Briefing Space Weather - 2021/06/14

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Sun

Responsible: José Roberto Cecatto

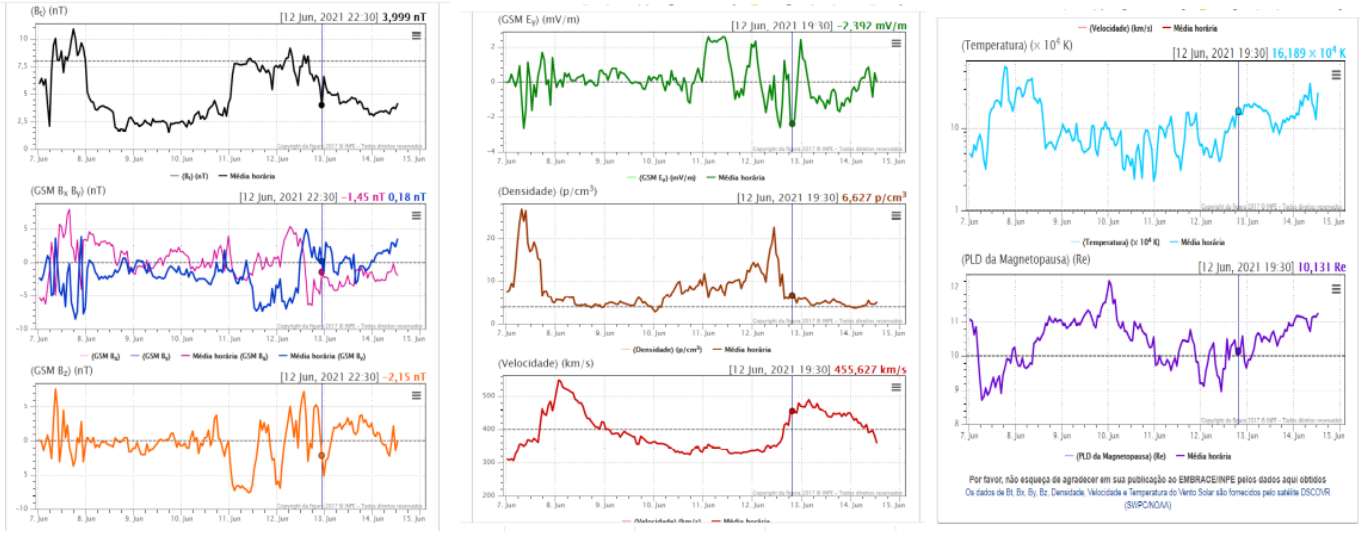
OBS: 09/06 – Type II burst, associated to CME; 1 CME – 04/06 e 05/06; 3 CMEs - 06/06
Day 07/06 – Fast wind stream from a CH; 1 CME can have component toward the Earth;
Day 08/06 – Fast wind stream from a CH; 1 CME can have component toward the Earth;
Day 09/06 – No fast wind stream; 4 CME can have component toward the Earth;
Day 10/06 – No fast wind stream; no CME observed toward the Earth;
Day 11/06 – No fast wind stream; no CME observed toward the Earth;
Day 12/06 – Fast wind stream from a CH; no CME observed toward the Earth;
Day 13/06 – Fast wind stream from a CH; no CME observed toward the Earth;
Day 14/06 – No fast wind stream; no CME observed toward the Earth;
Prev.: Fast wind expected on June 14-16; low (1% 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.
- Coronal holes:
  - An extension of the coronal hole ch1 observed between the 10th and 14th of June face Earth.
  - Coronal hole 34169 observed at the south pole of the solar disk between June 6th and 8th was also facing Earth presenting a maximum area of 15000 Mm2 on June 6th.

Interplanetary Medium

Responsible: Paulo Jauer



- The total Bt magnetic field oscillated in magnitude remaining above 5 nT in the intervals of June 7th to 8th from 5:30 am to 0:30 am and from June 11 to June 13 from 1:30 am to 2:30 am. Between days 8 to 11, all parameters of the solar wind remained oscillating around the calm values.
- The IMF Bz component showed fluctuations from June 7th to June 8th from 00:00 to 00:30 UT respectively. Bz changed orientation on June 10 at 23:30 UT. Bz stays south on June 11th from 2:30 to 10:30 ~ -7 nT. There were another 2 peaks in bz on June 12 at 01:30 and 23:30 at -6 and -5 nT respectively.
- There was a change of sector in the BxBy components, between June 7th and 8th, from 8:30 am to 8:30 pm UT, and on the 12th at 11:30 am UT.
- The Vsw density showed 2 sharp peaks: The first was 26 p/cm^3 on June 7th at 7:30 am, remaining above 5p/cm^3 until June 8th at 8:30 am UT. The second range that remained above 5 p/cm^3 was from June 10th to June 13th from 3:30 am to 5:30 am whose peak was on the 12th at 10:30 am at 22 p/cm^3.
- The solar wind speed Vsw remained above 400km/s between June 7th and June 8th from 4:30pm to 9:30pm, respectively, peaking on the 8th at 01:30 UT of ~ 548 km/s respectively. A second increase is in speed between 12th and 14th from 15:30 to 06:30 UT, which peaked at ~489km/s on June 13th at 03:30 UT.
- The subsolar Mp remains below 10Re between the 7th and 8th of June with a minimum in this range of 8.7 Re. Two more MP compressions were detected, on the 12th at 01:30 and 10:30 of ~9.1 and ~8.9 Re , respectively. The maximum MP expansion position was 12 Re on June 10 at 00:30 UT.

