Briefing Space Weather - 2021/08/16

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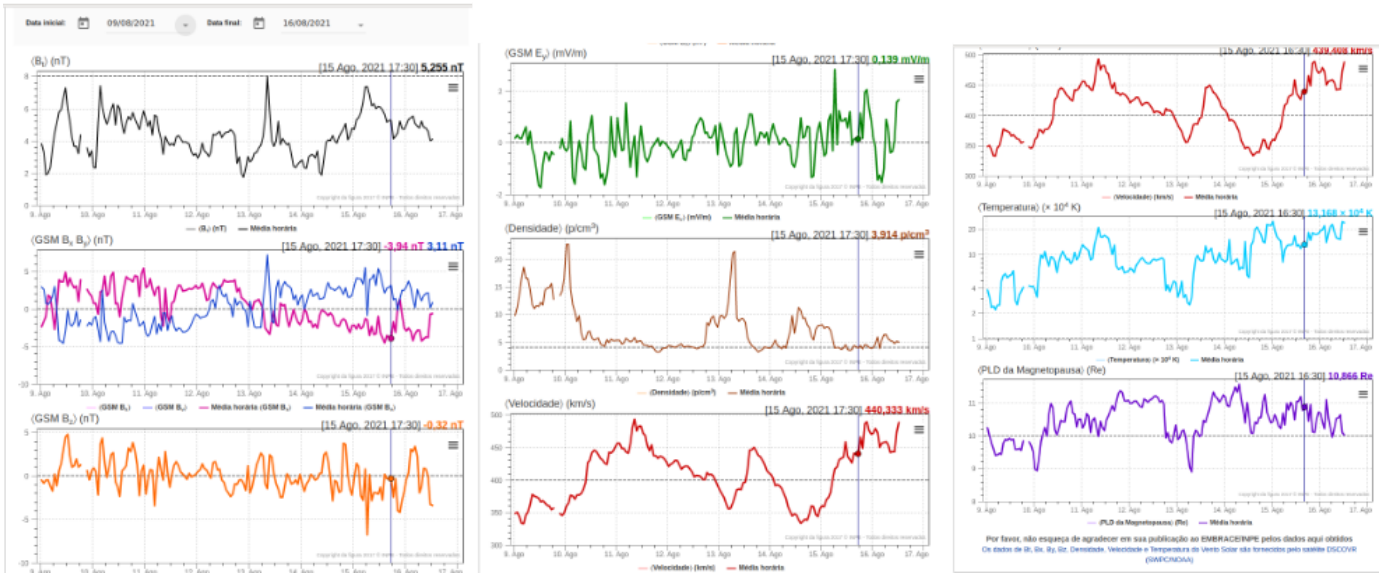
Sun

Responsible: José Roberto Cecatto

OBS: Two surges have been observed on the end of August 08, and half of August 09.
08/09 – No fast wind stream; 1 CME can have component toward the Earth;
08/10 – Fast (=< 450 km/s) wind stream; No CME toward the Earth;
08/11 – Fast (=< 500 km/s) wind stream; No CME toward the Earth;
08/12 – Fast (< 450 km/s) wind stream; 4 CME can have component toward the Earth;
08/13 – Fast (< 500 km/s) wind stream; No CME toward the Earth;
08/14 – No fast wind stream; 3 CME can have component toward the Earth;
08/15 – Fast (=< 500 km/s) wind stream; 5 CME can have component toward the Earth;
08/16 – Fast (=< 500 km/s) wind stream; No CME toward the Earth;
Prev.: Fast wind stream expected for August 17; for while low (1% M, 1% X) probability of M / X flares next 2 days; also, occasionally some other CME can present a component toward the Earth.

Interplanetary Medium

Responsible: Paulo Jauer



- The interplanetary region in the last week showed a moderate/low level of plasma perturbations due to the passage of the CME and HSS structures identified by the DISCOVERY satellite in the

interplanetary region along with sector boundary crossing.

