

Briefing Space Weather - 2021/06/28



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Sun

Responsible: José Roberto Cecatto / Douglas Silva

OBS: One can have component toward the Earth on each of the days June 17, 18, and also 20.

Day 21 – No fast wind stream; no CME observed toward the Earth;

Day 22 – No fast wind stream; 1 CME can have component toward the Earth;

Day 23 – No fast wind stream; 3 CME can have component toward the Earth;

Day 24 – No fast wind stream; 1 CME can have component toward the Earth;

Day 25 – No fast wind stream; 2 CME can have component toward the Earth;

Day 26 – No fast wind stream; 3 CME can have component toward the Earth;

Day 27 – No fast wind stream; 5 CME can have component toward the Earth;

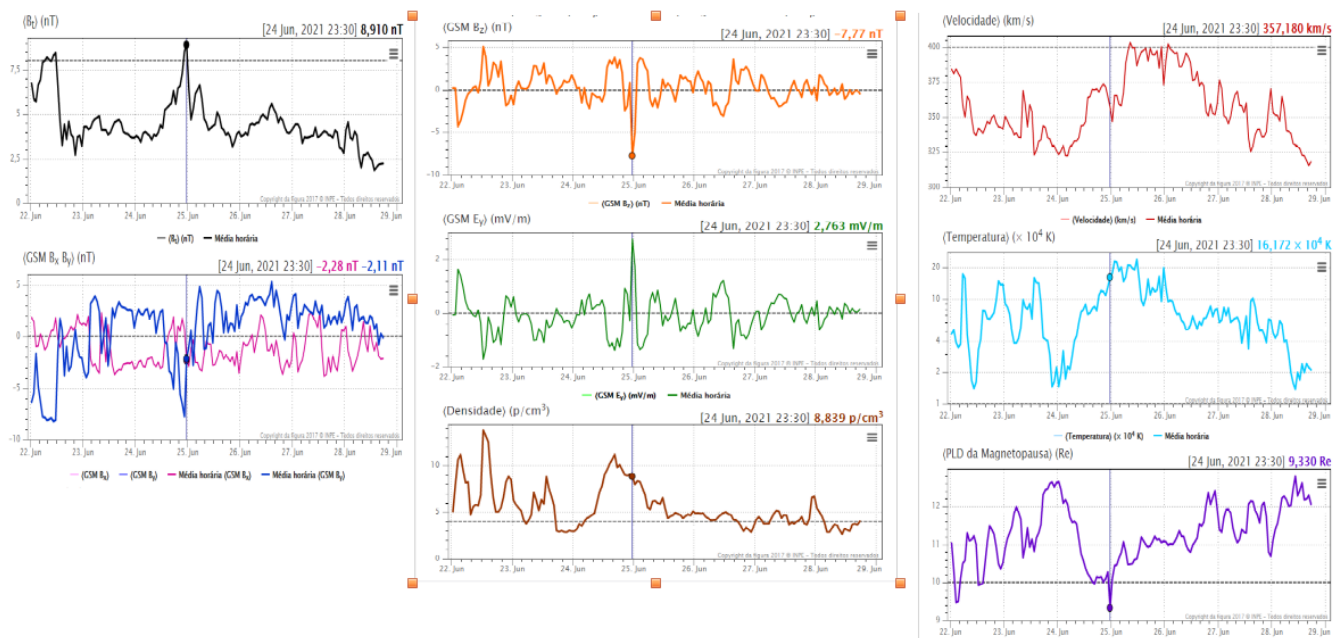
Day 28 – No fast wind stream; no CME observed toward the Earth;

Prev.: Fast wind expected on June 29-30; low (5% 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 23 at 07:24:00 UT for halo type II.
- WSA-ENLIL (Prediction for CMEs 2021-06-23T14:45:00 and 2021-06-25T20:57:00)
 - According to the simulations both CMES not collide with the Earth.
- Coronal holes:
- An extension of the north polar coronal hole was observed by both the SPOCA (34147) and the CHIMERA (CH2) between the 21st and 24th of June.

