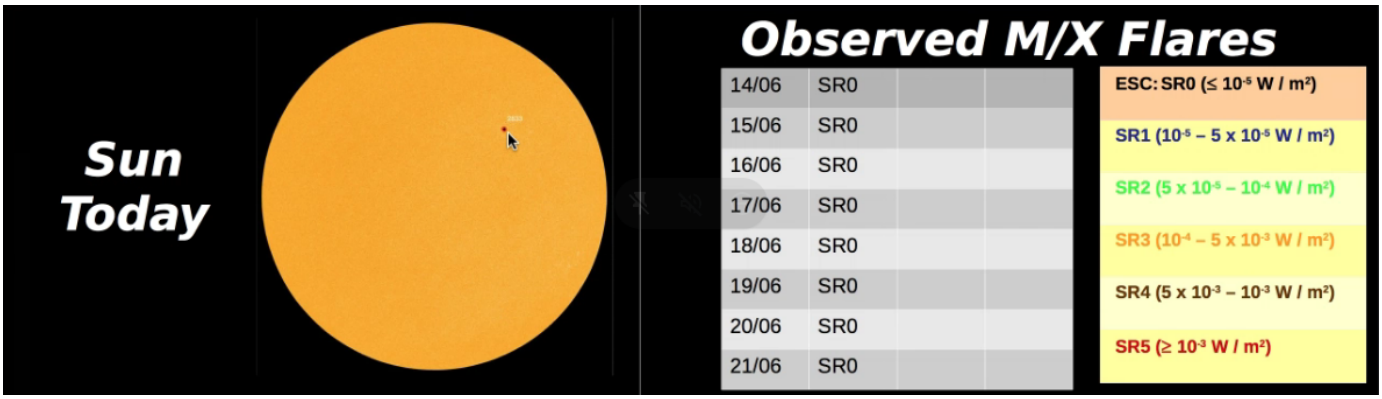
Briefing Space Weather - 2021/06/21

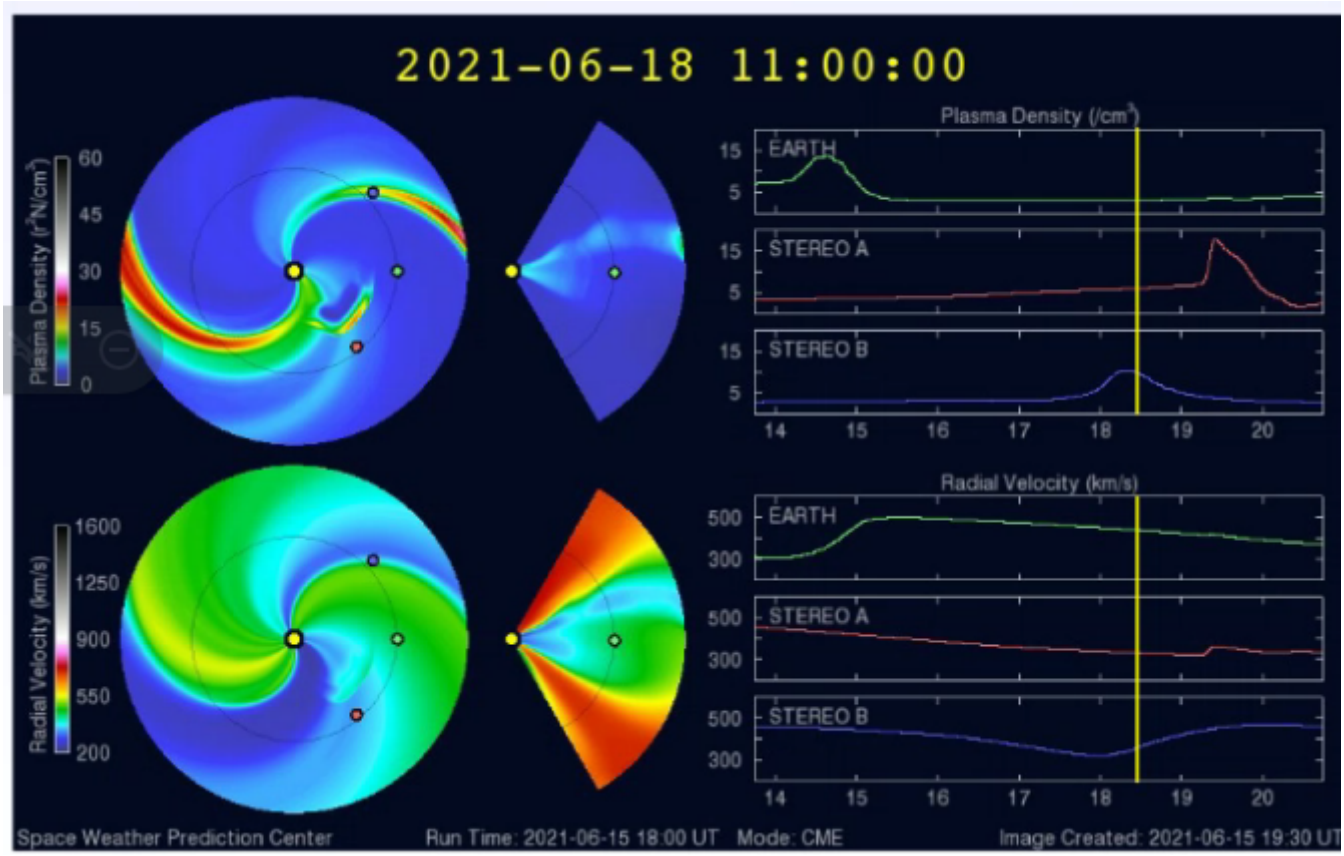
Briefing Space Weather - 2021/06/21

Sun

Responsible: José Roberto Cecatto / Douglas Silva



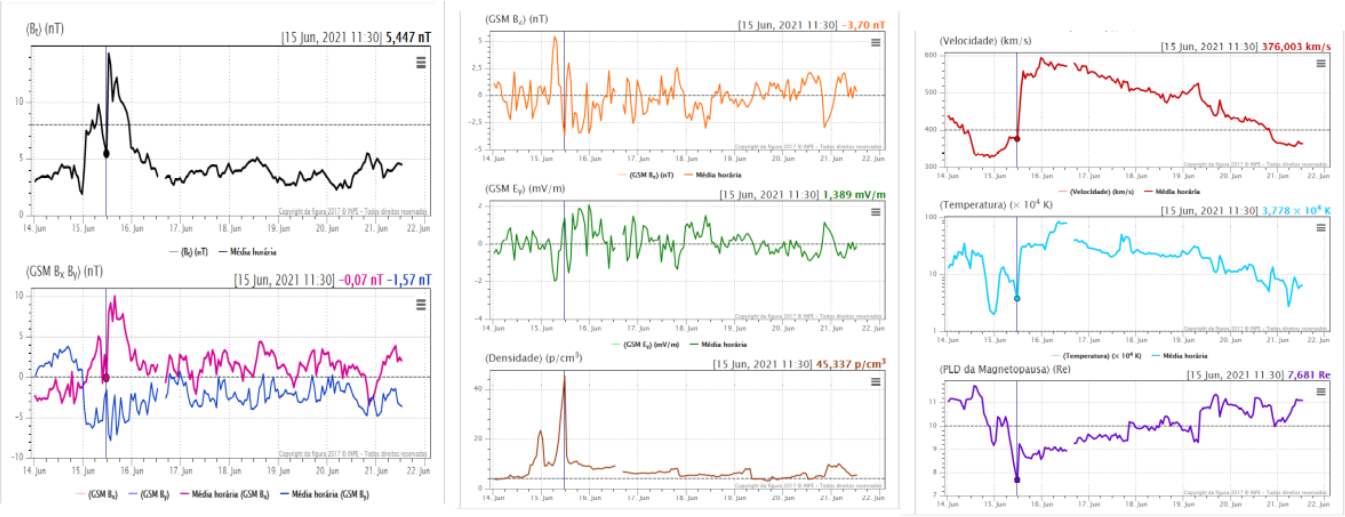
Day 14/06 – No fast wind stream; no CME observed toward the Earth;
Day 15/06 – Fast wind stream from a CH; 2 CME can have component toward the Earth;
Day 16/06 – Fast wind stream from a CH; no CME observed toward the Earth;
Day 17/06 – Fast wind stream from a CH; 1 CME can have component toward the Earth;
Day 18/06 – Fast wind stream from a CH; 1 CME can have component toward the Earth;
Day 19/06 – Fast wind stream from a CH; no CME observed toward the Earth;
Day 20/06 – No fast wind stream; 1 CME can have component toward the Earth;
Day 21/06 – No fast wind stream; no CME observed toward the Earth;
Prev.: Fast wind expected on June 22-23; low (1% M, 1% X) probability of M / X flares next days; also, occasionally some other CME can present a component toward the Earth;



- CME:
  - Observed a coronal mass ejection on June 15 at 04:24:00 UT associated with a filament eruption.
- WSA-ENLIL (Prediction for CME 2021-06-15T04:24:00)
  - This CME was associated with a filament eruption. According to the simulation, the CME is likely to pass behind the Earth's orbit and with little chance of being detected on Earth.
- Coronal holes: (SPOCA):
  - Coronal hole 34219 an extension of the coronal south polar hole and coronal hole 34205 showed a decrease in their areas during the observation period.

