Briefing Space Weather

2022/08/16

1 Sun

1.1 Responsible: José Cecatto

08/08 – No flare (M/X); Fast wind stream (=< 600 km/s); 2 CME c.h.c. toward the Earth;
08/09 – No flare (M/X); Fast wind stream (=< 600 km/s); 3 CME c.h.c. toward the Earth;
08/10 – No flare (M/X); Fast wind stream (=< 600 km/s); 3 CME c.h.c. toward the Earth;
08/11 – No flare (M/X); Fast wind stream (=< 600 km/s); 1 CME c.h.c. toward the Earth;
08/12 – No flare (M/X); Fast wind stream (=< 600 km/s); 1 CME c.h.c. toward the Earth;
08/13 – No flare (M/X); Fast wind stream (=< 550 km/s); 5 CME c.h.c. toward the Earth;
08/14 – No flare (M/X); Fast wind stream (=< 500 km/s); 7 CME c.h.c. toward the Earth *;
08/15 – No flare (M/X); Fast wind stream (=< 500 km/s); No CME toward the Earth;
Prev.: Fast wind stream expected on August 17-18; for the next 2 days (25% M, 5% 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 022-08-13T18:48Z)
  - The simulation indicates that the flank of the Coronal Mass Ejection will reach the DSCOVR mission between 2022-08-16T11:00Z and 2022-08-17T017:00Z.
- WSA-ENLIL (CMEs 2022-08-13T18:48Z, 2022-08-13T19:48Z)
  - The simulation results indicate that the flanks of combined Coronal Mass Ejections will reach the DSCOVR mission between 2022-08-16T21:00Z e 2022-08-17T11:00Z.
- WSA-ENLIL (CME 022-08-14T12:48Z)
  - The simulation results indicate that the flank of CME will reach the DSCOVR mission between 2022-08-15T15:22Z and 2022-08-16T05:22Z.

Coronal holes (SPOCA):

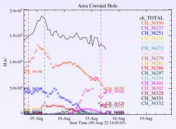


Figura: The solid line in black shows the products of the sum of areas for each detection interval performed by SPOCA between August 06 and 15, 2022.

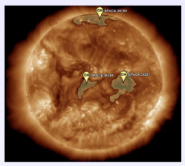


Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 22:00 UT on August 07, 2022 (blue dot line).

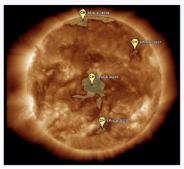


Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 01:00 UT on August 06, 2022 (red dot line).

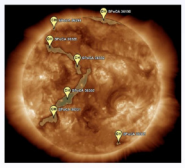
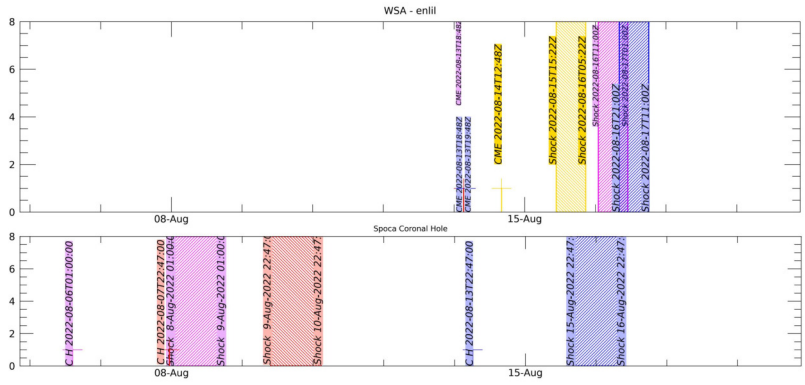


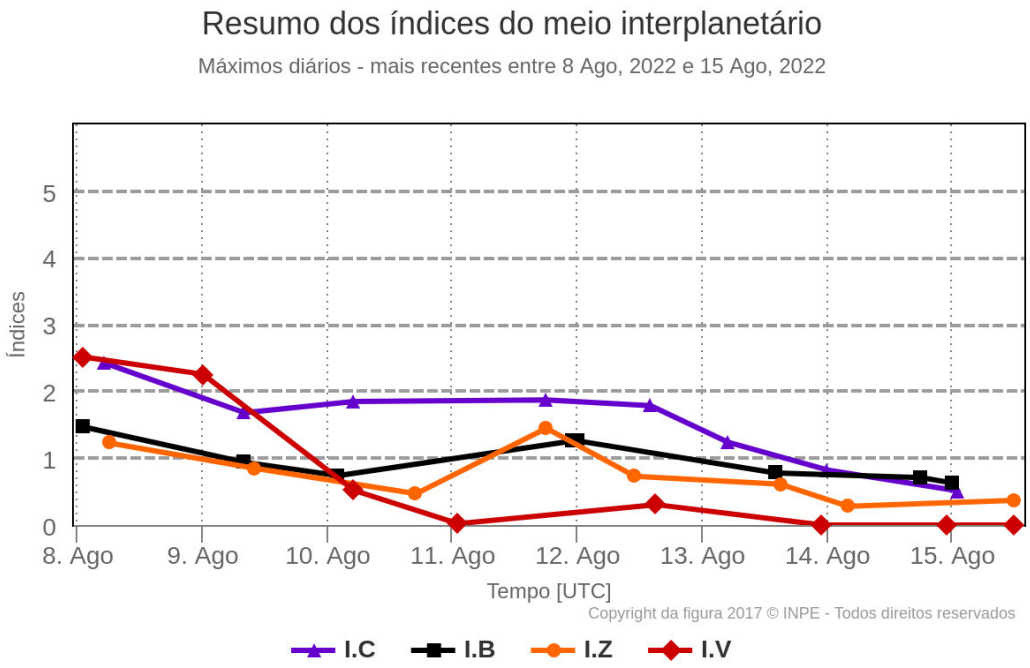
Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 00:00 UT on August 13, 2022 (pink dot line).

