Briefing Space Weather

2022/08/30

1 Sun

1.1 Responsible: José Cecatto

08/22 – No flare (M/X); Fast wind stream (=< 600 km/s); 1 CME c.h.c. toward the Earth;
08/23 – No flare (M/X); Fast wind stream (=< 500 km/s); 2 CME c.h.c. toward the Earth;
08/24 – No flare (M/X); Fast wind stream (< 450 km/s); 3 CME c.h.c. toward the Earth;
08/25 – M1.8, M1.0 flares; No fast wind stream; 7 CME c.h.c. toward the Earth;
08/26 – M2.1, M7.2, M5.3 flares; No fast wind stream; 2 CME c.h.c. toward the Earth *;
08/27 – M4.8, M1.2, M1.1, M1.8 flares; Fast wind stream (< 450 km/s); 11 CME c.h.c. toward the Earth *;
08/28 – M1.4, M6.7, M4.7 flares; Fast wind stream (=< 500 km/s); 8 CME c.h.c. toward the Earth *;
08/29 – M3.3, M8.6, M2.5, M4.6 flares; Fast wind stream (=< 500 km/s); 2 CME c.h.c. toward the Earth;
Prev.: Fast wind stream expected up to August 31; for the next 2 days (55% M, 25% X) probability of M / X flares;
also, occasionally other CME can present component toward the Earth.
c.h.c. – can have a component; * partial halo; ** halo

2 Sun

2.1 Responsible: Douglas Silva

- WSA-ENLIL (Prediction for CME : 2022-08-19T07:30Z)
  - The simulation results indicate that the flank of CME will reach the DSCOVR mission between 2022-08-22T08:00Z and 2022-08-22T22:00Z.
- WSA-ENLIL (Prediction for CME : 2022-08-27T02:23Z)
  - The simulation results indicate that the flank of CME will reach the DSCOVR mission between 2022-08-29T04:00Z and 2022-08-29T18:00Z.

Coronal holes (SPOCA):

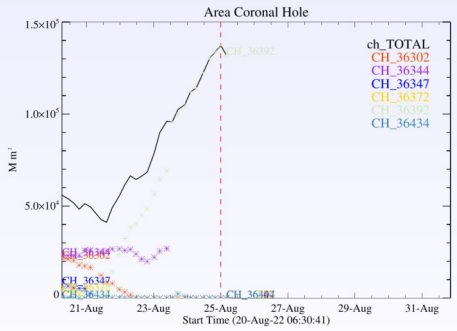


Figura: The solid line in black shows the products of the sum of areas for each detection interval performed by SPOCA between August 20 and 25, 2022.

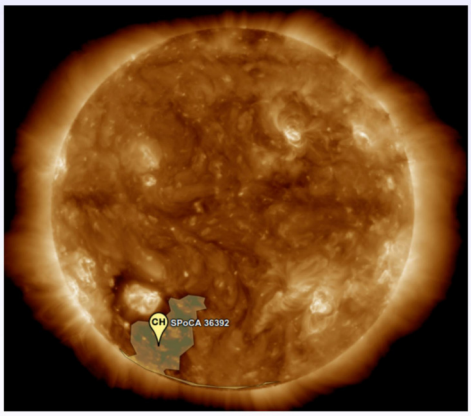
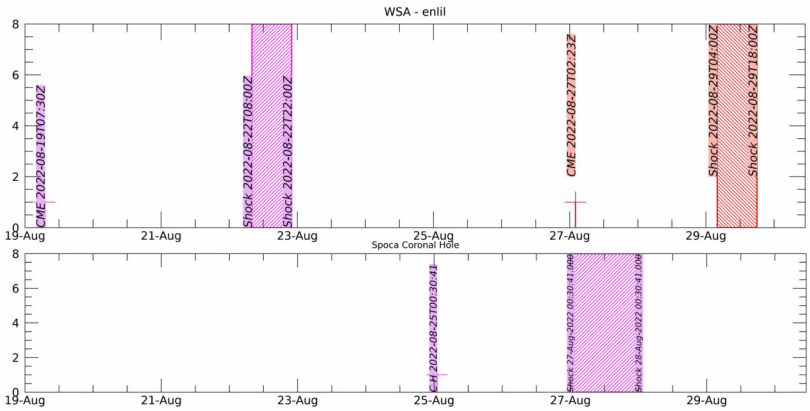


Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 00:30 UT on August 25, 2022 (blue dot line).

