Briefing Space Weather - 2021/08/09

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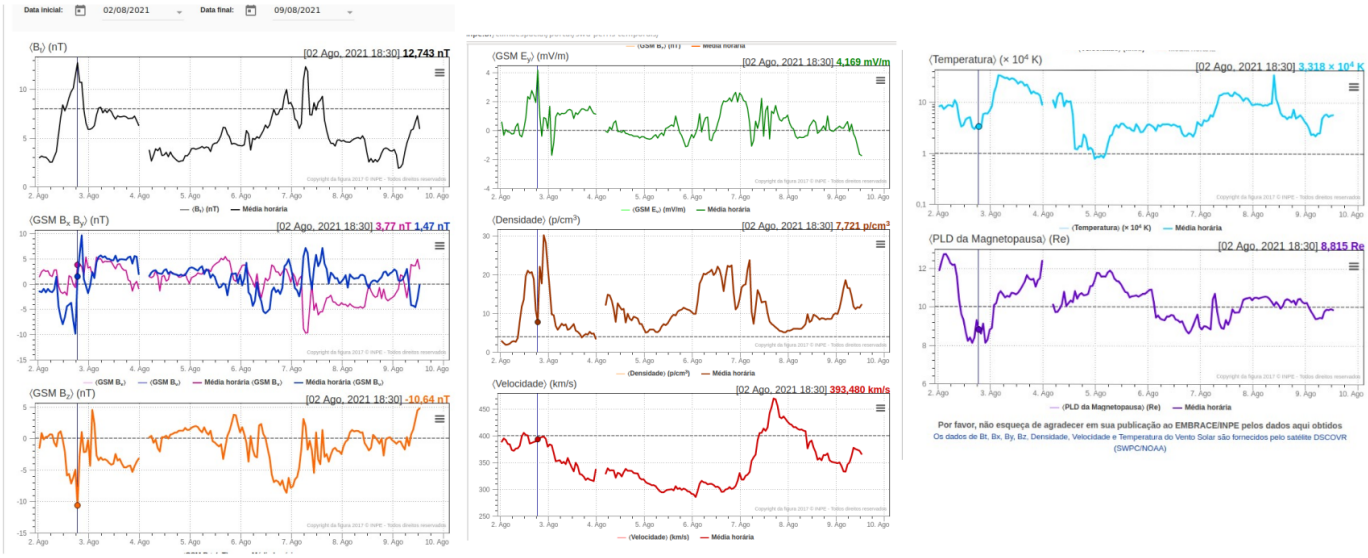
Sun

Responsible: José Roberto Cecatto

08/02 – Fast (< 500 km/s) wind stream; No CME toward the Earth;
08/03 – No fast wind stream; No CME toward the Earth;
08/04 – No fast wind stream; 2 CME can have component toward the Earth;
08/05 – No fast wind stream; No CME toward the Earth;
08/06 – No fast wind stream; No CME toward the Earth;
08/07 – Fast (< 500 km/s) wind stream; No CME toward the Earth;
08/08 – Fast (< 500 km/s) wind stream; No CME toward the Earth;
08/09 – No fast wind stream; No CME toward the Earth;
Prev.: No fast wind stream; 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 fluctuated its magnitude with maximum peak recorded on August 02 at 10:30 UT ~12.74nT and a second peak on August 07 at 06:30 UT 12.32 nT.
- The IMF Bz component oscillated with two peaks in the negative value observed on August 02 at 18:30 UT of -10.64nT and on August 06 at 21:30 UT -8.6 nT. Most of the time the Bz oscillated negatively.
- The occurrence of the change of sector in the BxBy components took place on August 07 and 09 at 06:30. In the rest of the interval there is no clear change of sector in the BxBy components. There are also 2 peaks in the by component on August 02 at 5:30 pm and at 8:30 pm of -9.85nT and 9.6 nT respectively.
- The density of the Vsw remained oscillating whose maximum peak recorded was around 30 p/cm^3 on the 02/Aug at 21:30 UT. Density remained above 10 p/cm^3 between the 6th and 7th of August from 00:30 UT to 13:30 UT, respectively.
- The solar wind speed Vsw remained below 400km/s between August 2nd and August 7th with maximum peak on August 7th at 17:30 at 468.3 km/s.
- Subsolar Mp had a maximum expansion of ~12.7 Re on August 2nd at 03:30 UT and a minimum compression of 8.11 Re on August 02 at 15:30 and 21:30 UT. A compression was also found on August 6th at 18:30 of ~ 8.63 Re.