Interplanetary Medium

Responsible: Paulo Jauer



- The interplanetary region last week showed a moderate/low level of plasma perturbations due to the passage CME and fast HSS structures identified by the DISCOVERY satellite in the interplanetary mid-range along with sector crossing.
- The total Bt magnetic field oscillated its magnitude remaining above 5 nT in the intervals of June 14 to 16 from 23:30 to 03:30 UT. For the remainder of the period it remained oscillating around quiet values.
- The IMF Bz component showed negative mean fluctuations during the period analyzed. Three peaks were observed on June 15 at 11:30 am, 6:30 pm and at 11:30 pm UT around -3 nT. On June 16, 18 and 20, at 9:30 pm, 9:30 am, and 8:30 pm, peaks were observed whose value did not exceed -4nT.
- There was a change of sector in the BxBy components, on June 14th at 23:30.
- The density of Vsw showed 2 sharp peaks: The first of 23 p/cm^3 on June 14 at 23:30, the second of 45.3 p/cm^3 on June 15 at 11:30 am. Density presented other secondary peaks on the 17, 19 and 2nd on the 20 of June, at 19:30, 07:30, 11:30, 22:30 UT, being below 10 p/cm^3.
- The solar wind speed Vsw, presented a minimum value on June 14 at 21:30 UT of 326km/s. On June 15, the transition occurred at a speed of 376 km/s to a maximum value of 594 km/s. On June 19 at 07:30 it again increased to 525 km/s, again decreasing to a value of 355km/s at 13:30 UT on June 21.
- The subsolar Mp had a maximum expansion of 11.72 Re on June 14 at 13:30. The MP showed a maximum compression on June 15 at 11:30 am of 7.68 Re.