WSA - ENLIL SPOCA



3 Radiation Belts

3.1 Responsible: Ligia Alves da Silva

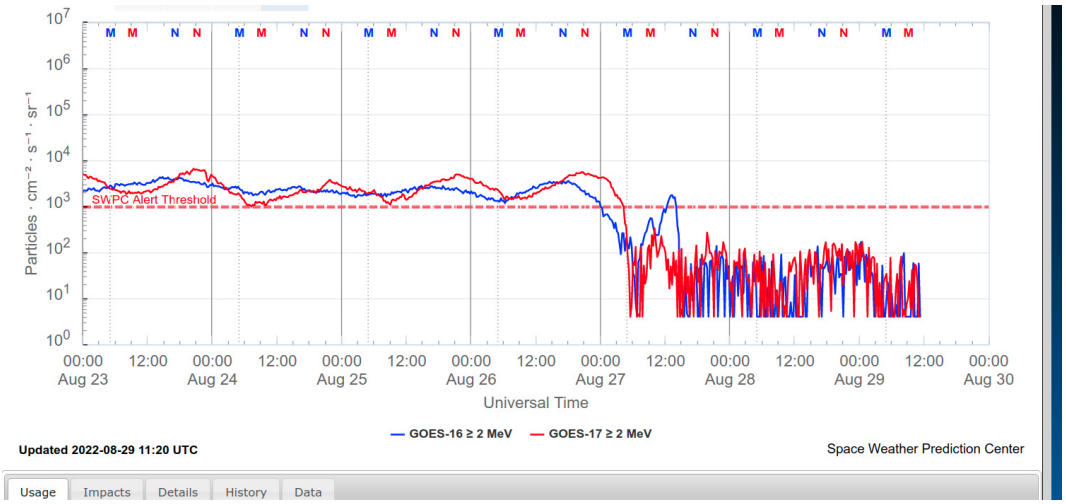


Figura 1: High-energy electron flux (> 2 MeV) obtained from GOES-16 and GOES-17 satellite. Source: `https://www.swpc.noaa.gov/products/goes-electron-flux`

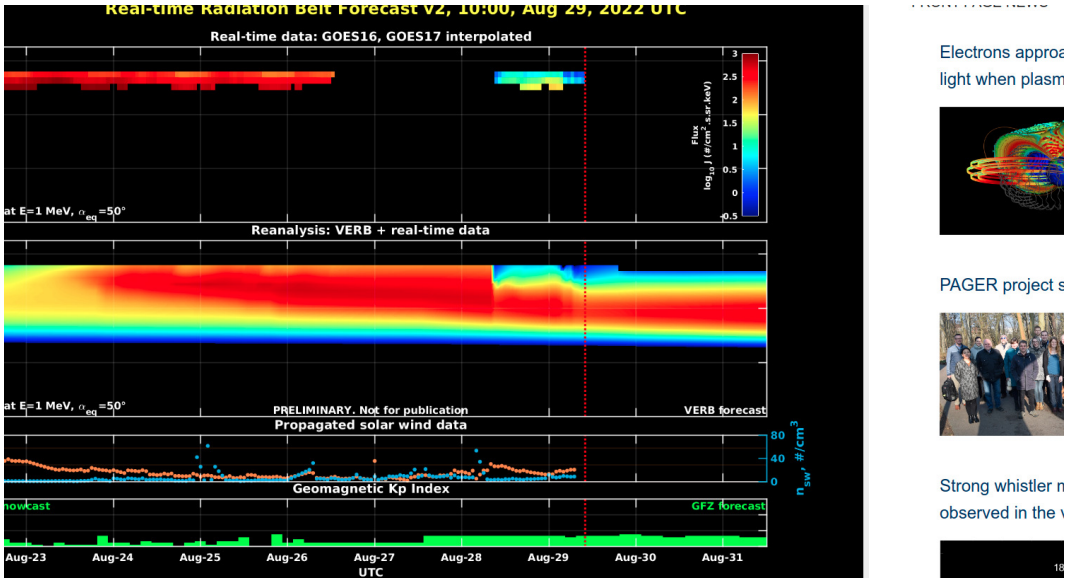


Figura 2: High-energy electron flux data (real-time and interpolated) obtained from GOES-16 and GOES-17 satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: `https://rbm.epss.ucla.edu/realtime-forecas`

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 slightly above 10^3 particles/$(cm^2 ssr)$) between August 23rd and the beginning of August 27th. From 03:00 UT on August 27th, a strong dropout can be observed, reaching more than two orders of magnitude. The outer belt repopulates mid-August 27th for a few hours, followed by a further flux decrease, which confines electrons below 10^2 particles/$(cm^2 ssr)$).

The GOES-16 and GOES-17 satellite data are interpolated and assimilated into the VERB code (Figure 2), which reconstructs this electron flux considering the Ultra Low Frequency (ULF) waves' radial diffusion. The simulation (VERB code) shows that the dropouts observed in the electron flux

reach $L - shell > 6.0$. These flux variabilities coincide with the arrival of solar wind structures and ULF wave activities. It is important to highlight that the data from GOOES-16 and GOES-17 presented problems in assimilation between August 26th and 27th.