Radiation Belts

Responsible: Ligia Alves da Silva

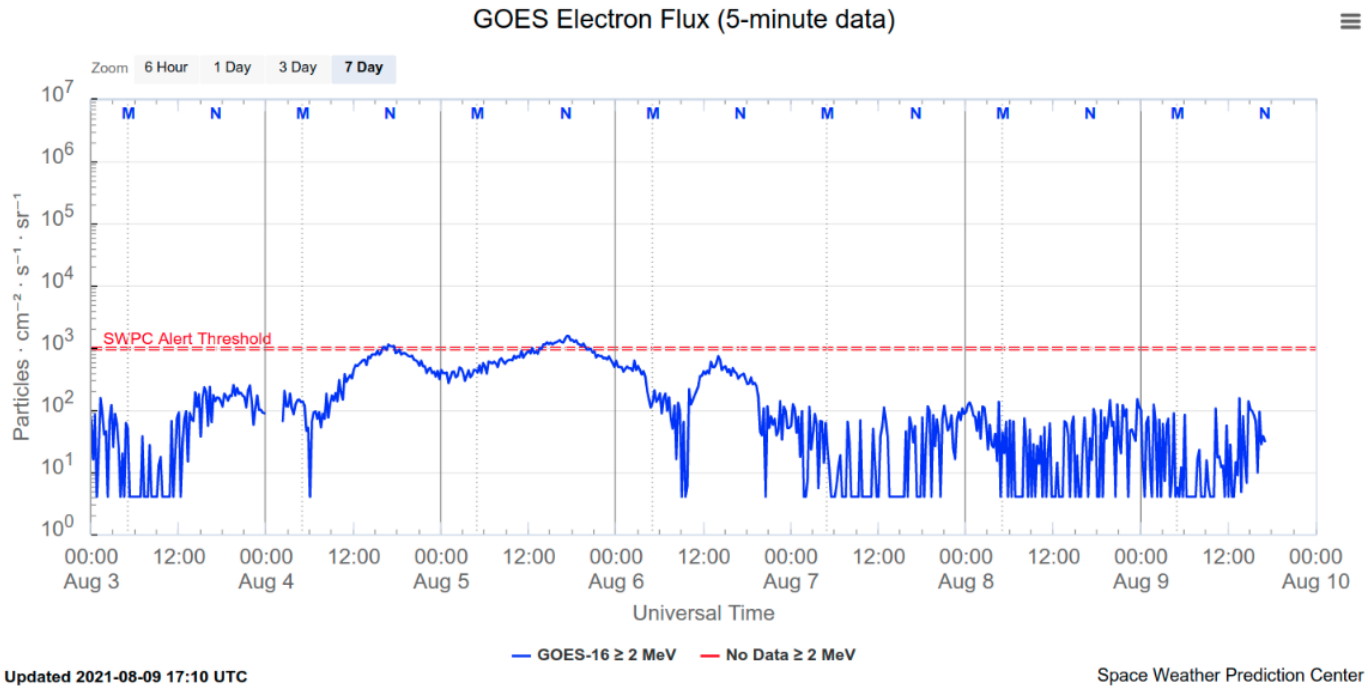


Figure 1: High-energy electron flux (> 2MeV) obtained from GOES satellite. Source: https://www.swpc.noaa.gov/products/goes-electron-flux