WSA - ENLIL SPOCA



3 Interplanetary Medium

3.1 Responsible: Paulo Jauer



- The interplanetary region in the last week showed a moderate of plasma perturbations due to the passage of the HSS structures identified by the DISCOVR satellite in the interplanetary region.
- The modulus of the interplanetary magnetic field component remained below 10nT.
- The bxby components do not show a clear sector change during the analyzed period, remaining [10,-10]nT.
- The component of the south bz field remained oscillating mostly negative, however with its magnitude below 10nT The solar wind density remained below 17 p/cm^3 with some peaks.
- The solar wind speed was mostly oscillating above 400km/s during the analyzed period with a peak around 600 km/s on 10/Aug at 05:30 UT.
- The magnetopause position was on average below the typical position. The maximum compression was observed on 08/Aug of 7.8 Re.

4 Radiation Belts

4.1 Responsible: Ligia Alves da Silva

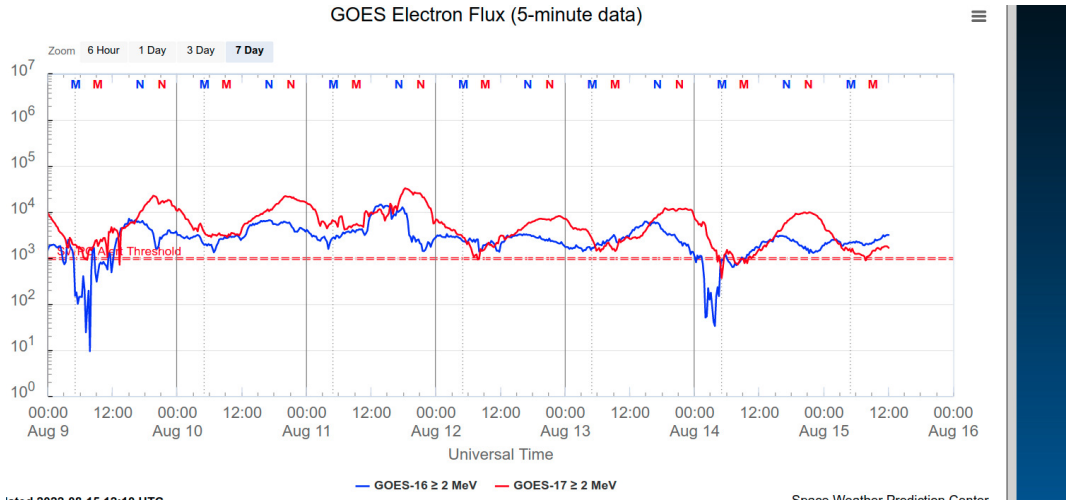


Figura 1: High-energy electron flux (> 2 MeV) obtained from GOES-16 and GOES-17 satellite. Source: `https://www.swpc.noaa.gov/products/goes-electron-flux`.

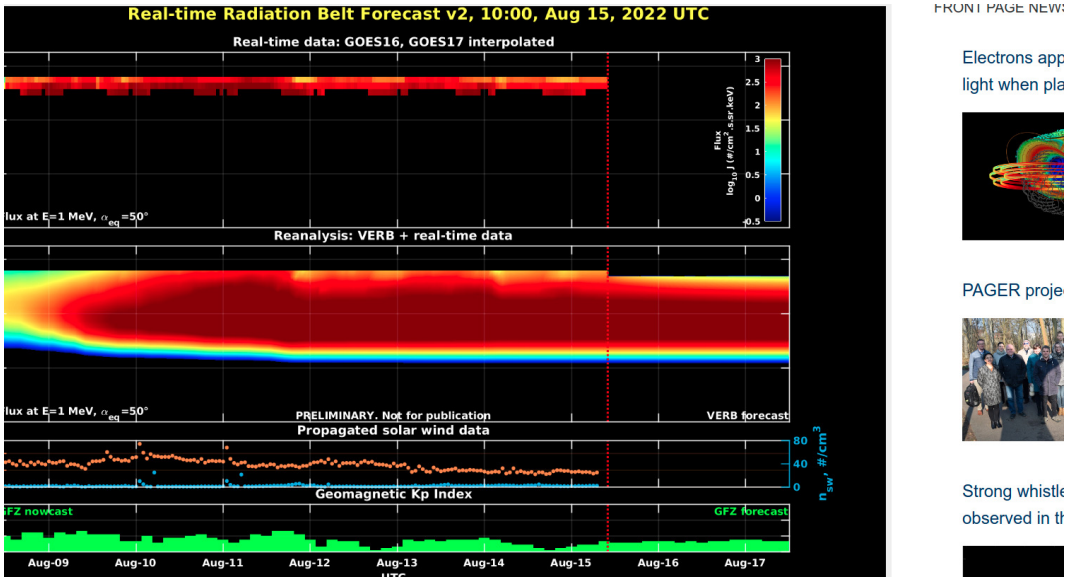


Figura 2: high-energy electron flux data (real-time and interpolated) obtained from ARASE, GOES-16, GOES-17 satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: `https://rbm.epss.ucla.edu/realtime-forecas`.