Interplanetary Medium

Responsible: Paulo Jauer



- The interplanetary region in the last week showed a moderate/low level of plasma disturbance due to the passage of solar wind structures such as: HSS and CME identified by the DISCOVERY satellite in the interplanetary medium together with sector boundary crossing.
- The total Bt magnetic field oscillated its magnitude remaining above 5 nT in the intervals of June 22 to 24 from 11:30 am to 11:30 pm UT. For the remainder of the period it remained oscillating around calm values.
- The IMF Bz component showed low amplitude fluctuations around zero during the analyzed period. Two more evident peaks were observed on June 22nd and 24th at 02:30 and 23:30 of -4.27 and -7.7 nT respectively.
- There was a change of sector in the BxBy components, on June at 13:30 and an almost change on June 25 at 01:30 UT.
- Vsw density remained below 15p/cm³ throughout the analyzed period, however, with peaks observed on days 22, 23 and 24. On June 22, 3 peaks were found in density at 00:30, 12:30 and 22:30 at ~11, 13 and 8.8 p/cm³. On the 23 at 13:30 a peak of ~ 8.8p/cm³ was observed and on the 24 of June at 16:30 ~ 11.18 p/cm³.
- The solar wind speed Vsw remained practically during the entire period below 405 km/s, with peaks observed on days 23, 24, 25 and 27 at 8:30 am, 8:30 pm, 8:30 am and at 12:30 am ~ 369, 373, 403 and 376 km/s respectively.
- Subsolar Mp fluctuated below 10Re on the 22 and 24 of June at 03:30 and 23:30 UT around 9.49 and 9.33 Re respectively.

Radiation Belts

Responsible: Ligia Alves da Silva

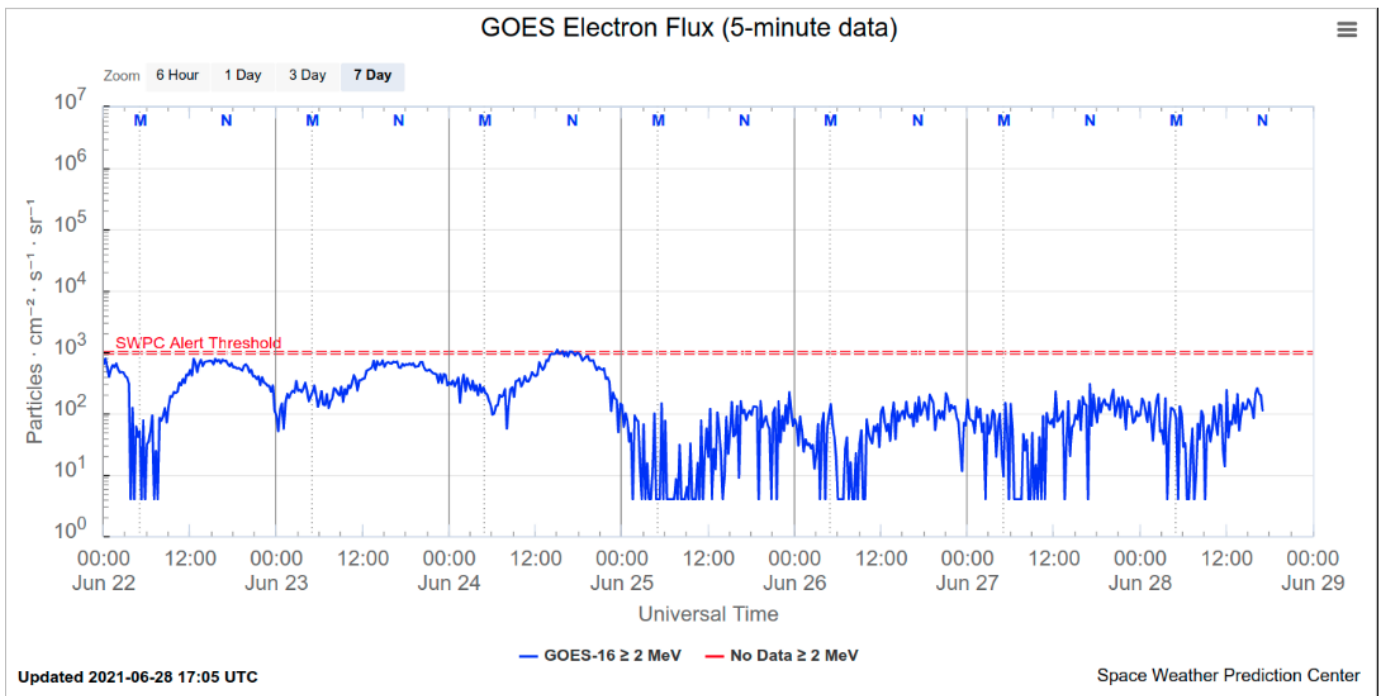


Figure 1: High-energy electron flux (> 2MeV) obtained from GOES satellite. Source: <https://www.swpc.noaa.gov/products/goes-electron-flux>