- The total Bt magnetic field oscillated its magnitude with maximum peak recorded on August 13 at 08:30 UT ~ 7,964 nT.
- The component of the IMF Bz fluctuated around zero with the minimum peak recorded on August 15 at -6.80 nT.
- The occurrence of the change of sector in the BxBy components took place on August 13 at 06:30. In the rest of the interval there is no clear change of sector in the BxBy components.
- The Vsw density showed peaks on days 9, 10, 13 and 14 at 4:30 am, 1:30 am, 7:30 am, 2:30 pm of 18, 22, 21, and 10 p/cm³ respectively.
- The solar wind speed Vsw peaked on August 11, 13, and 15 at 8:30 am, 4:30 pm and 9:30 pm of 493, 450, and 489 km/s respectively.
- The subsolar Mp presented two minimum values on the 10 and 13 of August at 01:30 and at 07:30 of 8.9 and 8.8 respectively. Subsolar Mp fluctuated mostly within the range 10 [+1.5,-1.5] Re

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Radiation Belts

Responsible: Ligia Alves da Silva

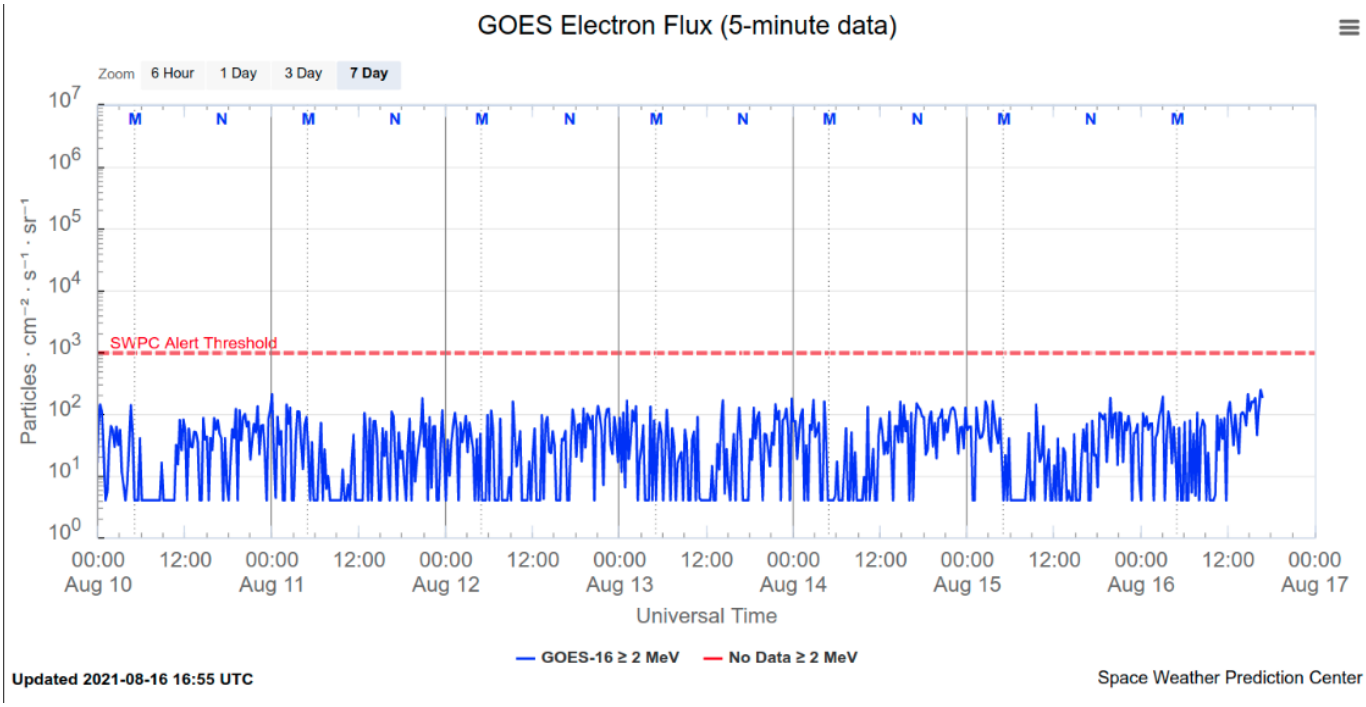


Figure 1: High-energy electron flux (> 2MeV) obtained from GOES satellite. Source: https://www.swpc.noaa.gov/products/goes-electron-flux

