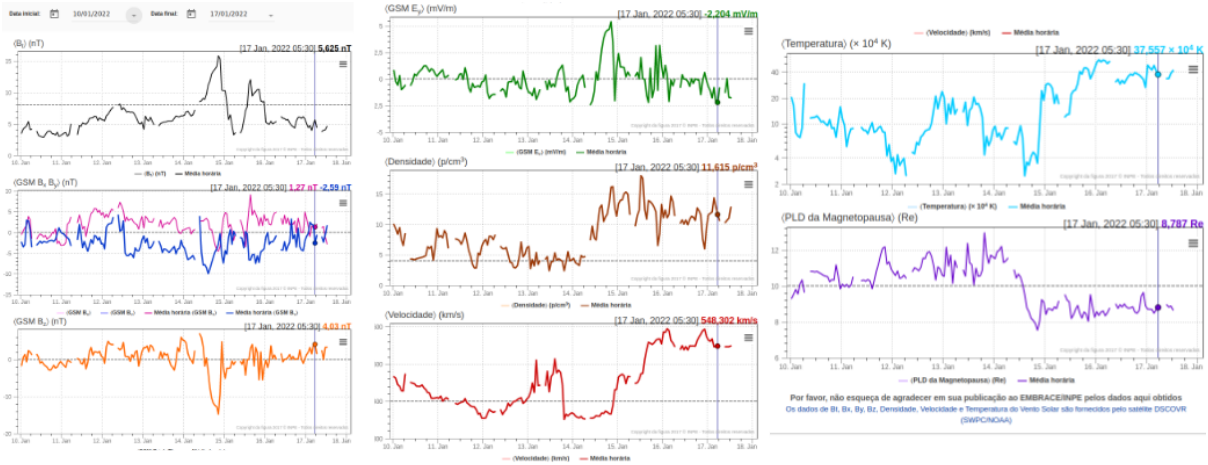
Interplanetary Medium

Responsible: Paulo Ricardo Jauer

Resumo dos índices do meio interplanetário

Máximos diários - mais recentes entre 11 Jan, 2022 e 17 Jan, 2022





- The interplanetary region in the last week showed a moderate/low level of plasma perturbations due to the passage of the CME and HSS structures
  identified by the DISCOVERY satellite in the interplanetary region along with sector boundary crossing.
- The modulus of the interplanetary magnetic field component showed 2 peaks: 14/Jan at 20:30 at ~ 15.7 nT and another 15/Jan at 15:30 ~ 12nT.
- The bxby components show a sector switch on Jan 11 at 01:30, being within the range of ~[+10, -10]nT.
- The component of the south bz field showed a significant peak of ~ -14.79 nT, during ~ 7 hours on 14/Jan at 19:30.
- The solar wind density remained below 10 p/cm³ between January 10-14. The density also showed a peak of 15/Jan 12:30 UT of 18 p/cm³.
- The solar wind speed was mostly above 400km/s during the analyzed period, with a peak around ~595km/s on 16/Jan at 02:30 UT.
- The magnetopause position was above the typical position between January 10-14 with maximum compression of 7.5 Re on January 14 at 20:30.

