Briefing Space Weather

2023/08/17

1 Sun

1.1 Responsible: José Cecatto

08/07 – M2.4, M1.0, M1.4, X1.5 flares; Fast wind stream (=< 500 km/s); 6 CME c.h.c. toward the Earth *;
08/08 – M3.6 flare; Fast wind stream (=< 500 km/s); 6 CME c.h.c. toward the Earth *;
08/09 – No M/X flare; Fast wind stream (=< 450 km/s); 8 CME c.h.c. toward the Earth *;
08/10 – No M/X flare; Fast wind stream (=< 500 km/s); 10 CME c.h.c. toward the Earth;
08/11 – No M/X flare; Fast wind stream (=< 500 km/s); 9 CME c.h.c. toward the Earth *;
08/12 – No M/X flare; Fast wind stream (=< 450 km/s); 4 CME c.h.c. toward the Earth;
08/13 – No M/X flare; No fast wind stream; 6 CME c.h.c. toward the Earth;
08/14 – No M/X flare; No fast wind stream; 2 CME c.h.c. toward the Earth *
Prev.: No fast wind stream for the next 01-02 days; for the next 2 days (20% M, 01% 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 (CME 2023-08-05T22:24:00 UT)
  - The simulation results indicate that the flank of CME will reach the DSCOVR mission between 2023-08-08T23:00:00 UT and 2023-08-09T13:00:00 UT.

- Buracos coronais (SPoCA : Spatial Possibilistic Clustering Algorithm):

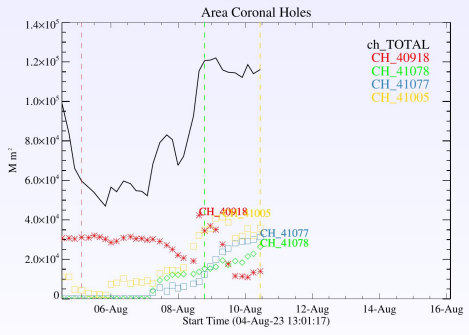


Figura: A linha preta mostra o resultado da soma das areas para cada intervalo da detecção realizado pelo SPOCA entre os dias 04 e 10 de agosto de 2023

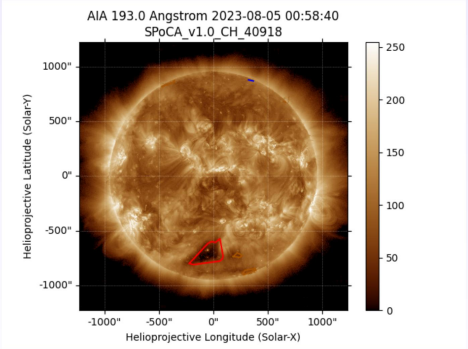


Figura: Sobre a imagem em 193 Å do Sol estão destacados os Buracos coronais observado pelo SPOCA por volta das 00:50 UT do dia 05 de agosto de 2023 (linha vermelha pontilhada do gráfico à esquerda).

- Buracos coronais (SPoCA : Spatial Possibilistic Clustering Algorithm):

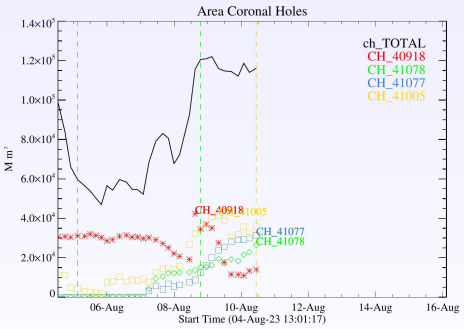


Figura: A linha preta mostra o resultado da soma das areas para cada intervalo da detecção realizado pelo SPOCA entre os dias 04 e 10 de agosto de 2023

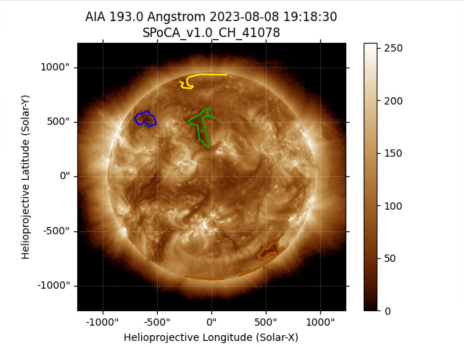


Figura: Sobre a imagem em 193 Å do Sol estão destacados os Buracos coronais observados pelo SPOCA por volta das 19:10 UT do dia 08 de agosto de 2023 (linha verde pontilhada do gráfico à esquerda).

- Buracos coronais (SPoCA : Spatial Possibilistic Clustering Algorithm):

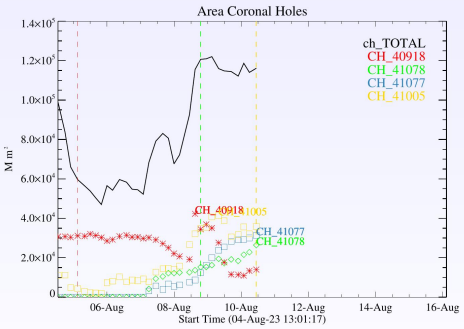


Figura: A linha preta mostra o resultado da soma das areas para cada intervalo da detecção realizado pelo SPOCA entre os dias 04 e 10 de agosto de 2023