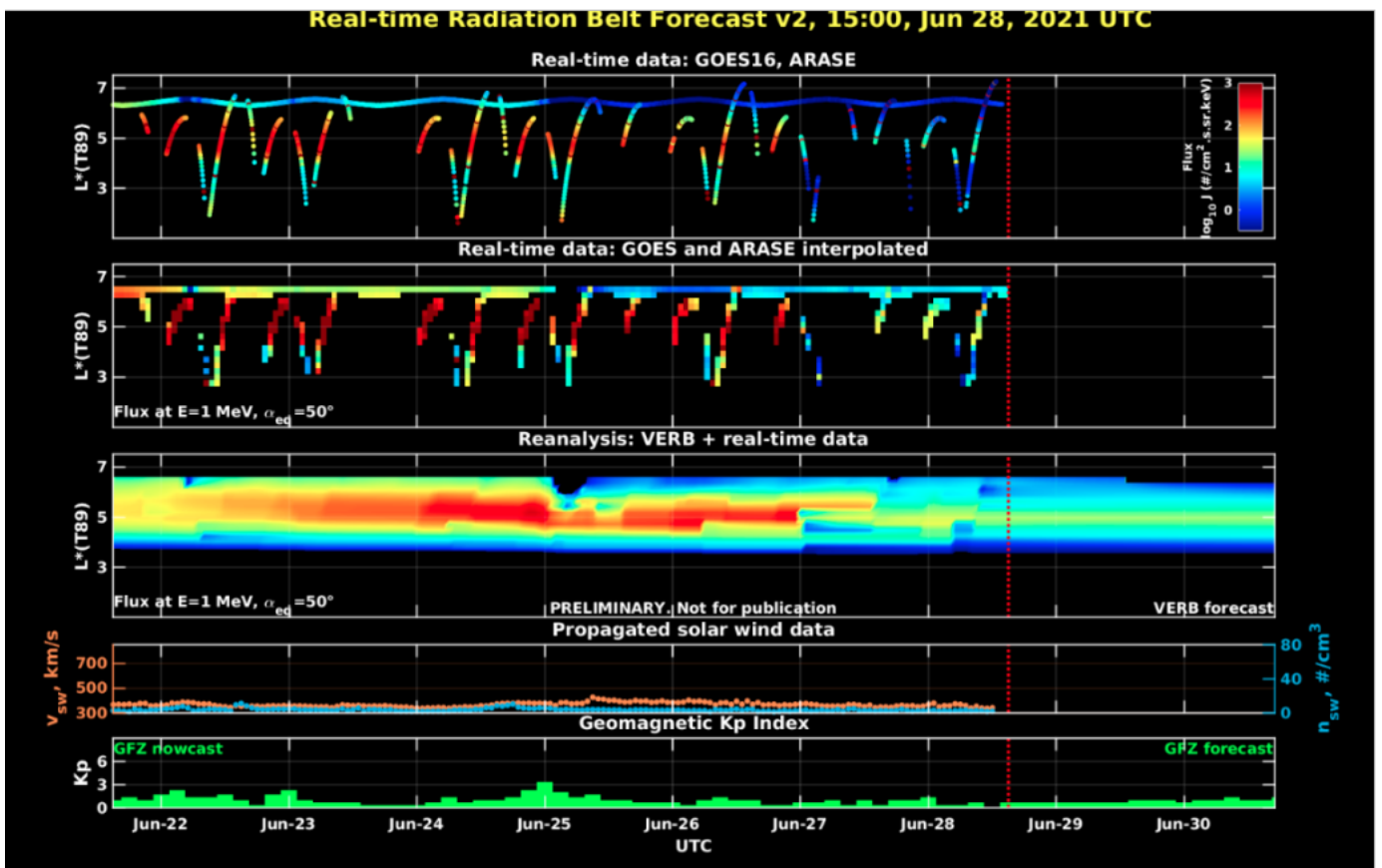


Figure 2: high-energy electron flux data (real-time and interpolated) obtained from ARASE, GOES 16, POES satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: Fonte: <https://rbm.epss.ucla.edu/realtime-forecast/>

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 103 particles/(cm² s sr) at the beginning of June 22nd followed by an electron flux decrease. Also, on June 22nd, there is an electron

flux increase that persisted until the end of June 24th. Again the electron flux decreases significantly at the beginning of the 25th, persisting until today.