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 above the minimum threshold (10^3 particles/$(cm^2 ssr)$) during almost the entire analyzed period, showing two dropouts, the first on August 9th and the second on August 14th. It is also observed electron flux increases at the end of the 8th, 10th, and 11th of August, which exceeds 10^4 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 electron flux recomposes between days 9-10/August. After that, the electron flux variabilities are observed only at the outer boundary of the outer radiation belt ($L - shell > 6.0$).

5 ULF waves

5.1 Responsible: Graziela B. D. Silva

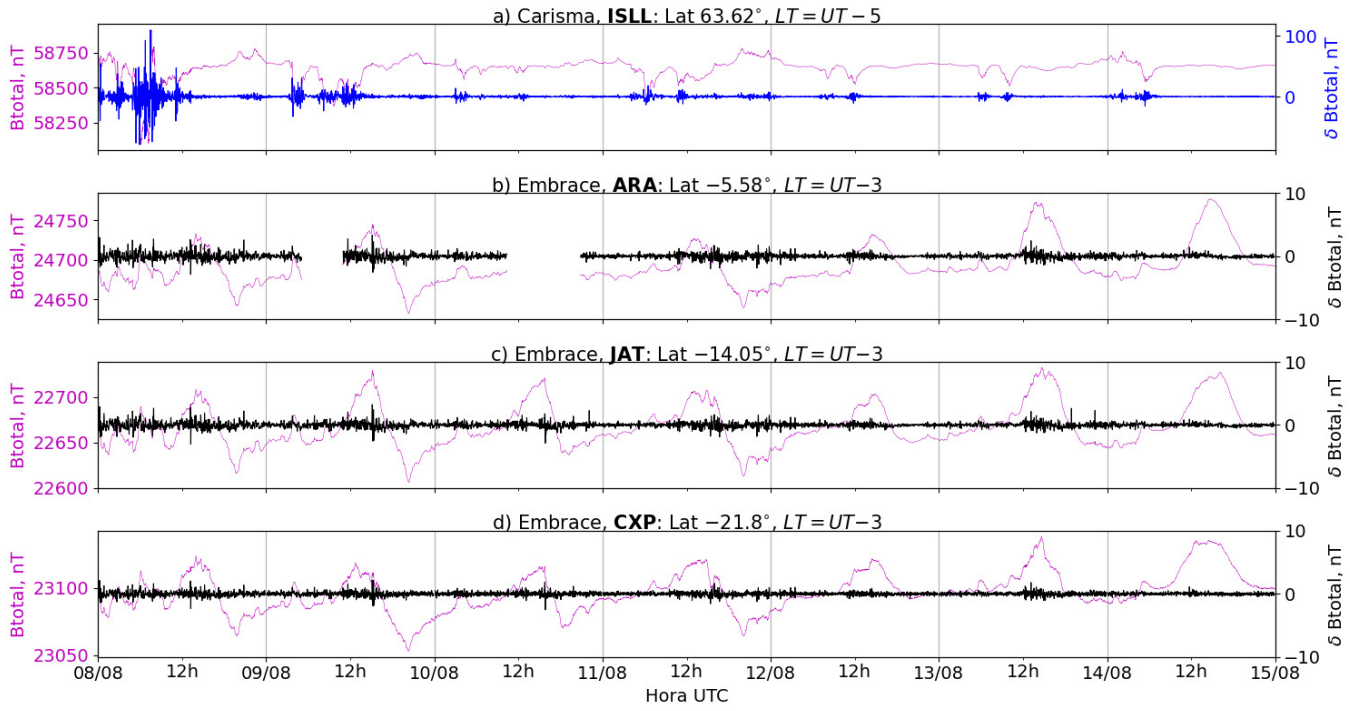


Figura 3: a) Timeseries of the geomagnetic field total component measured at ISLL station (Island Lake) of the CARISMA magnetometer network in magenta, along with the associated perturbation in the Pc5 band shown in blue. b-d) timeseries of the geomagnetic field total component measured at stations ARA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