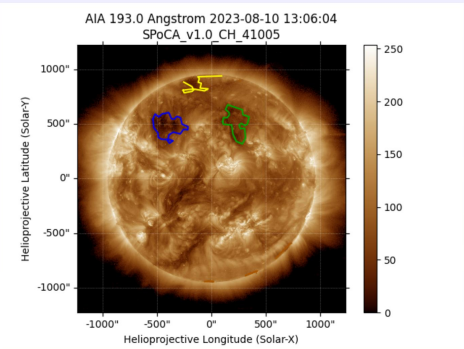
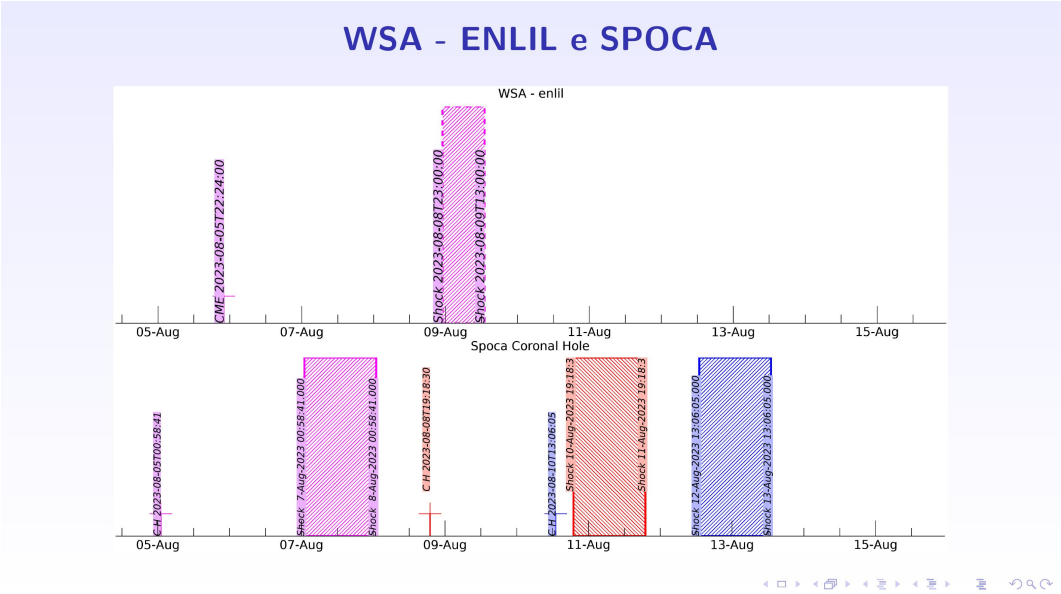


Figura: Sobre a imagem em 193 Å do Sol estão destacados os Buracos coronais observados pelo SPOCA por volta das 13:00 UT do dia 10 de agosto de 2023 (linha amarela pontilhada do gráfico à esquerda).



3 Radiation Belts

3.1 Responsible: Ligia Alves da Silva

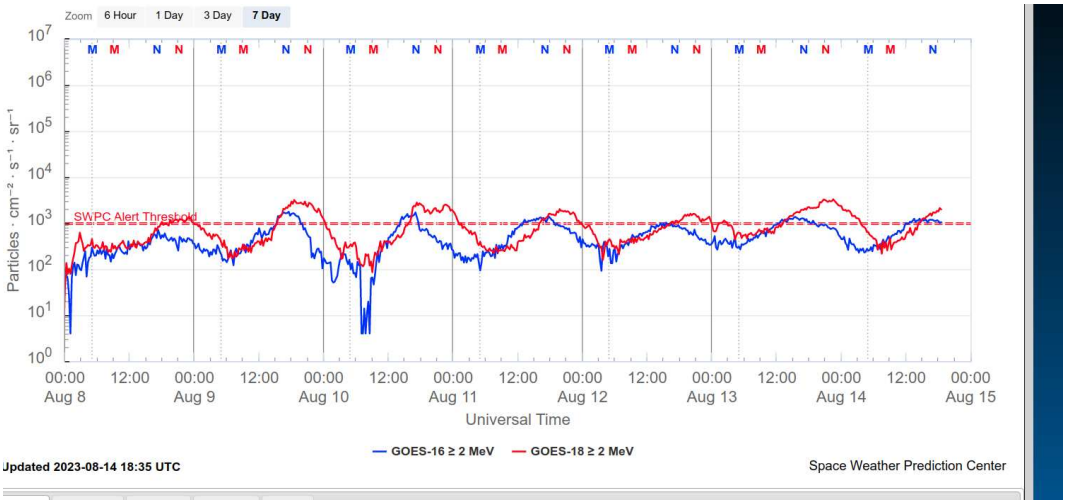


Figura 1: High-energy electron flux (> 2MeV) obtained from GOES-16 and GOES-18 satellite. Source: `https://www.swpc.noaa.gov/products/goes-electron-flux`

High-energy electron flux (> 2 MeV) in the outer boundary of the outer radiation belt obtained from geostationary satellite data GOES-16 and GOES-18 (Figure below) oscillates around 10^3 particles/$(cm^2 sr)$ between August 8-14, presenting two dropouts. The first dropout possibly occurs with more intensity on August 7th, in which the electron flux recovery starts on August 8th, reaching 10^3 particles/$(cm^2 sr)$ approximately at 18:00 UT on the same day. The second dropout is observed on August 10th with a fast recovery.