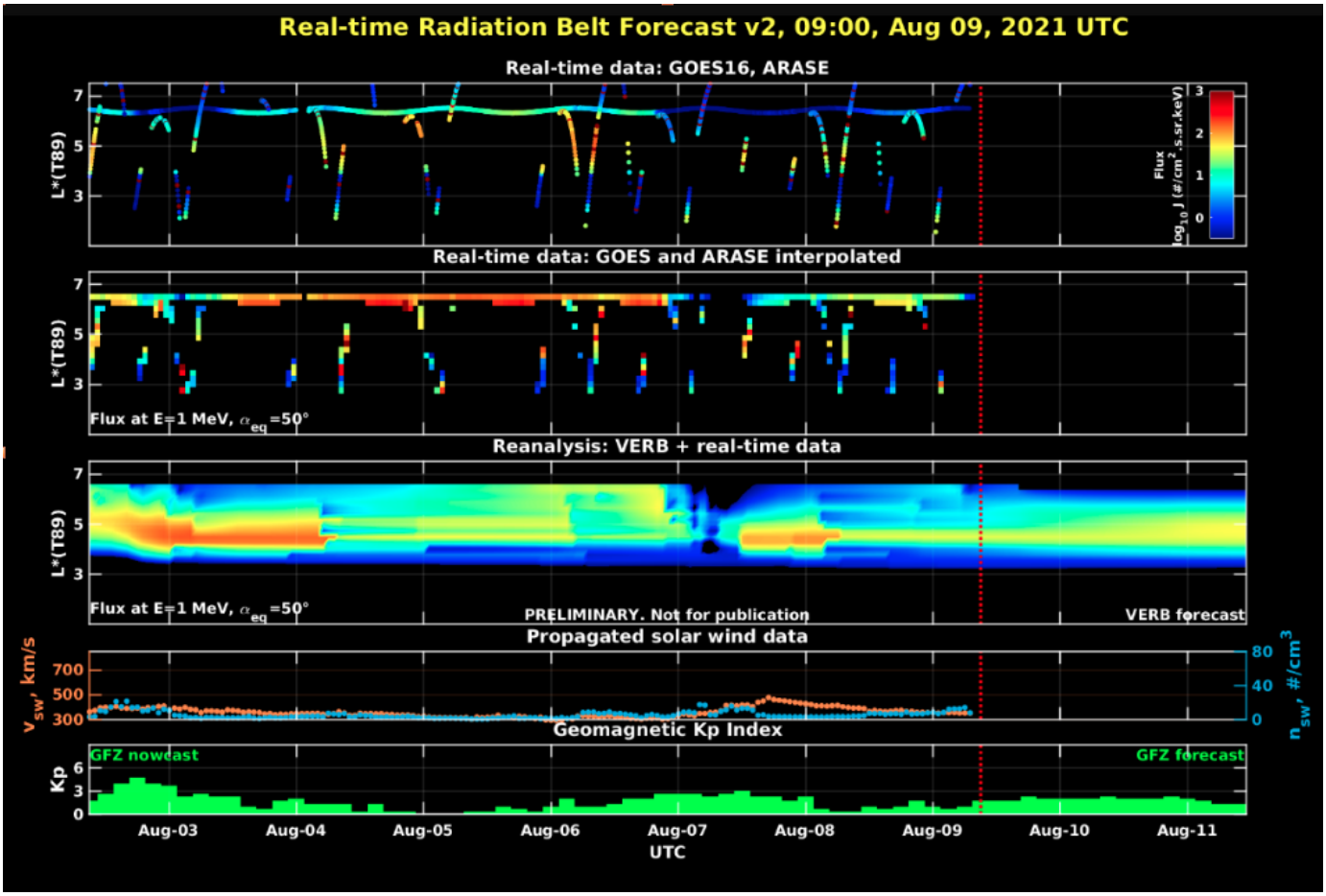


Figure 2: high-energy electron flux data (real-time and interpolated) obtained from ARASE, GOES 16, POES satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: Fonte: https://rbm.epss.ucla.edu/realtime-forecast/

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) at the beginning of August 2nd. A electron flux decrease is observed from 06:00 UT on the same day, followed by an electron flux increase at 12:00 UT reaching 103 particles/(cm2 s sr), which persists in this level until August 6th.

