Briefing Space Weather

2023/04/26

1 Sun

1.1 Responsible: José Cecatto

04/17 – No flare; Fast wind stream (=< 500 km/s); 4 CME c.h.c. toward the Earth;
04/18 – No flare; Fast wind stream (=< 600 km/s); 4 CME c.h.c. toward the Earth;
04/19 – No flare; Fast wind stream (=< 550 km/s); 3 CME c.h.c. toward the Earth;
04/20 – No flare; Fast wind stream (=< 450 km/s); 6 CME c.h.c. toward the Earth;
04/21 – M1.8 flare; No fast wind stream; 2 CME c.h.c. toward the Earth *;
04/22 – No flare; Fast wind stream (=< 450 km/s); 12 CME c.h.c. toward the Earth *;
04/23 – No flare; Fast wind stream (=< 650 km/s); 5 CME c.h.c. toward the Earth;
04/24 – No flare; Fast wind stream (>= 600 km/s) since noon time; 1 CME c.h.c. toward the Earth;
Prev.: Fast wind stream for the next 01-03 days; for the next 2 days (25% 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 2023-04-16T00:36 UT)
  - The simulation results indicate that the CME will reach the DSCOVR mission between 2023-04-19T21:33 UT and 2023-04-20T11:33 UT.
- WSA-ENLIL (CME 2023-04-21T18:12 UT)
  - The simulation results indicate that the Coronal Mass Ejection will reach the DSCOVR mission between 2023-04-23T12:05 UT and 2023-04-24T02:05 UT.

Coronal holes (SPOCA):

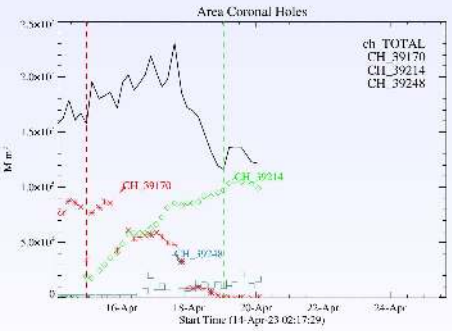


Figura: The solid black line depicts the products of the sum of areas for each detection interval performed by SPOCA between April 14 and 22, 2023.

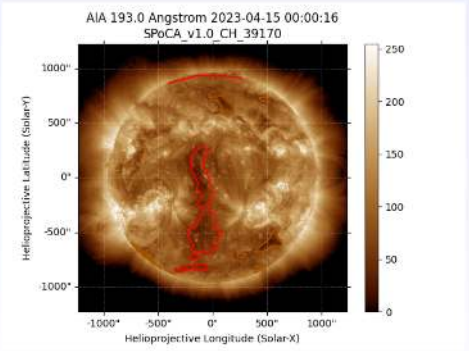


Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 00:00 UT on April 15, 2023 (red dot line).

Coronal holes (SPOCA):

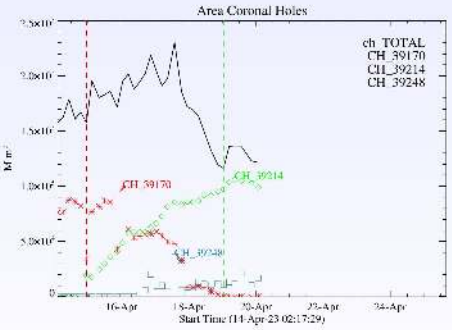


Figura: The solid black line depicts the products of the sum of areas for each detection interval performed by SPOCA between April 14 and 22, 2023.

