Briefing Space Weather

2022/08/09

1 Sun

1.1 Responsible: José Cecatto

08/01 – No flare (M/X); Fast wind stream (=< 550 km/s); 3 CME c.h.c. toward the Earth;
08/02 – No flare (M/X); Fast wind stream (=< 550 km/s); 4 CME c.h.c. toward the Earth;
08/03 – No flare (M/X); Fast wind stream (=< 550 km/s); 4 CME c.h.c. toward the Earth;
08/04 – No flare (M/X); Fast wind stream (=< 500 km/s); 2 CME c.h.c. toward the Earth;
08/05 – No flare (M/X); Fast wind stream (~ 400 km/s); 7 CME c.h.c. toward the Earth;
08/06 – No flare (M/X); No fast wind stream; 6 CME c.h.c. toward the Earth *;
08/07 – No flare (M/X); Fast wind stream (=< 600 km/s); 3 CME c.h.c. toward the Earth;
08/08 – No flare (M/X); Fast wind stream (=< 600 km/s; No CME toward the Earth;
Prev.: Fast wind stream expected up to August 11; for the next 2 days very low (5% M, 1% 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 2022-08-06T01:48)
  - The simulation indicates that the flank of the Coronal Mass Ejection will reach the DSCOVR mission between 2022-08-08T06:00 and 2022-08-08T20:00.

Coronal holes (SPOCA):

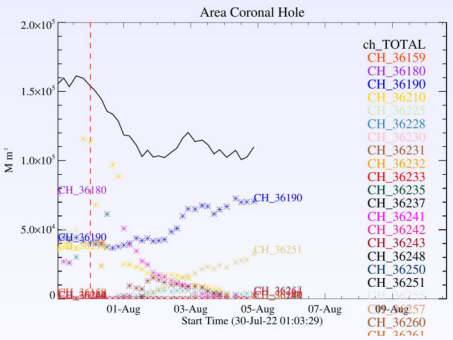


Figura: The solid line in black shows the products of the sum of areas for each detection interval performed by SPOCA between July 31 and August 06, 2022.

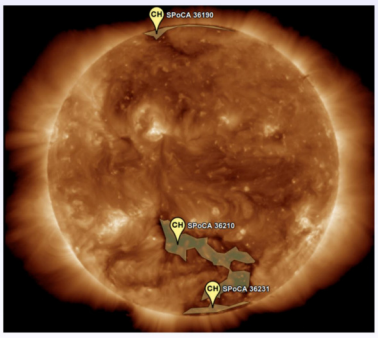
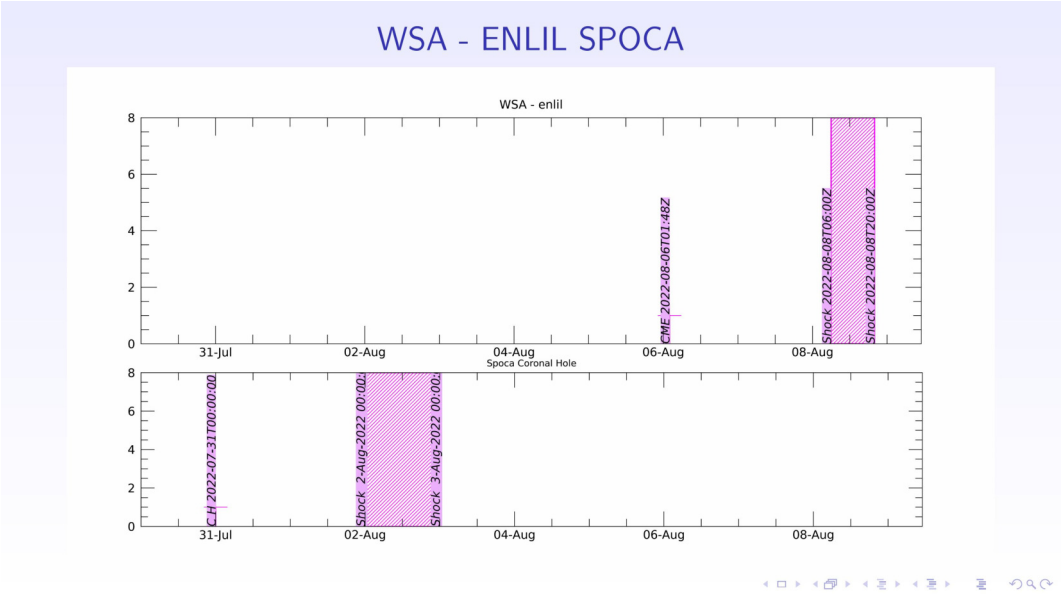


Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 00:00 UT on July 31, 2022 (red dot line).