Radiation Belts

Responsible: Ligia Alves da Silva

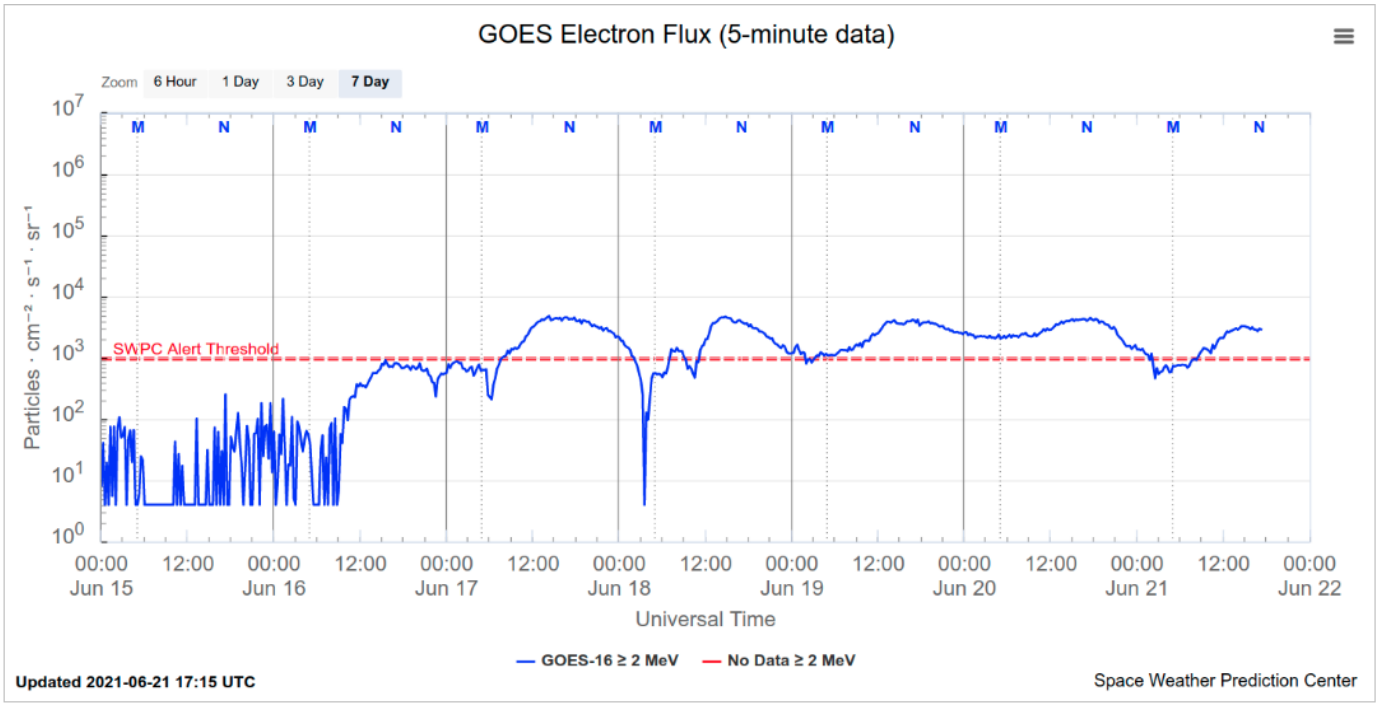


Figure 1: High-energy electron flux (> 2MeV) obtained from GOES satellite. Source: https://www.swpc.noaa.gov/products/goes-electron-flux