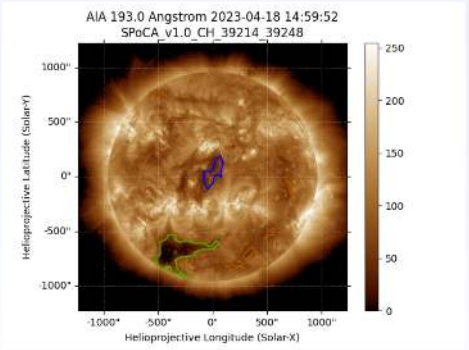
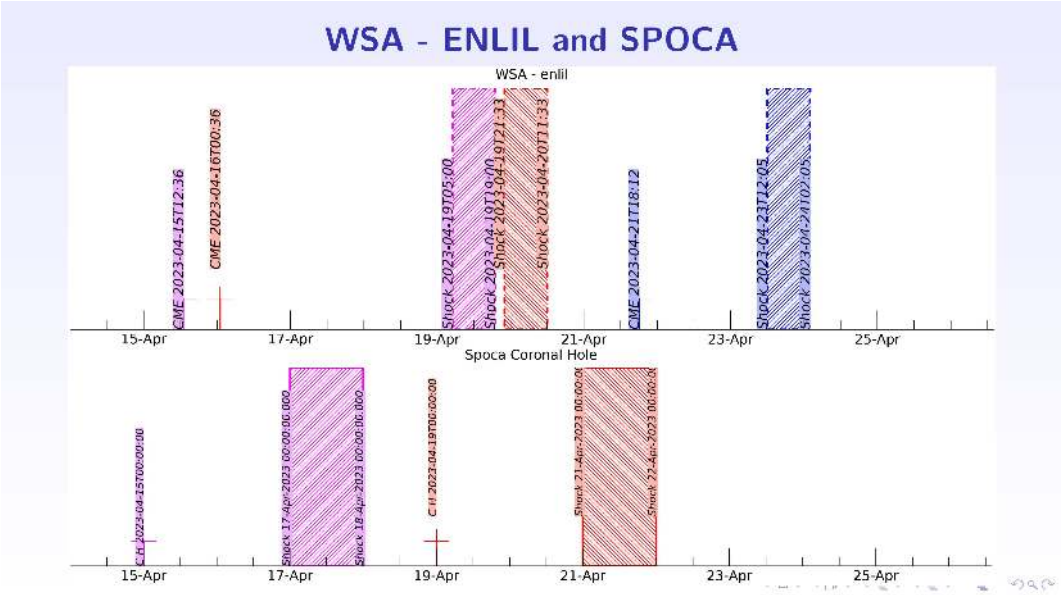
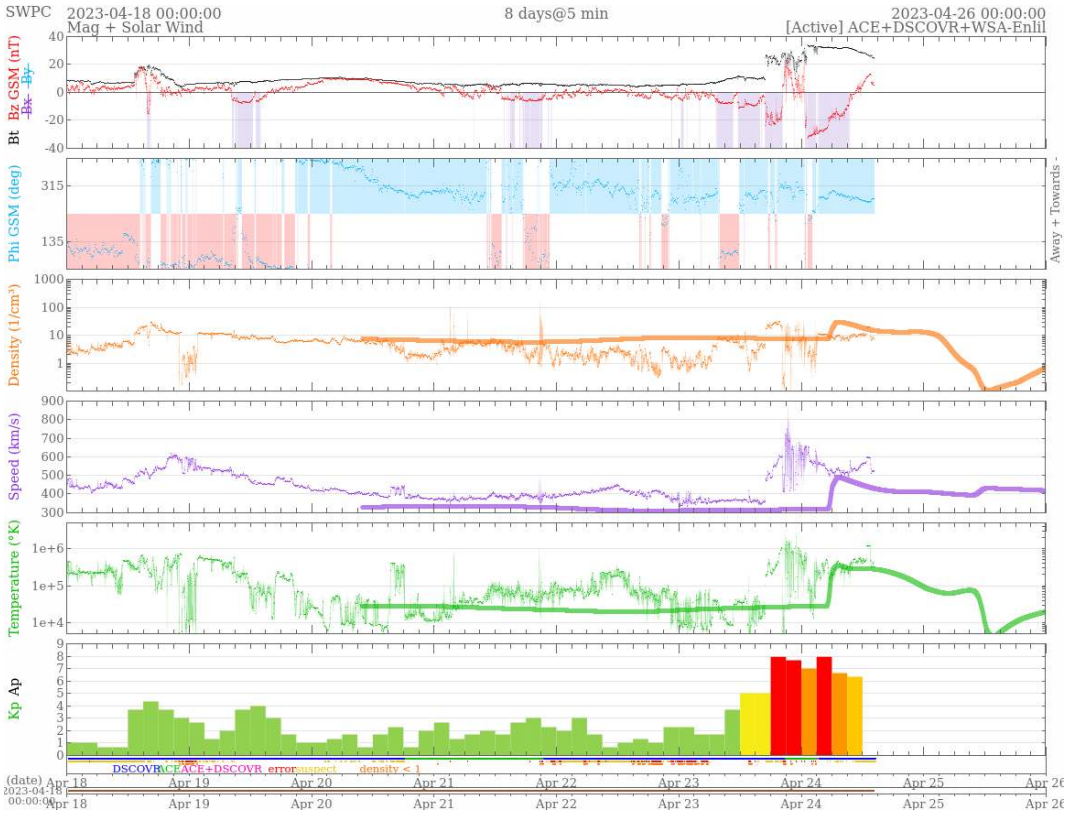


Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 15:00 UT on April 18, 2023 (green dot line).