The GOES-16 and Arase 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 at the beginning of June 22nd is detected only in the outer radiation belt's outer boundary, while the electron flux decrease observed on June 25th reached at L-shell ≥ 4.5 . The concomitance between the electron flux decrease on June 25th and the Ultra Low Frequency (ULF) wave activity was observed.

Geomagnetism

Responsible: Livia Ribeiro Alves / José Paulo Marchezi

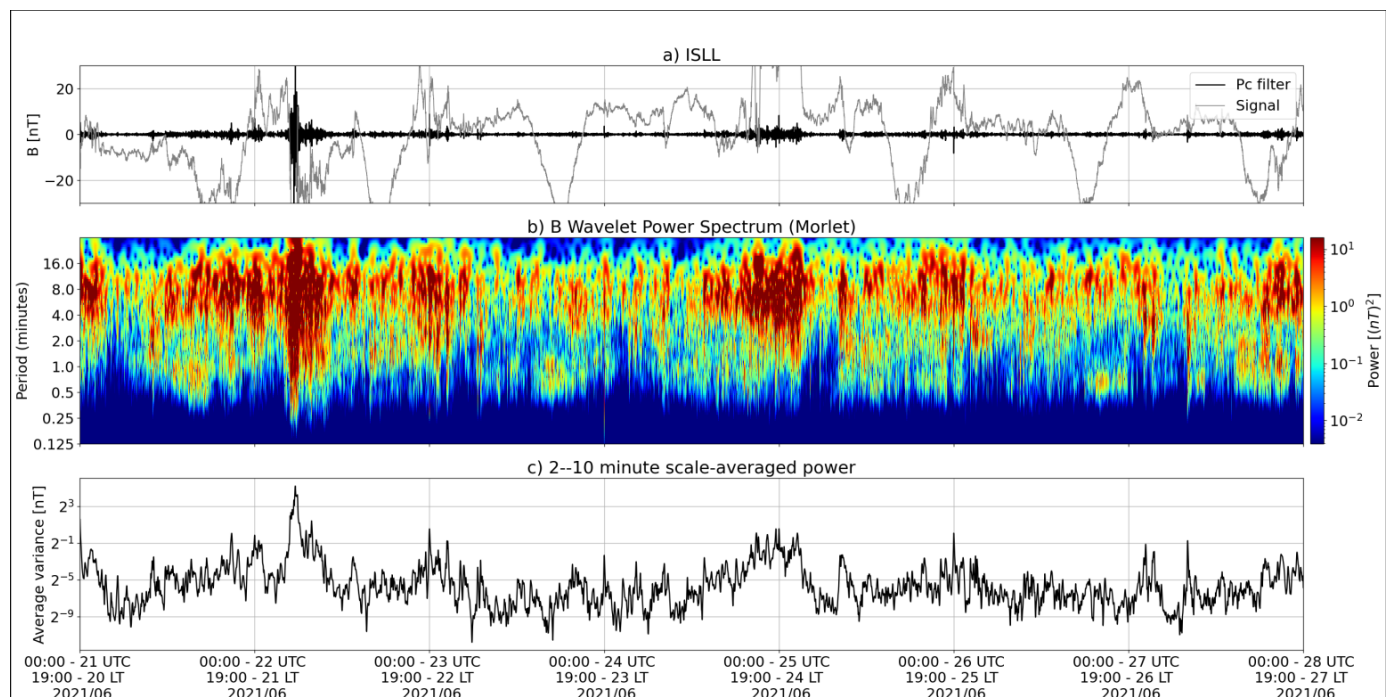


Figure 1: a) signal of the total magnetic field measured at the ISLL Station of the Carisma network in gray, together with the fluctuation in the range of Pc5 in black. b) Wavelet power spectrum of the filtered signal. c) Average spectral power in the ranges from 2 to 10 minutes (ULF waves).

