Briefing Space Weather - 07/06/2021 14:39

Briefing Space Weather - 2021/06/07 14:45

Sun

Responsible: José Roberto Cecatto

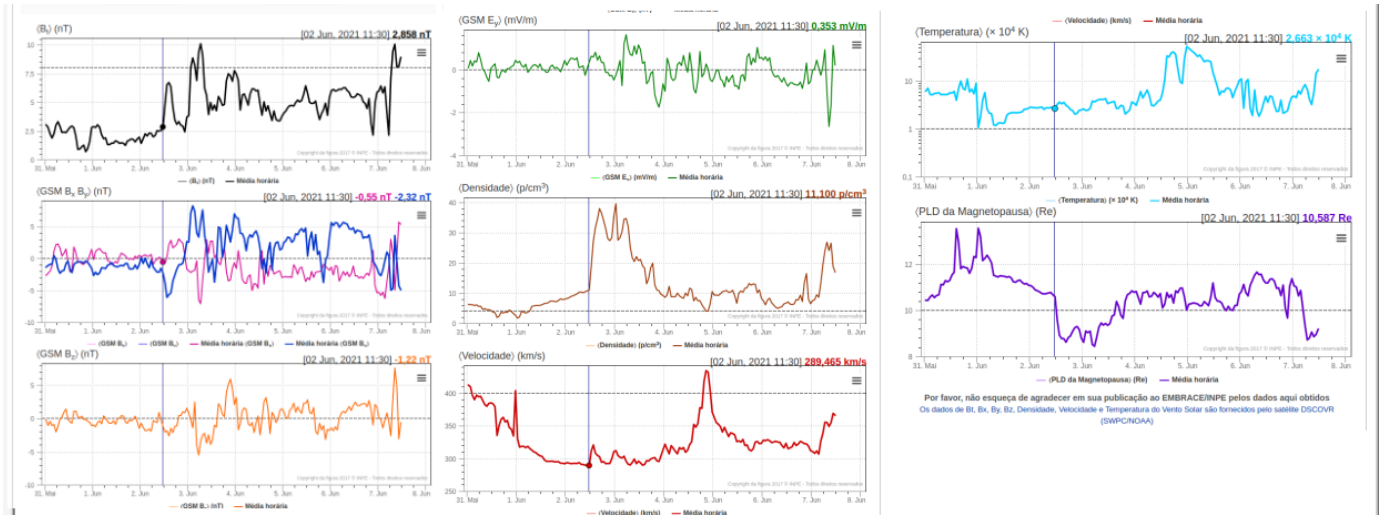
- OBS: 30/05 - “Fast” wind stream from a CH; CMEs: 3 – 28/05, 4 - 29/05
- Day 31/05 – No fast wind stream; no CME observed toward the Earth;
- Day 01/06 – No fast wind stream; no CME observed toward the Earth;
- Day 02/06 – No fast wind stream; 3 CME can have component toward the Earth;
- Day 03/06 – No fast wind stream; 2 CME can have component toward the Earth;
- Day 04/06 – No fast wind stream; 1 CME can have component toward the Earth;
- Day 05/06 – No fast wind stream; 1 CME can have component toward the Earth;
- Day 06/06 – No fast wind stream; 3 CME can have component toward the Earth;
- Day 07/06 – “Fast” wind stream from a CH; no CME observed toward the Earth;
- Prev.: Fast wind expected on June 08-09; low (5% M, 1% X) probability of M / X flares next days; also, occasionally some other CME can present a component toward the Earth;

Responsible: Douglas Silva

- CME:
  - No CME was observed directed to the Earth with the LASCO images. WSA-ENLIL
  - The partial halo CME observed on May 28 at 23:12 UT has a 30% chance of a shock wave reaching Earth between May 31 and June 1.
- Coronal holes:
  - Observed in the center of the solar disk the coronal hole ch1 between the 31st of May and the 7th of June which presented a decrease in the area of the solar disk from 14.0 to 6.4 %.
  - Coronal hole 34169 also observed in the center of the solar disk between the 2nd and 5th of June had an area between 3000 to 19500 Mm2

Interplanetary Medium

Responsible: Paulo Jauer



- The interplanetary medium region in the last week showed a moderate/low level of plasma perturbations due to the passage of CME-like structures and fast HSS structures identified by the DISCOVERY satellite in the interplanetary mid-range and sector crossing.
- The total Bt magnetic field oscillated in magnitude remaining below +11 nT. However, it showed peaks on June 02,03 and 07 at 14:30, 06:30 and at 08:30 UT. The IMF Bz component had 3 negative incursions: on June 3, 5 and 7, ~ -5 nT, -3 nT, -3 nT respectively.
- There was a change of sector in the BxBy components, on June 02, 03 and 04 at 22:30, 17:30 and at 15:30 UT, respectively.
- The density during the period from June 2 to June 3 from 9:30 am to 9:30 pm UT remained above 10 p/cm³, with a maximum peak on June 3 at 00:30 am UT of 39 p/cm³ .The density oscillates around the quiet values with 2 peaks reported on days 06 and 07 at 9:30 pm and at 7:30 am, ~16 and 26 p/cm³.
- The solar wind speed Vsw during the period from May 31 to June 3rd remains decreasing, with peaks on the 31 of ~ 403 km/s at 23:30, and showing a minimum value on June 2 at 11:30 am UT of ~ 312km/s. From this period the speed tends to increase with maximum peak on June 4 at 20:30 of ~ 434 km/s, after decreasing and growing again on June 7 at 03:30 UT to ~ 369km/s.
- The subsolar Mp during remains above 10 Re during the period from May 31 to June 2 at 11:30 am. During the 2 and until June 3 at 3:30 pm the MP remains below 10Re with a minimum value of 8.43 Re. After this period, Mp fluctuates around typical values, except on June 7 at 06:30, whose value remained as low as 8.7Re.