Radiation Belts

Responsible: Ligia Alves da Silva

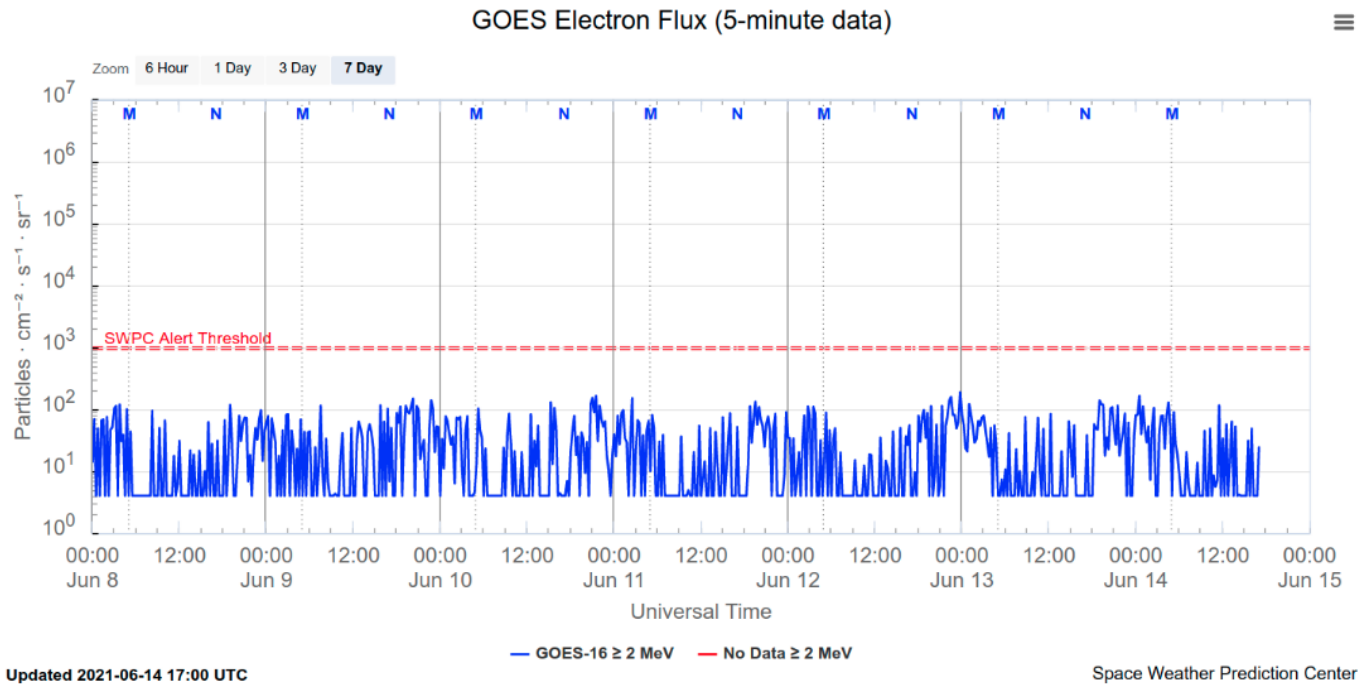


Figure 1: High-energy electron flux (> 2MeV) obtained from GOES satellite. Source: https://www.swpc.noaa.gov/products/goes-electron-flux