4 ULF waves

4.1 Responsible: Graziela B. D. Silva

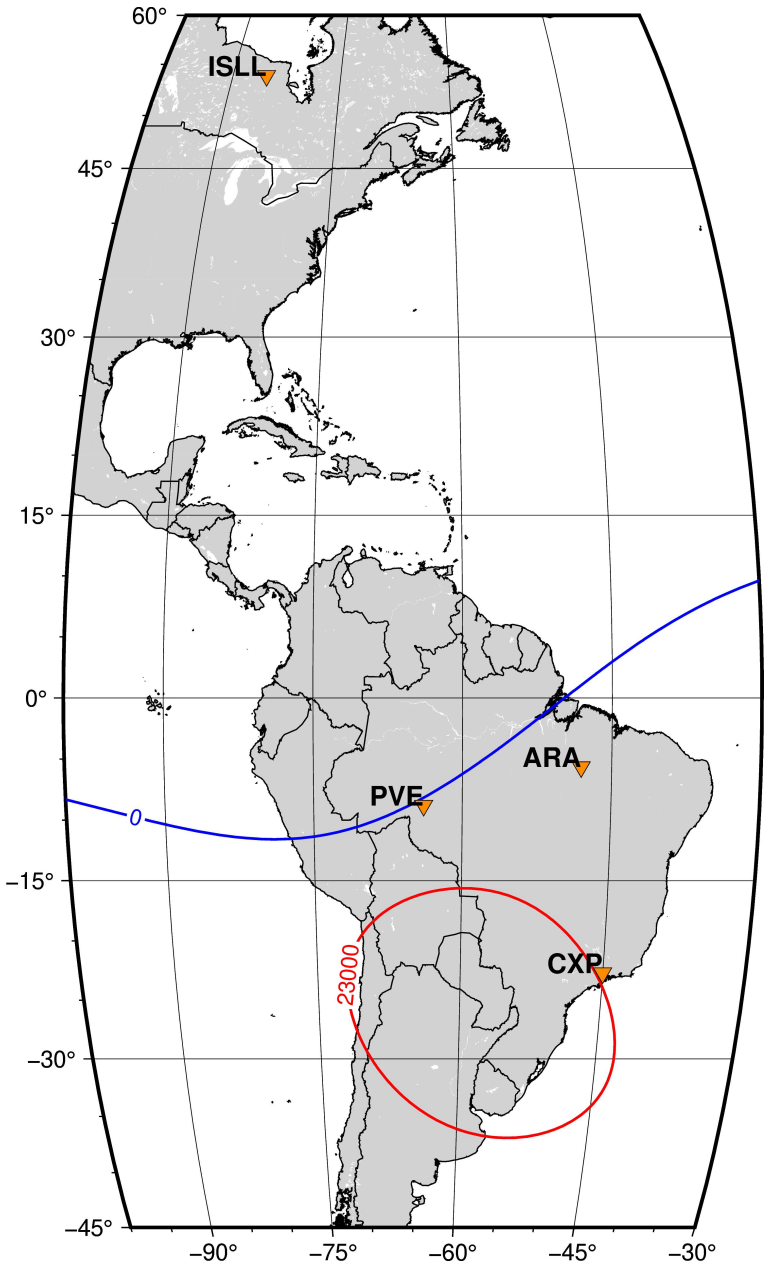


Figura 2: a) Map describing the geographic location of the stations together with the magnetic isolines to show that magnetic equator (blue) and the SAMA region (red). Cortesy: Karen Sarmiento.

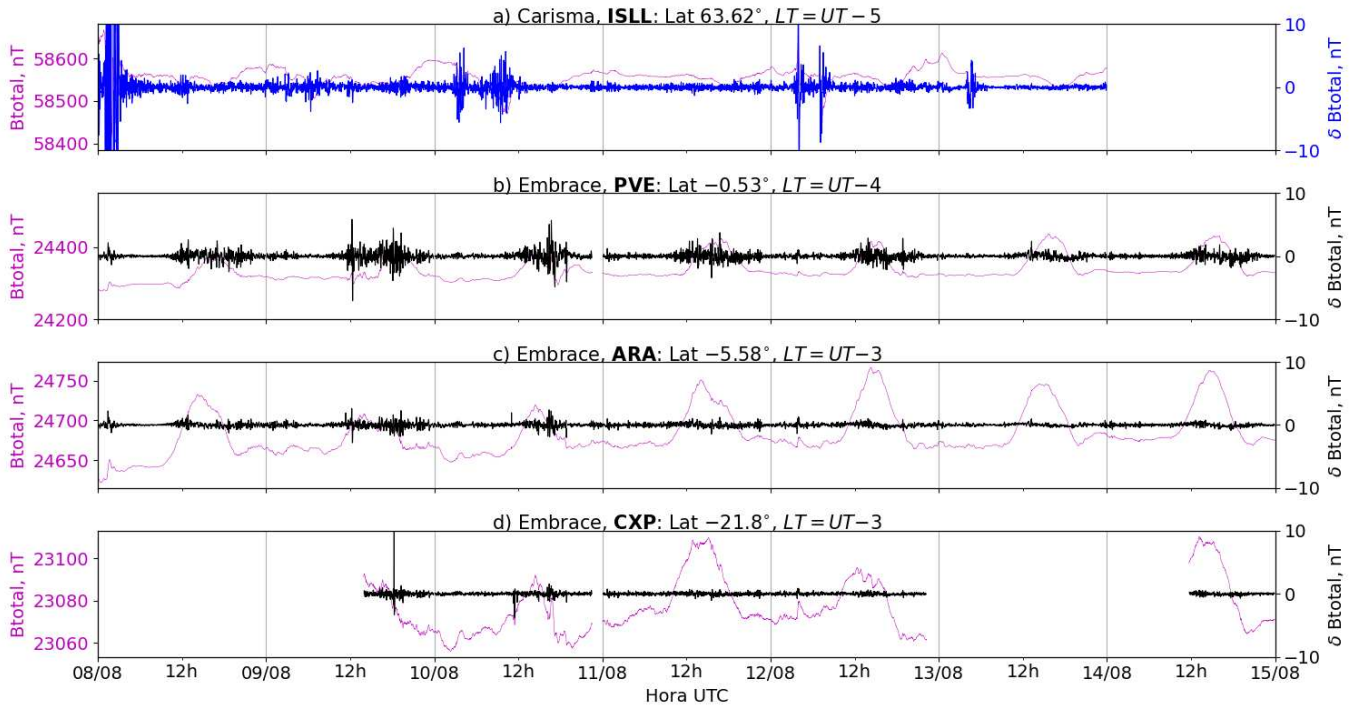


Figura 3: a) Timeseries of the geomagnetic field total component measured at ISLL station (Island Lake) of the CARISMA magnetometer network in magenta, along with the associated perturbation in the Pc5 band shown in blue. b-d) timeseries of the geomagnetic field total component measured at stations PVE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