4 ULF waves

4.1 Responsible: Graziela B. D. Silva

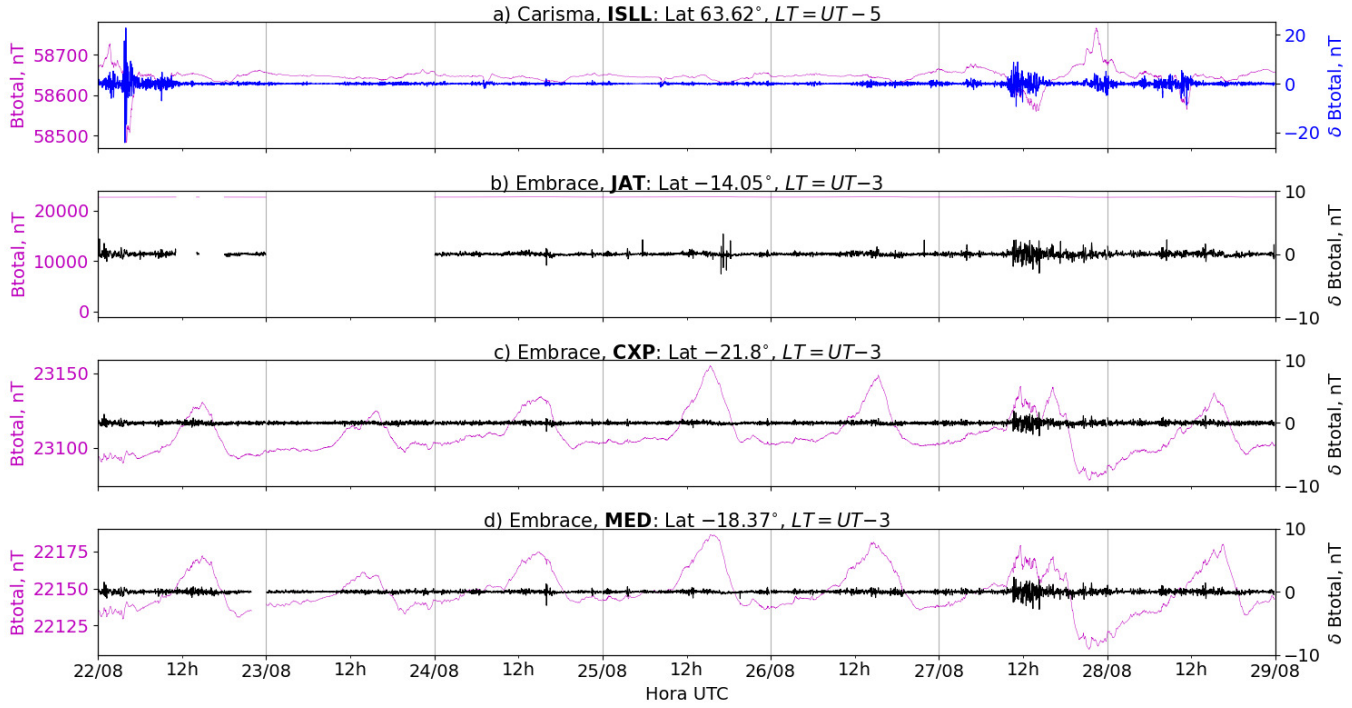


Figura 3: a) Timeseries of the geomagnetic field total component measured at ISLL station (Island Lake) of the CARISMA magnetometer network in magenta, along with the associated perturbation in the Pc5 band shown in blue. b-d) timeseries of the geomagnetic field total component measured at stations JAT (Jataí), CXP (Cachoeira Paulista) and MED (Medianeira) of the EMBRACE network in magenta, along with the Pc5 perturbation in blue.

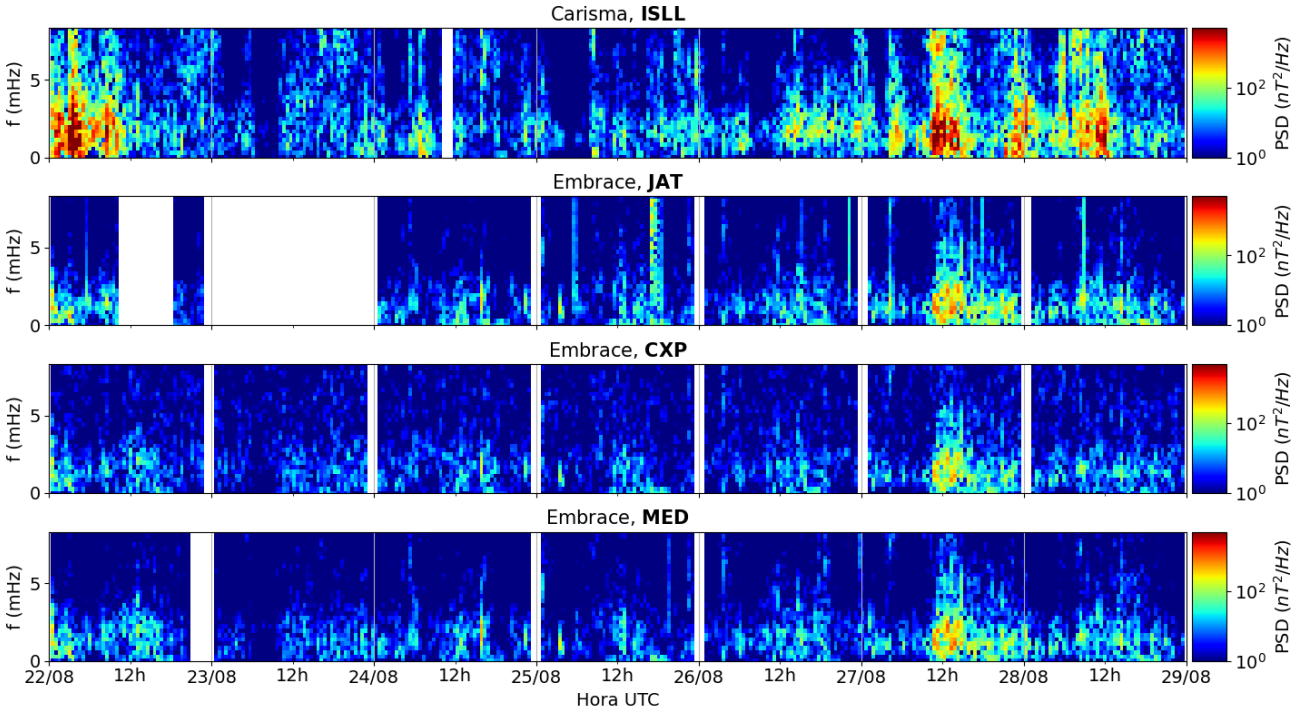


Figura 4: a-d) Time evolution of the power spectral density obtained from the filtered timeseries of the geomagnetic field total component (δ Btotal) for a) the high latitude station (ISLL-CARISMA), and b-d) for the low latitude stations of EMBRACE ([JAT, CXP, MED).