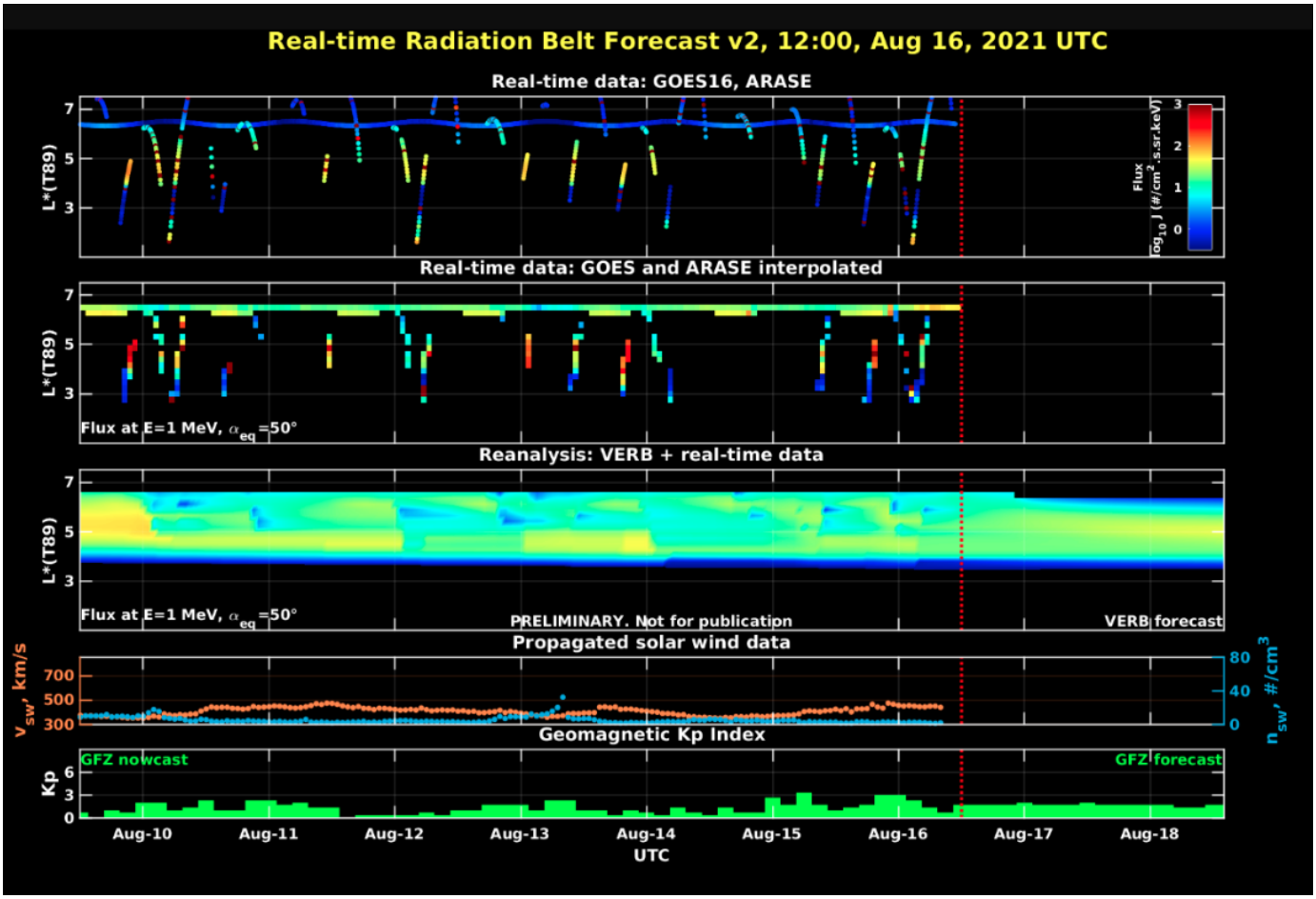


Figure 2: high-energy electron flux data (real-time and interpolated) obtained from ARASE, GOES 16, POES satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: Fonte: https://rbm.epss.ucla.edu/realtime-forecast/

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) throughout the analyzed period, showing slight electron flux at 12:00 UT on August 14th and August 16th, which must be associated with the arrival of a high-speed stream.