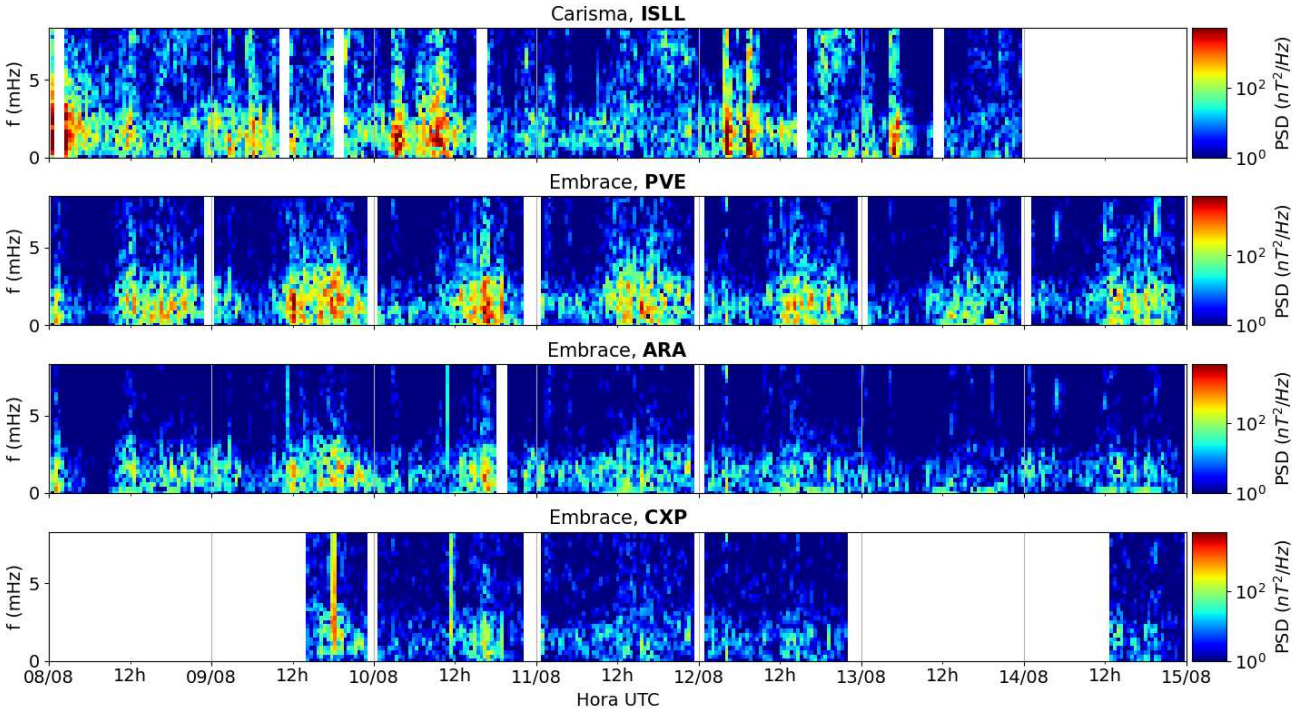


Figura 4: a-d) Time evolution of the power spectral density obtained from the filtered timeseries of the geomagnetic field total component (δ Btotal) for a) the high latitude station (ISLL-CARISMA), and b-d) for the low latitude stations of EMBRACE (PVE, ARA, CXP).