Radiation Belts

Responsible: Ligia Alves Da Silva

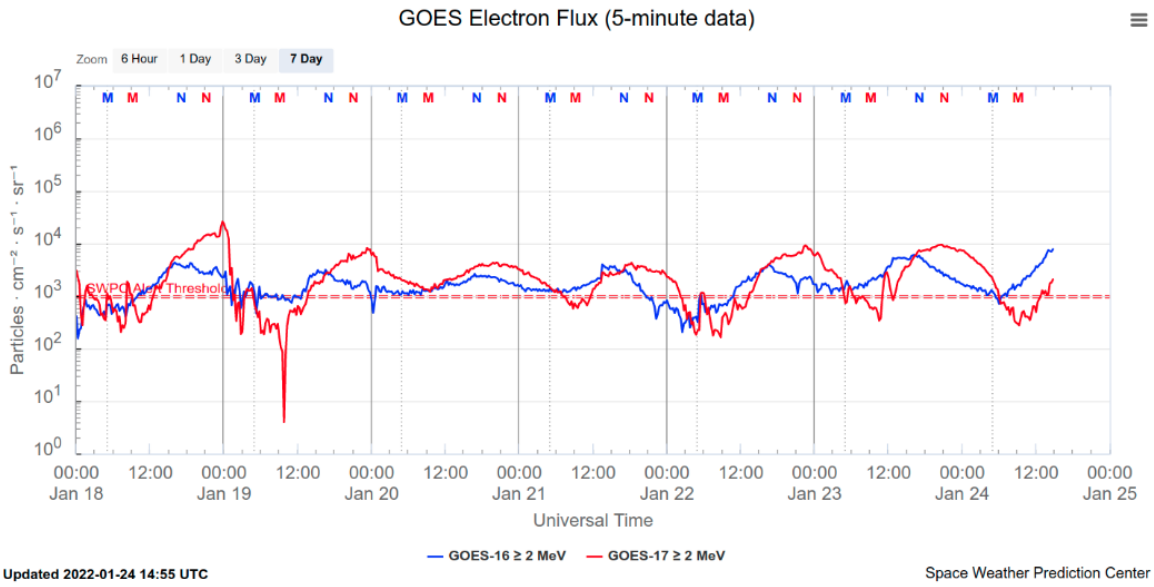


Figure 1: High-energy electron flux (> 2MeV) obtained from GOES-16 and GOES-17 satellite. Source: https://www.swpc.noaa.gov/products/goes-electron-flux