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 slight electron flux increases occur concomitantly with strong Ultra Low Frequency (ULF) wave activity.

ULF waves in the magnetosphere

Responsible: José Paulo Marchezi

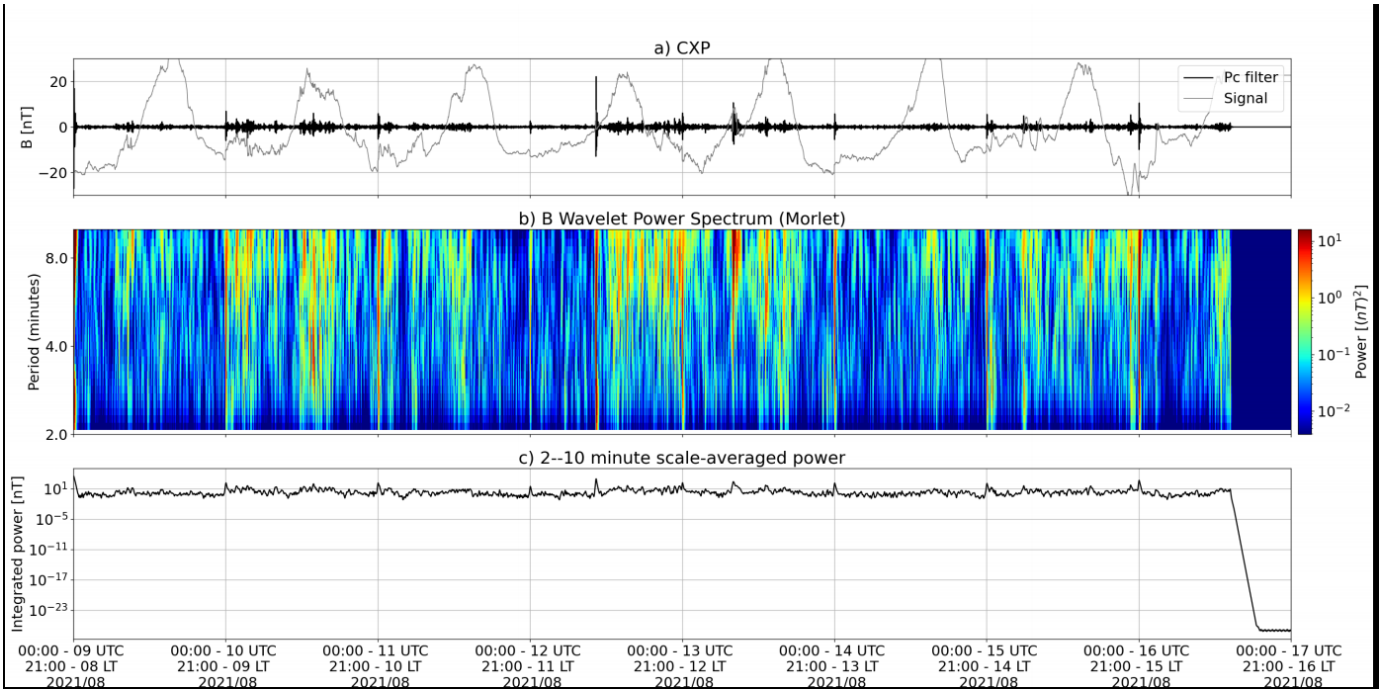


Figure 2: a) signal of the total magnetic field measured at the CXP Station of the EMBRACE network in gray, together with the fluctuation in the range of Pc5 in black. b) Wavelet power spectrum of the filtered signal. c) Average spectral power in the ranges from 2 to 10 minutes (ULF waves).