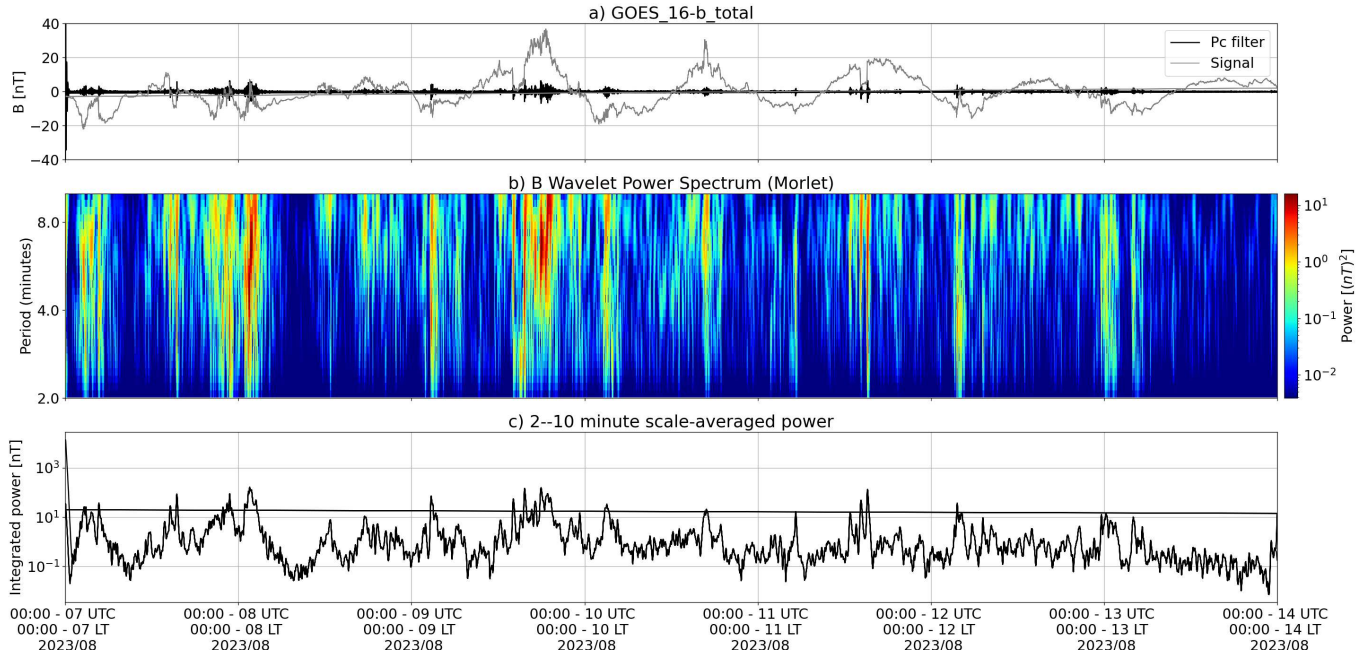


Figura 5: a) Timeseries of the geomagnetic field total component measured by GOES 16, together with the Pc5 fluctuation in black. b) Wavelet power spectrum of the filtered timeseries. c) Average ULF power in the period range from 2 to 10 minutes.

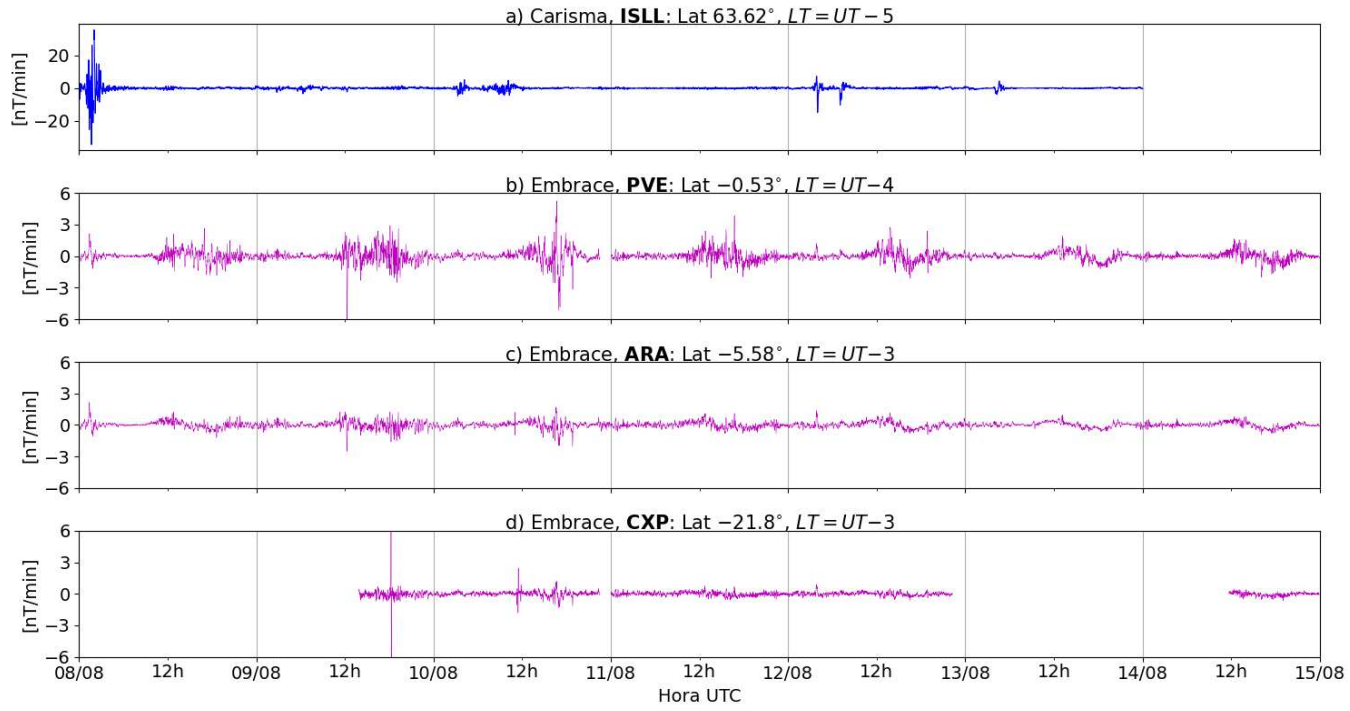


Figura 6: a-d) The rate of change of the geomagnetic field total component (dB/dt) obtained for a) the high latitude station (ISLL-CARISMA), and b-d) for the low latitude stations of EMBRACE (PVE, ARA, CXP).

- The GOES 16 satellite in geosynchronous orbit (L $\sim$ 6.6) registered significant activity of Pc5 ULF waves over the week.
- As observed on the ground, the ISLL station at high latitude registered continuous ULF wave

activity over Aug. 08.

- The PVE station from Embrace MagNet, located under the dip equator, registered regular activity of the waves during the week.
- The ARA and CXP stations at low latitude of Brazil registered low to moderate activity of the waves.
- The dB/dt rates were higher than 20 nT/min in magnitude at ISLL (high latitude), reached on Aug. 08. The rates were below 6 nT/min at the Embrace stations in lower latitudes.