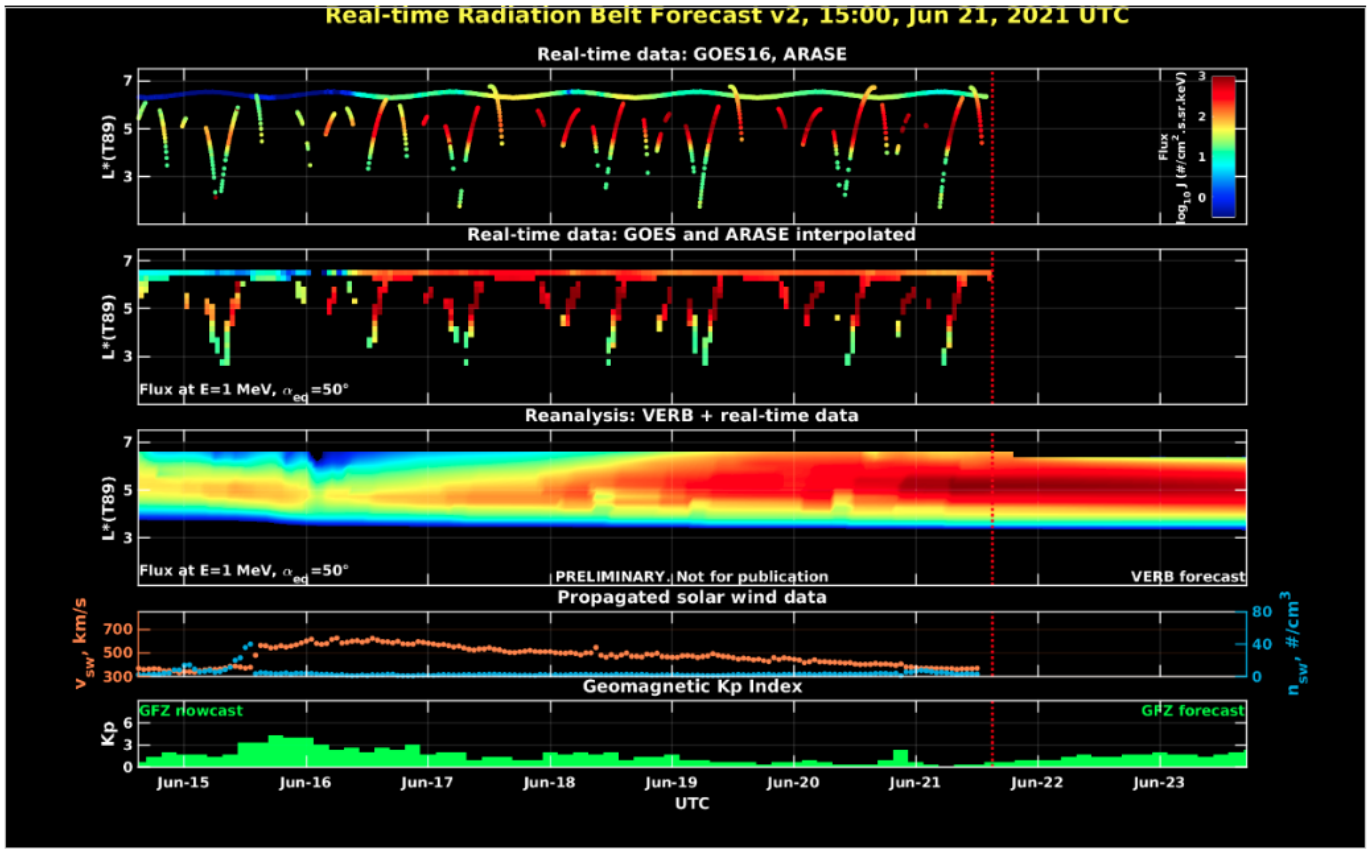


Figure 2: high-energy electron flux data (real-time and interpolated) obtained from ARASE, GOES 16, POES satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: Fonte: https://rbm.epss.ucla.edu/realtime-forecast/

The spectrograms of the magnetic field from the EMFISIS instrument onboard the Van Allen Probe B are used to observe the magnetospheric wave activities during the geomagnetic storm's recovery phase. The Van 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) until 09:00 UT on June 16th. The electron flux increase is observed from 12:00 UT on June 16th in the outer radiation belt's outer boundary that persists until today.

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 increase is observed on June 16th, reaching L-shell ≥ 4.0. There are pieces of evidence of the concomitance between the electron flux increase, the Ultra Low Frequency (ULF) activity, and the High-Speed solar wind Stream.