- Activity was high on the 9th, 10th, 11th and 13th of August
  - On 09/08 there is an impulsive disturbance, followed by a period without waves. Possible change of sector and a period with positive Bz.
  - Same happens on 10/08, possibly associated with an increase in the dynamic pressure of the solar wind
  - Day 8/11 responds to increased solar wind speed and negative fluctuations of IMF Bz
- Day 13/08 presents impulsive fluctuations, followed by more periodic fluctuations.
  - Possibly associated with High Speed Stream.
  - Possibly pronounced auroral activity in the period after 8/13.

Geomagnetism

Responsible: Livia Ribeiro Alves

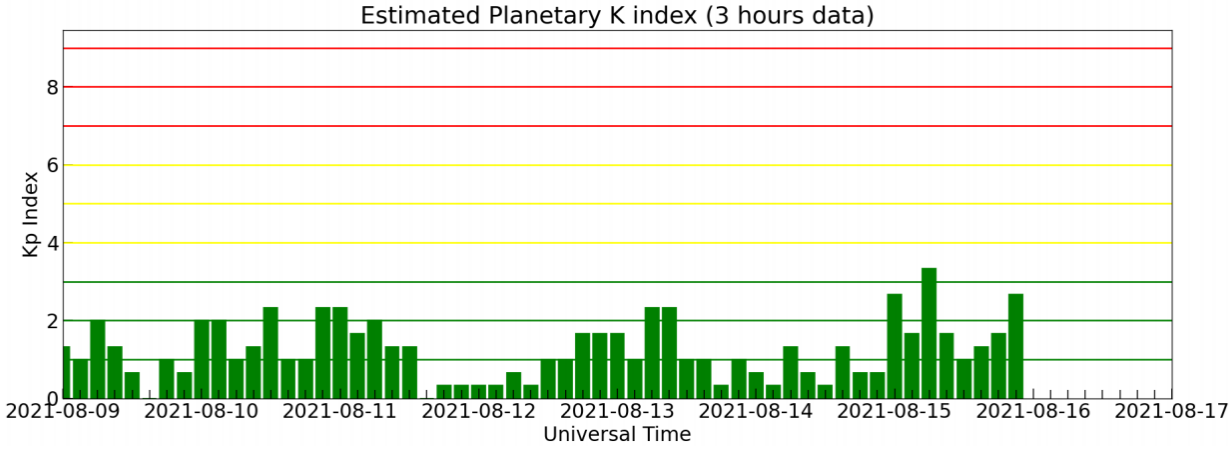


Figure 4:Geomagnetic Kp index

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

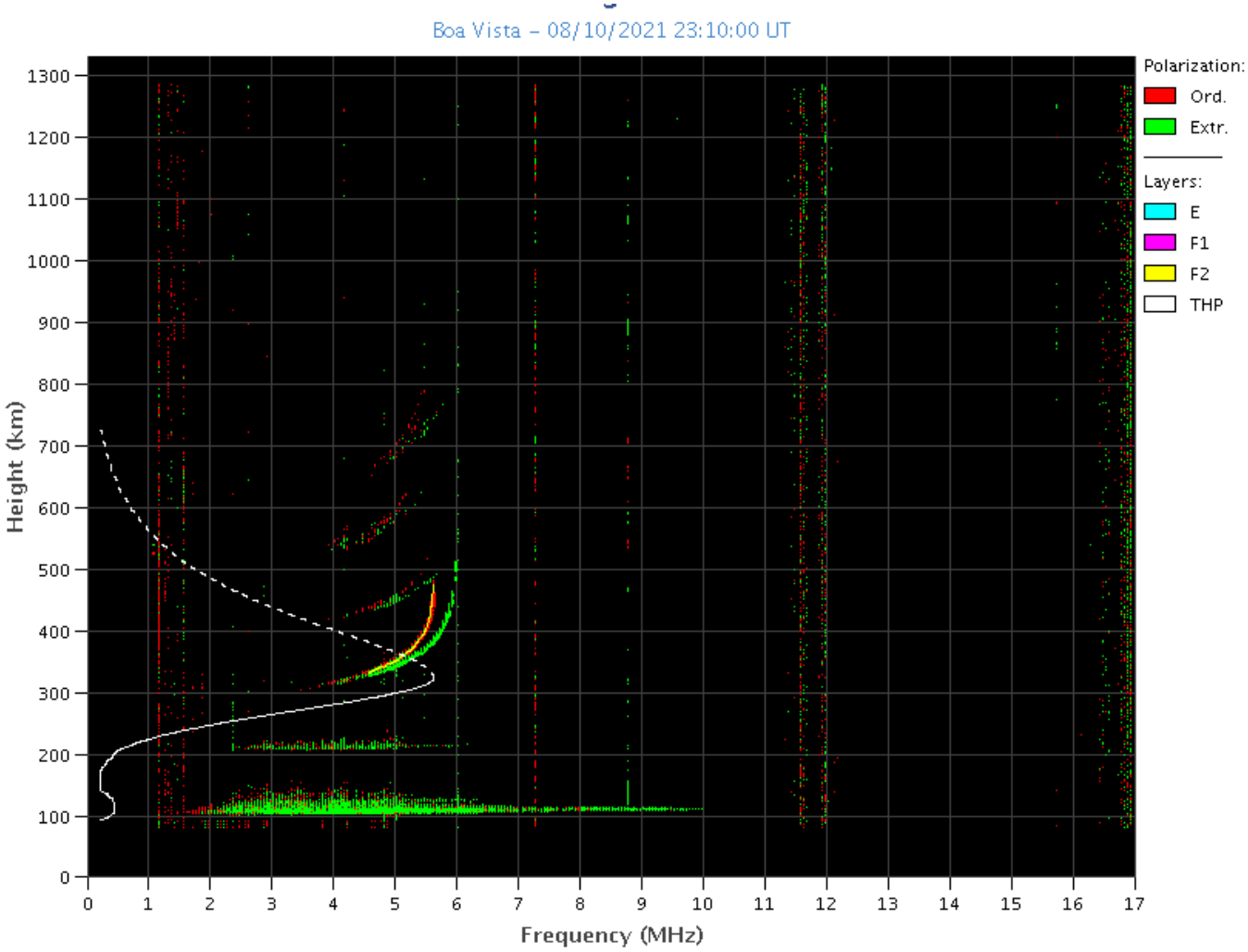
- The MagNet showed instabilities throughout the period, with some highlighted events:
  - 13/08 component increase above 20 nT @ 18:00 UT
  - 14/08 component increase above 20 nT @ 18:00 UT
  - 08/16 drop of component H at the beginning of the day
  - 03/16 @ 03:00 UT signature with the possibility of being an SI
- Embrace network also recorded several short-period perturbations superimposed on diurnal variation
- 12/08 - The PVE station registered characteristic activity of local ionospheric current @ 15 UT, shifting from the behavior of the other stations.
- Geomagnetic activity was reportedly unstable during the week, with the Dst index reaching its lowest value on 8/16. The highest Kp of the week was 3+ also recorded on 8/16
- The auroral activity remained unstable throughout the period.
- Magnetic field measured in the GOES satellite orbit showed a decrease in the H component on the night side on August 13 and August 16, characteristic of magnetotail current activity signature.