5 Geomagnetic activity

5.1 Responsible: Lívia Alves

From 08-10 August, the geomagnetic field was unsettled, the following occurences are highlighted

- 08, 09: Embrace MagNet registered a shock enhancement
- 09, 10: Embrace MagNet registered instabilities and a drop of -90 nT at 08 UT, Dst = -6 nT
- 08, 09: AE index reached 500 nT and Kp was 3+

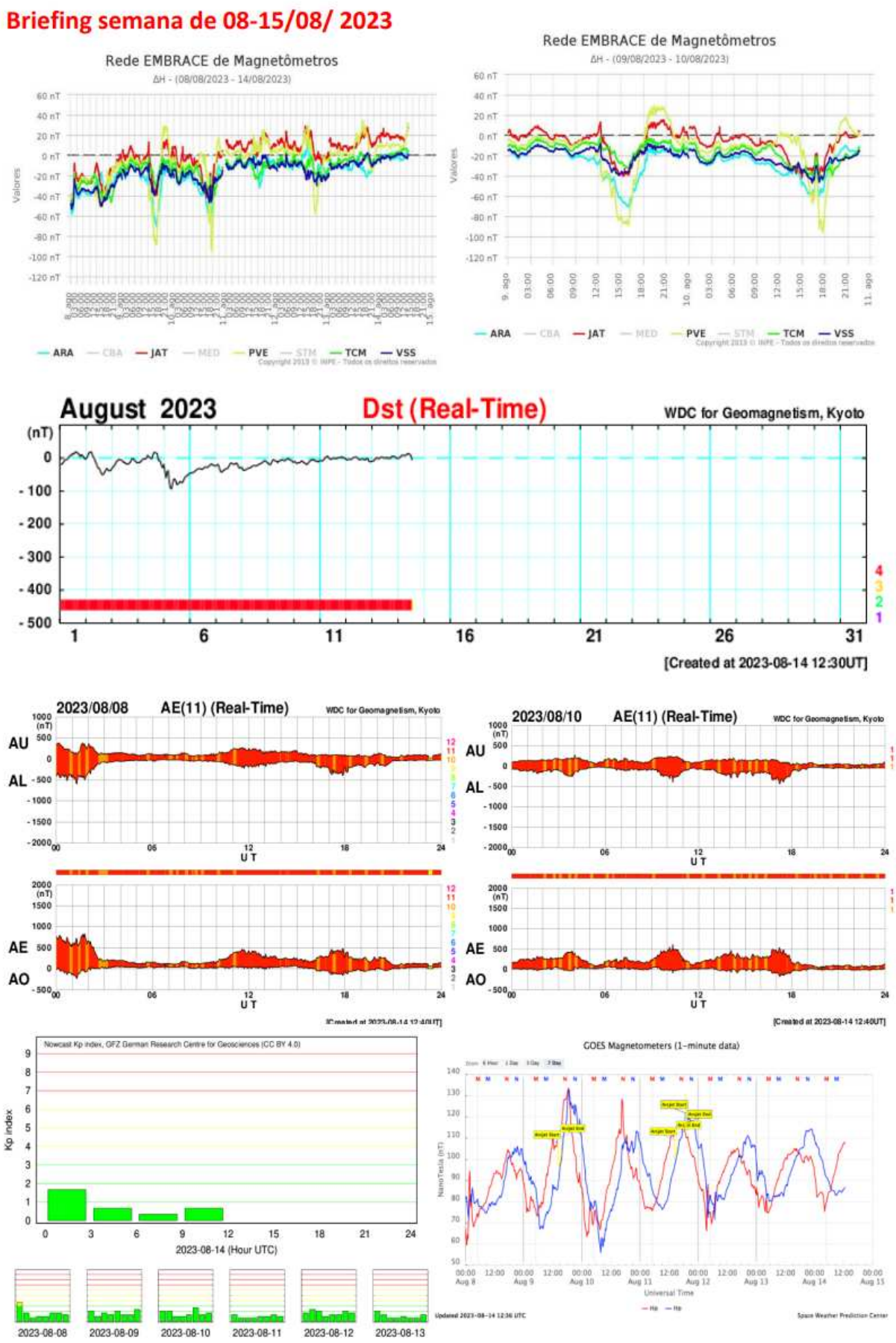


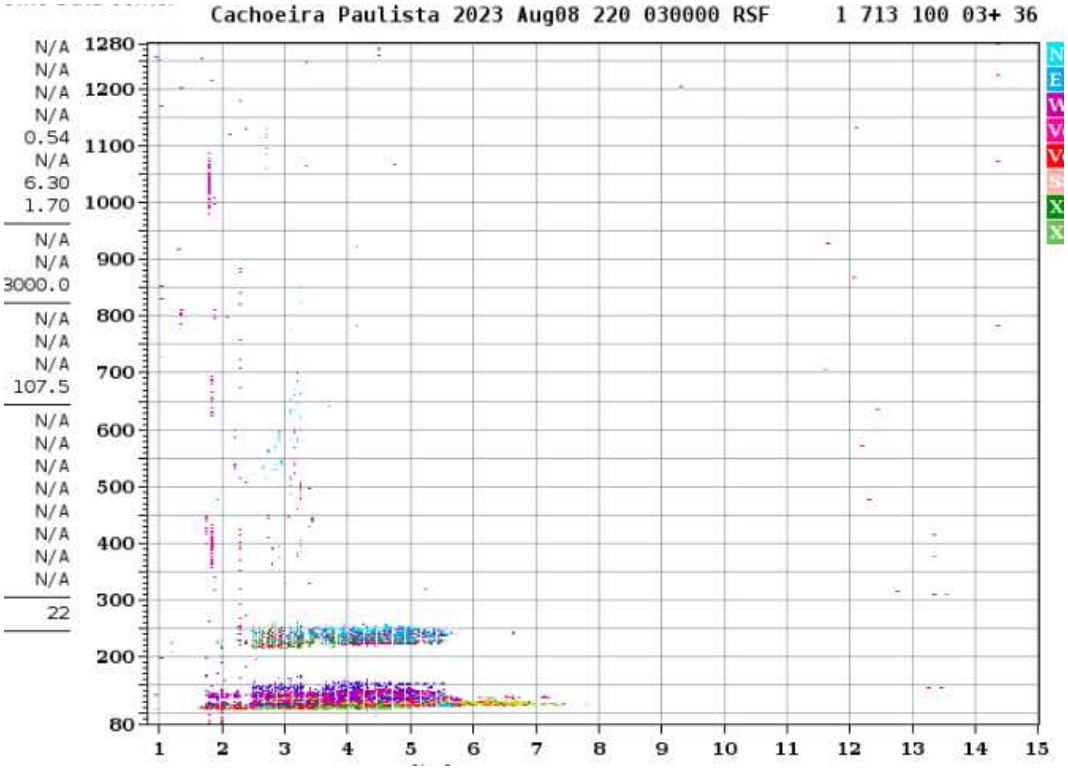
Figura 7: Time evolution of the geomagnetic field data and indices during the reported week.