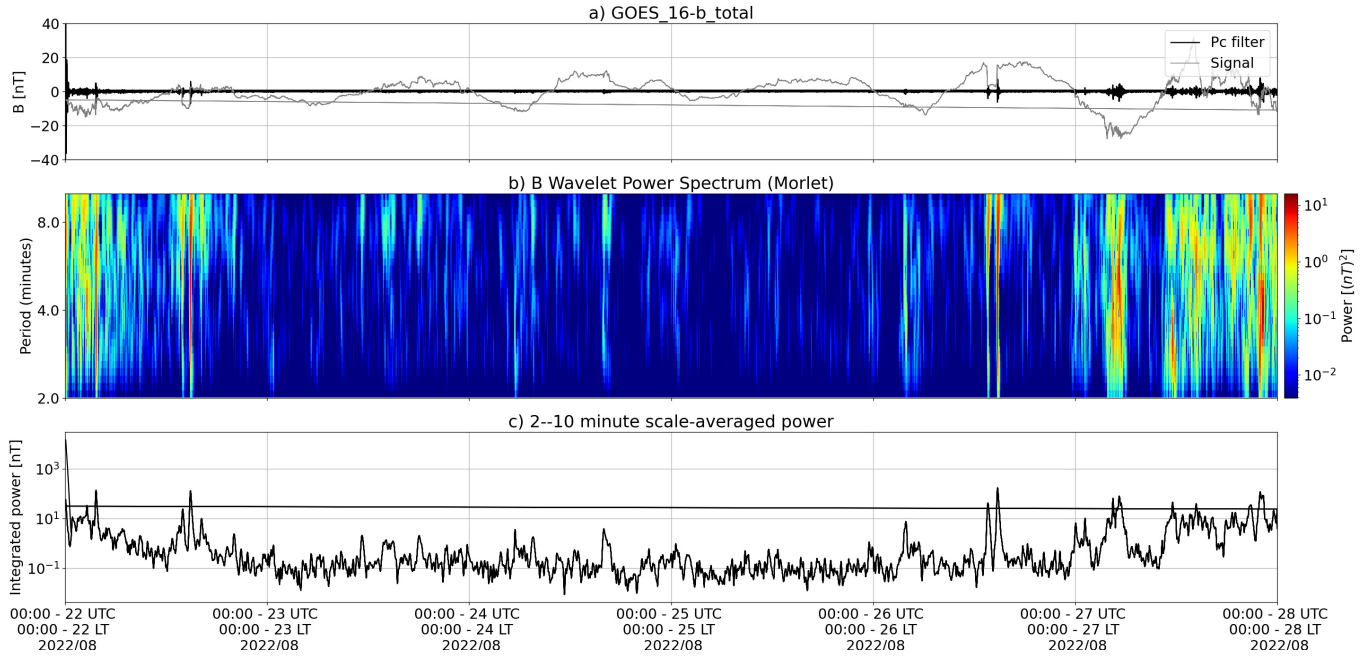


Figura 5: a) Timeseries of the geomagnetic field total component measured by GOES 16, together with the Pc5 fluctuation in black. b) Wavelet power spectrum of the filtered timeseries. c) Average ULF power in the period range from 2 to 10 minutes.

- There was an intense activity of Pc5 ULF waves on August 22 and 27 as reported with GOES 16 at geosynchronous orbit (L $\sim$ 6.6).
- For the ground-based stations, only the ISLL station (high latitude, L=5.15) registered significant

activity on August 22.

- The activity of Pc5 ULF waves on August 27 was observed from 12 UT down to low latitudes (Embrace stations), but on August 28 the wave activity was concentrated again over the high latitude region (Carisma station).

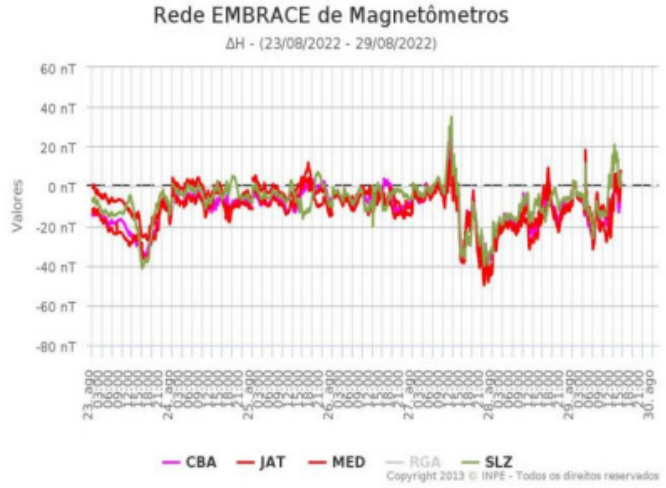
5 Geomagnetic activity

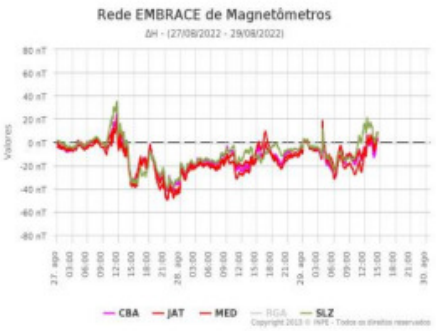
5.1 Responsible: Lívia Alves

In the week of Aug 23-29, the following events related to geomagnetic activity stand out:

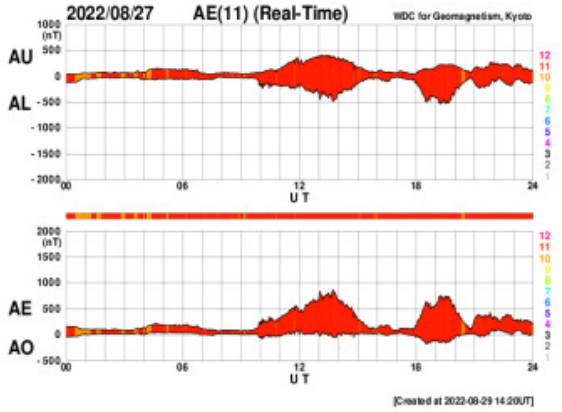
- The data from the Embrace magnetometer network registered a geomagnetic storm in Aug 27. Aug 27 - The magnetometers of the Embrace network recorded a drop to values of -50 nT in the H component.
- The geomagnetic field was active, the AE index reached 500 nT for several hours on Aug 27, 28. The Dst index reached -32 nT (Aug 27). The highest Kp of the week was 4o.
- The geomagnetic field measured at the GOES orbit shows instabilities on Aug 27-28.

Briefing semana de 23/08 à 29/08 de 2022

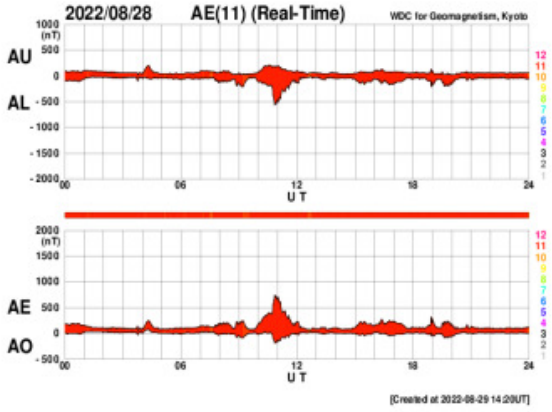


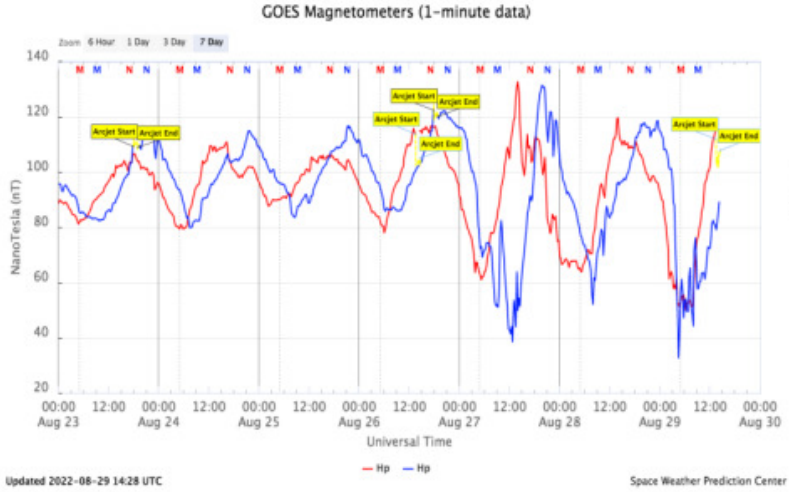


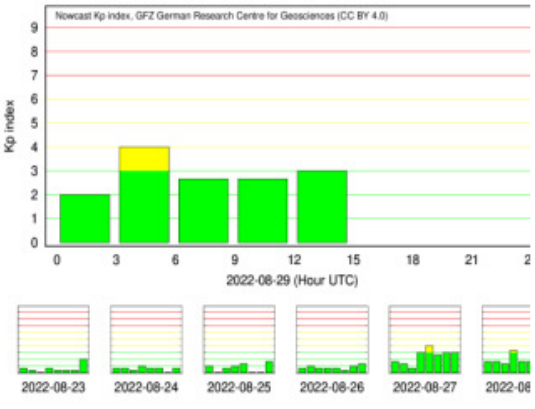
27/ago

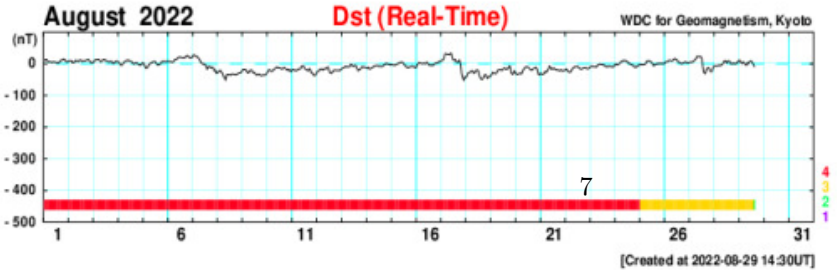


28/ago







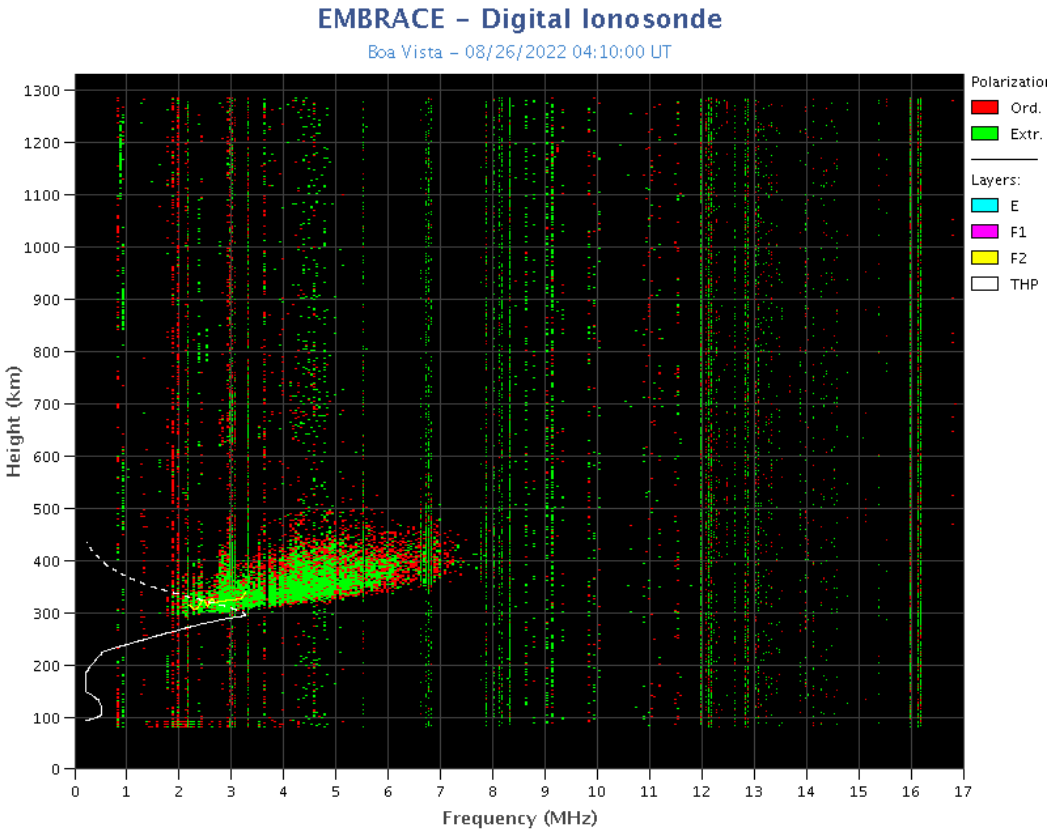


6 Ionosphere

6.1 Responsible: Laysa Resende

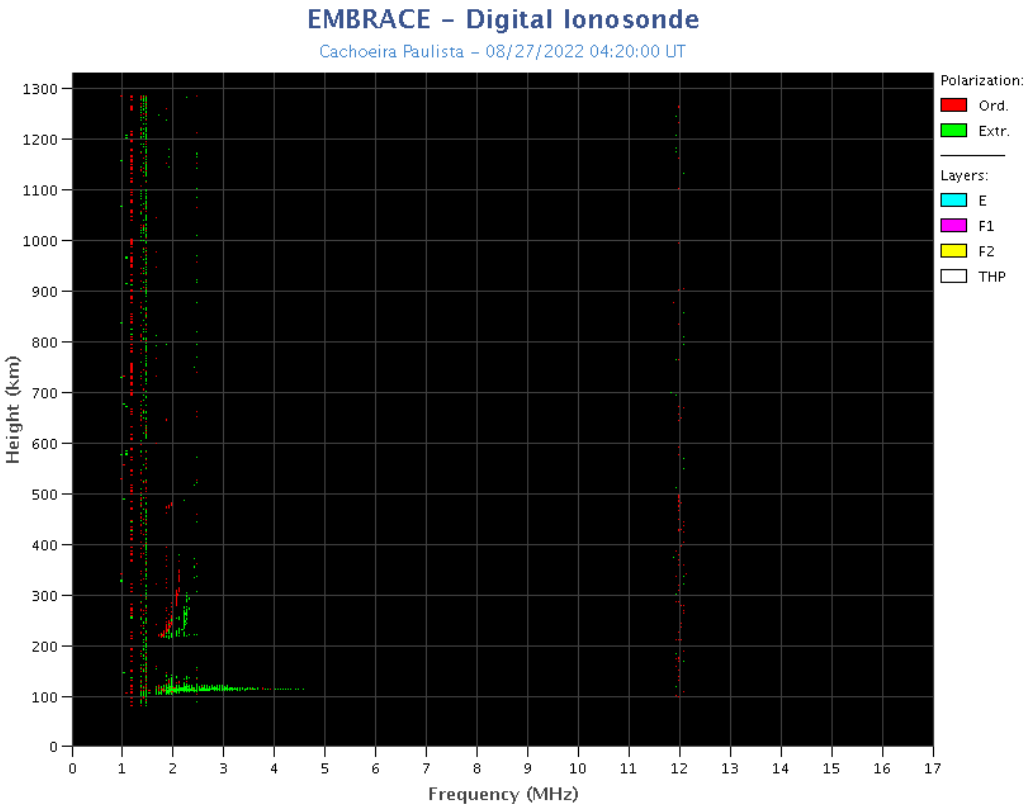
Boa Vista:

- The spread occurred on August 26 to 28.
- The Es layers reached scale 4 on August 20.