Geomagnetism

Responsible: Livia Ribeiro Alves / José Paulo Marchezi

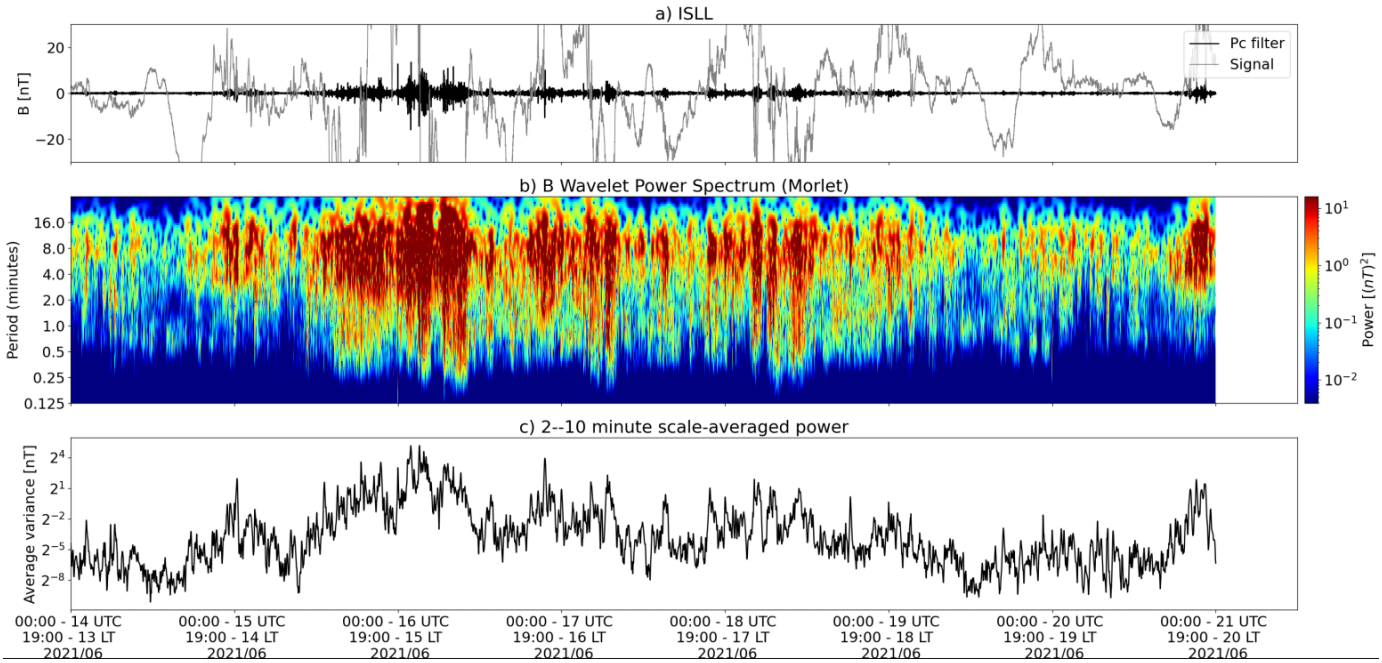


Figure 1: a) signal of the total magnetic field measured at the ISLL Station of the Carisma network in gray, together with the fluctuation in the range of Pc5 in black. b) Wavelet power spectrum of the filtered signal. c) Average spectral power in the ranges from 2 to 10 minutes (ULF waves).

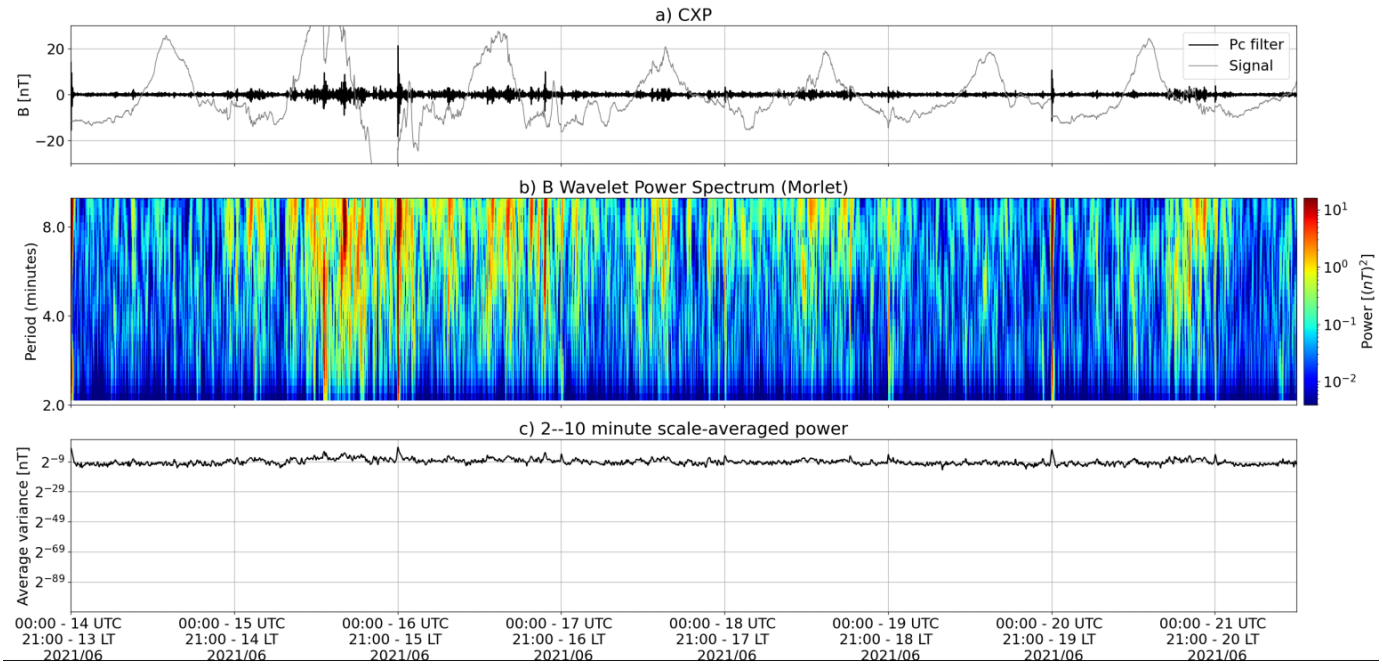


Figura 2: a) signal of the total magnetic field measured at the CXP Station of the EMBRACE network in gray, together with the fluctuation in the range of Pc5 in black. b) Wavelet power spectrum of the filtered signal. c) Average spectral power in the ranges from 2 to 10 minutes (ULF waves).

- Beginning of 15/06 there is a ULF activity in high latitudes. It may be related to an IMF sector change.
- Second half of 06/15 with high ULF wave activity from high to low latitudes.
  - Possibly related to peak solar wind proton density
  - Increased solar wind speed may be maintaining wave activity
- Day 18/06 presents impulsive ULF activity.
  - May be associated with a negative incursion of the IMF Bz component
  - There is an abrupt reduction in the flow of electrons in geostationary orbit.