Radiation Belts

Responsible: Ligia Alves da Silva

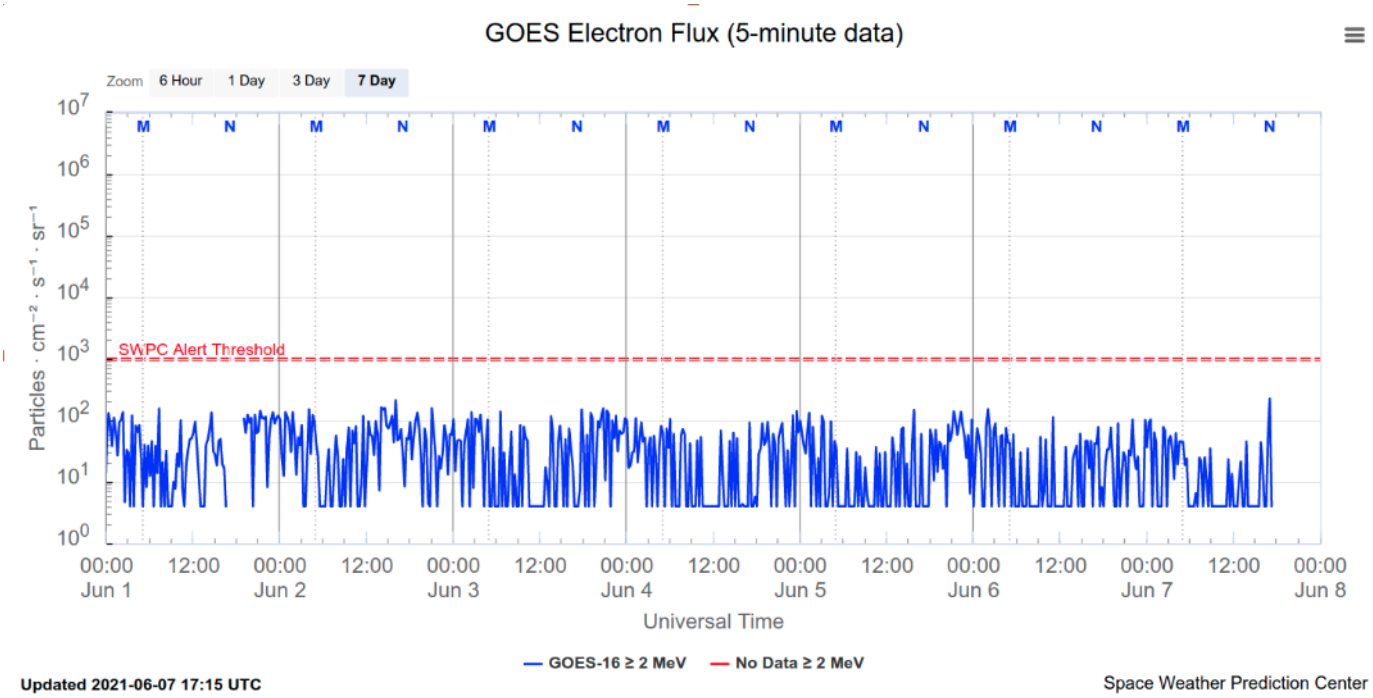


Figure 1: High-energy electron flux (> 2MeV) obtained from GOES satellite. Source: https://www.swpc.noaa.gov/products/goes-electron-flux