6 Ionosphere

6.1 Responsible: Laysa Resende

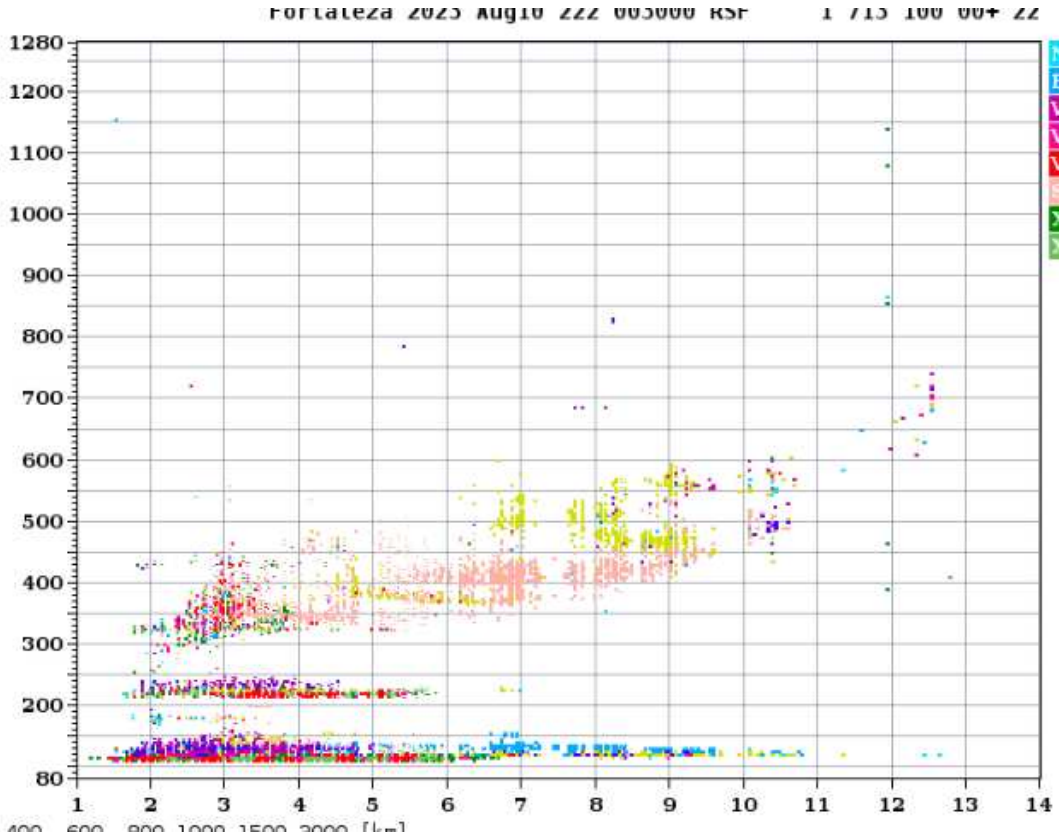
Cachoeira Paulista:

- There were not spread F during this week.
- The Es layers reached scale 4 during this week.
-



Fortaleza

- There was spread F during this week.
- The Es layers reached scale 5 during this week.



7 Scintilation

7.1 Responsible: Siomel Savio Odriozola

In this report on the S4 scintillation index, data from SLMA in São Luiz/MA, UFBA in Salvador/BA, 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 $\sim$ 400 m. The S4 index registered scintillation values lower than 0.3 during the whole week in STCB and SJCE stations. As can be seen in Figure 1, moderate scintillation values were recorded after sunset on 08/08 and 08/09 in the case of the SLMA station and only on 08/09 in the case of the UFBA station. The images of plasma bubbles recorded in São João do Cariri (https://www2.inpe.br/climaespacial/portal/video-imagem-original/) indicate that the scintillation could have been caused by these large-scale irregularities.