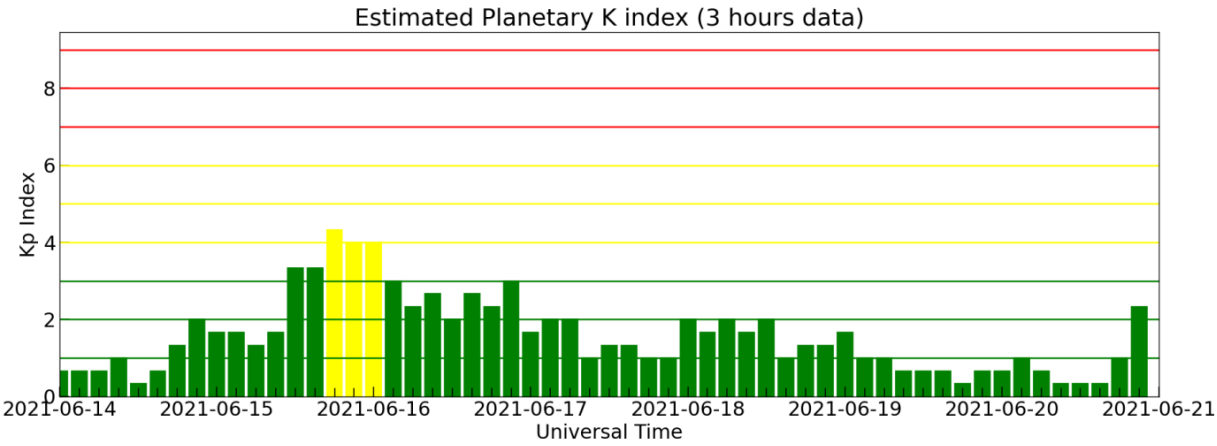


Figura 4:Geomagnetic Kp index for the period from 14/07- to 21/07/2021.