3 Radiation Belts

3.1 Responsible: Ligia Alves da Silva

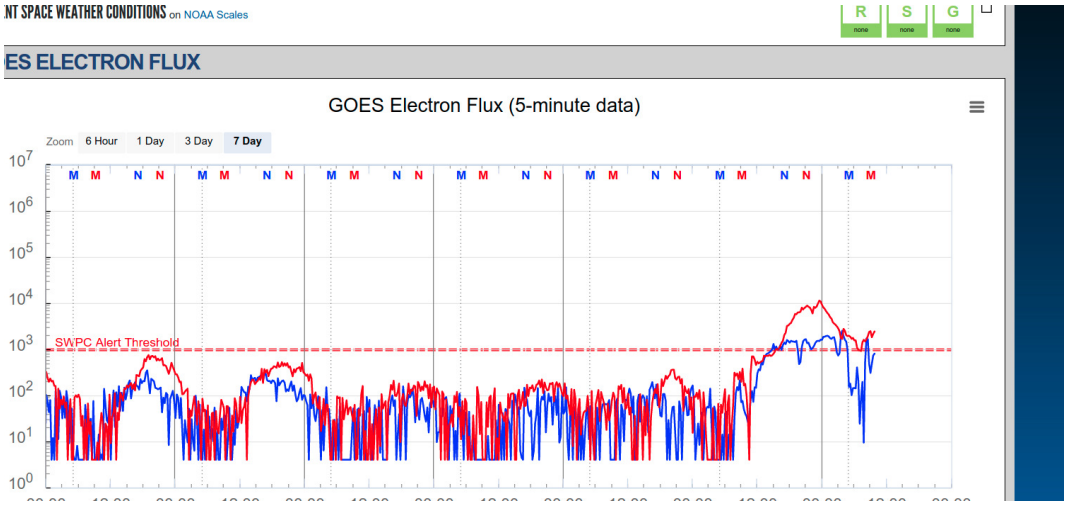


Figura 1: High-energy electron flux (> 2 MeV) obtained from GOES-16 and GOES-17 satellite. Source: `https://www.swpc.noaa.gov/products/goes-electron-flux`

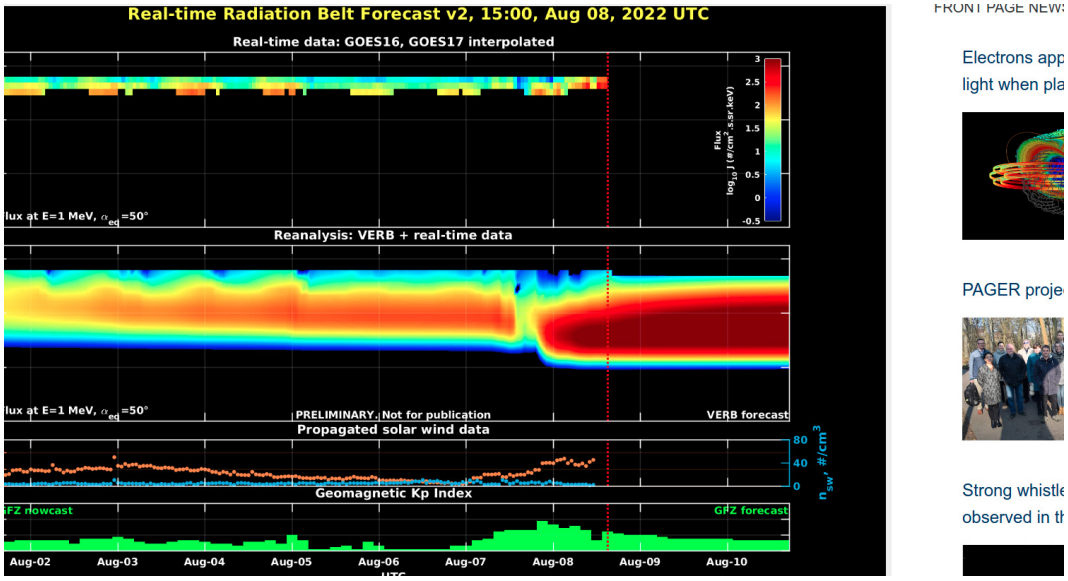


Figura 2: High-energy electron flux data (real-time and interpolated) obtained from ARASE, GOES-16, GOES-17 satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: `https://rbm.epss.ucla.edu/realtime-forecast/`

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 below the minimum threshold (10^3 particles/$(cm^2 ssr)$) during almost the entire analyzed period, showing an increase that surpasses this threshold only on August 8th at 15:00 UT.

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 a significant electron flux decrease that reached L-shell > 3.5 on August 8th. An equally significant electron flux increase followed this decrease is observed mainly between $3.0 >$ L-shell > 6.0.