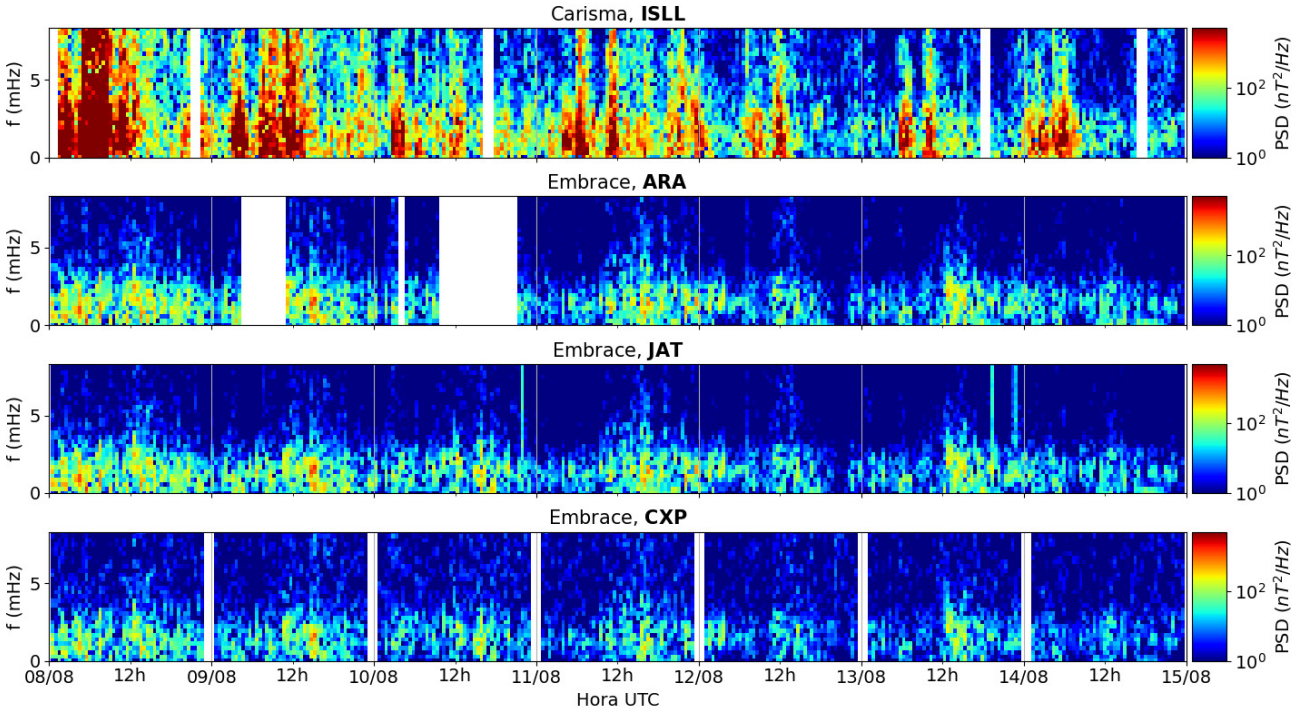


Figura 4: a-d) Time evolution of the power spectral density obtained from the filtered timeseries of the geomagnetic field total component (δ Btotal) for a) the high latitude station (ISLL-CARISMA), and b-d) for the low latitude stations of EMBRACE (ARA, JAT, CXP).

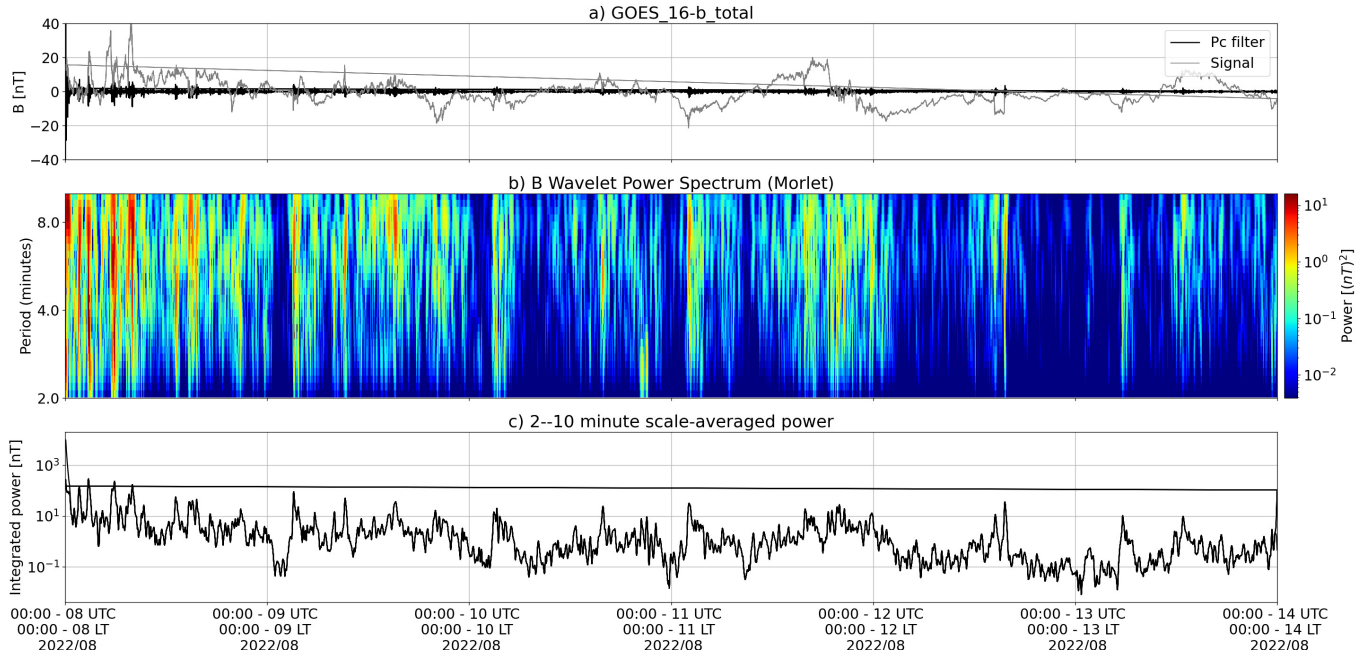


Figura 5: a) Timeseries of the geomagnetic field total component measured by GOES 16, together with the Pc5 fluctuation in black. b) Wavelet power spectrum of the filtered timeseries. c) Average ULF power in the period range from 2 to 10 minutes.