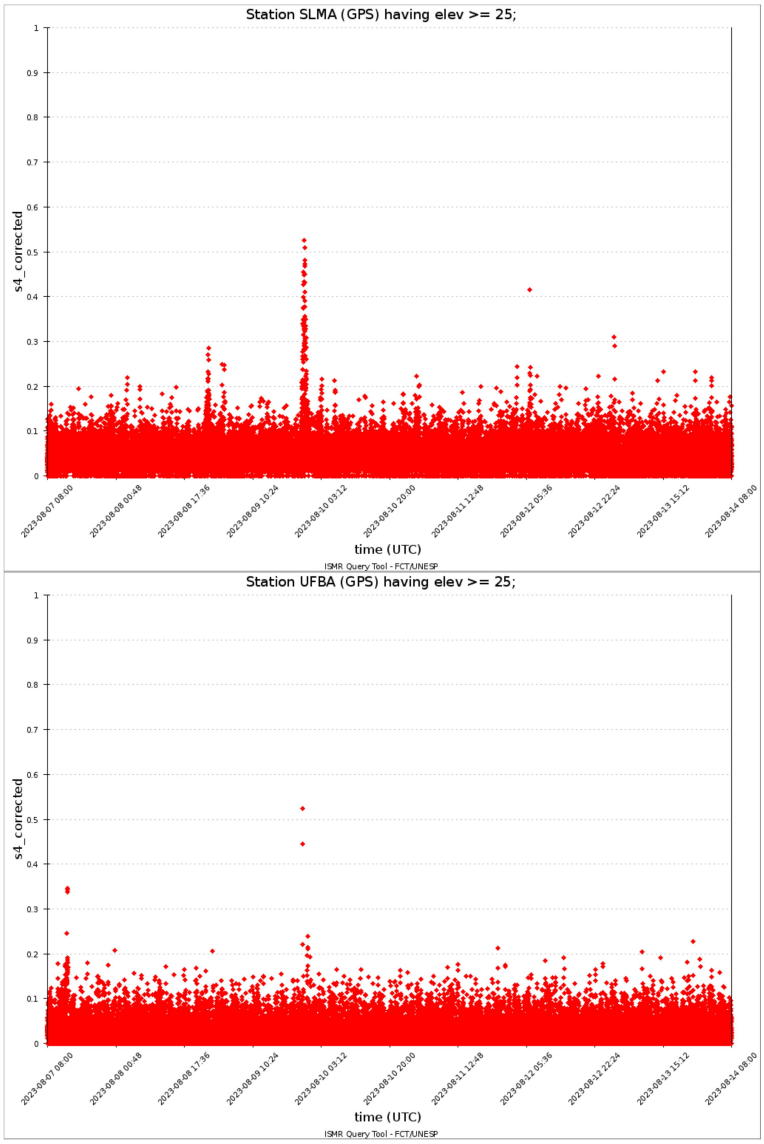


Figure 1: S4 index values for the GPS constellation measured at SLMA (upper panel) and UFBA (lower panel) during the week 08/07—14.

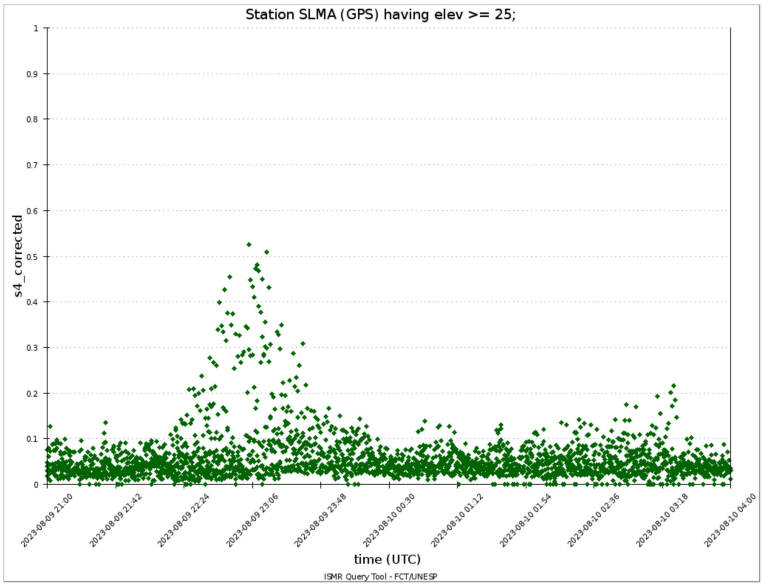


Figura 2: S4 index values for the GPS constellation measured at SLMA between 2100 on the 08/09 until 0400 UT on the following day. S4 values above 0.2 started to be observed from 22UT on the 9th

8 ROTI

8.1 Responsible: Carolina de Sousa

In the week 2274 (August 06-12, 2023) there were ionospheric irregularities (plasma bubble) on August 7 over CUIB and on August 9 over RNNA and MABB. Figure below shows the ROTI time series for four stations in the Brazilian sector (Natal (RNNA), Bacabal (MABB), Cuiabá (CUIB) and São José dos Campos (SJSP)).

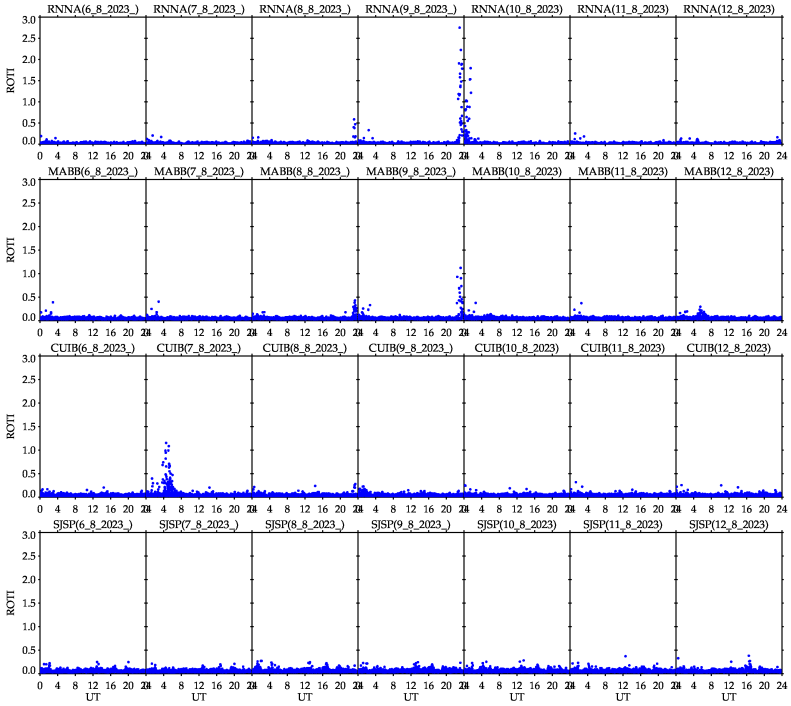


Figura 8: ROTI time series for four stations in the Brazilian sector (Natal (RNNA), Bacabal (MABB), Cuiabá (CUIB) and São José dos Campos (SJSP)), from August 06 - 12, 2023.