4 ULF waves

4.1 Responsible: Graziela B. D. Silva

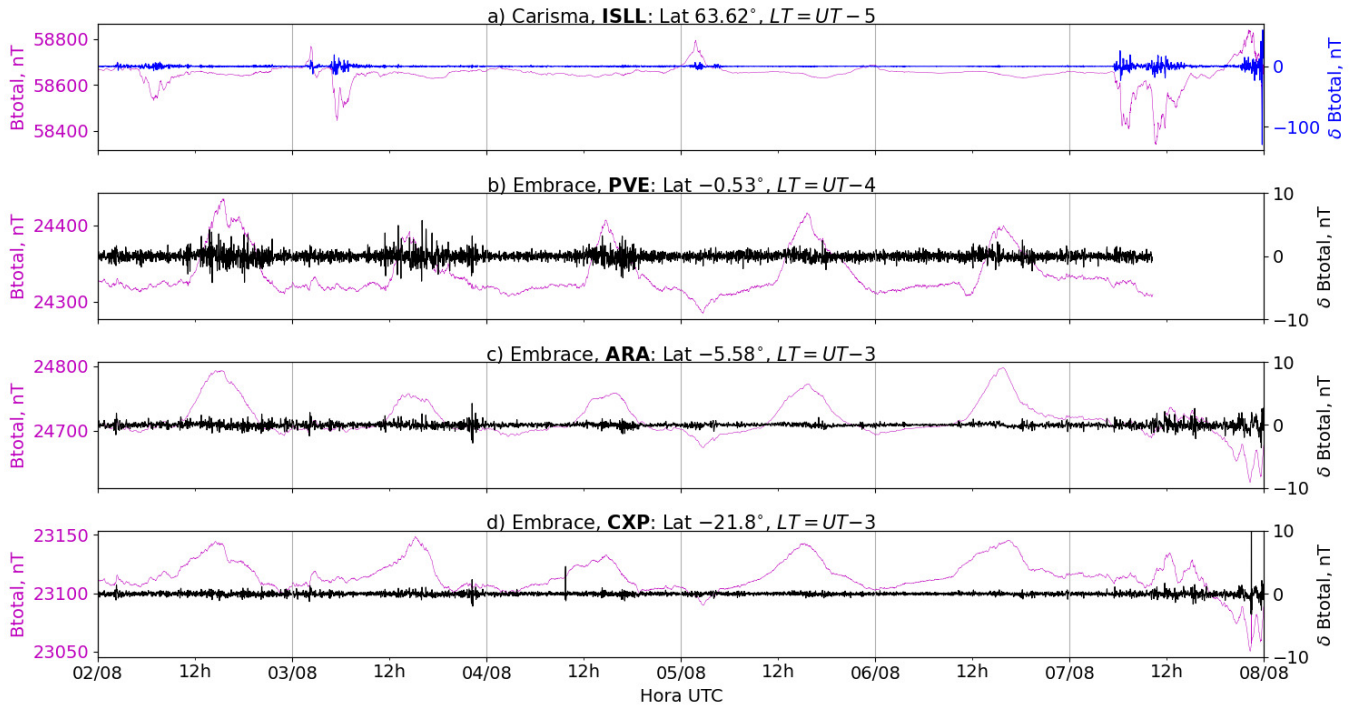


Figura 3: a) Timeseries of the geomagnetic field total component measured at ISLL station (Island Lake) of the CARISMA magnetometer network in magenta, along with the associated perturbation in the Pc5 band shown in blue. b-d) timeseries of the geomagnetic field total component measured at stations PVE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