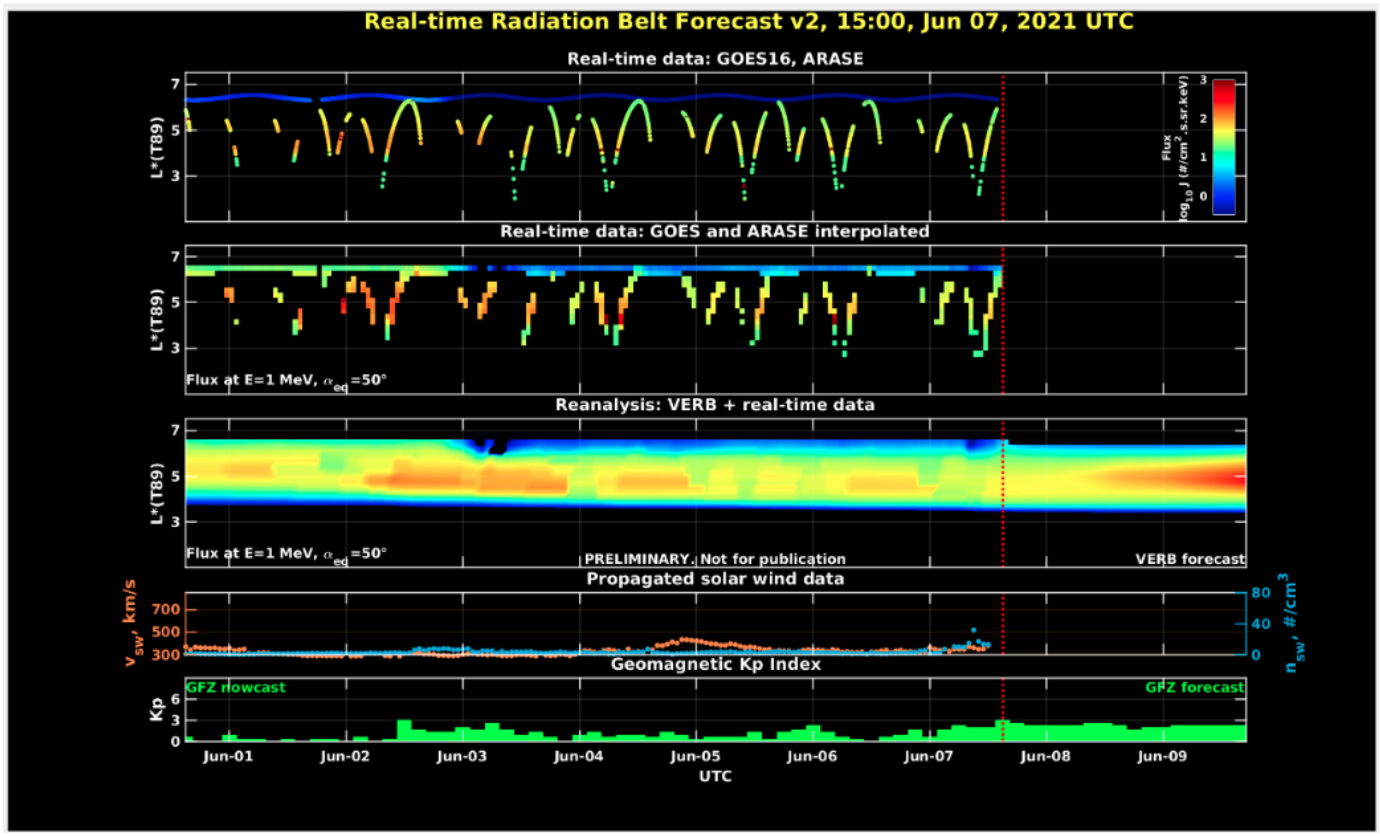


Figure 2: high-energy electron flux data (real-time and interpolated) obtained from ARASE, GOES 16, POES satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: Fonte: https://rbm.epss.ucla.edu/realtime-forecast/

High-energy electron flux (>2 MeV) in the outer boundary of the outer radiation belt obtained from geostationary satellite data - GOES 16 (Figure 1) is shown to be close to 102 particles/(cm2 s sr) during the entire analyzed period. A slight electron flux increase is observed on June 2nd, followed by an electron flux decrease that persists until mid-June 3rd. On June 7th, there is another slight electron flux decrease in the outer radiation belt's outer boundary.

The GOES-16, Arase, and POES satellite data are analyzed and interpolated to observe the high-energy electron flux variability (1 MeV) in the outer radiation belt (Figure 2). Additionally, the VERB code rebuilds this electron considering the ULF waves' radial diffusion. It is observed that the high-energy electron flux decrease is concomitant with the arrival of the coronal mass ejection (on June 2nd), reach since the outer boundary of the radiation belt until L-shells deeper (> 5.0). There is clear evidence of these concomitance between the electron flux increase/decrease and the Ultra Low Frequency (ULF) activity.