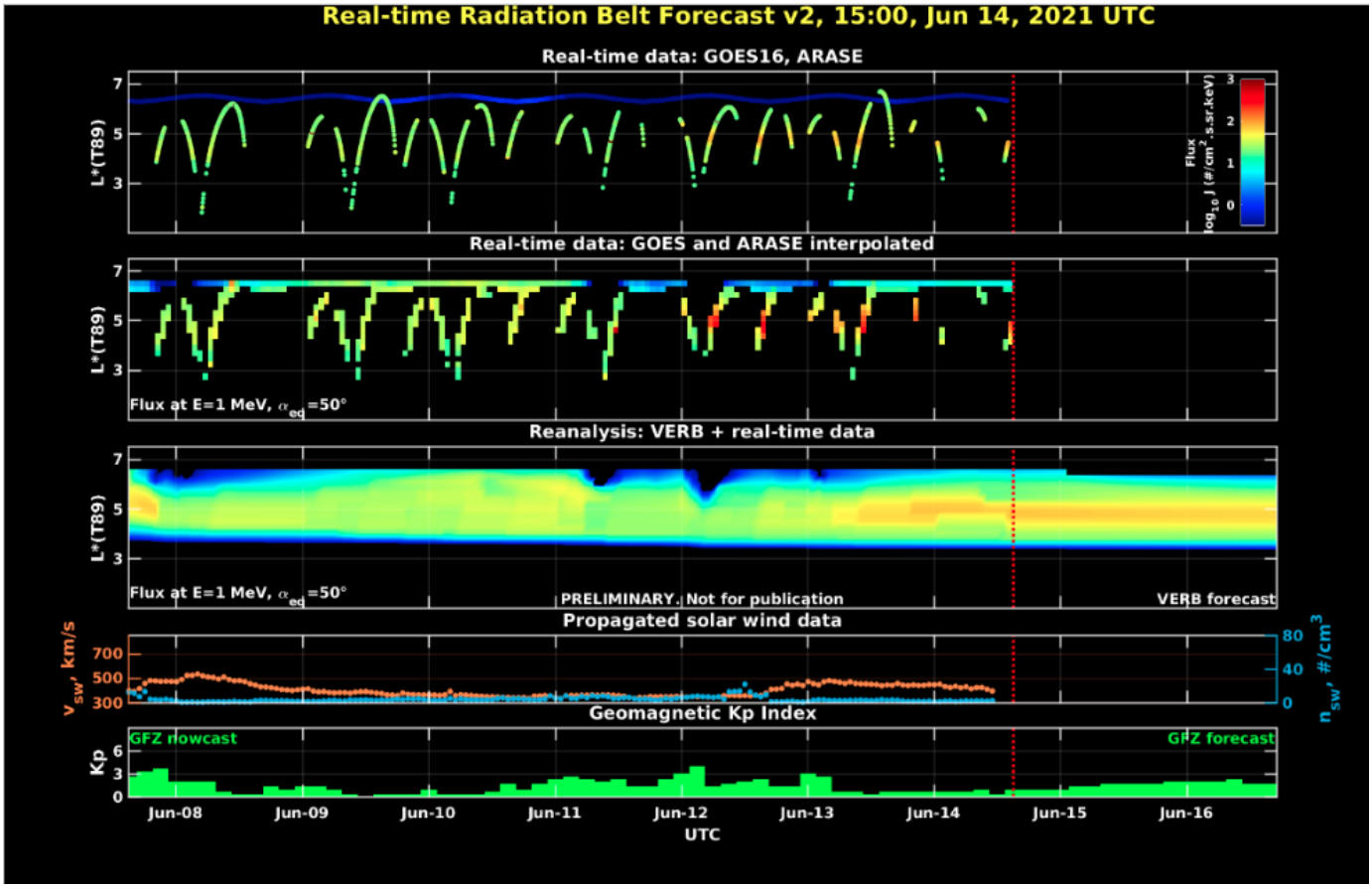


Figure 2: high-energy electron flux data (real-time and interpolated) obtained from ARASE, GOES 16, POES satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: Fonte: https://rbm.epss.ucla.edu/realtime-forecast/

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. Three electron flux decreases are observed on June 08th, 11th and 12th in the outer boundary of the outer radiation belt.

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. The electron flux decrease observed on June 12th is followed by an electron flux increase at 4.0 < L-shell < 5.5. There is clear evidence of these concomitances between the electron flux decreases/increase and the Ultra Low Frequency (ULF) activity.

Geomagnetism

Responsible: Livia Ribeiro Alves / José Paulo Marchezi

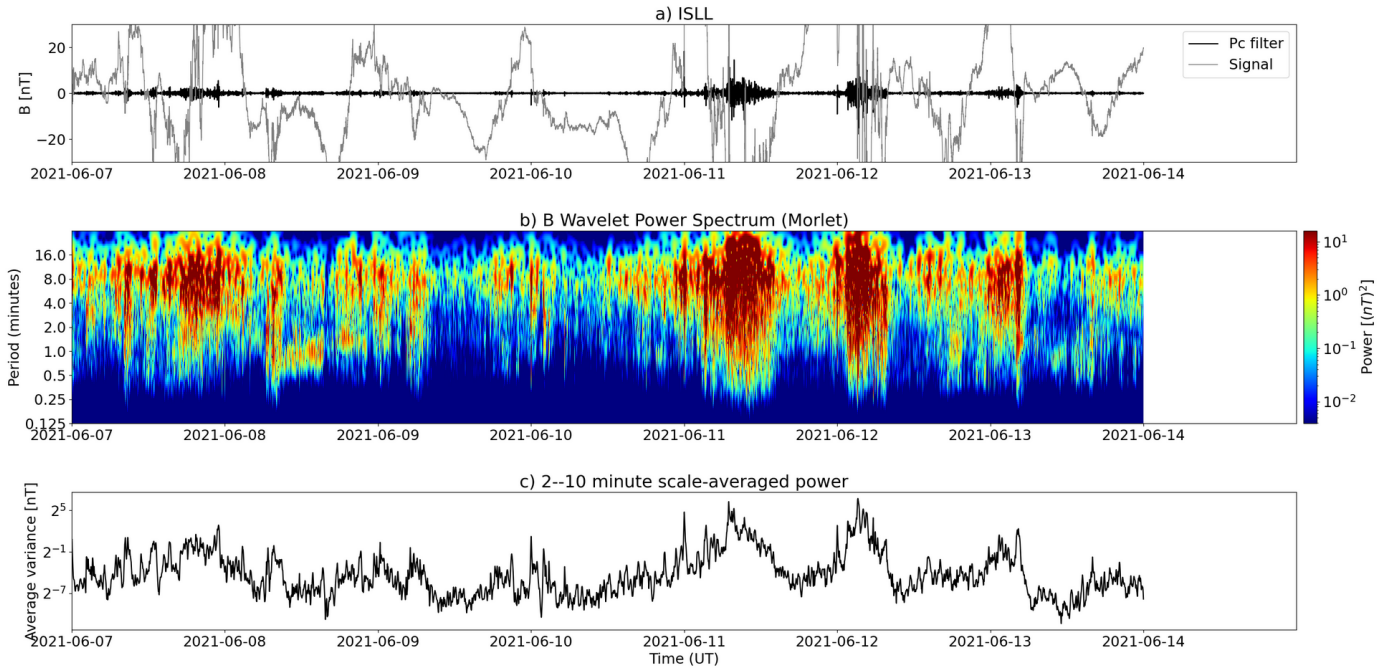


Figure 1: a) signal of the total magnetic field measured at the ISLL Station of the Carisma network in gray, together with the fluctuation in the range of Pc5 in black. b) Wavelet power spectrum of the filtered signal. c) Average spectral power in the ranges from 2 to 10 minutes (ULF waves).