- There was an intense activity of Pc5 ULF waves on August 08-09, 11, and sporadic wave activity on August 10, 12 and 13, as measured by GOES 16 at geosynchronous orbit (L $\sim$ 6.6).
- For the ground-based stations, an intense activity of ULF waves was registered at ISLL station

(high latitude, L=5.15) throughout the reported week, especially on August 08.

- The Embrace stations over the low latitude region of Brazil also registered significant ULF wave activity throughout the week, but of lower impact than observed for the ISLL station.
- The Pc5 ULF waves simultaneously observed on August 08-09 was related to a moderate geomagnetic storm.

6 Geomagnetic activity

6.1 Responsible: Lívia Alves

In the week of August 09-15, the following events related to geomagnetic activity stand out:

- The data from the Embrace magnetometer network showed instabilities throughout the period, with emphasis on August 09, 11 and 12 - The magnetometers of the Embrace network recorded a drop in the H component.
- The geomagnetic activity was unstable throughout the period, the AE index was active and reached 1000 nT for several hours. The Dst index reached -30 nT. The highest Kp of the week was 4o.
- The gemagnetic field measured at the GOES orbit shows instabilities on August 11.

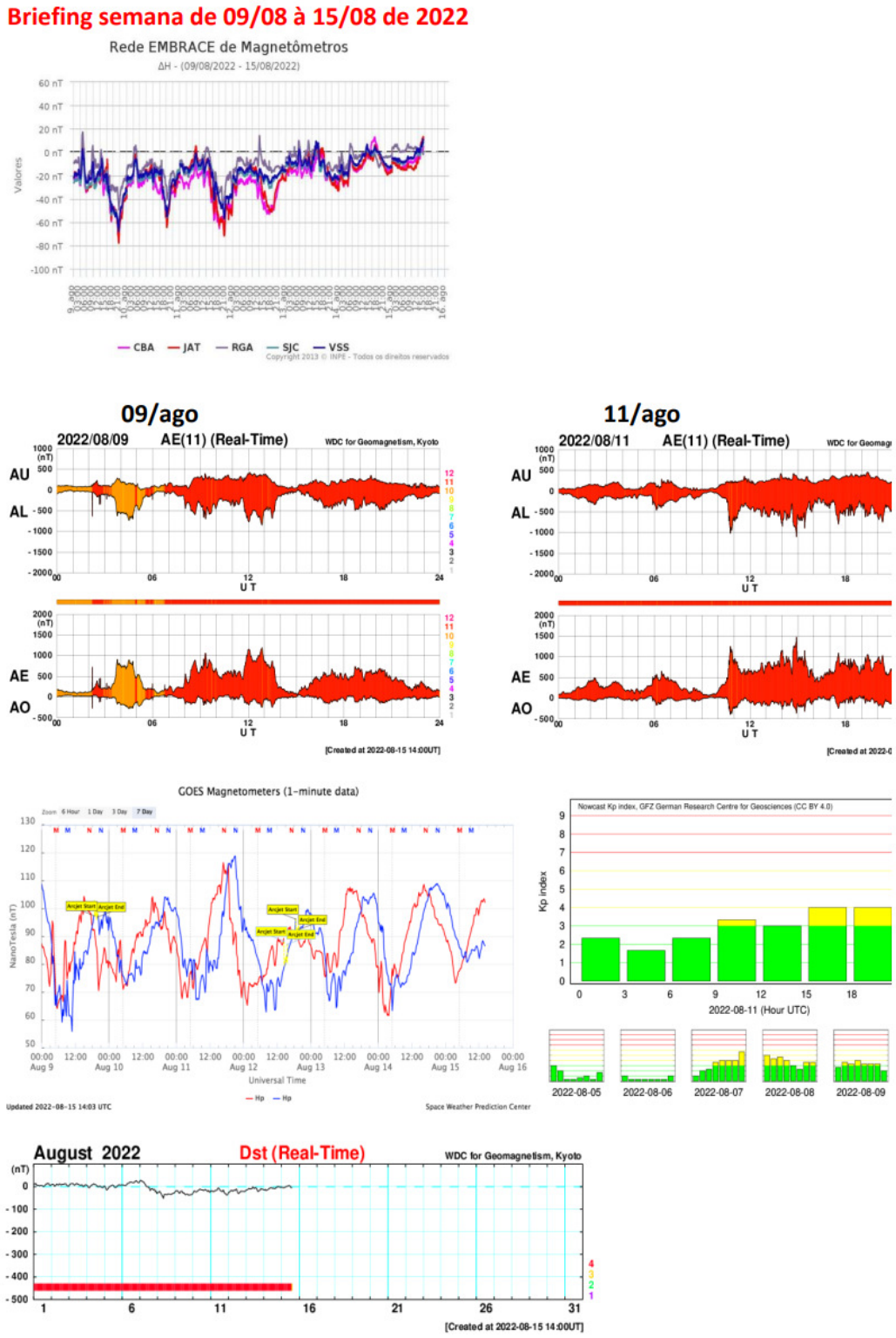
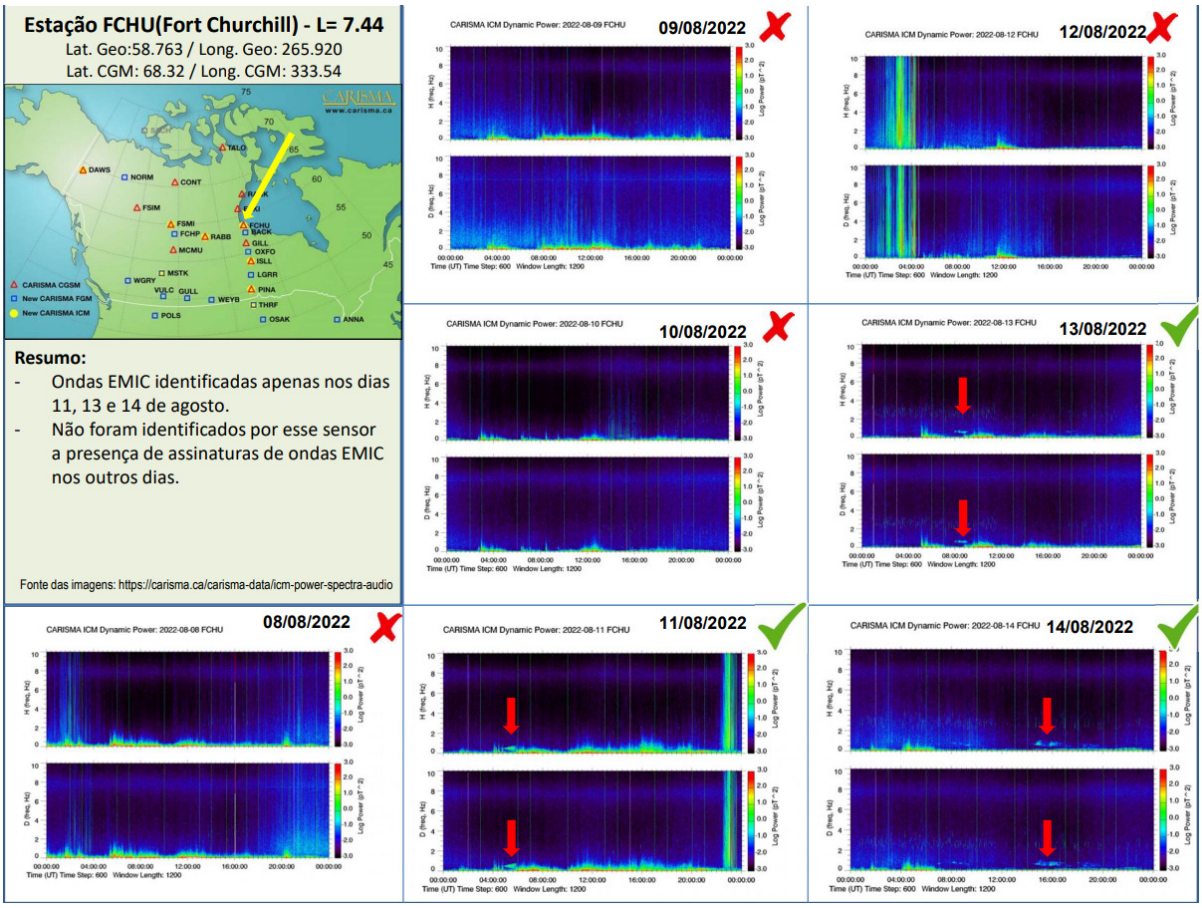