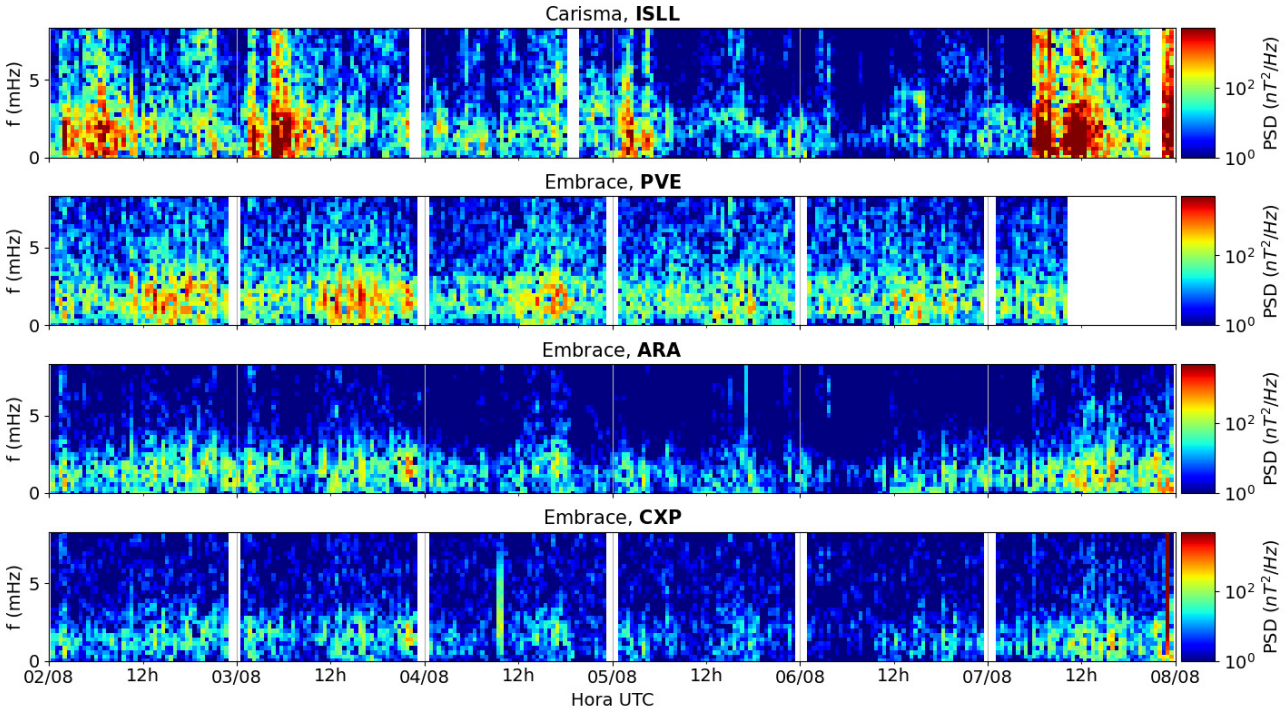


Figura 4: a-d) Time evolution of the power spectral density obtained from the filtered timeseries of the geomagnetic field total component (δ Btotal) for a) the high latitude station (ISLL-CARISMA), and b-d) for the low latitude stations of EMBRACE (PVE, ARA, CXP).

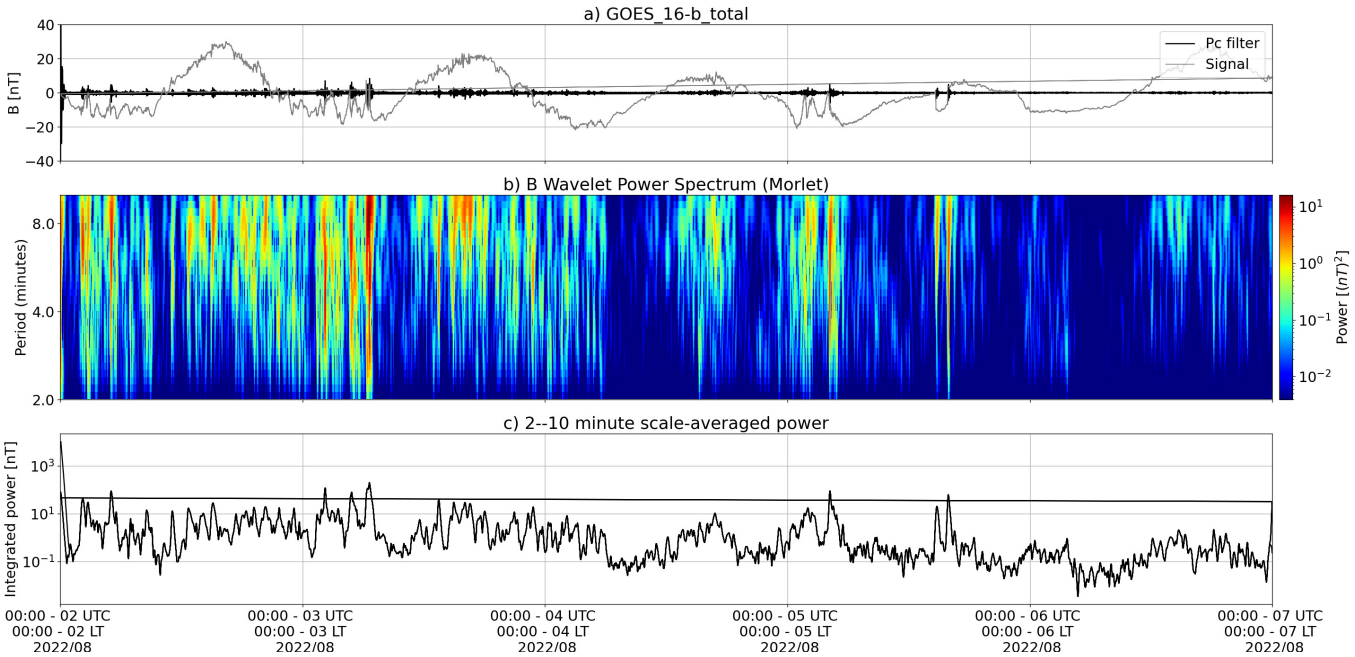


Figura 5: a) Timeseries of the geomagnetic field total component measured by GOES 16, together with the Pc5 fluctuation in black. b) Wavelet power spectrum of the filtered timeseries. c) Average ULF power in the period range from 2 to 10 minutes.

- There was significant activity of Pc5 ULF waves on August 02-05 and on the 7th (not shown), as measured by GOES 16 at geosynchronous orbit (L $\sim$ 6.6). an intense acitivity of the waves was probed by the satellite, in response to global perturbation in the magnetosphere. (interplanetary

coronal mass ejections) on 01/july and 03/july.