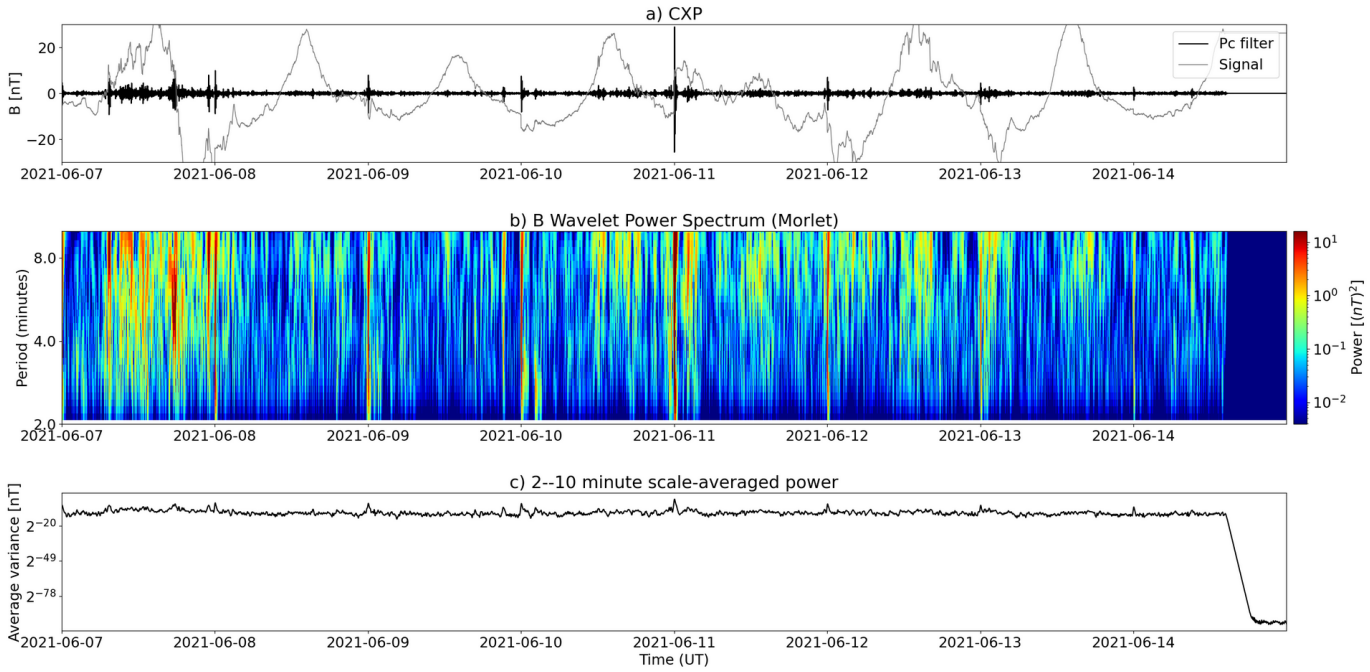


Figura 2: a) signal of the total magnetic field measured at the CXP Station of the EMBRACE network in gray, together with the fluctuation in the range of Pc5 in black. b) Wavelet power spectrum of the filtered signal. c) Average spectral power in the ranges from 2 to 10 minutes (ULF waves).

- The second half of the day 07/06 with high ULF wave activity from to low latitudes.
  *Large fluctuations in the Bx, By, and Bz components of the IMF. Increased solar wind speed.
- Day 08/06 presents a separation in the ULF bands (Pc3 - Pc5) at high latitudes.
  - It may be associated with variations in the Bx and By components of the IMF
- High wave activity on 06/11 and 06/12.
  - The Bz component of the IMF makes an incursion south and stays for approximately 12 hours on 11/06.
  - Component Bz makes a new incursion south on 12/06. There is also a sector change in the second half of the same day.

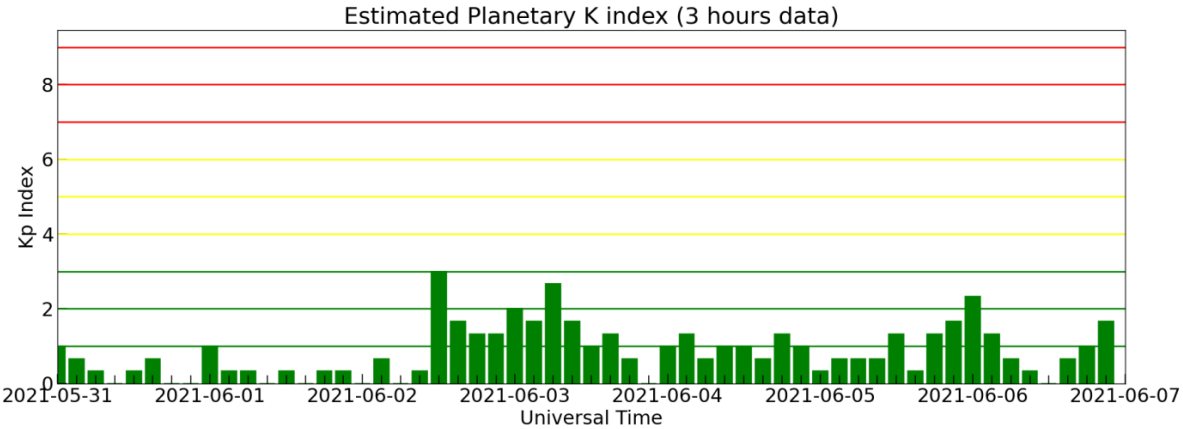


Figure 3: Geomagnetic Kp index for the period from 05/31 to 06/07/2021.