Geomagnetism

Responsible: Livia Ribeiro Alves / José Paulo Marchezi

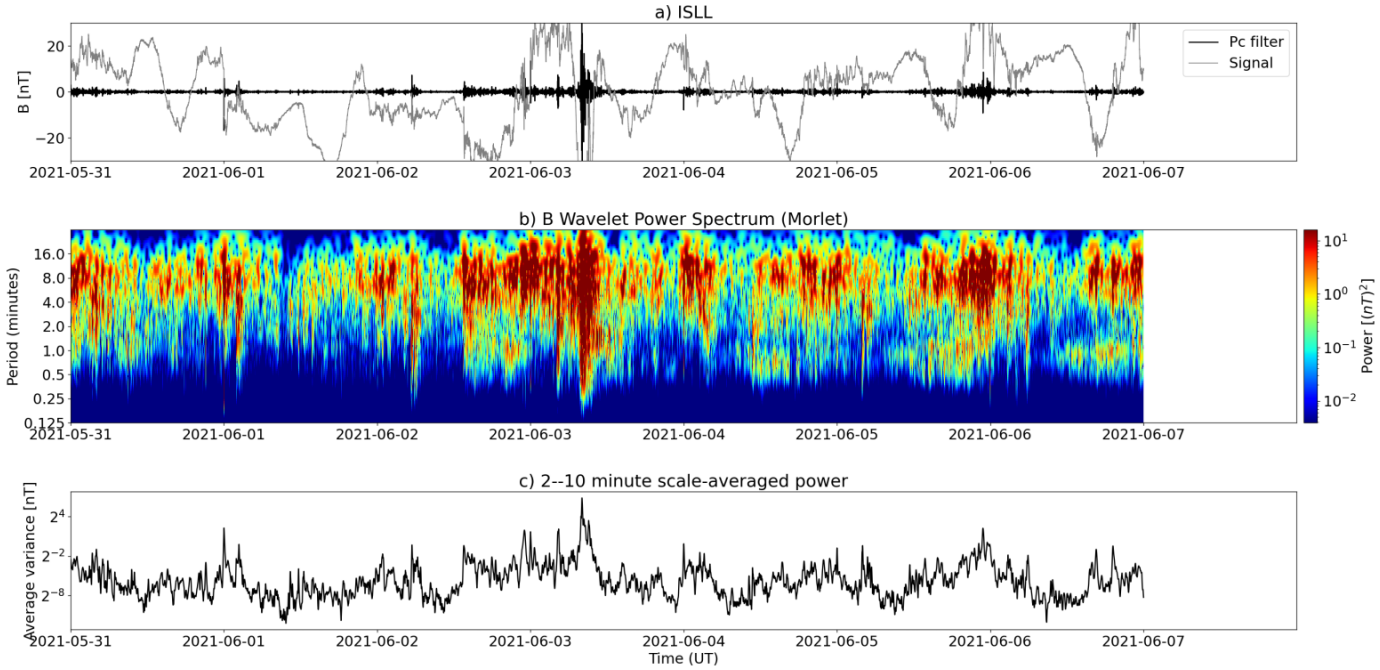


Figure 1: a) signal of the total magnetic field measured at the ISLL Station of the Carisma network in gray, together with the fluctuation in the range of Pc5 in black. b) Wavelet power spectrum of the filtered signal. c) Average spectral power in the ranges from 2 to 10 minutes (ULF waves).

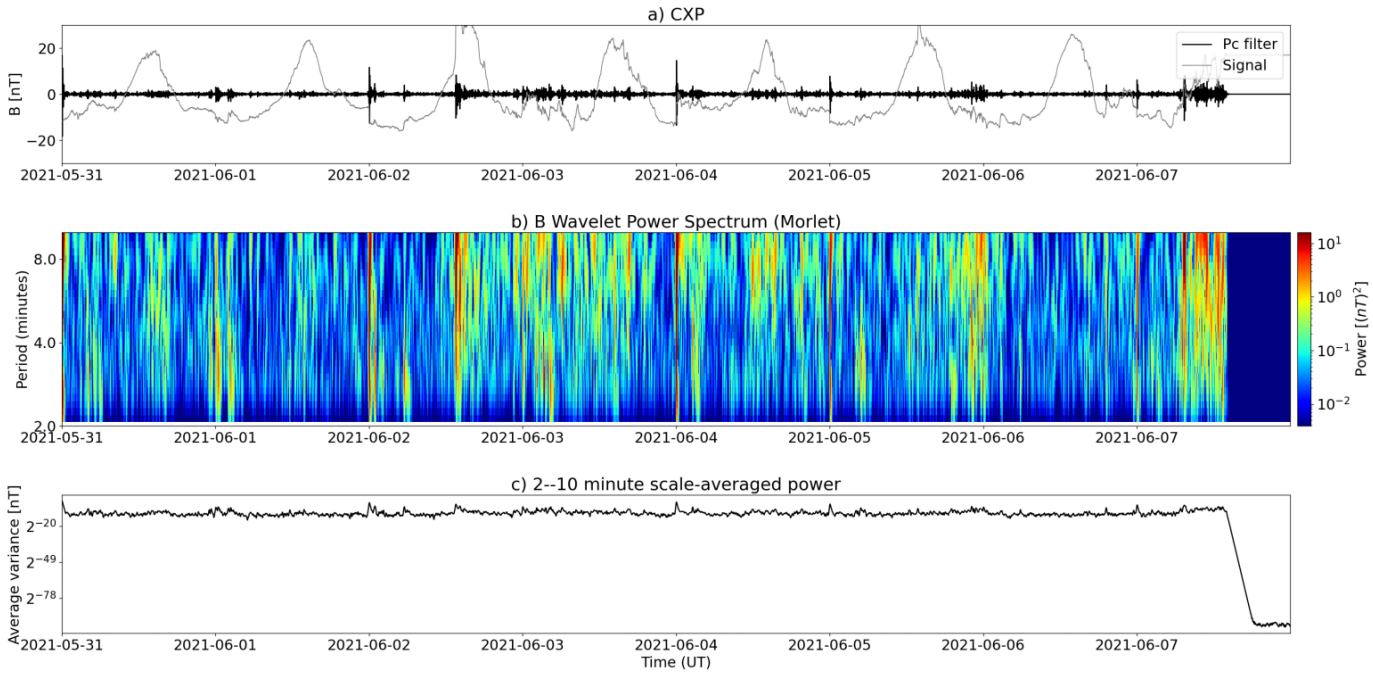


Figura 2: a) signal of the total magnetic field measured at the CXP Station of the EMBRACE network in gray, together with the fluctuation in the range of Pc5 in black. b) Wavelet power spectrum of the filtered signal. c) Average spectral power in the ranges from 2 to 10 minutes (ULF waves).