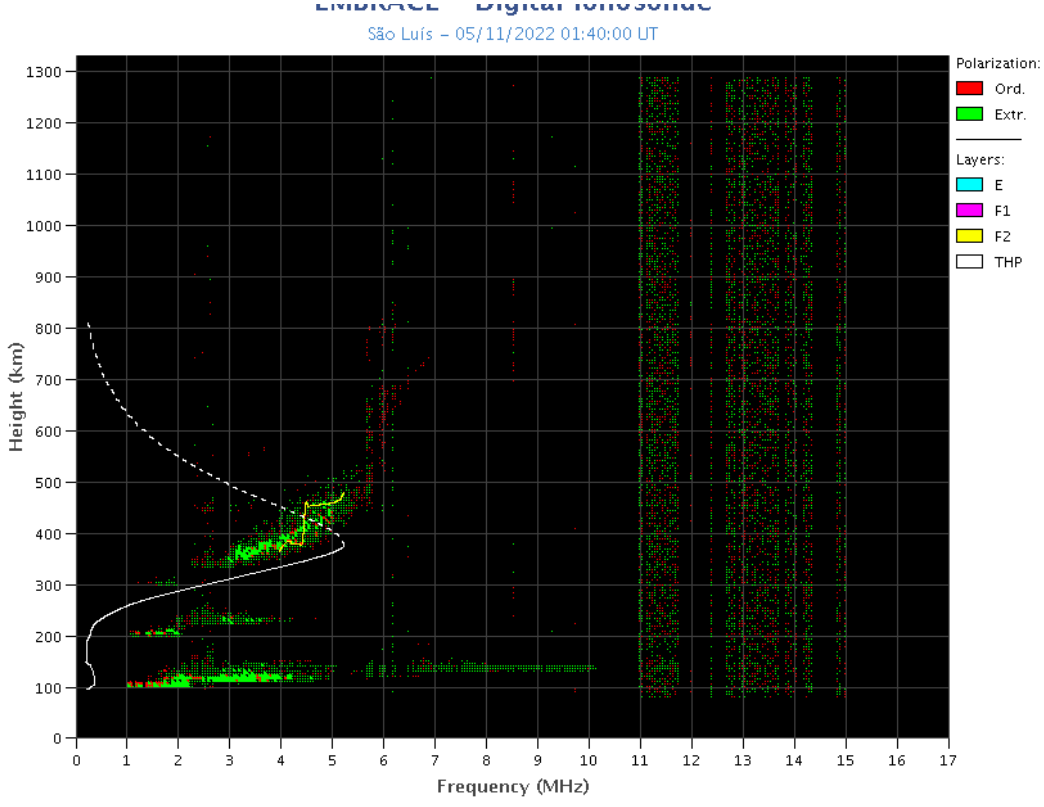
Cachoeira Paulista:

- The spread did not occur in this week.
- The Es layers reached scale 2 during this week.



São Luís:

- There were a spread F during this week.
- The Es layers reached scale 4 on August 26.



7 Scintilation

7.1 Responsible: Siomel Savio Odriozola

In this report on the S4 scintillation index, data from SLMA in São Luiz/MA, STNT in Natal/RN, STCB in Cuiabá/MT and SJCE in São José dos Campos/SP are presented. The S4 index tracks the presence of irregularities in the ionosphere having a spatial scale $\sim$ 360 m. The SLMA station showed a slight scintillation behavior after sunset on the 25th and 28th of August. Also, on the 28th, shortly after noon, another light scintillation event (S4 $\sim$ 0.3) was recorded. This event was also detected by the other three stations analyzed this week (Figure 1). The STCB station additionally reported a moderate event (S4 reaching values up to 0.5) in the last hours of the 28th and the first hours of the 29th which may be related to plasma bubbles. Figure 2 shows the maps with the spatial arrangement of some GPS satellites signal intercept with a layer at 400 km high over the field of view of the stations used in this report. The wide-ranging spatial distribution, both longitudinally and latitudinally, of the moderate values of S4 (between 0.2 and 0.3) suggests a disturbance of the equatorial ionization anomaly, that is, a continental scale ionospheric disturbance. Finally, it is worth noting that the same scintillation shown in Figure 1 was detected with the GLONASS constellation.