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

- Embrace network magnetometers detected geomagnetic disturbance from the 10th to the 13th of June.
- On June 11, the MagNet network detected a minimum of H component (~ -40 nT) in all stations
- Geomagnetic activity was mostly quiet, despite the Dst index reaching - 33 nT on 06/11
- The auroral activity on June 11 remained at 500 nT most of the time, however, the AE index registered low activity in the week, except on June 11.
- Magnetic field measured in the night side GOES satellite orbit on June 11 to 13, shown a drop in the H component, characteristic of magnetotail current activity

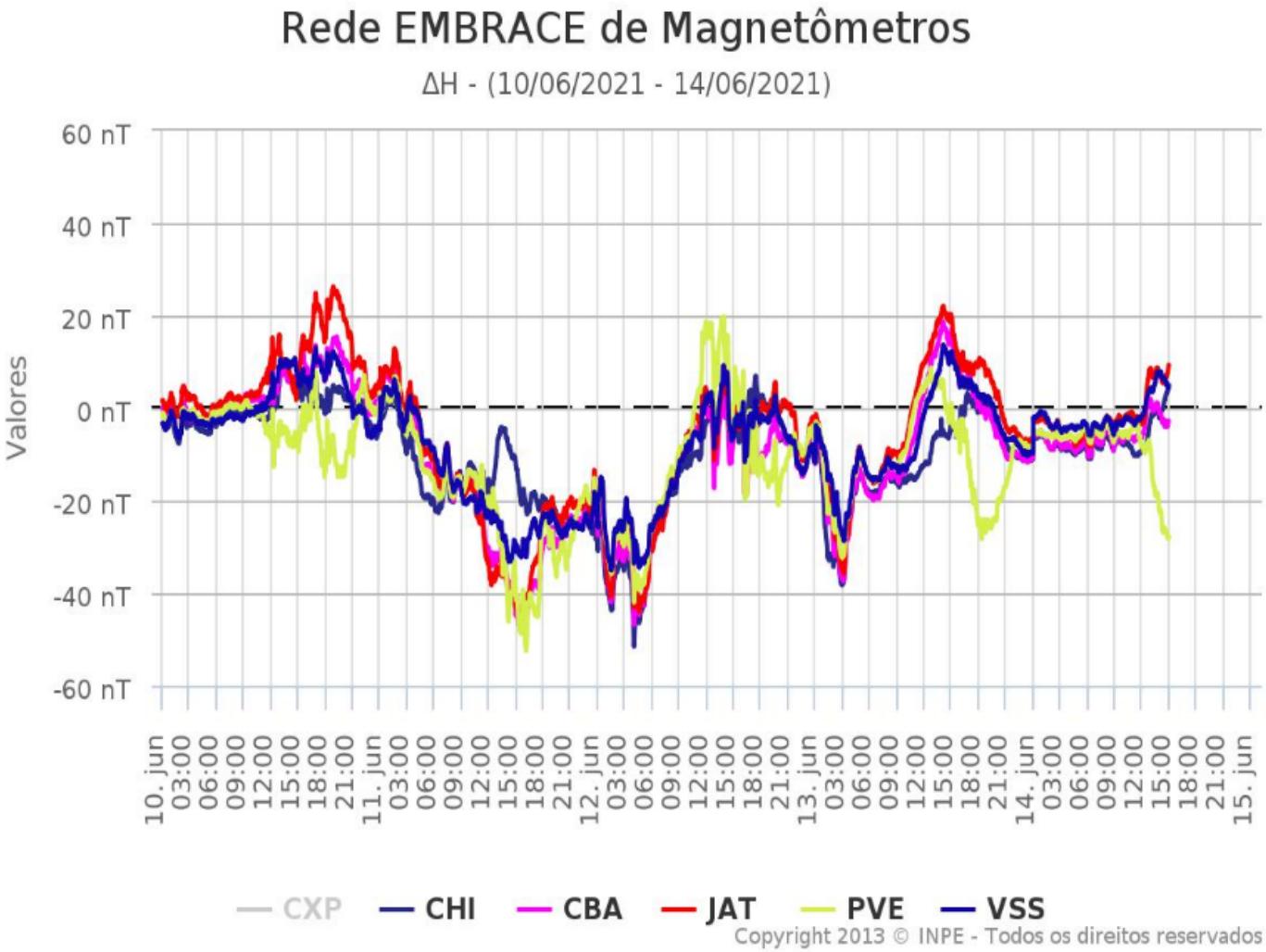


Figura 3: Variação da compoente H do campo geomagnético registrado pelos magnetômetros da rede EMBRACE.

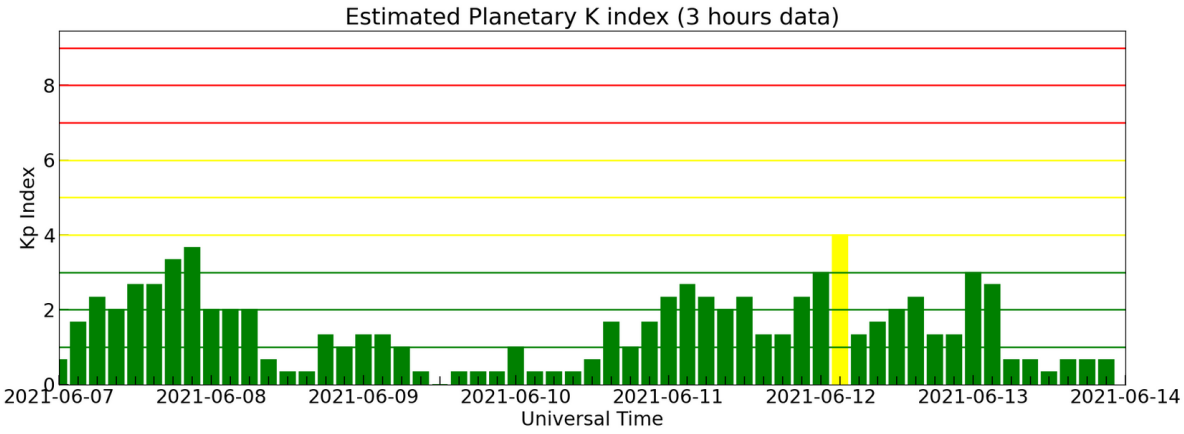


Figura 4:Geomagnetic Kp index for the period from 06/07- to 06/07/2021.