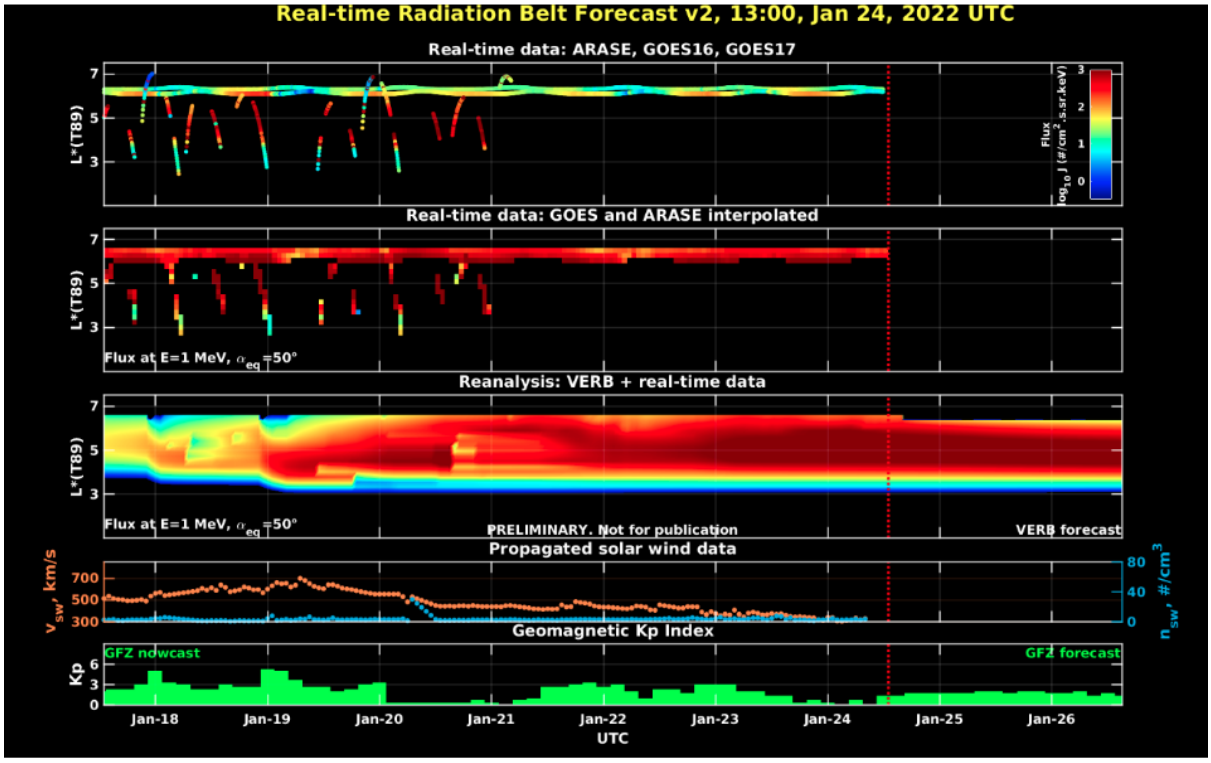


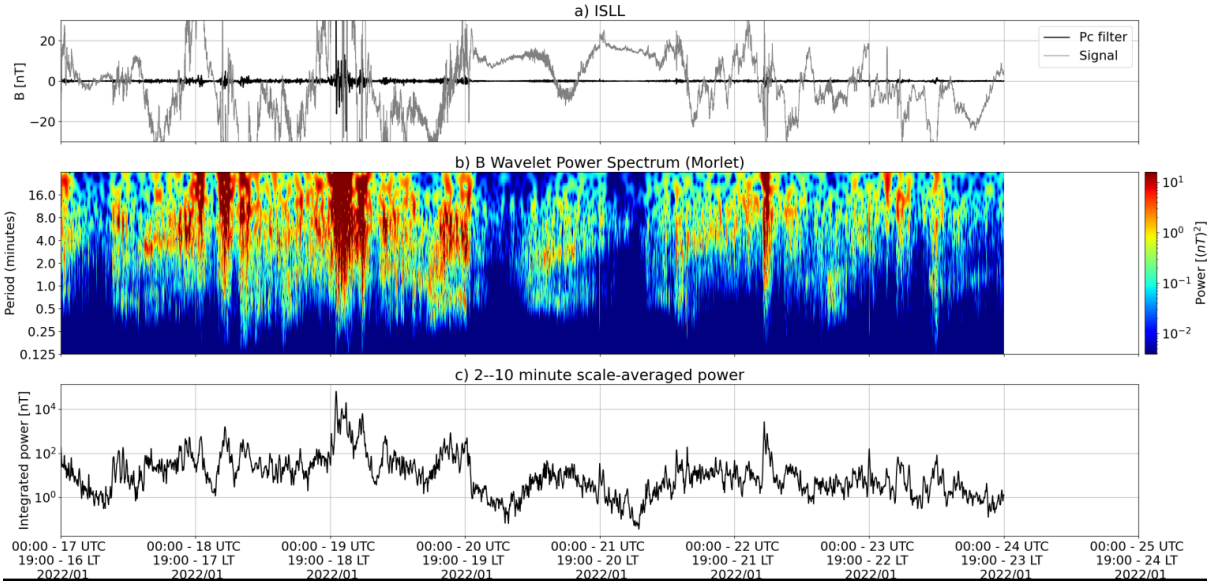
Figure 2: high-energy electron flux data (real-time and interpolated) obtained from ARASE, GOES-16, GOES-17 satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: https://rbm.epss.ucla.edu/realtime-forecast/

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) is shown to be above 103 particles/(cm2 s sr) every week. An increase in electron flux was observed on January 19th at 00:00 UT, reaching 104 particles/(cm2 s sr), followed by a rapid dropout of more than three orders of magnitude.