- Day from 02 to 03/06 Remarkable increase in ULF waves from high to low latitudes, even without GOES satellite
  - Possible interaction with a solar wind sector crossover, followed by a fast solar wind
  - Fluctuations continue until the beginning of 06/04.
- End of day 06/06 and beginning of day 06/07, the second increase in fluctuations.
  - Second increase in density, followed by an increase in solar wind speed.
  - Fluctuations at the IMF last from 06/06/ to 07/06.

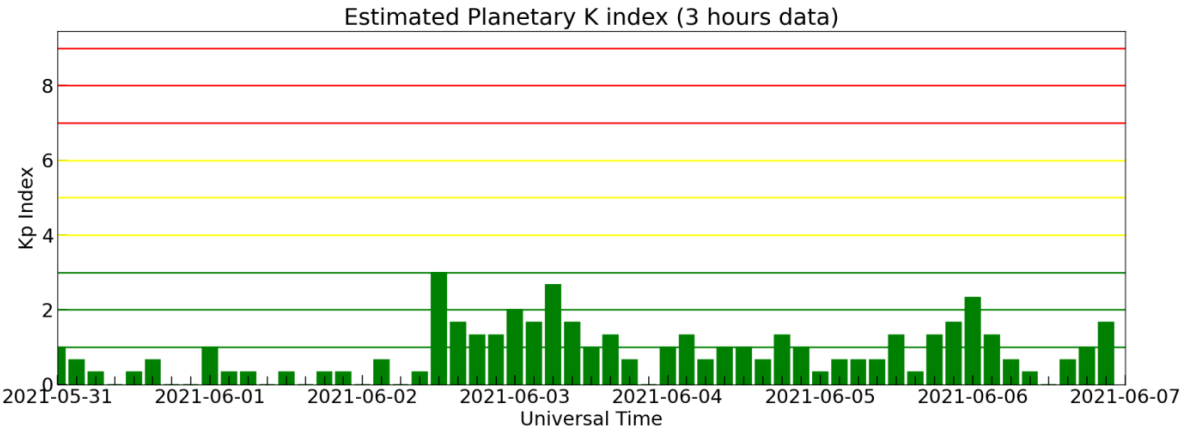
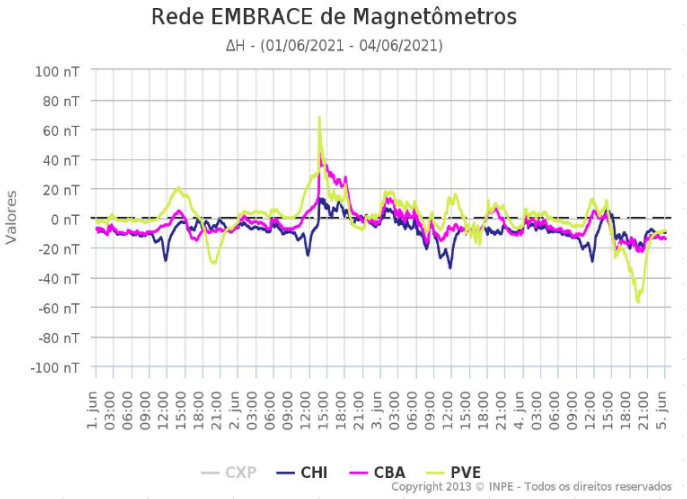


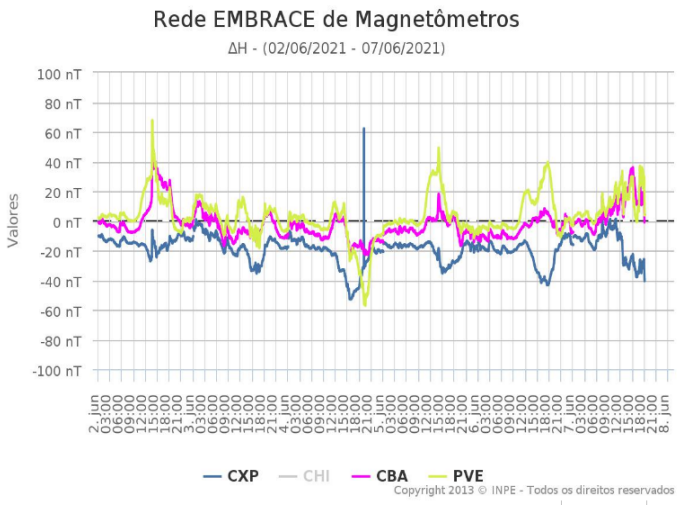
Figure 3: Geomagnetic Kp index for the period from 05/31 to 06/07/2021.