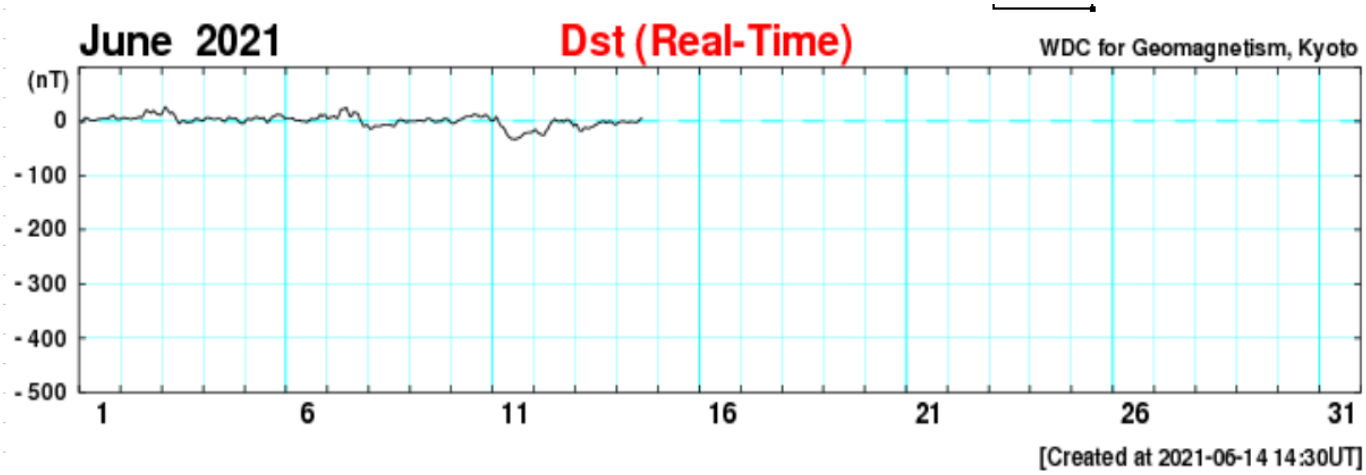


Figura 5: Dst Index for 06/07- to 06/07/2021.