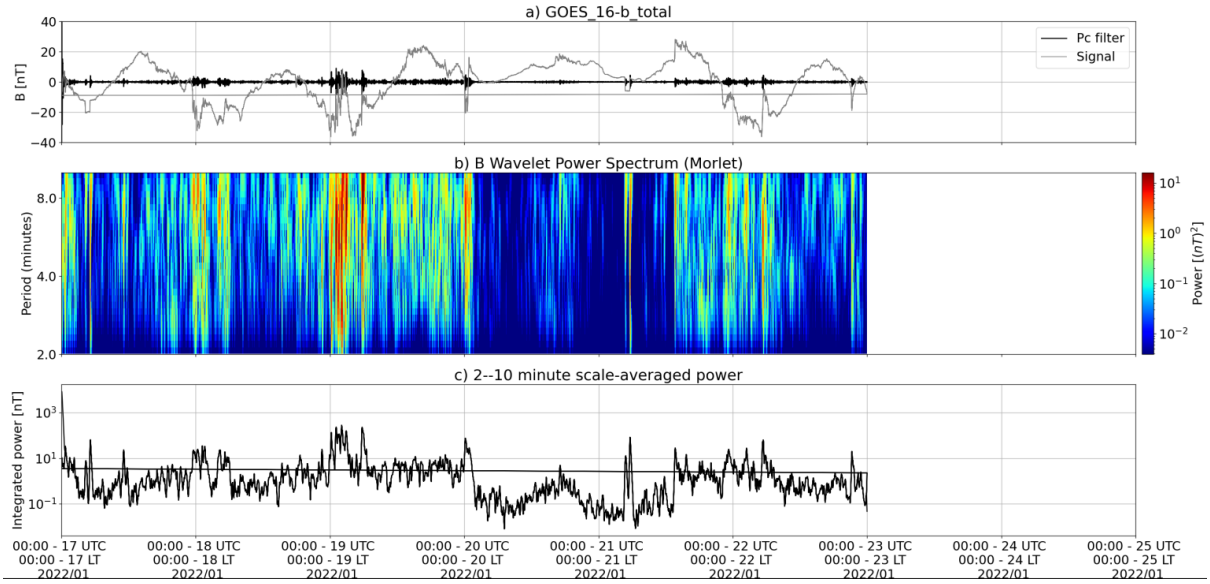
The GOES-16, GOES-17, and Arase satellite data are analyzed and interpolated to observe the high-energy electron flux variability (1 MeV) in the outer radiation belt (Figure 2). Additionally, the VERB code rebuilds this electron considering the Ultra Low Frequency (ULF) waves' radial diffusion. The electron flux increase observed on January 19th reached L-shell > 3.5, while the electron flux dropout was observed from L-shell > 6. These variabilities occurred concomitantly with ULF wave activity. It is important to note that ARASE data were unavailable from January 21st.

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 begins with a high activity of geomagnetic pulsations, on the 18th and 18th of January there is an interaction with a CME, which is related to the increase in activity in the beginning of the 19/Jan, which continues until the 20/Jan, mainly in 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 19/Jan. This activity may be related to variations in electron flux in the outer Van Allen radiation belt and an auroral activity on January 19 and 20.