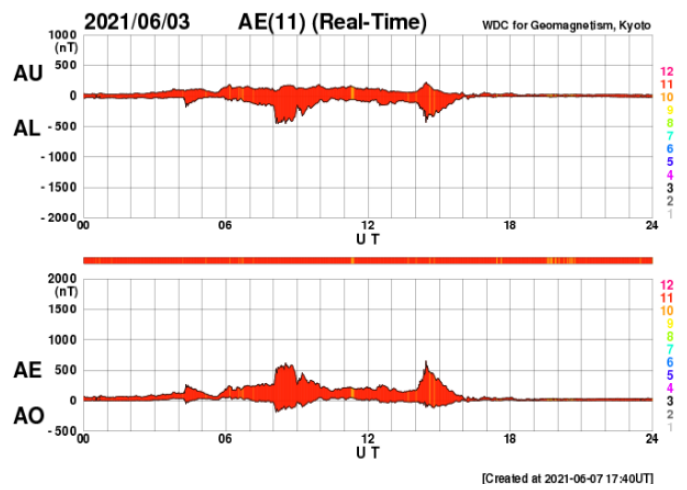
The geomagnetic events that are representative of this period are listed below:

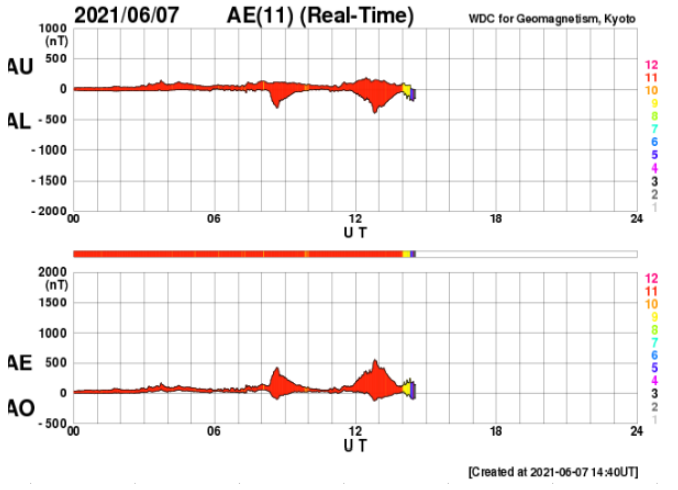
- The Embrace network magnetometers detect sudden impulse on June 2nd around 13:00 UT
- During the occurrence of the sudden impulse, the Embrace network was on the dayside, thus it was possible to observe the contribution of the equatorial Electrojet at PVE station,

- A second event was observed on June 5th at 15:00 UT, but it was not possible to declare that was a sudden impulse,
- The geomagnetic activity was quiet in general; the Dst index was mostly at positive values throughout the period, reaching up to 27 nT on June 3rd,
- Aurora activity was mostly quiet, AE index recorded up to 500 nT in a few periods.
- On June 2nd, the magnetic field measured in the GOES satellite orbit showed an increase in the H component, which is characteristic of dayside magnetospheric current increasing, and on June 3rd, it was registered a signature of magnetotail current activity in the records made on the nightside.