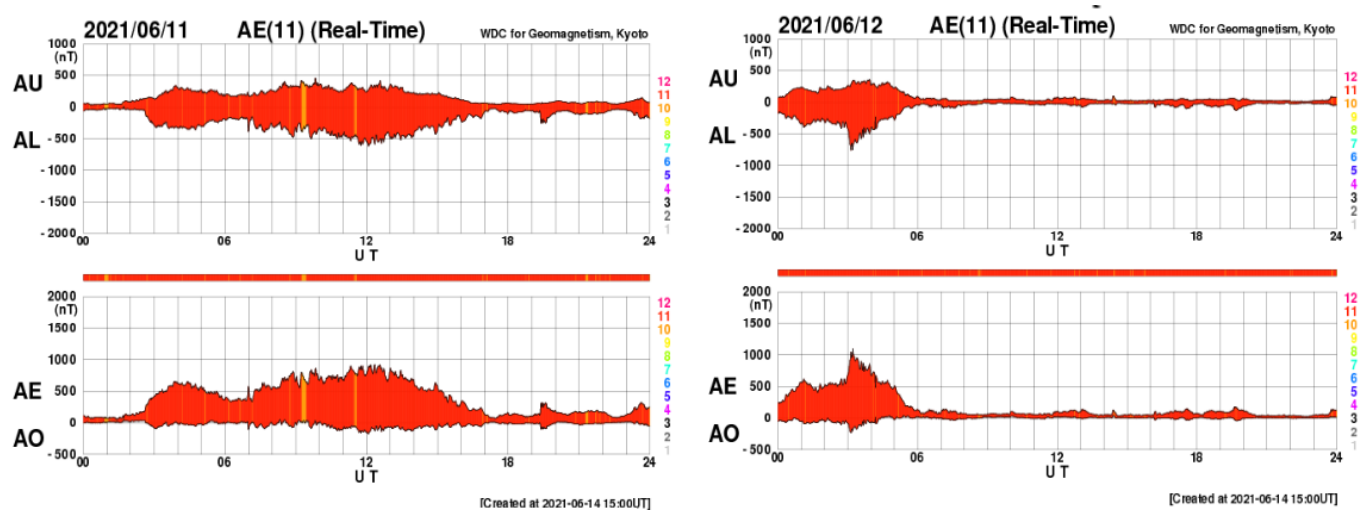


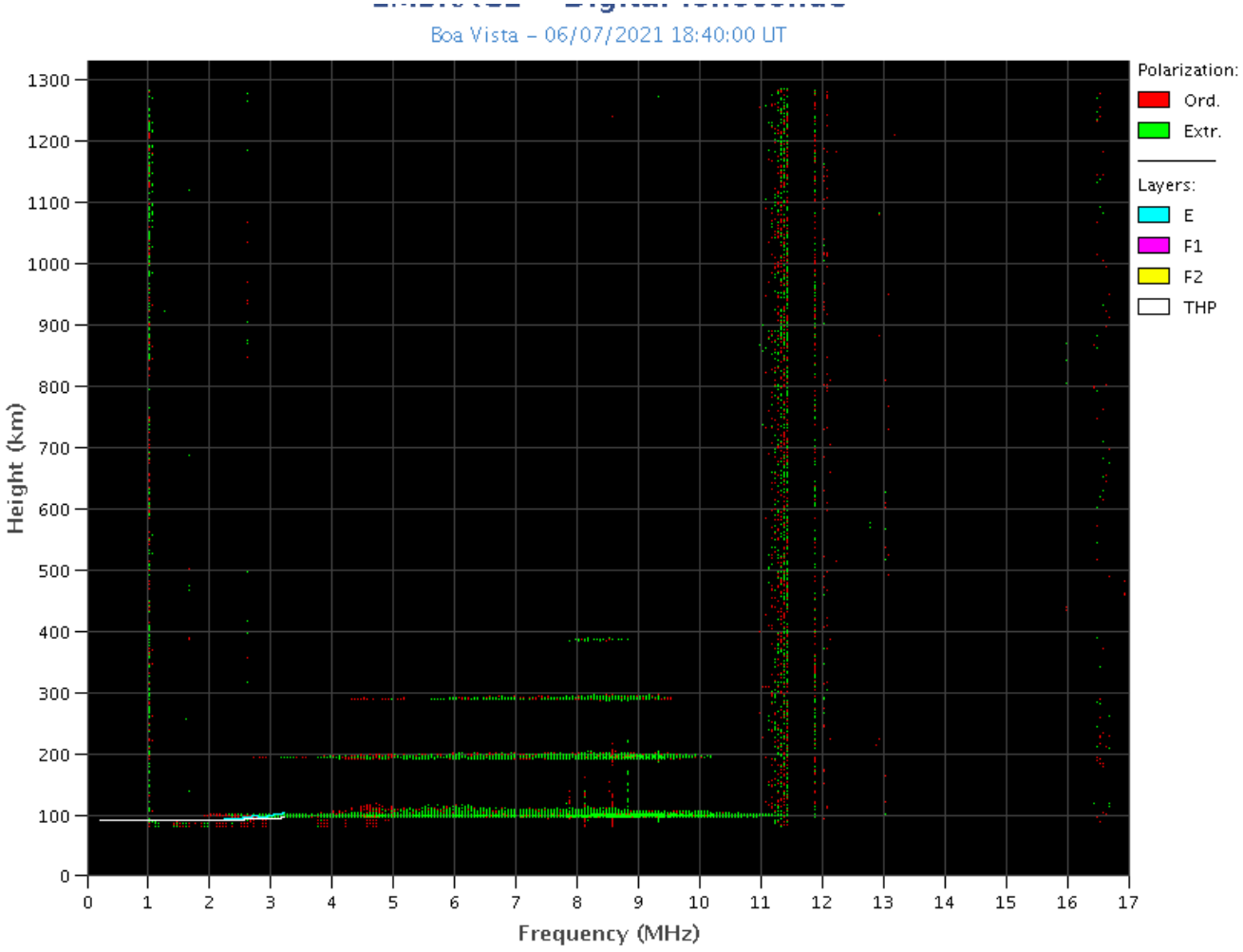
Figura 6: AU, AL, AE e AO indexes for 06/11 and 06/12/2021

Ionosphere

Responsible: Laysa Resende

Boa Vista

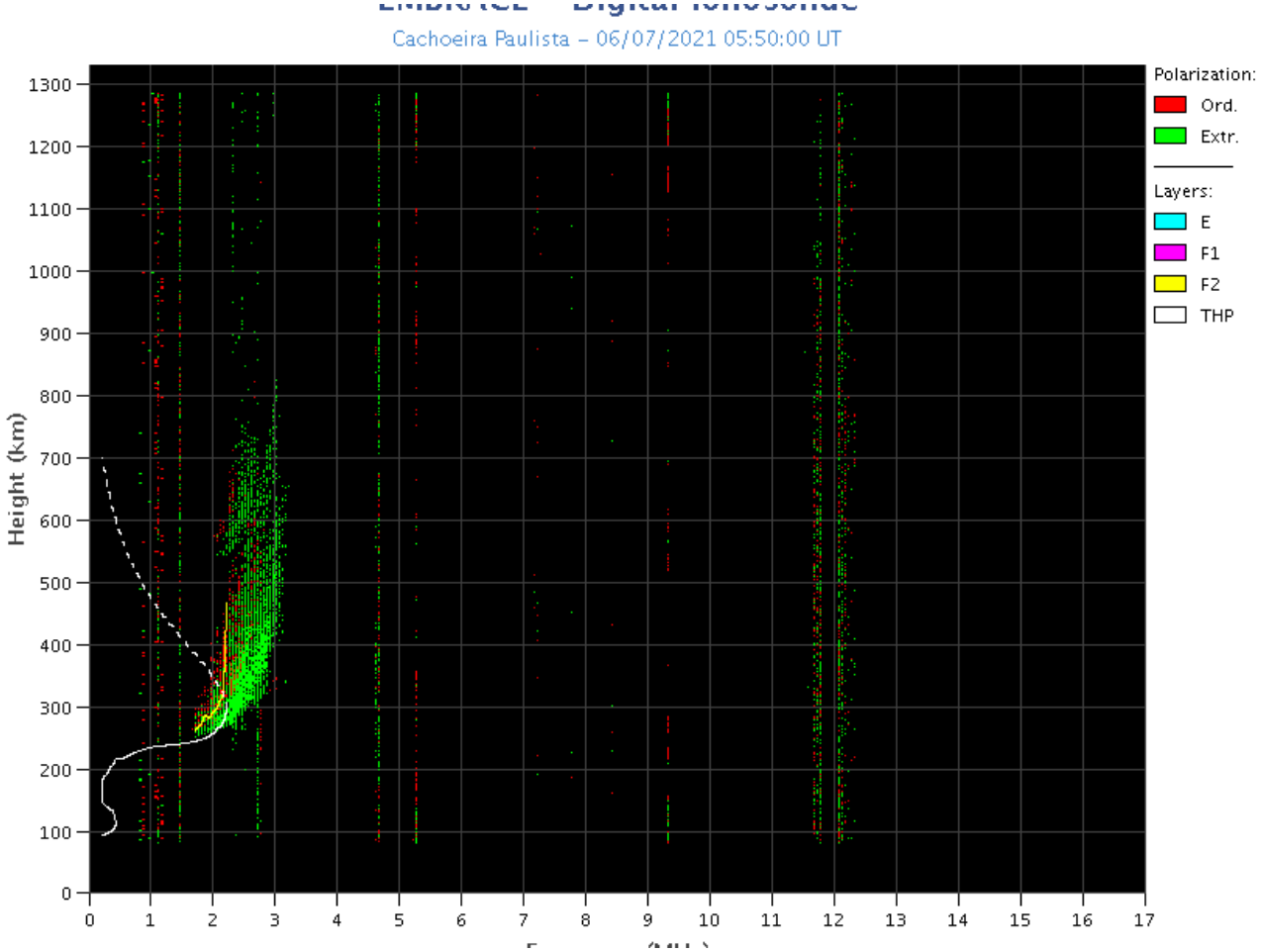
- There was a weak spread-F that started after the pre-reversal peak throughout the week.
- There were very strong Es layers during all week, reaching scale 5 on the 7 and 11.