3 Interplanetary Medium

3.1 Responsible: Paulo Jauer



- The interplanetary medium region in the last week showed a moderate/high level of plasma perturbations due to the possible interaction of CME and HSS-like structures identified by the DSCOVR satellite in the interplanetary medium.
- The modulus of the interplanetary magnetic field component showed a peak of 32 nT on 24/Apr at 03:30 during the analyzed period.

- The BxBy components presented variations in the analyzed period, keeping both oscillating within the interval [+15, -30] nT, without the presence of sector change. The IMF By component showed a minimum value of -30 nT on Apr/24 at 10:30 UT.
- The component of the Bz field showed a minimum value on 24/Apr at 02:30 UT of -29 nT. During the interaction of the CME-like structure that interacted with the global and inner magnetosphere
- The solar wind density showed a maximum peak on 23/Apr at 19:30 of 27 p/cm^3 due to the interaction of the interplanetary structure.
- The solar wind speed remained on average above 400 km/s with a peak on 23/Apr at 21:30 UT of 637 km/s.
- The position of the magnetopause was oscillating with a minimum value recorded on 23/Apr at 19:30 UT of 5.9 Re. On average, the position of the magnetopause was above the equilibrium position.

4 ULF waves

4.1 Responsible: Graziela B. D. Silva

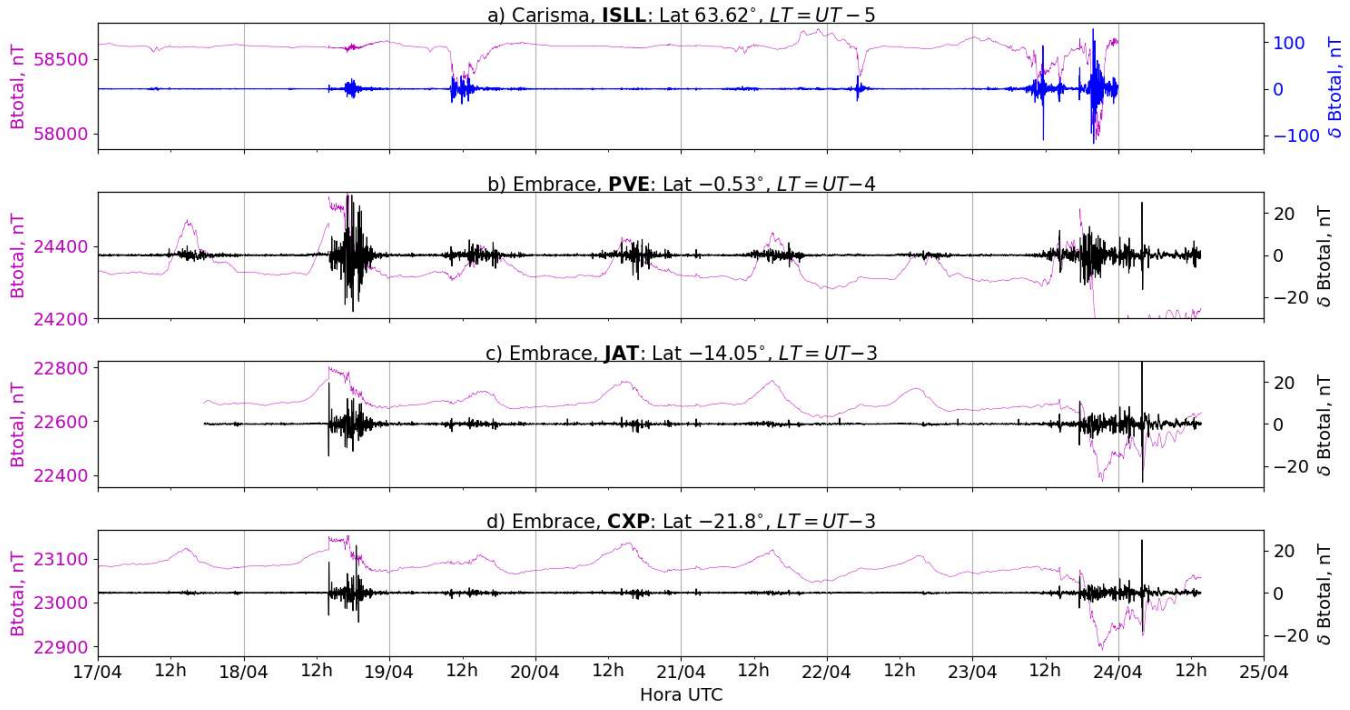


Figura 1: a) Timeseries of the geomagnetic field total component measured at ISLL station (Island Lake) of the CARISMA magnetometer network in magenta, along with the associated perturbation in the Pc5 band shown in blue. b-d) timeseries of the geomagnetic field total component measured at stations PVE (Porto Velho), JAT (Jataí), and CXP (Cachoeira Paulista) of the EMBRACE network in magenta, along with the Pc5 perturbation in blue.