Geomagnetism

Responsible: Livia Ribeiro Alves

Geomagnetic Report - January 11-17

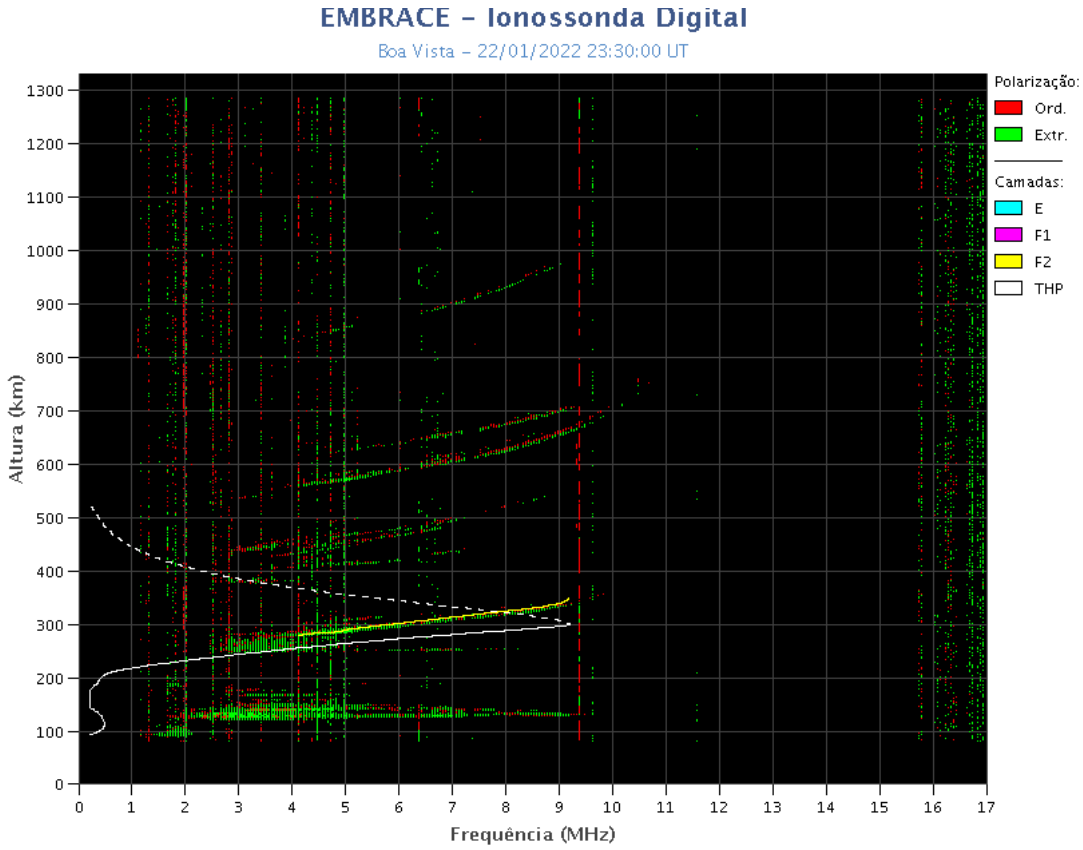
- Data from the Embrace magnetometer network similarities instabilities throughout the period, with a few highlighted:14th, sh -160 nT15th, 16th and 17th, show the geomagnetic storm recovery phase
- Geomagnetic activity reached the G1 level on the 14th and 15th, with the Dst index reaching its minimum value of -95 nT on 01/15. The Highest Kp of the week was 5+ recorded on the 14th
- Auroral activity was intensified on the 14th, 15th, 16th, and 17th.
- Average magnetic field in the orbit of the GOES satellite showed disturbances on the 14th and 15th of January.

Ionosphere

Responsible: Laysa Resende

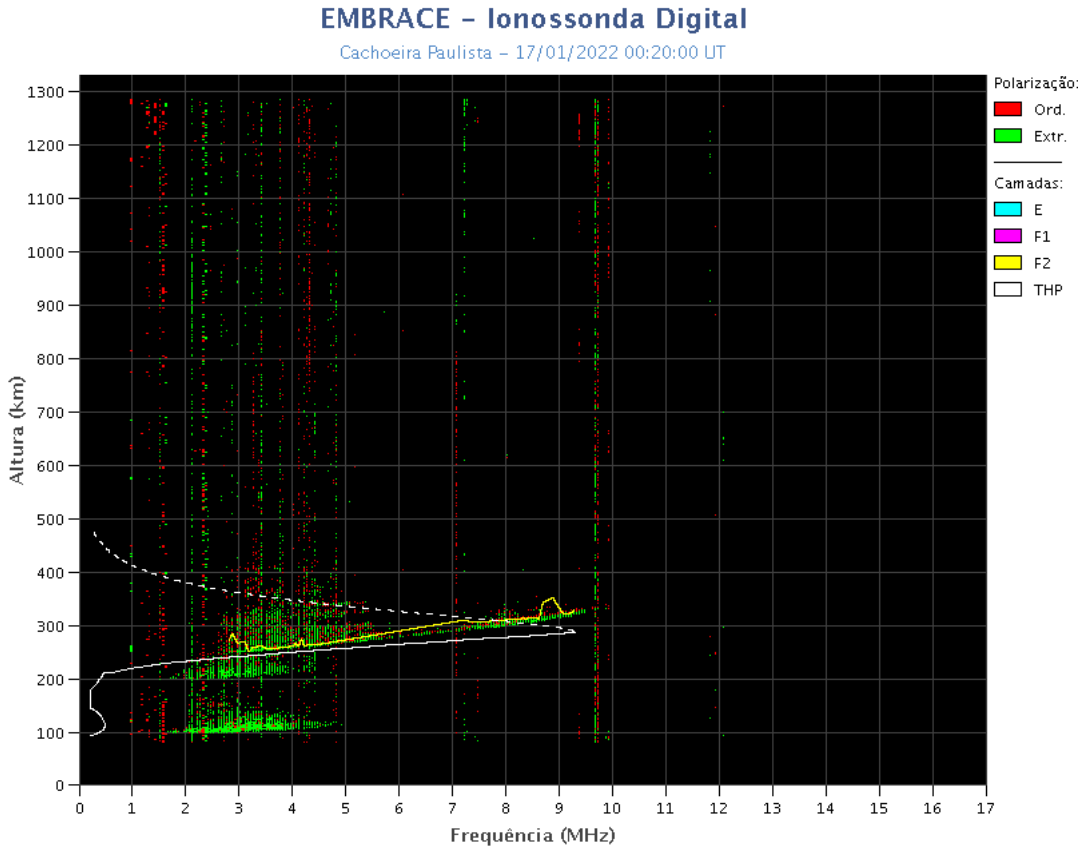
Boa Vista:

- There were spread F during all days in this week.
- The Es layers reached scale 4 on days 22 and 23.



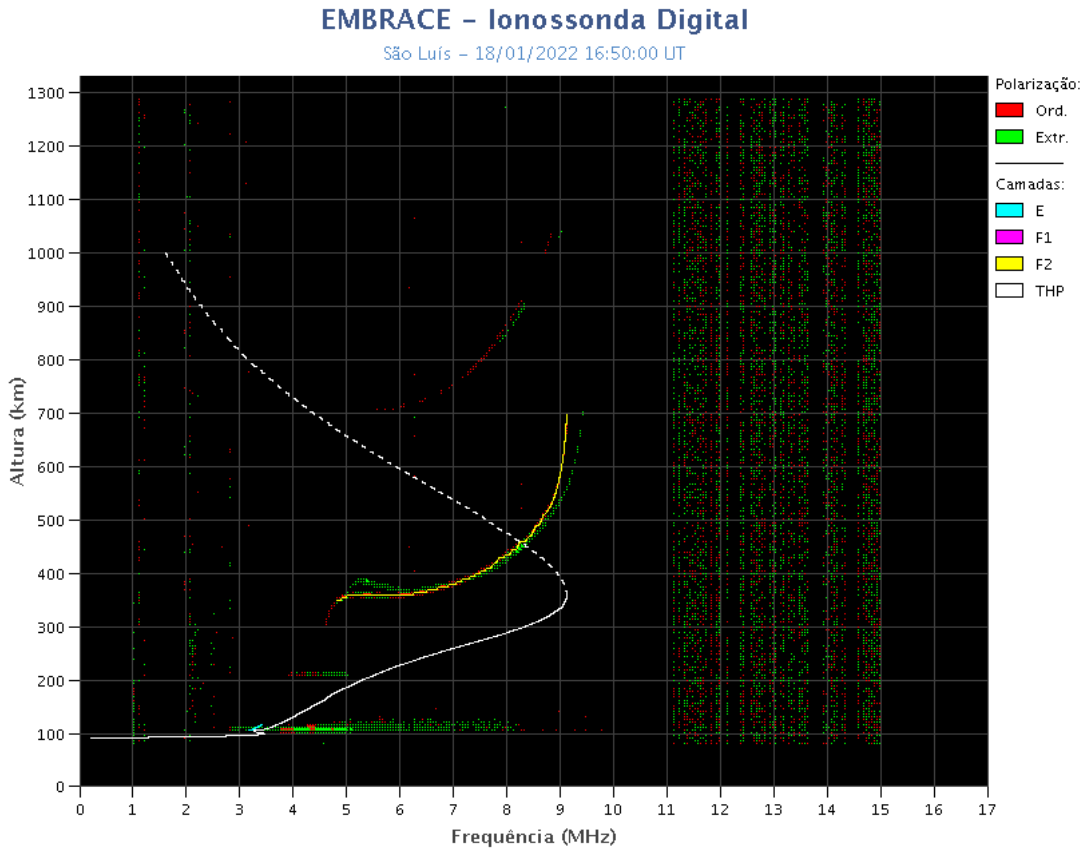
Cachoeira Paulista:

- There were spread F on days 18, 20, and 23.
- The Es layers reached scale 4 on day 19.