Cachoeira Paulista

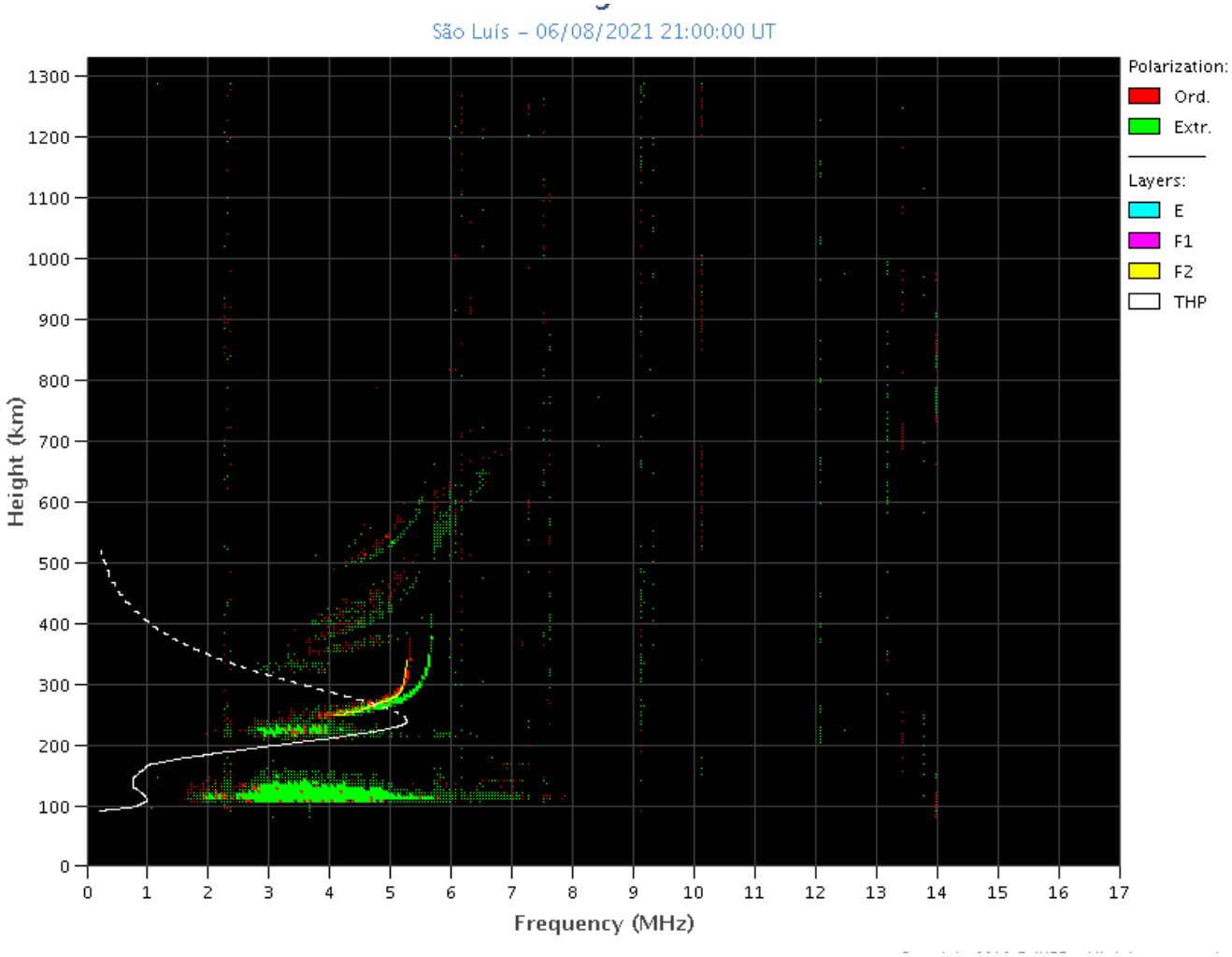
- There was a weak spread-F throughout the week, except on the 12.

- The Es layers in this region were generally weak. It reached scale 3 on the 11.



São Luis

- There was only Spread F on the 9 and 11.
- The Es layers in this region reached scales 2 and 3 throughout the week.



Cintilation S4

Responsible: Siomel Savio Odriozola

No data available for the period.