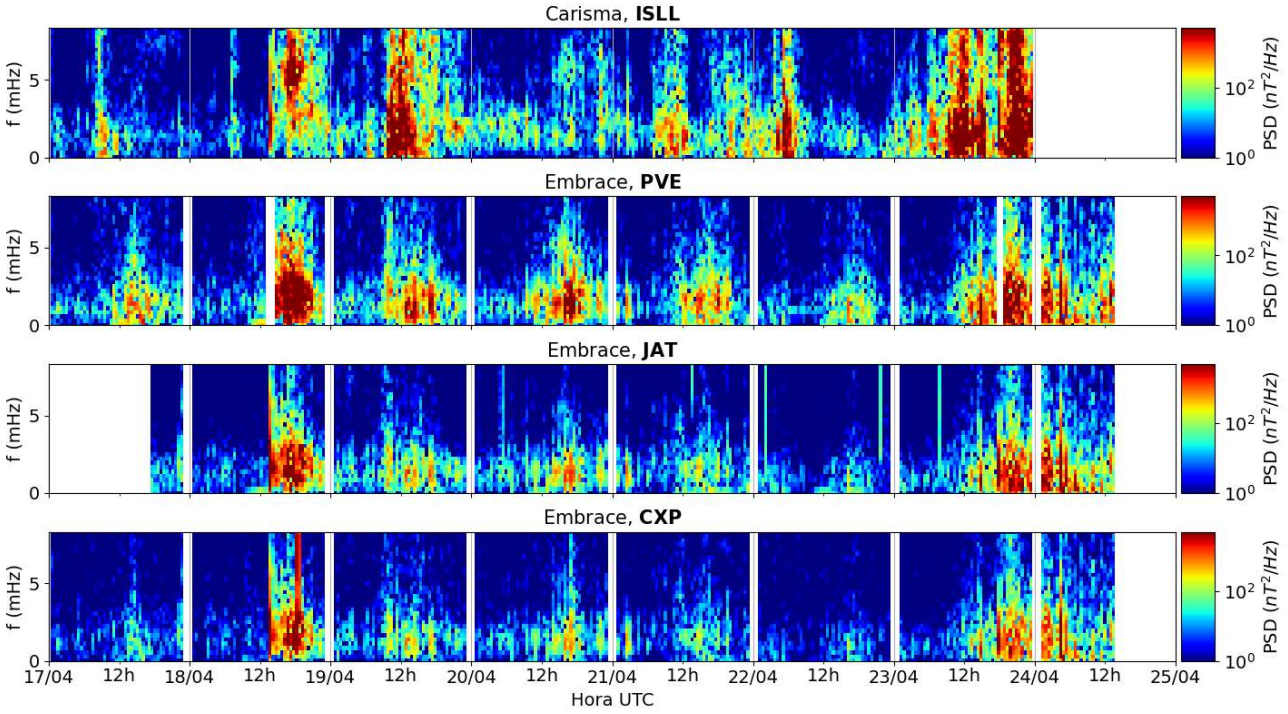


Figura 2: a-d) Time evolution of the power spectral density obtained from the filtered timeseries of the geomagnetic field total component (δ Btotal) for a) the high latitude station (ISLL-CARISMA), and b-d) for the low latitude stations of EMBRACE (PVE, JAT, CXP).