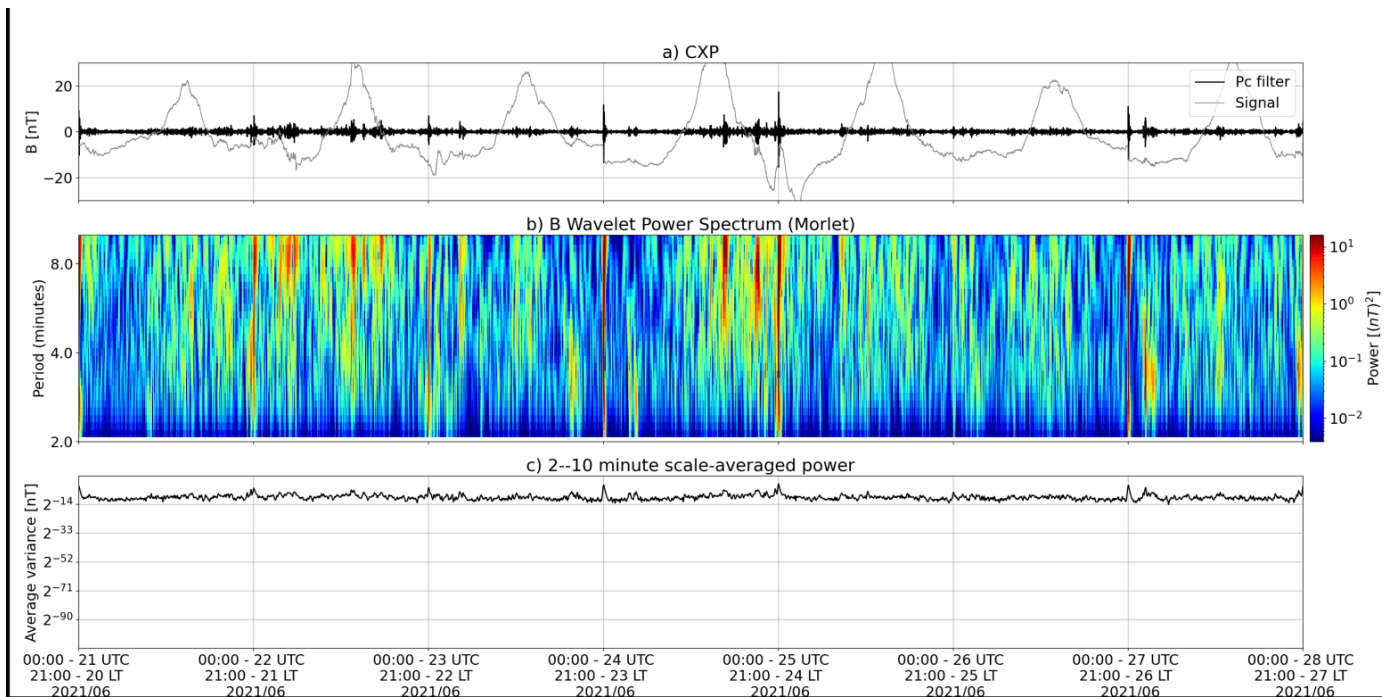


Figura 2: a) signal of the total magnetic field measured at the CXP Station of the EMBRACE network in gray, together with the fluctuation in the range of Pc5 in black. b) Wavelet power spectrum of the filtered signal. c) Average spectral power in the ranges from 2 to 10 minutes (ULF waves).

- Beginning of the 22/06 there is an increase in the density and speed of the solar wind.
 - Abrupt rise in ULF waves and high latitudes.
- Beginning of the 23/06 there is a ULV activity in high latitudes. It may be related to an IMF sector change.
- Day 06/25 interaction with a CME and HSS.
 - Waves increase gradually at high latitudes. Low latitudes show an abrupt increase concomitant with the increase in the density of the solar wind.
- ULF activity remains high for the remainder of the period.