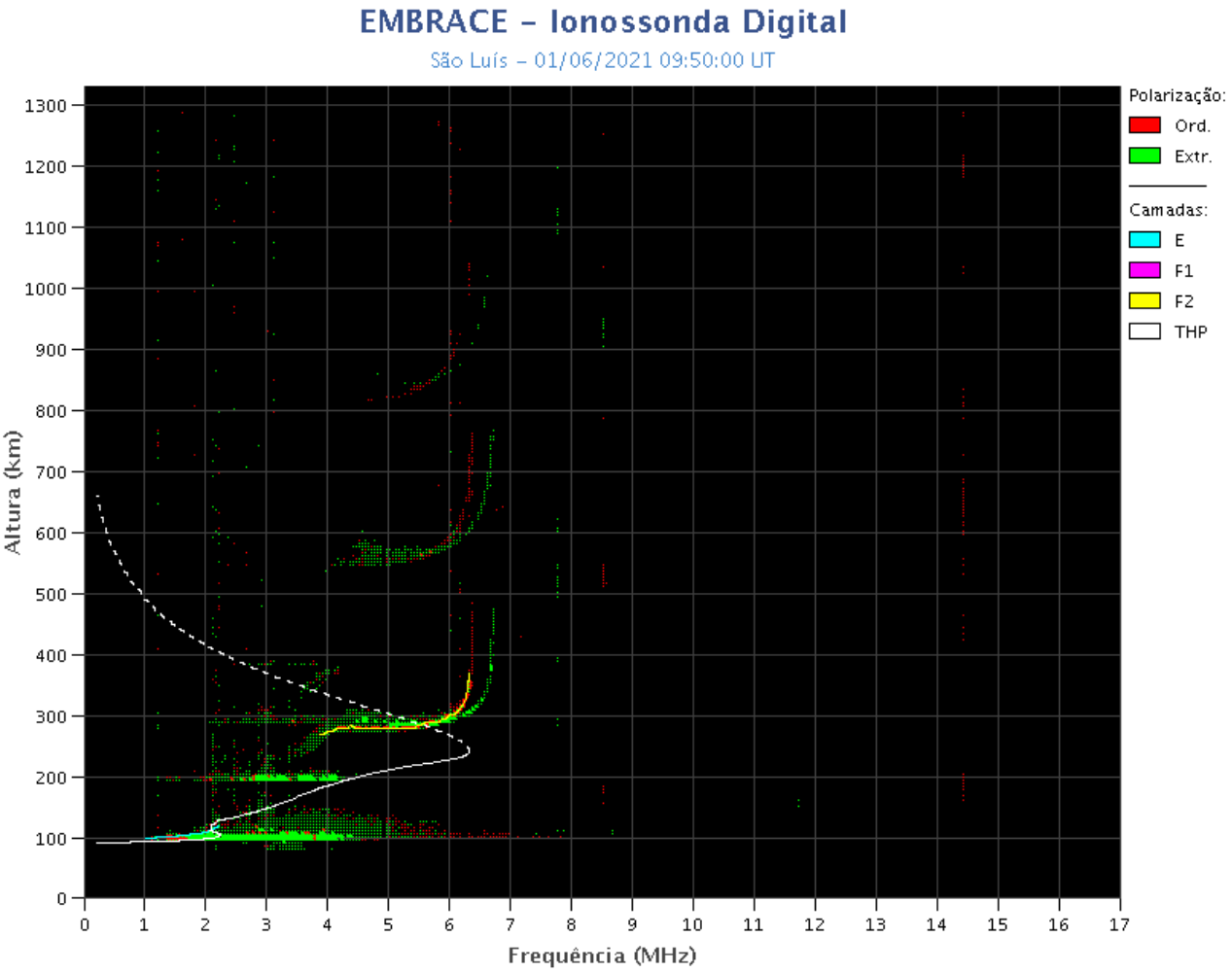
Ionosphere

Responsible: Laysa Resende

Boa Vista

- There was a weak spread-F that started after the pre-reversal enhancement throughout the week.

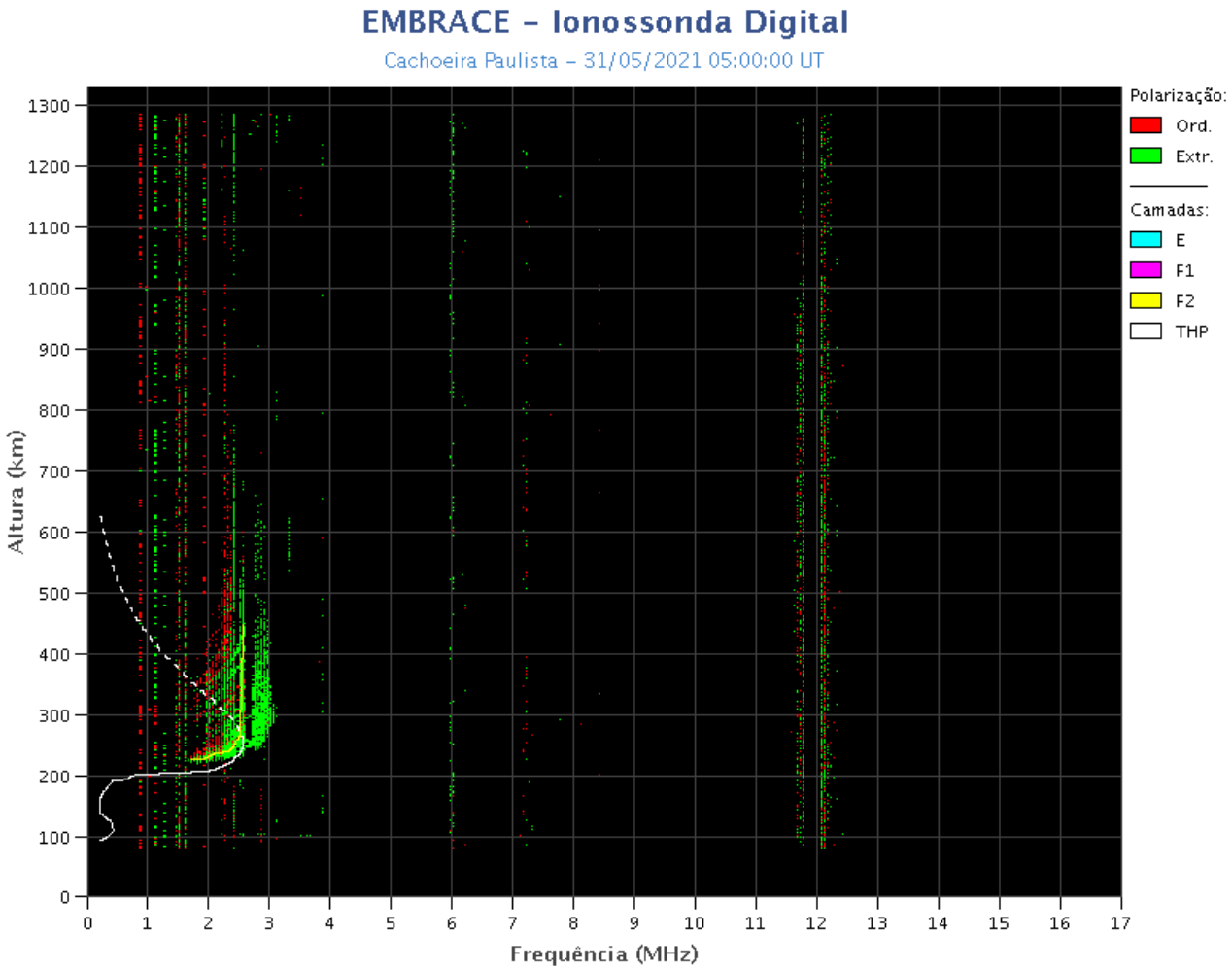
- The Es layers of this region reached scale 4 on the 1st, 2nd, and 3rd.