São Luís:

- There were spread F during all days in this week.
- The Es layers reached scale 5 on day 20



Scintillation S4

Responsible: Siomel Savio Odriozola

In this report on the S4 scintillation index, data from the SLMA stations in São Luís / MA, STSN in Sinop /MT, UFBA, in Bahía / BA and SJCE in São José dos Campos / SP were presented. The S4 index tracks the presence of irregularities in the ionosphere having a spatial scale ~ 360 m.

This week, no data were acquired at the UFBA station. The S4 index values for the SLMA station show scintillation effects every day, while for STSN, except on 01/15-16, the rest of the week showed S4 values greater than 0.4. For SJCE station, scintillation events were frequent in this analyzed period, with emphasis on the early hours of the 17/01 (Figure 1). Figure 2 shows the satellites that contributed to the highest S4 values for the three stations analyzed in this summary during the days 01/16- 01/17/2022

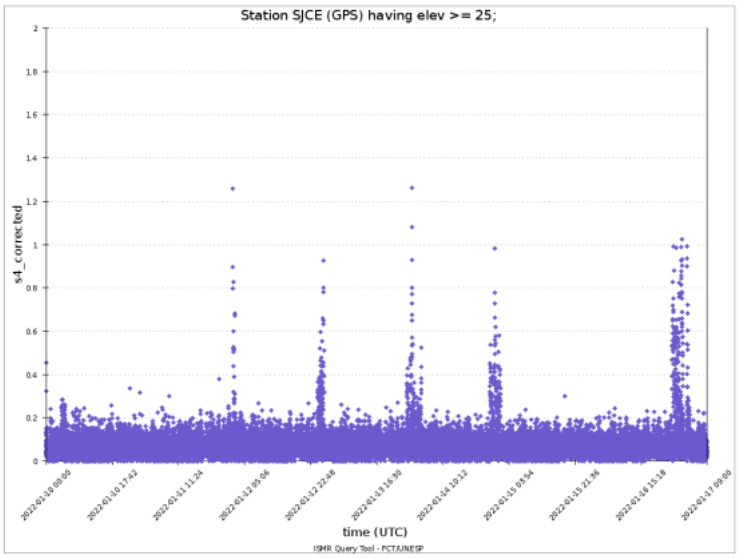


Figure 1: Values of the S4 index for the GPS constellation for SJCE station measured during the week 10/01—17/01/2022.

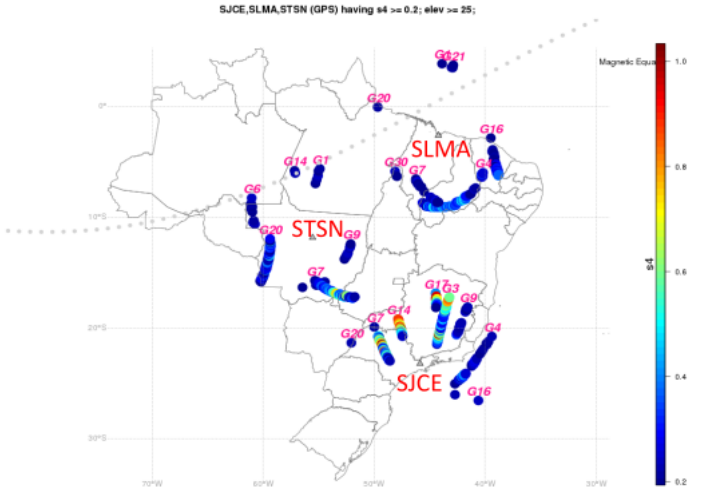


Figure 2: Map of S4 values > 0.2 for the GPS satellites with elevation > 25° in the receiver's field of view of SLMA, STSN and SJCE stations between 2200 UT on 01/16 until 0500 UT on 01/17/2022.