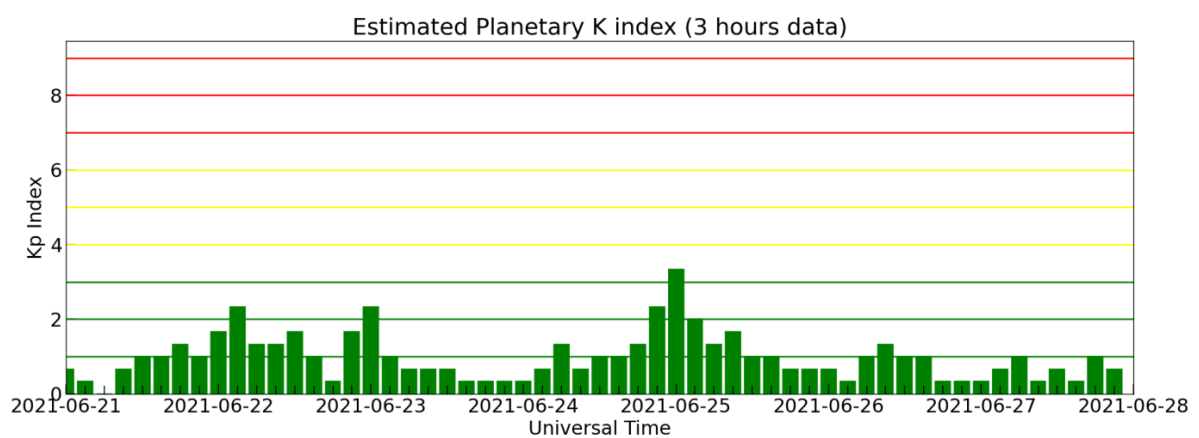


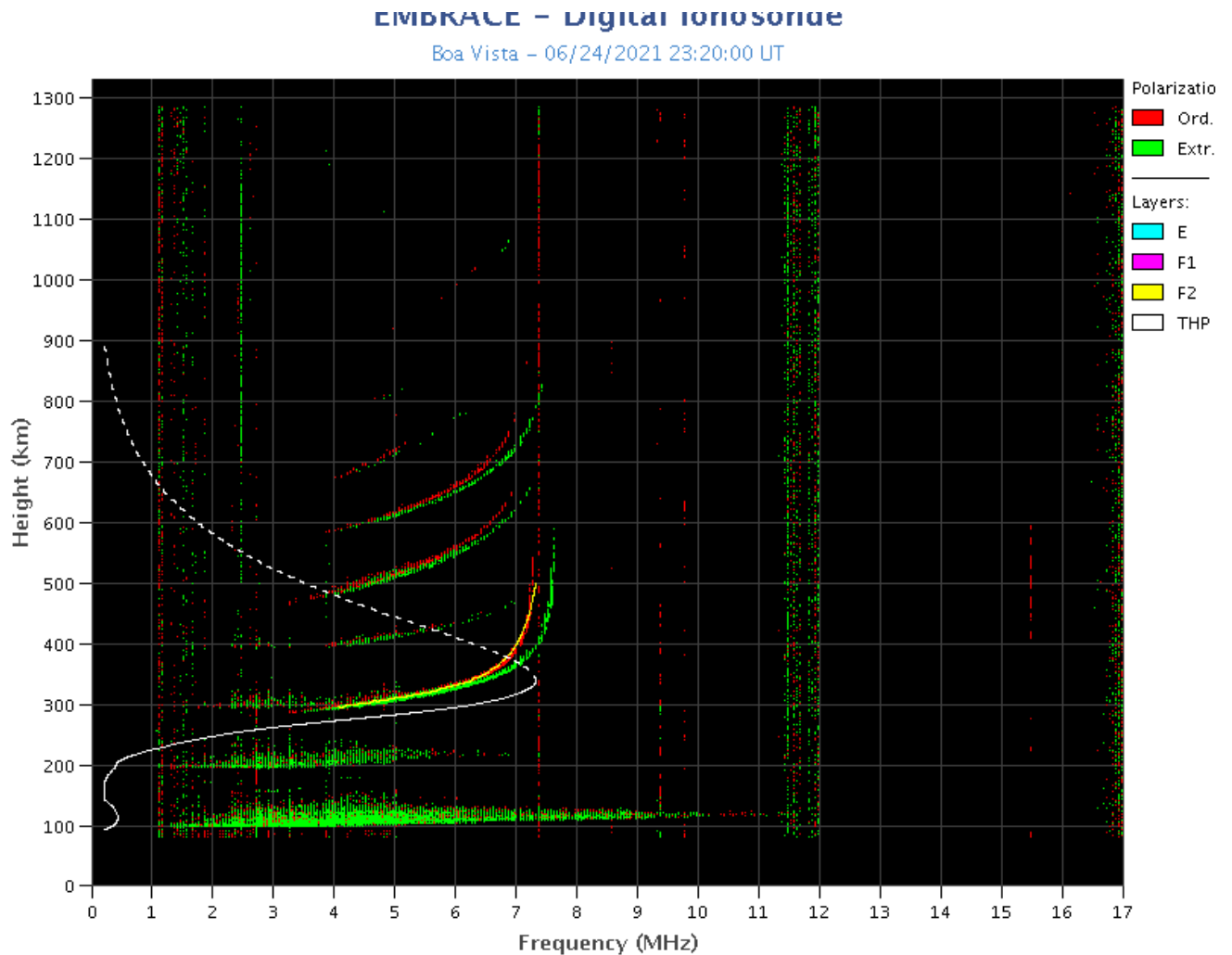
Figura 3: Geomagnetic Kp index

Ionosphere

Responsible: Laysa Resende

Boa Vista

- There was a weak spread-F that started after the pre-reversal enhancement on days 21, 22, 24, and 25.
- There was very strong Es layer on day 24, reaching scale 5.