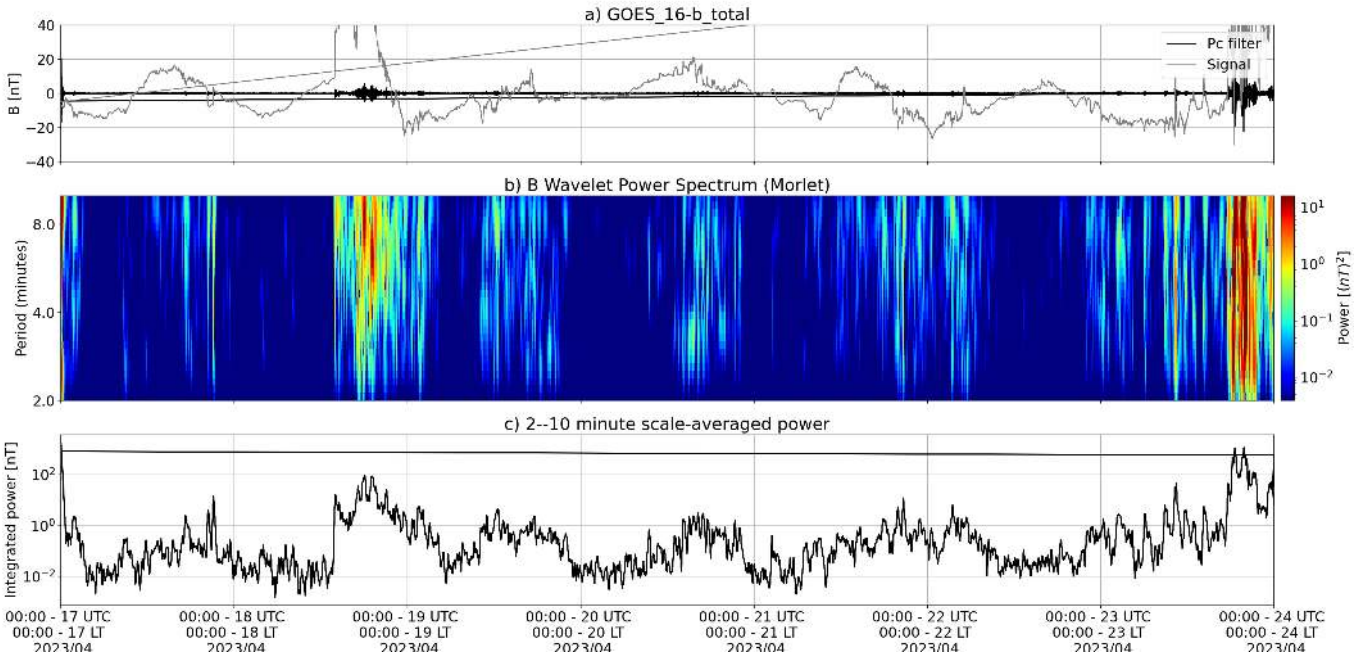


Figura 3: a) Timeseries of the geomagnetic field total component measured by GOES 16, together with the Pc5 fluctuation in black. b) Wavelet power spectrum of the filtered timeseries. c) Average ULF power in the period range from 2 to 10 minutes.