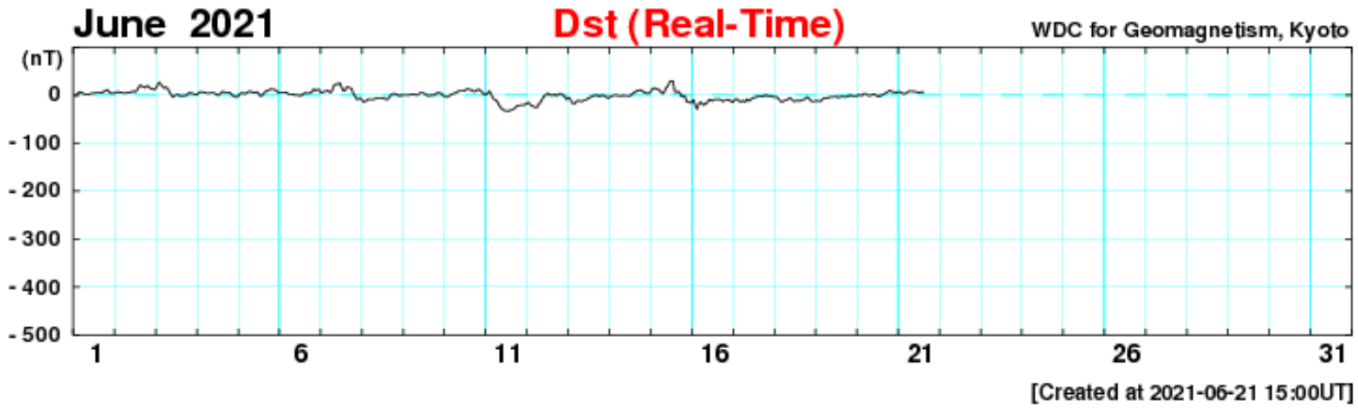


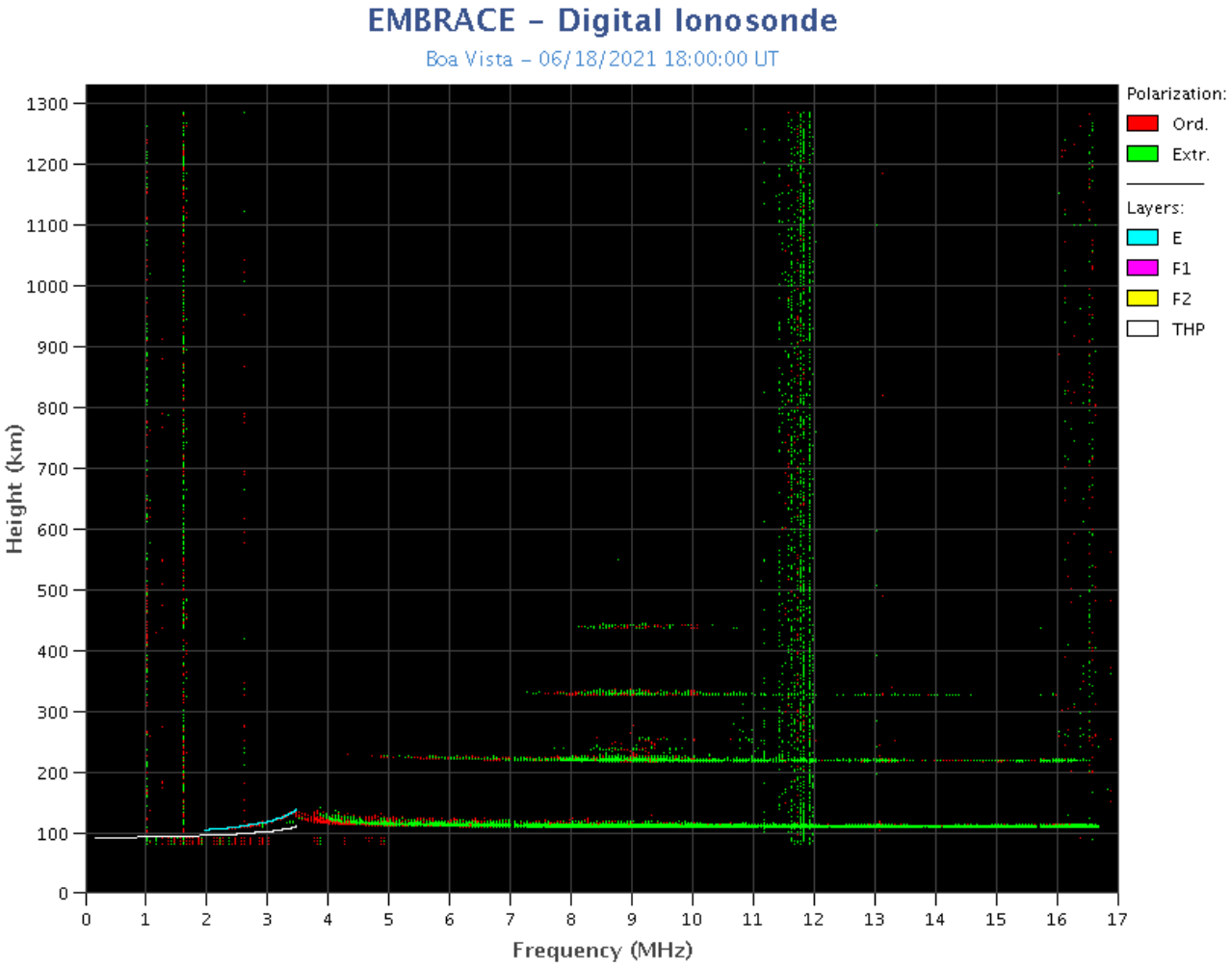
Figura 5: Dst Index for 14/07- to 21/07/2021.