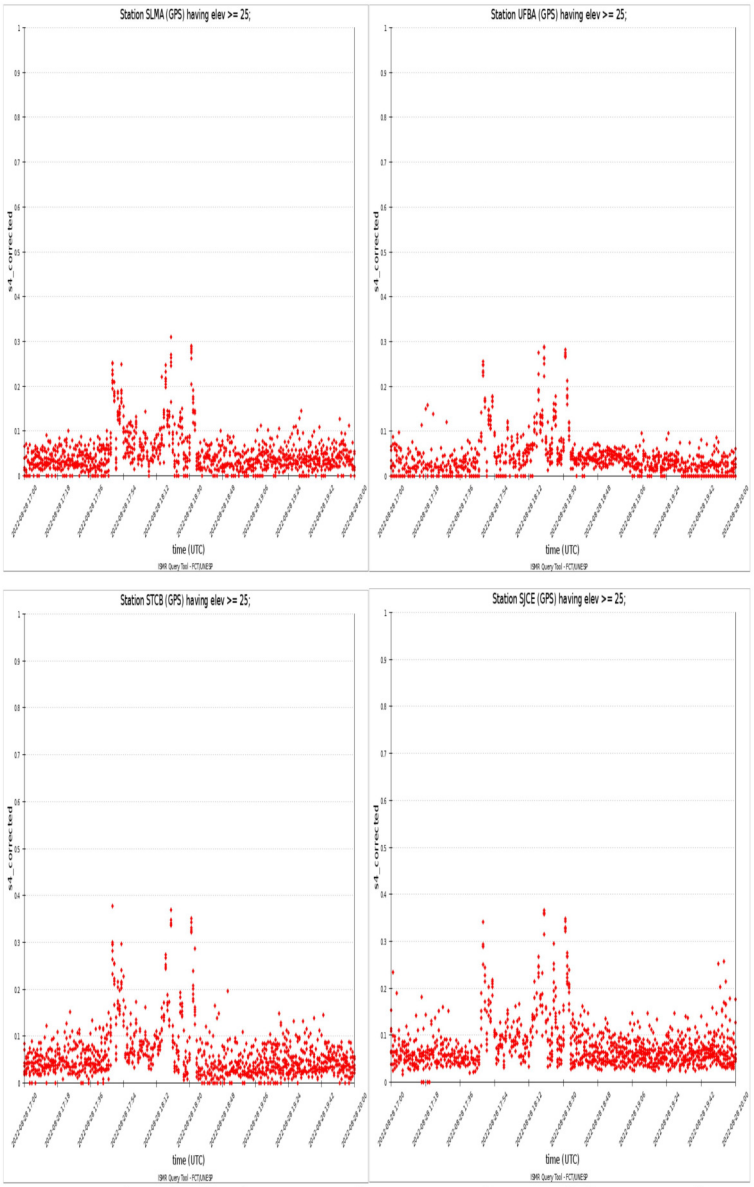


Figure 1: S4 index values for the GPS constellation measured at SLMA (left upper panel), UFBA right upper panel), STCB (left lower panel) and SJCE (right lower panel), on 08/28 between 1700 and 2000 UT.

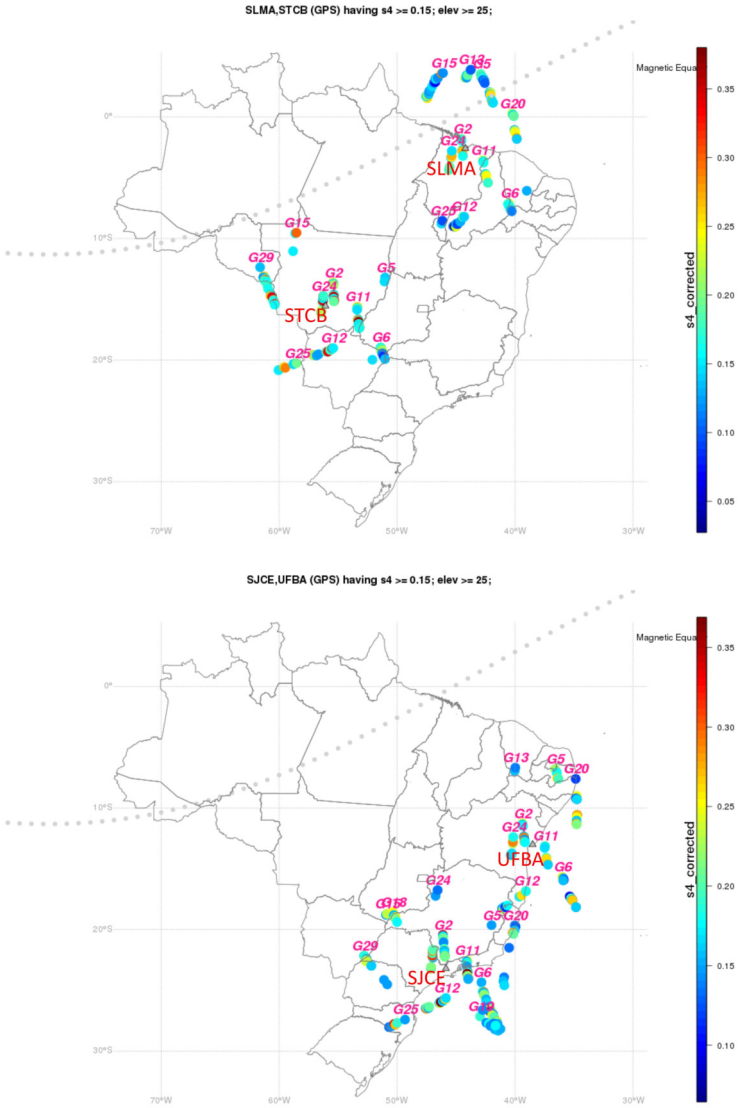


Figure 2: Map of S4 index values for the GPS constellation measured from the point of view of at SLMA, STCB (upper panel) and UFBA, SJCE (lower panel) for the same time interval appearing in Figure 1