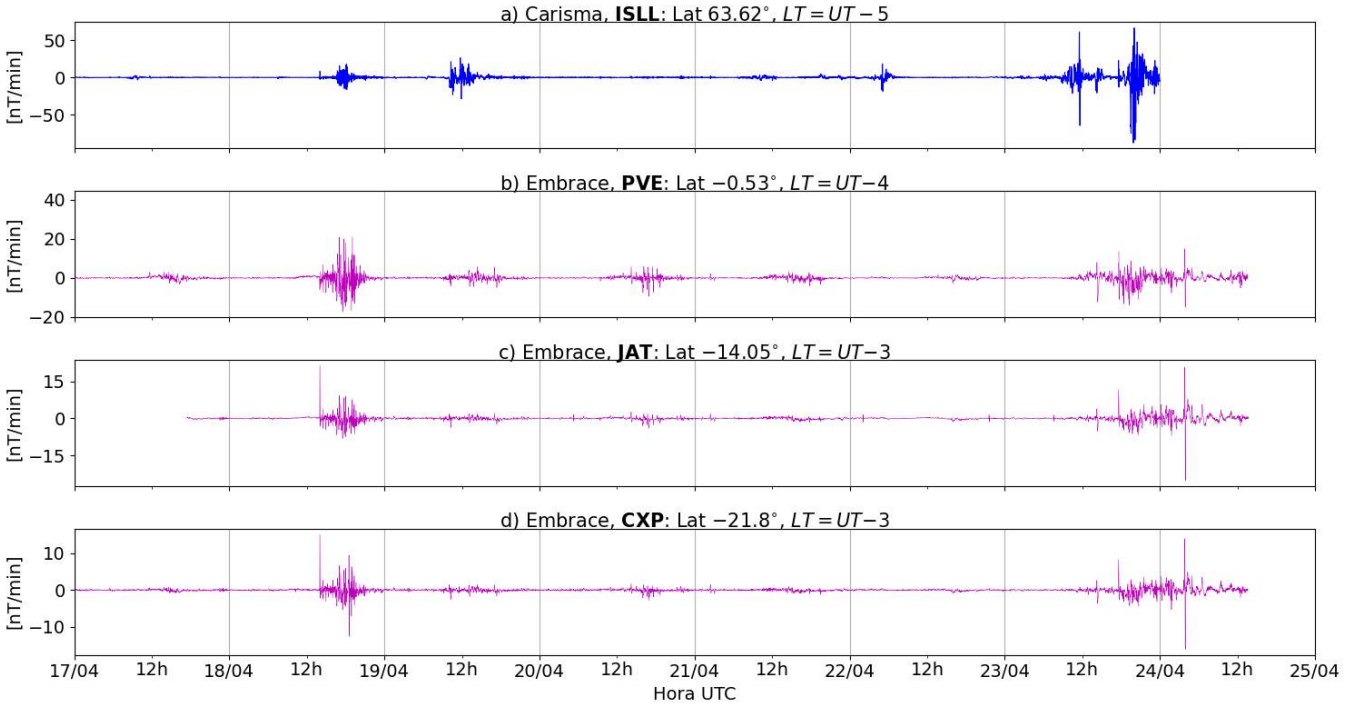


Figura 4: a-d) The rate of change of the geomagnetic field total component (dB/dt) obtained for a) the high latitude station (ISLL-CARISMA), and b-d) for the low latitude stations of EMBRACE (PVE, JAT, CXP).

- The GOES 16 satellite in geosynchronous orbit (L $\sim$ 6.6) registered an intense activity of Pc5 ULF waves on April 18 and April 23, which followed the arrival of ICMEs at Earth.
- As observed on the ground, the ISLL station at high latitude registered significant levels of ULF wave activity over the week as of April 18. Such activity was observed earlier in ISLL than in the low latitudes, hence it was triggered by substorm activity.
- The PVE station from Embrace MagNet, located under the dip equator, registered significant levels of recurrent ULF wave activity over these days. Through April 23-24, teh wave asctivity lasted for several hours due to the magnetic storm that was in course.
- The CXP and JAT stations at low latitudes of Brazil did register significant activity over the week, but with lower intensity compared to the power spectral results of PVE.
- The dB/dt rates were enhanced on April 18 and 24 up to values ¿ 50 nT/min in ISLL (high latitude) and over 20 nT/min in magnitude at the low latitudes of Brazil.

5 Geomagnetic activity

5.1 Responsible: Lívia Alves/Leonardo Klaus

The figures show that there was an intense geomagnetic storm during the reported week, where the main phase occurred between April 23 and 24. The minimum Dst reached -187 nT at 6 UT on April 24 (Fig. 7). The Embrace magnetometers measured a significant decrease in the H-component geomagnetic field by about 200 nT in Porto Velho and Jataí, and below 200 nT in Cachoeira Paulista (Fig. 1). The auroal activity was intense with periods of AE index > 1500 nT. In Fig. 6 (graph 1) it can be seen that Kp index reached 8o on Aperil 23 at 18 UT, being the greatest of the week (as seen in graph 2). Fig. 5 shows that there were magnetic instabilities on April 18, in which Kp reached a moderate value of 5- at 15 UT, and the Dst index was significantly positive at aup to +45 nT.

Figura 5: Time resposne of the geomagnetic indices on 18/04.