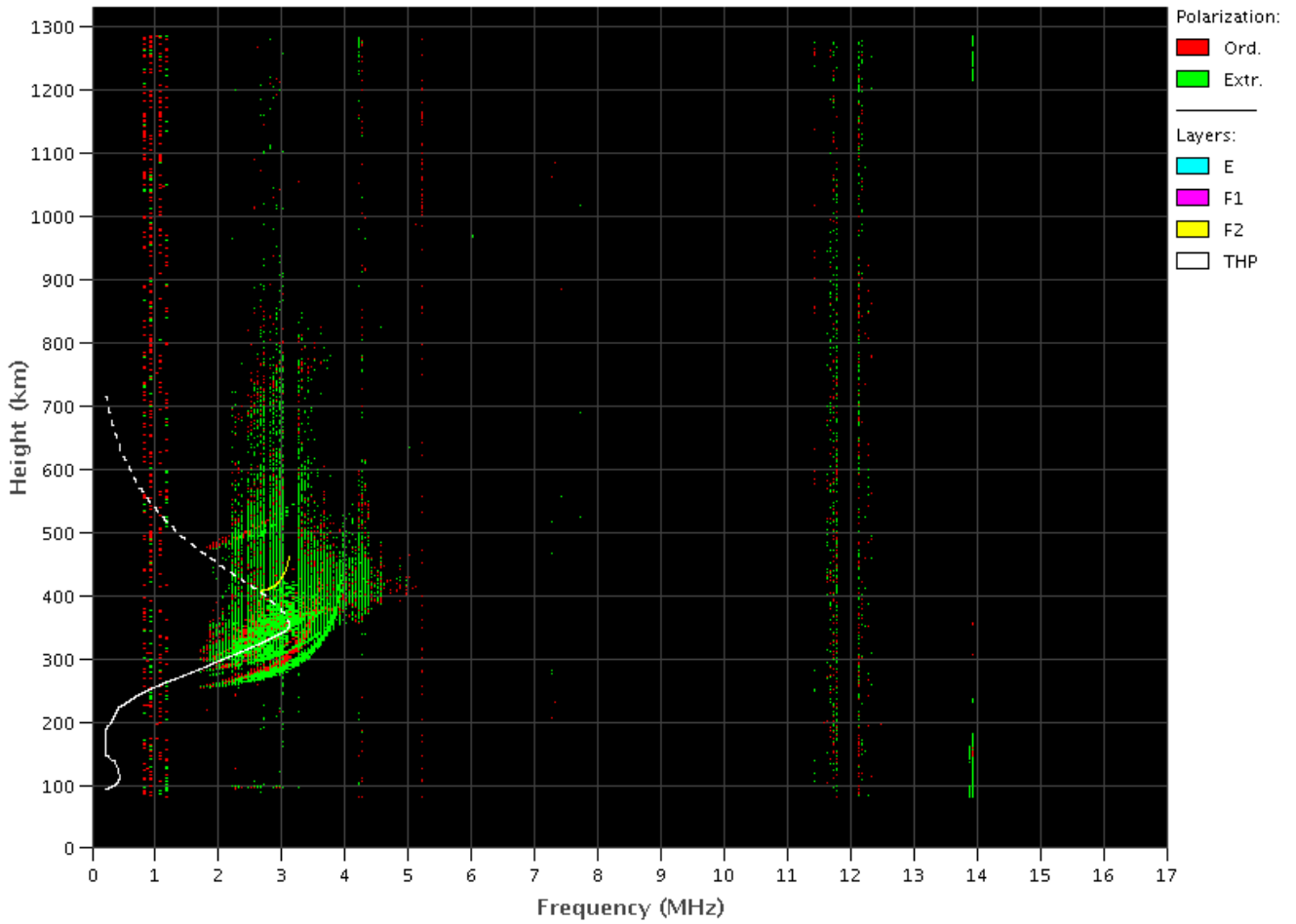


Cachoeira Paulista

- There was a weak spread-F that started after the pre-reversal enhancement on days 21, 24, 25, and 25.
- The Es layers in this region were generally weak.