Figura 6: The figures from top to bottom show the weekly evolution of the H magnetic field component measured by the Embrace network, of the auroral AE index, of the geomagnetic field measured by the GOES satellites at $L \sim 6.6$ on the left, along with the Kp index on the right hand side. The bottom most figure contains the Dst index time series.

7 EMIC waves

7.1 Responsible: Claudia Medeiros

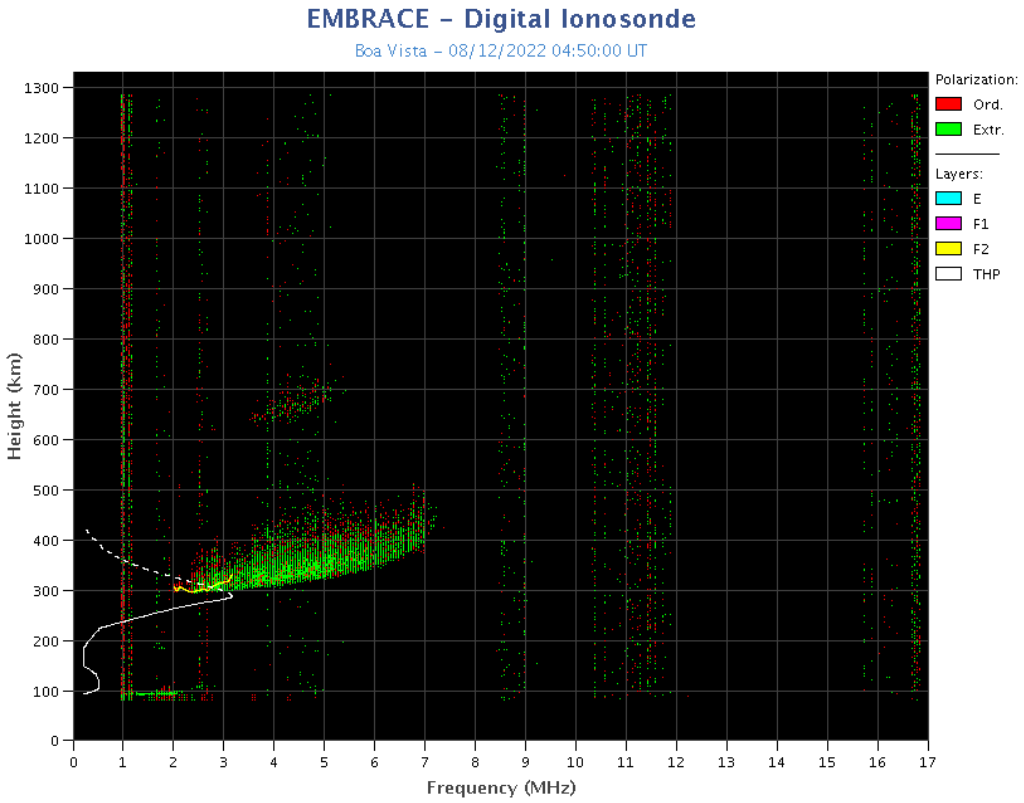


8 Ionosphere

8.1 Responsible: Laysa Resende

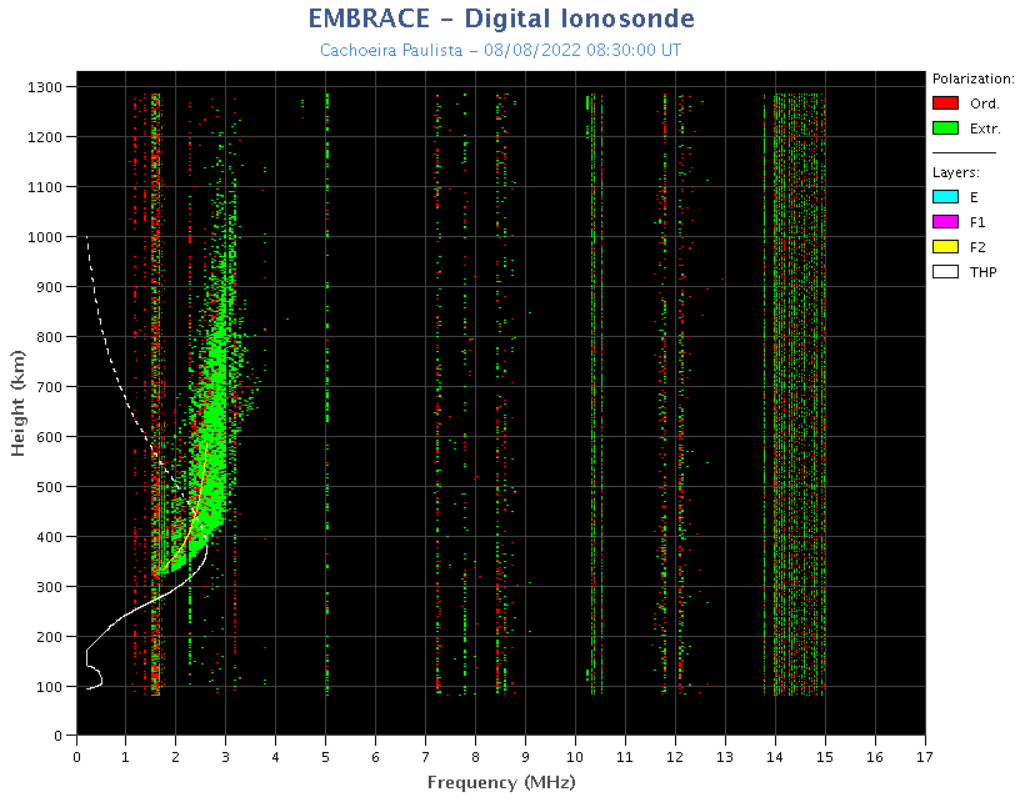
Boa Vista:

- The spread occurred on August 12.
- The Es layers reached scale 3 on August 08 and 11.



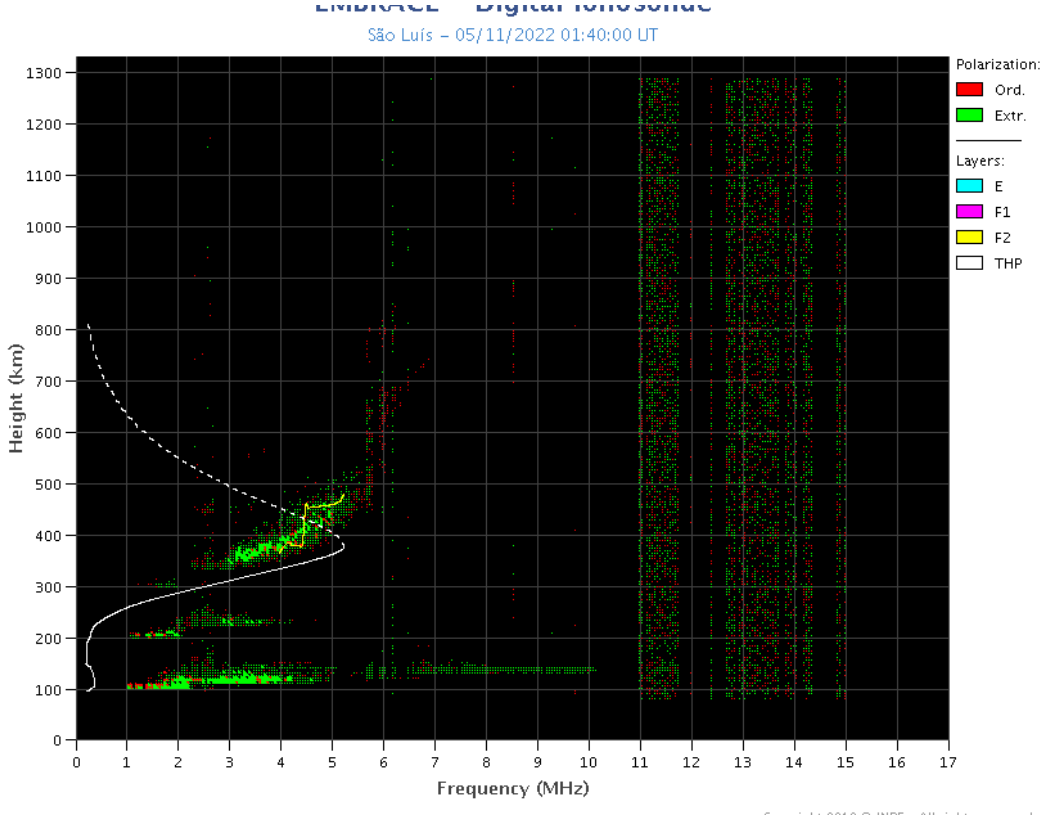
Cachoeira Paulista:

- The spread F occurred on August 08.
- The Es layers reached scale 3 on August 09, 13, and 14.



São Luís:

- There were a spread F on August 08 and 09.
- The Es layers reached scale 4 on August 12 and 14.



9 Scintilation

9.1 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 an above-average behavior only during the first hours of August 8, with values slightly above 0.2. STCB and SJCE stations did not show any behavior of S4 above 0.2. Finally, UFBA exhibited punctual values, probably due to one satellite, of the scintillation index above 0.3 between the 8th and 12th, including signal loss of lock in the afternoon of the 11th (Figure 1). Since this behavior was similar to last week, it could be an indicator of a problem with the installed receiver and not as a result of geophysical causes.

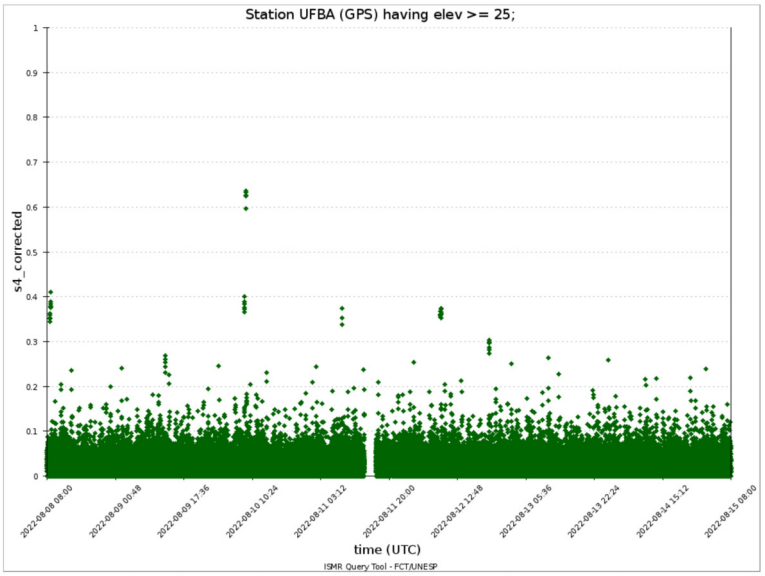


Figure 1: S4 index values for the GPS constellation measured at UFBA during the week 08-15/08/2022.

10 All-Sky Imager

10.1 Responsible: LUME

All-Sky Imager EPBs Observation
Observações das EPBs por meio do imageador All-Sky
August 07 - August 13, 2022 || 07 de agosto - 13 de agosto, 2022

Observatory Observatório	August 07 Agosto 07	August 08 Agosto 08	August 09 Agosto 09	August 10 Agosto 10	August 11 Agosto 11	August 12 Agosto 12	August 13 Agosto 13
CA	✓	✓	✓	✓	✗	✓	✓
BJL	✗	✗	✗	✗	✗	✗	✗
CP	✓	✓	✓	✗	✗	✓	✓
SMS	✓	✓	✓	✗	✗	✓	✓

Definition of Symbols	
CA	São João do Cariri
BJL	Bom Jesus da Lapa
CP	Cachoeira Paulista
SMS	São Martinho da Serra
✓	Observation - Observação
✗	No Observation - Sem Observação
❍	Clear sky - Céu limpo
	Partly Cloudy - Parcialmente Nublado
	Cloudy - Nublado
	Cloudy with Rain - Nublado com Chuva
	Blur image - Imagem Desfocada

- At the Sao Joao do Cariri observatory, no geophysical phenomena such as plasma bubbles and traveling ionospheric disturbances were observed during the period.
- At the Bom de Jesus da Lapa observatory there was no observation due to technical problems.
- At the Cachoeira Paulista observatory, no geophysical phenomena such as plasma bubbles and traveling ionospheric disturbances were observed during the period.
- Finally, at the observatory of Sao Martinho da Serra observatory, no geophysical phenomena such as plasma bubbles and traveling ionospheric disturbances were observed during the period
- It was observed plasma bubbles were on August, 08th. Besides, the equatorial anomaly was observed every day.

11 ROTI

11.1 Responsible: Carolina de Sousa do Carmo

- On August 7, 2022, plasma bubble appeared in the northeast region of Brazil between 00:00 UT and 02:00 UT.
- On August 8, 2022, there are irregularities throughout the Brazilian region, between 00:00 UT and 04:30 UT.
- Also, ROTI did not show significant variations related to ionospheric irregularities between August 9-13, 2022.