Ionosphere

Responsible: Laysa Resende

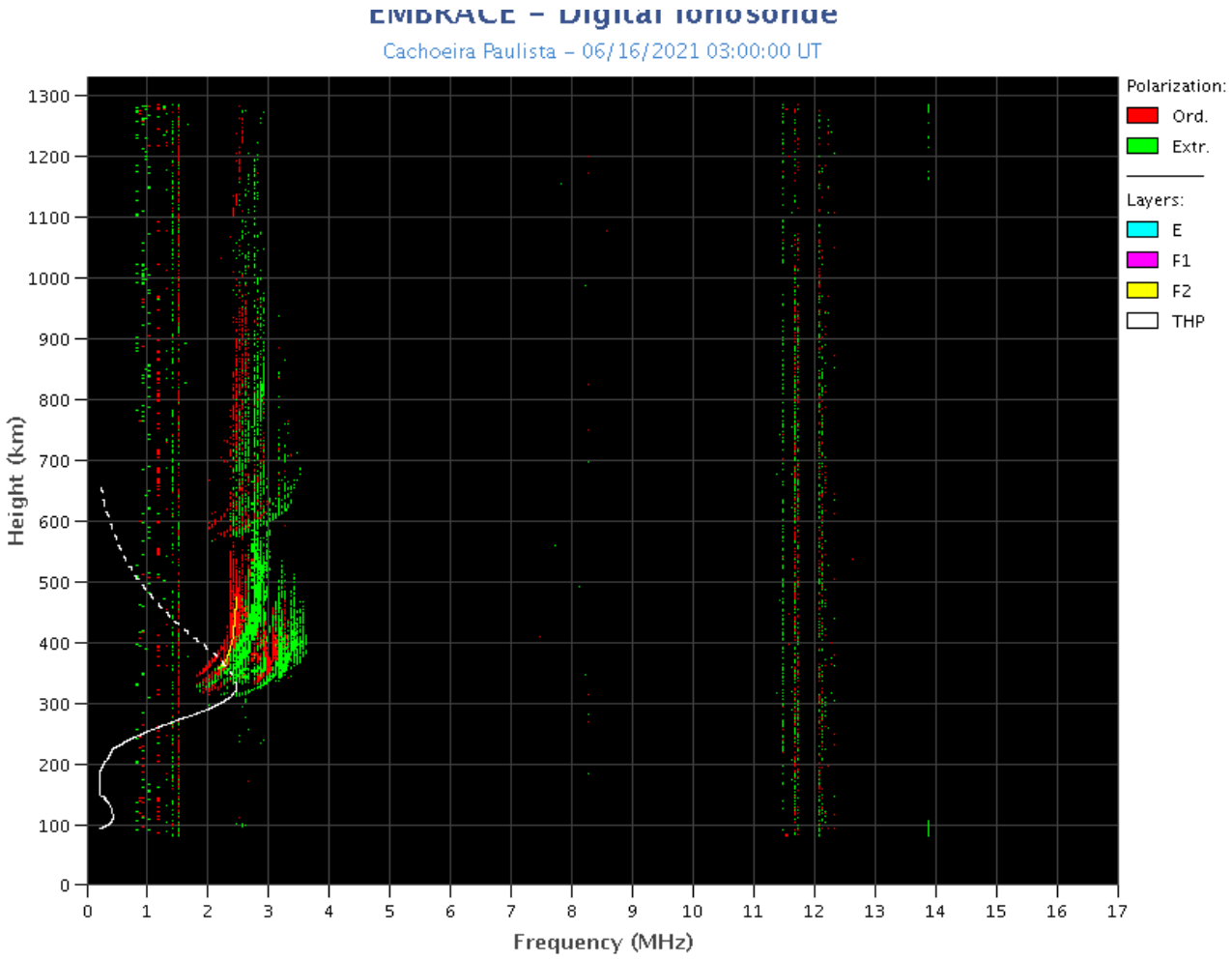
Boa Vista

- There was a weak spread-F that started after the pre-reversal peak on days 15, 19, and 20.
- There was very strong Es layer on day 18, reaching scale 5.



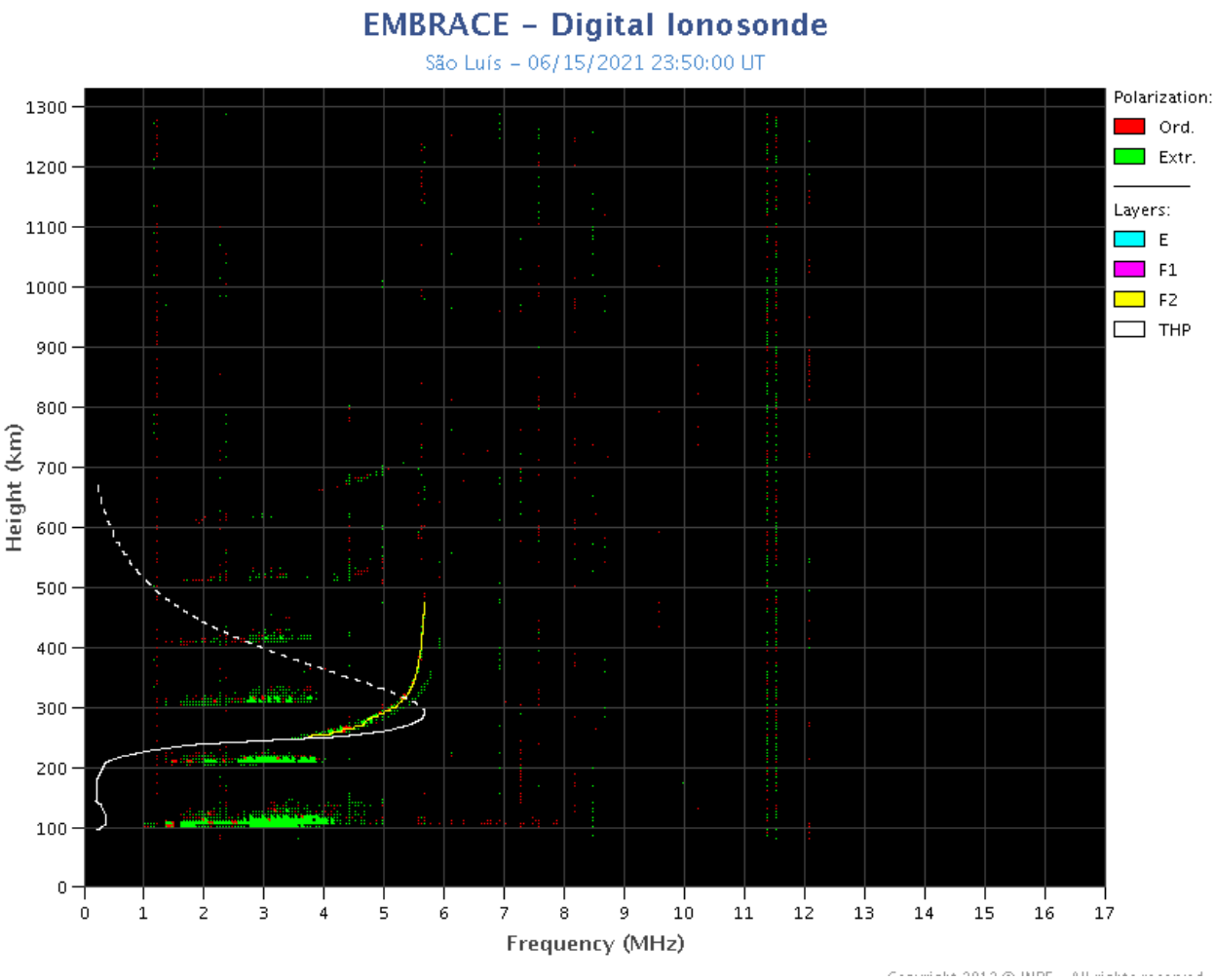
Cachoeira Paulista

- There was a weak spread-F throughout the week, except on the days 14 and 19.
- The Es layers in this region were generally weak



São Luis

- There was only Spread F on the day 16 and 17.
- The Es layers in this region reached scales 2 and 3 throughout the week.



Cintilation S4

Responsible: Siomel Savio Odriozola

No significant activity during the period.