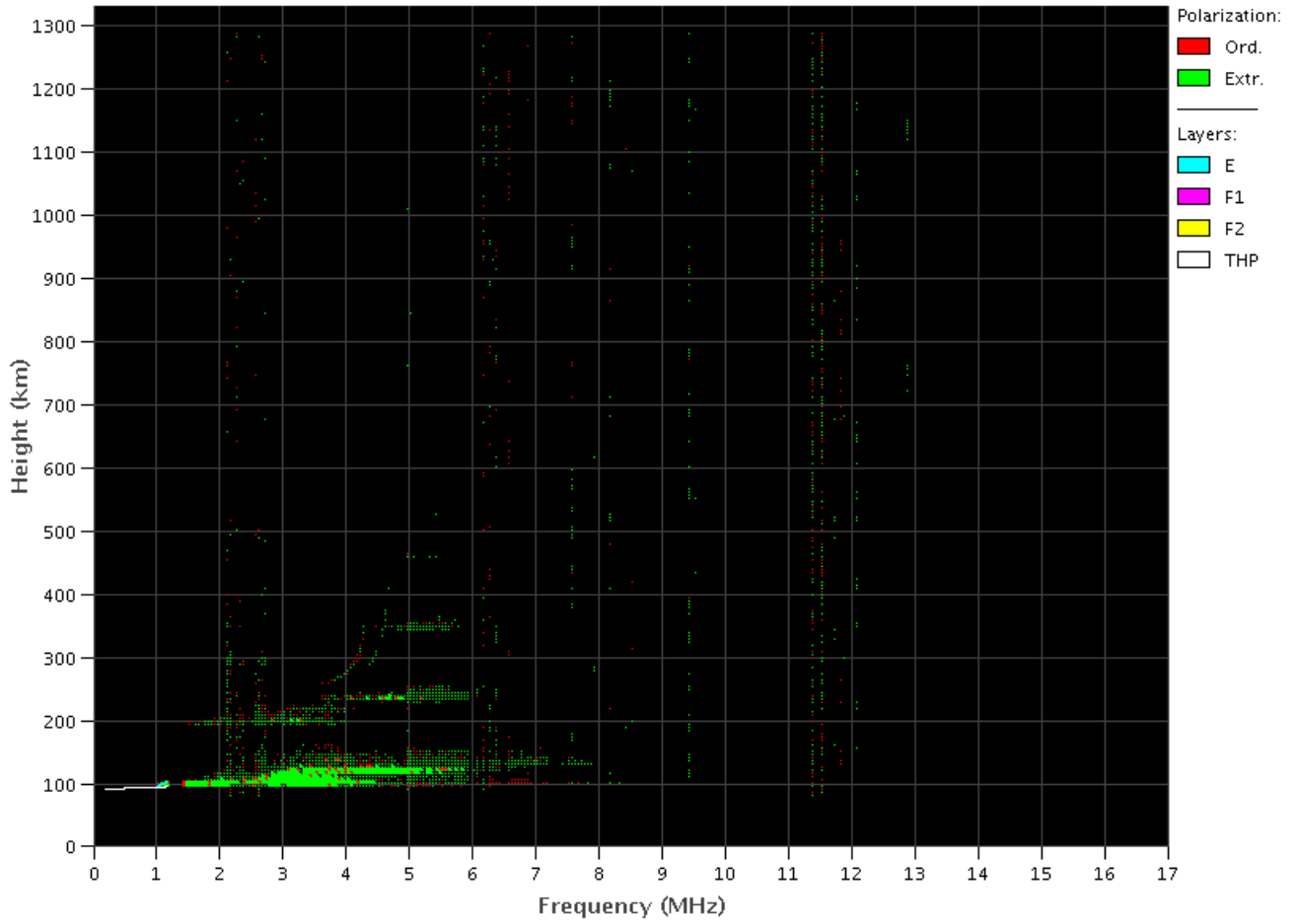
EMBKAEE - Digital Ionosonde

Cachoeira Paulista - 06/25/2021 04:50:00 UT



São Luis

- There was only Spread F on the day 27.
- There was Es layer on day 21, reaching scale 4. The other days reached scales 2 and 3 throughout the week.



Cintillation S4

Responsible: Siomel Savio Odriozola

No significant activity during the period.