- For the ground-based stations, an intense activity of ULF waves was registered at ISLL station (high latitude, L=5.15) especially on August 02-03, 05 and 07.
- The Embrace stations over the low latitude region of Brazil registered higher levels of ULF wave power mainly on August 02-04, and 07.
- The Pc5 ULF waves simultaneously observed on August 07 was related to a moderate geomagnetic storm.

5 Geomagnetic activity

5.1 Responsible: Lívia Alves

In the week of August 02-08, 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 02,03-07 - The magnetometers of the Embrace network recorded a drop followed by an enhancement in the H component.
- The geomagnetic activity was unstable throughout the period, the AE index was active reached 1000 nT for several hours. The Dst index reached -52 nT. The highest Kp of the week was 5o
- The gemagnetic field measured at the GOES orbit shows instabilities on August 07-08.

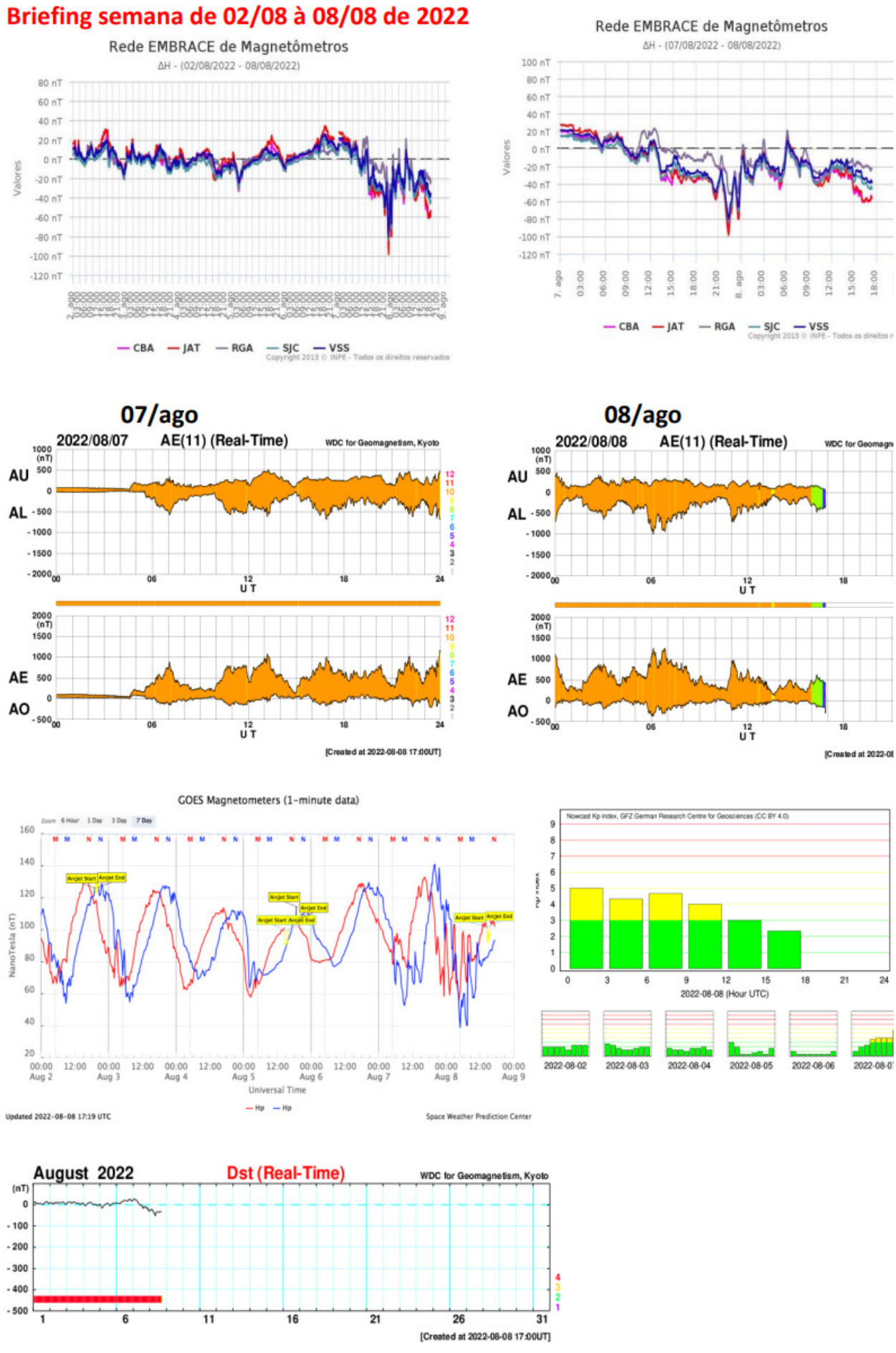


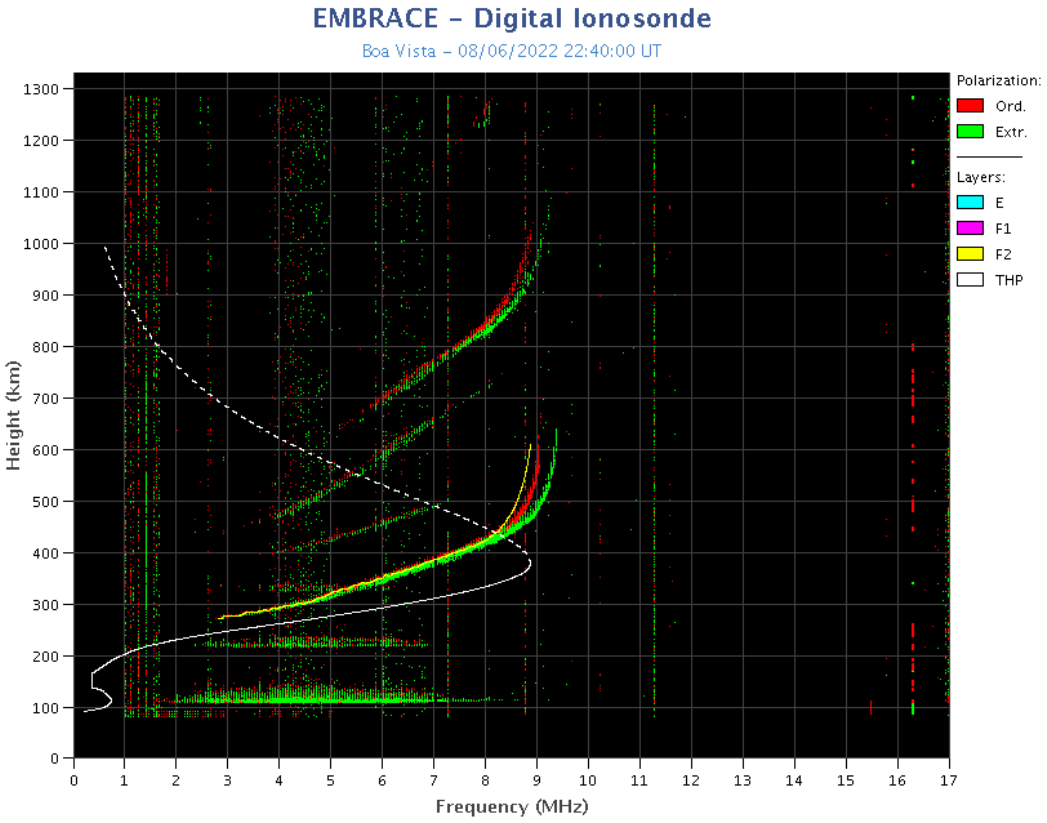
Figura 6: The figures from top to bottom show the weekly evolution of the H magnetic field component measured by the Embrace network, of the auroral AE index, of the geomagnetic field measured by the GOES satellites at $L \sim 6.6$ on the left, along with the Kp index on the right hand side. The bottom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

6 Ionosphere

6.1 Responsible: Laysa Resende

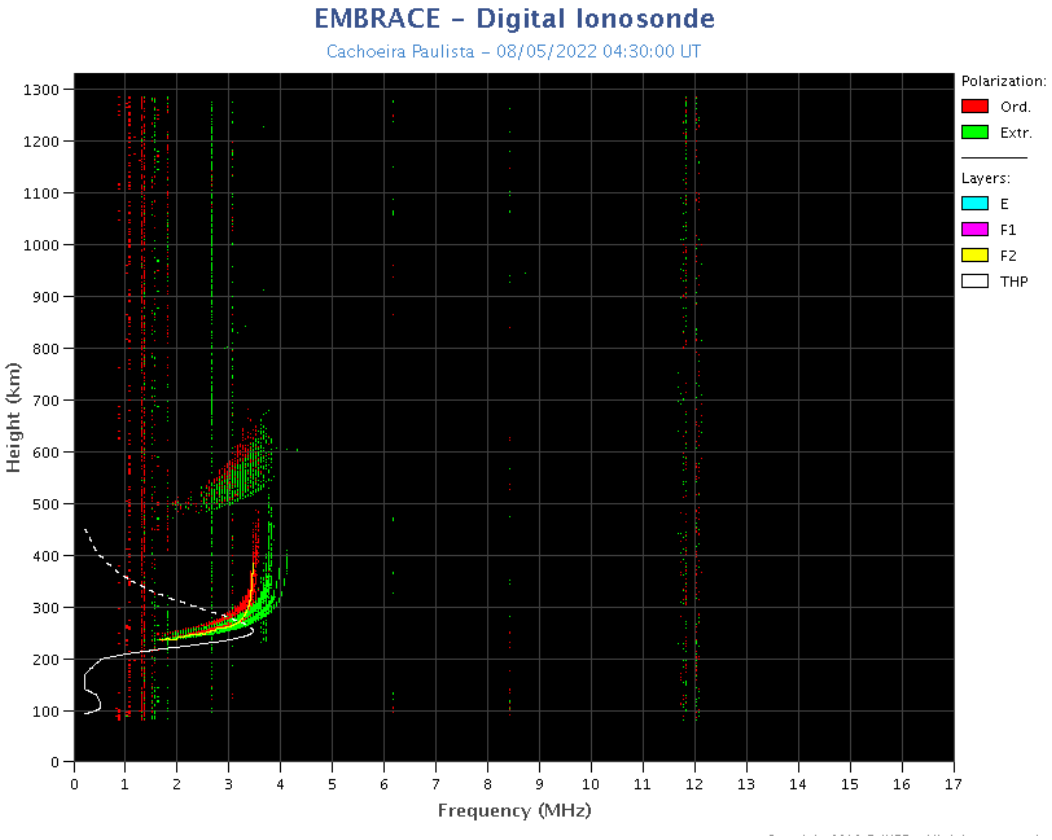
Boa Vista:

- The spread F does not occur during this week.
- The Es layers reached scale 4 on August 06.



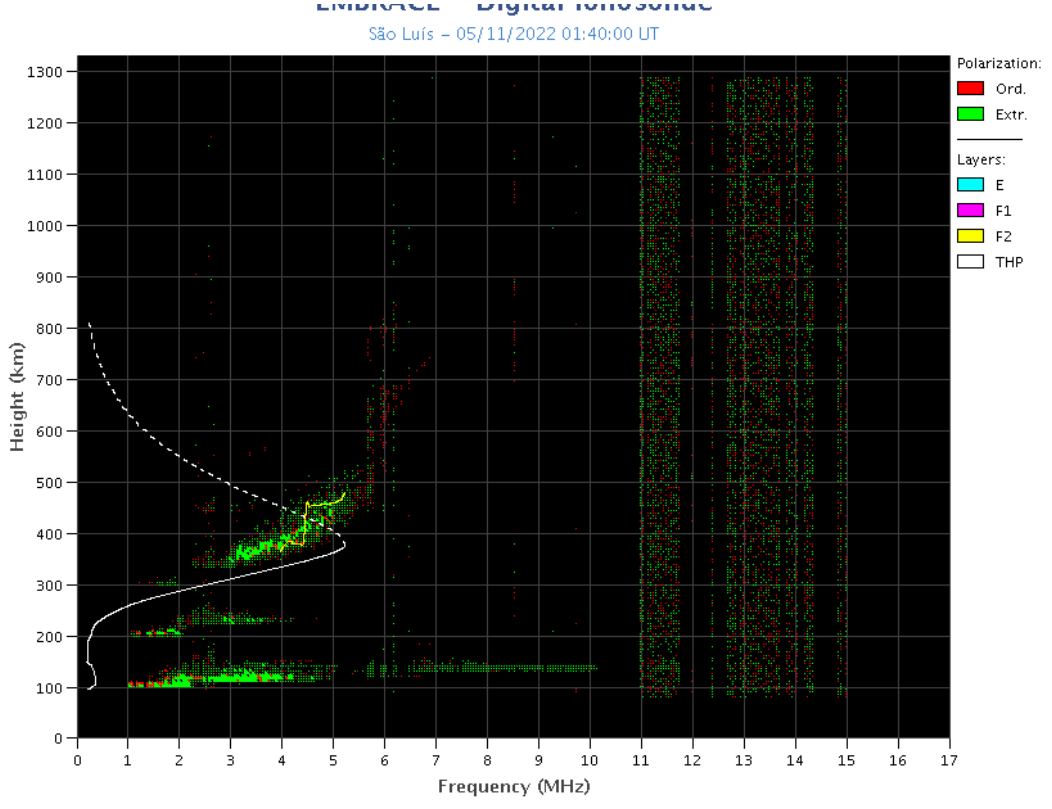
Cachoeira Paulista:

- The spread F does not occur during this week.
- The Es layers reached scale 2 during this week.



São Luís:

- There were a spread F on August 01.
- The Es layers reached scale 3 on August 03 and 05.



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, STSN in Sinop/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 360 m. During this week, the SLMA station presented S4 values below 0.2. The STSN station showed high values of S4 (¿ 0.4) throughout the week, including signal loss of lock during most of the week. The S4 index does not present a regular diurnal behavior which seems to indicate that the station is with technical issues and needs to be calibrated. In Natal (STNT) a single event was recorded with S4 above 0.5 during the last hours of 08/06 and the first hours of the following day (Figure 1). Satellites mainly located north and northeast of the STSN station were the ones that most contributed to S4 values above 0.2 (Figure 2). The SJCE station recorded an isolated scintillation event on 08/07-08 with S4 values approaching 0.6 around 0300 UT (0000 LT) (Figure 3).