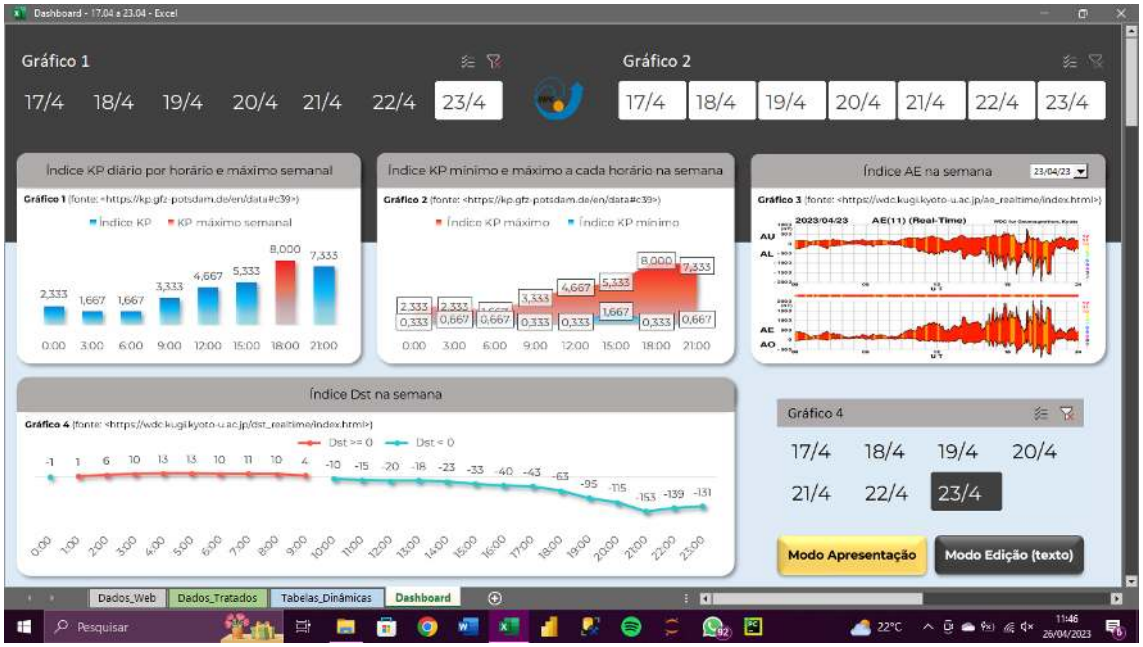


Figura 6: Time resposne of the geomagnetic indices on 23/04.

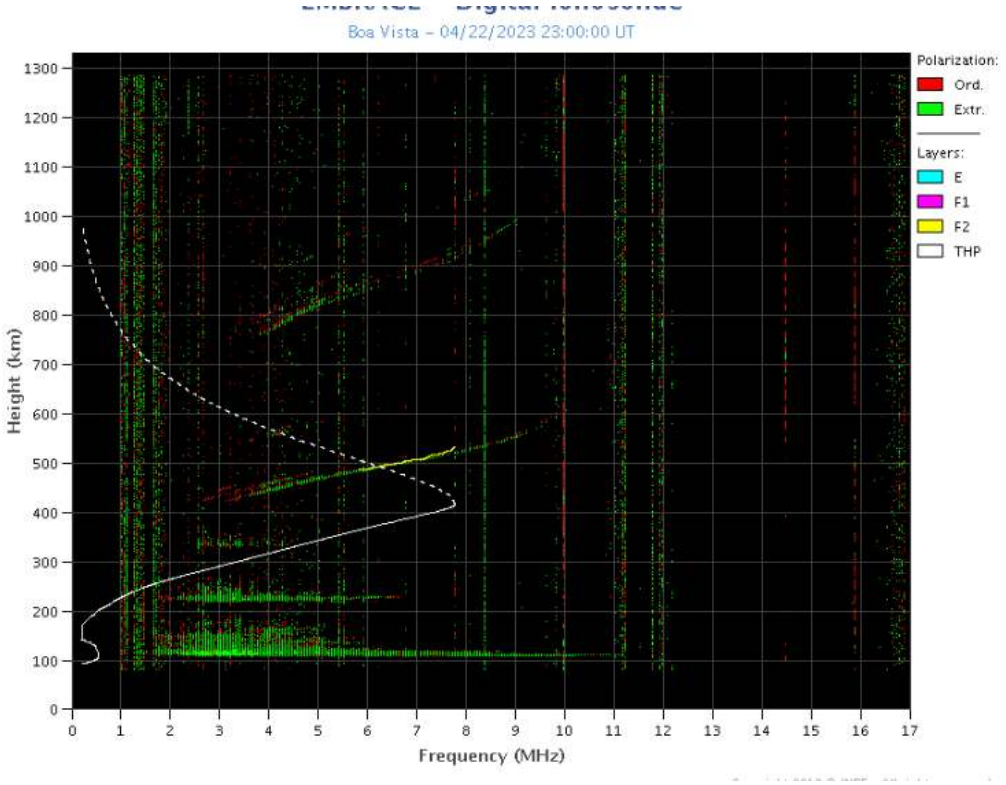
Figura 7: Time resposne of the geomagnetic indices on 24/04.

6 Ionosphere

6.1 Responsible: Laysa Resende

Boa Vista:

- There were spread F during all days in this week.
- The Es layers reached scale 5 on April 22.



Cachoeira Paulista:

- There were not spread F during all days in this week.
- The Es layers reached scale 2 and 3 during the week.
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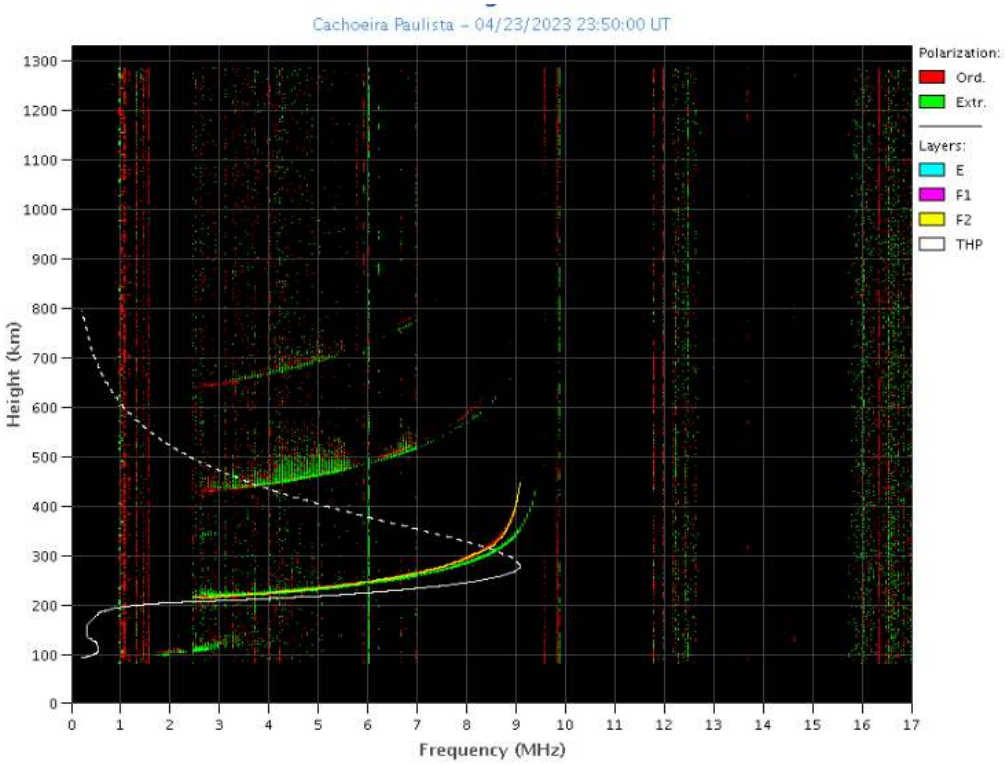
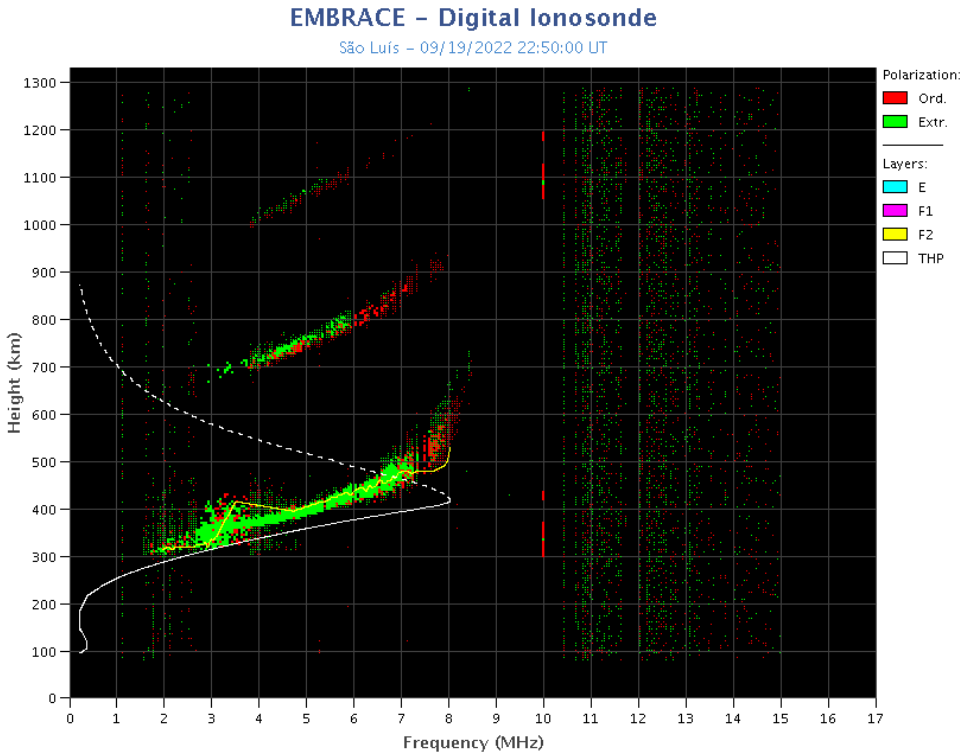


São Luís:

- There were weak spread F during all days in this week.
- The Es layers reached scale 3 on April 18.


EMBRACE – Digital Ionosonde
São Luís – 09/19/2022 22:50:00 UT
Height (km)
Frequency (MHz)
Polarization:
Ord.
Extr.
Layers:
E
F1
F2
THP