Ionosphere

Responsible: Laysa Resende

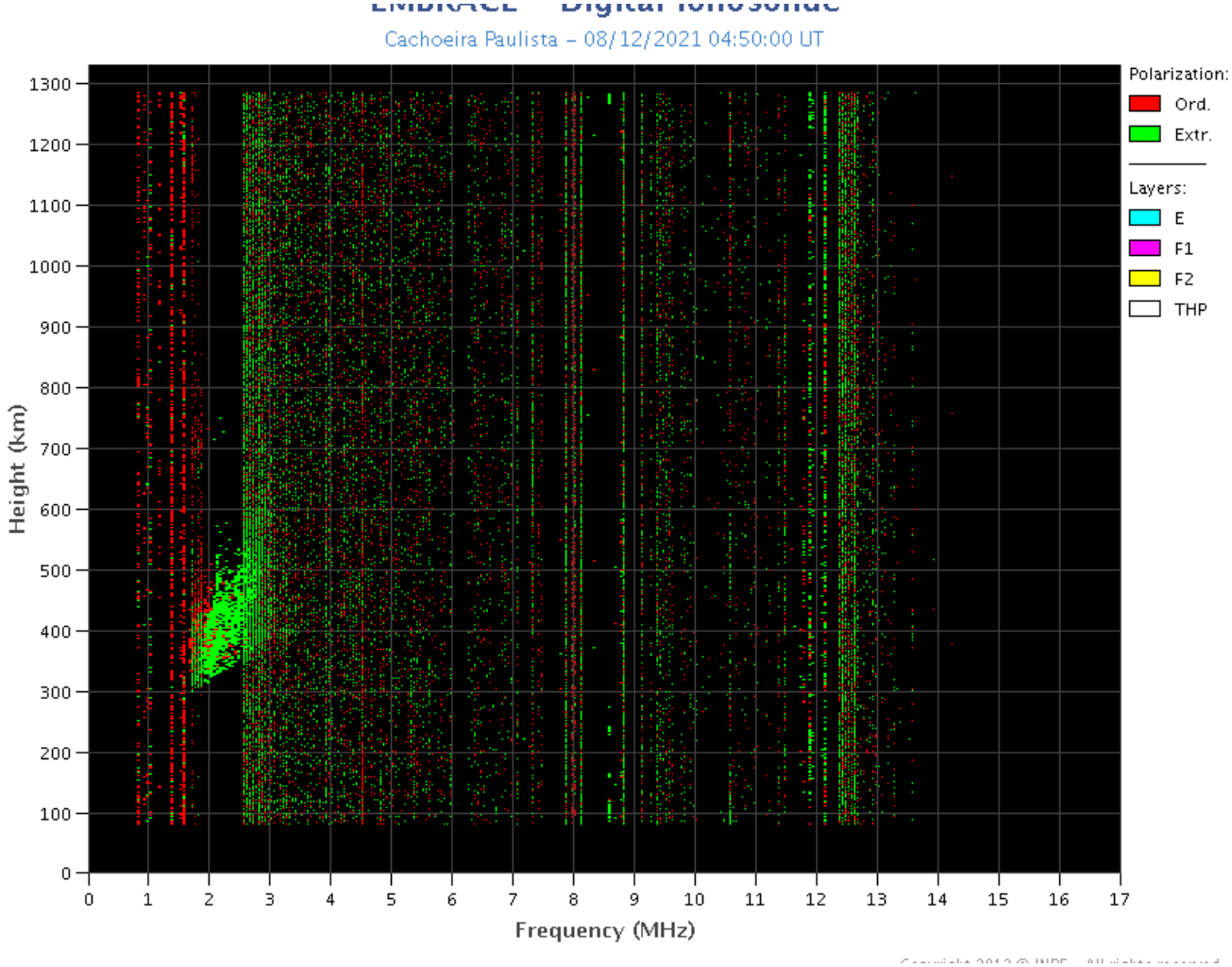
Boa Vista

- There were spread F on day August 10.
- The Es layers reached scale 4 on days August 09, and 10.