Cachoeira Paulista

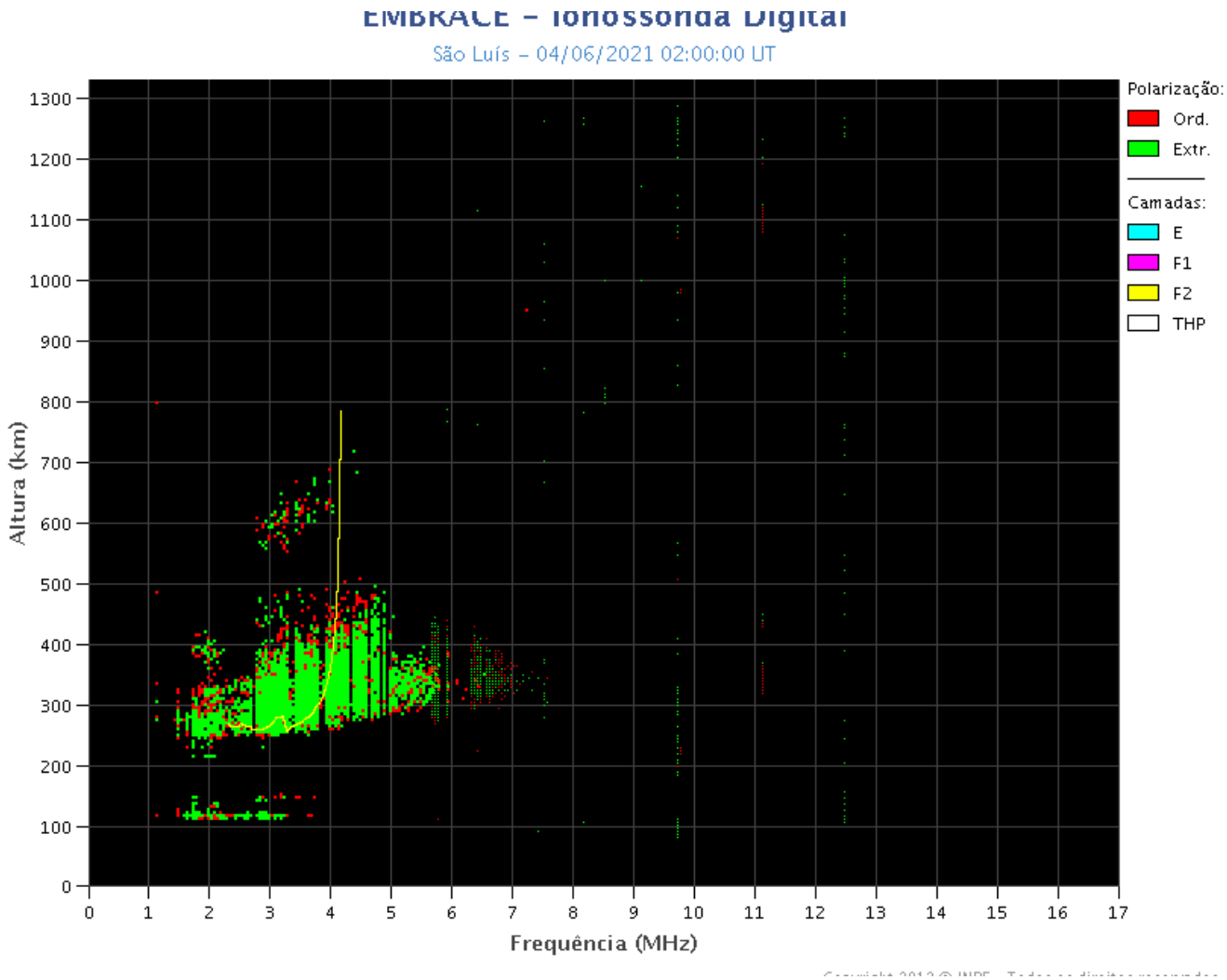
- There was a weak spread-F on the 31st, 01st, 02th and 06th.

- The Es layers in this region were weak with a 2 scale for the entire week.



São Luis

- There was only Spread F on June 4th.
- The Es layers of this region reached scales 3 and 4 throughout the week. Only on the 3rd was scale 2.



Cintilation S4

Responsible: Siomel Savio Odriozola

In this report on the S4 scintillation index, data from the SLMA stations in São Luís / MA, PALM in Palmas / TO, UFBA, in Bahía / BA and SJCE in São José dos Campos / SP were presented. The S4 index tracks the presence of irregularities in the ionosphere having a spatial scale ~ 360 m.

None of the stations showed appreciable values above the noise value in the analyzed period. In the case of the UFBA station, around 0530 UT on June 4th, values of the corrected S4 index (close to 0.3) above the noise level were measured. These values corresponded to the satellite 10 of the GPS number 10 for elevations between 25o and 30o, which could be a multipath effect of this satellite only. The location of the satellite with respect to the receiver was to the northwest. Data from the ionosonde in São Luís, showed the presence of spread -F after midnight during the day 04/06 and at the same time as the values of S4 registered in Bahia. However, in São Luís, no S4 value above 0.2 was observed.