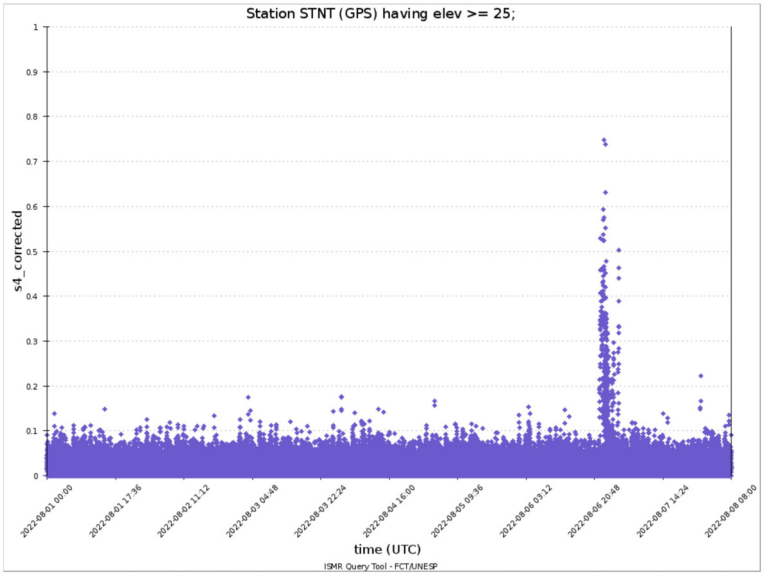


Figure 1: S4 index values for the GPS constellation measured at STSN during the week 01-08/08/2022.

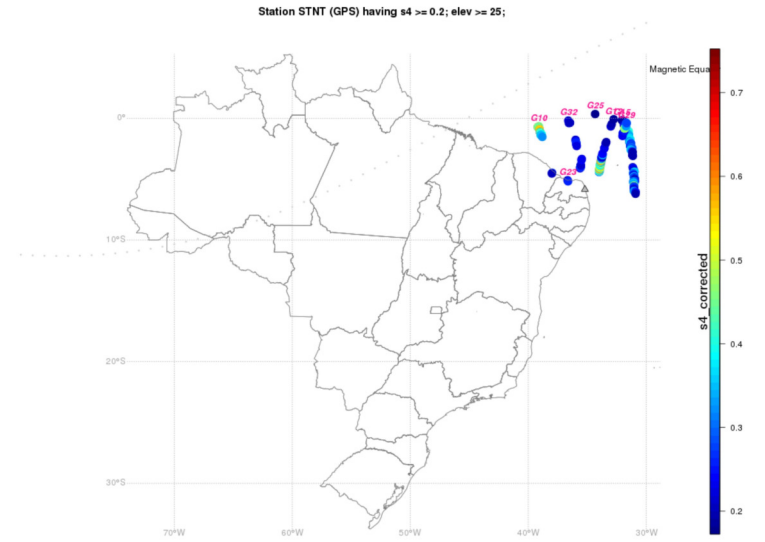


Figura 2: Map of S4 values > 0.2 for GPS satellites with elevation > 25° at STSN receiver field of view in between 2100-0400 UT on 08/06/2022.

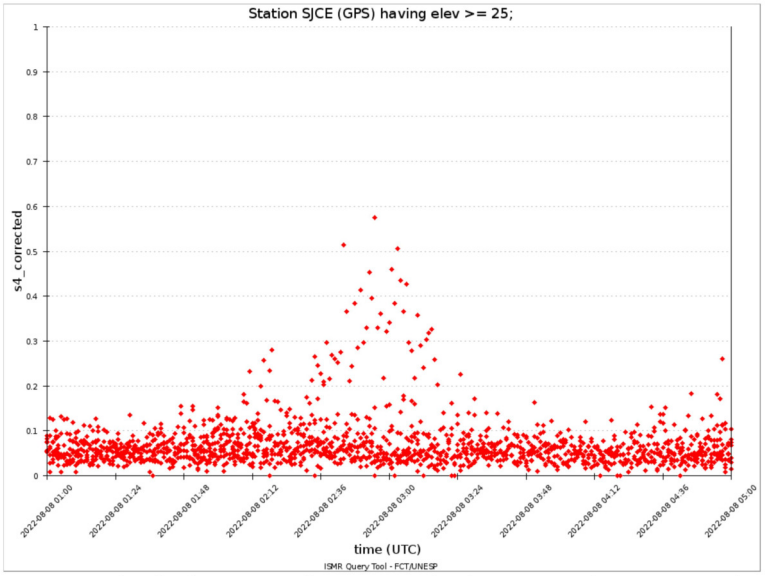


Figure 3: S4 values for the GPS constellation measured at the SJCE station between 0100 and 0500 UT on 08/08/2022.

8 All-Sky Imager

8.1 Responsible: LUME

All-Sky Imager EPBs Observation
Observações das EPBs por meio do imageador All-Sky
July 31 - August 06, 2022 || 31 de julho - 06 de Agosto, 2022

Observatory Observatório	July 31 julho 31	August 01 Agosto 01	August 02 Agosto 02	August 03 Agosto 03	August 04 Agosto 04	August 05 Agosto 05	August 06 Agosto 06
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

- 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
- No plasma bubbles were observed during the entire period. Besides, the equatorial anomaly was observed every day.