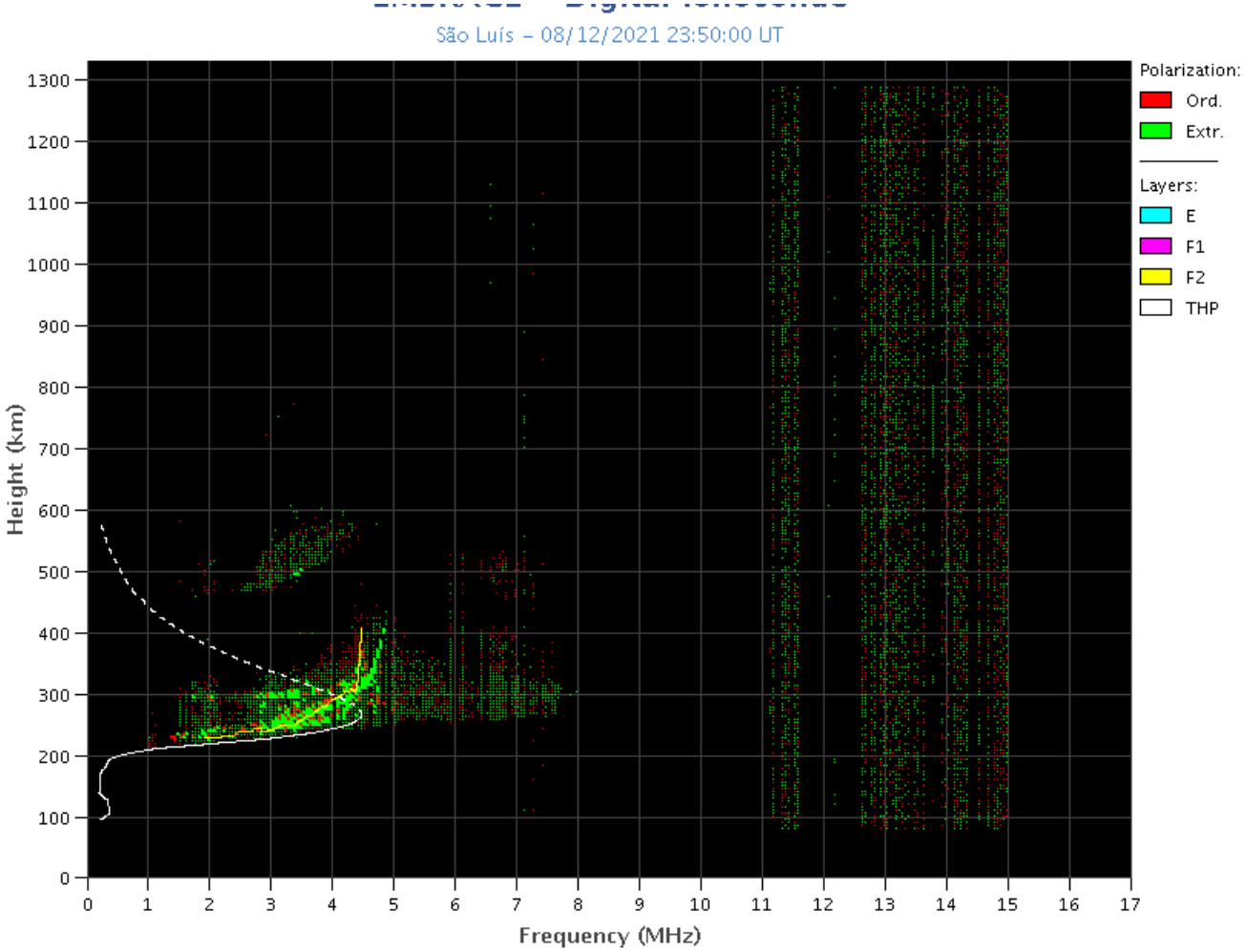
Cachoeira Paulista

- There were spread F on day August 12.
- The Es layers reached scale 2 during all day in the week.



São Luis

- There were spread F on days August 12, 13, and 14.
- The Es layers reached scale 3 on day August 14.



Cintilation S4

Responsible: Siomel Savio Odriozola

In this report on the S4 scintillation index, data from the SLMA stations in São Luís / MA, STSN in Sinop /MT, 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.

The four stations analyzed did not show appreciable values above the noise value in the period between 08/09 and 08/15. S4 values remained below the 0.3 typical of the winter seasons in the southern hemisphere where the manifestation of irregularities is low.