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. At the end of August 6th, there is an electron flux decrease that reaches L-shell > 3.5. The electron flux decrease always occurred concomitantly with the magnetopause compressions. The electron fluxalso occurs concomitantly with strong Ultra Low Frequency (ULF) wave activity.

Geomagnetism

Responsible: Livia Ribeiro Alves / José Paulo Marchezi

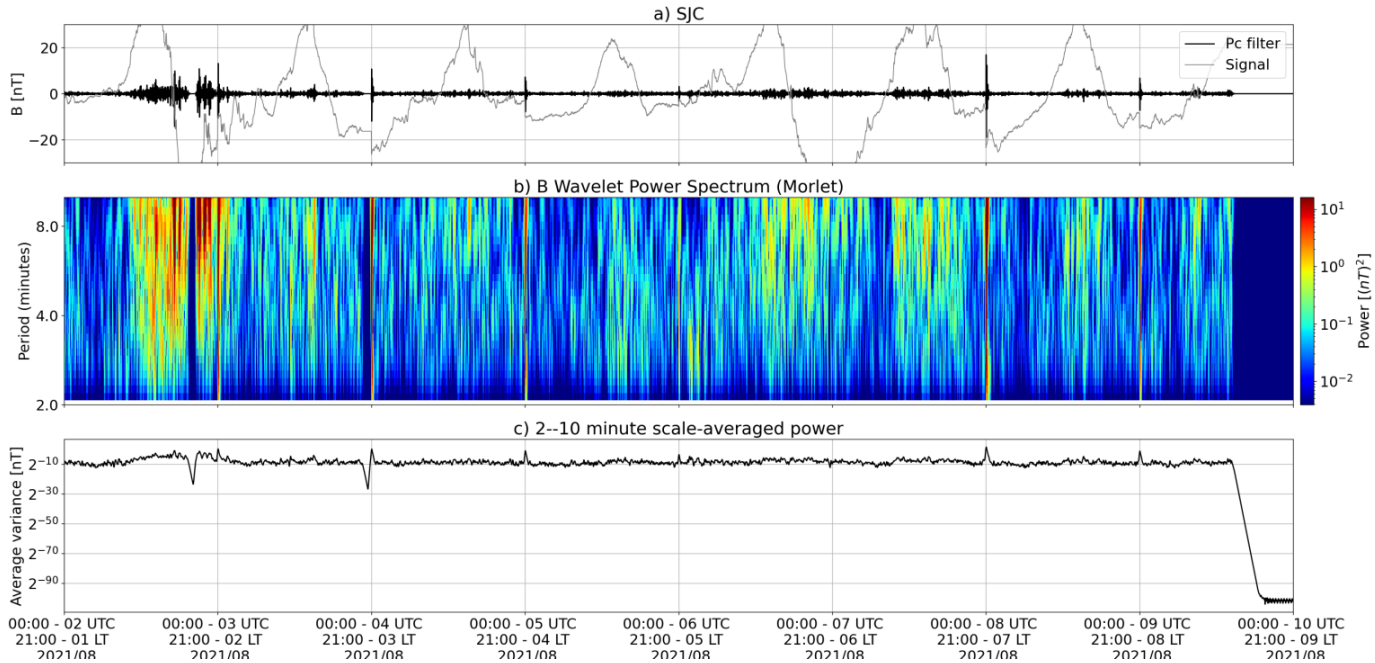


Figure 2: a) signal of the total magnetic field measured at the SJC Station of the EMBRACE network in gray, together with the fluctuation in the range of Pc5 in black. b) Wavelet power spectrum of the filtered signal. c) Average spectral power in the ranges from 2 to 10 minutes (ULF waves).

- The 2nd and 7th of August were the ones with the greatest amplitude of ULF waves
  - Response to negative incursions of the Bz component of the IMF
  - day 02 shows an increase in solar wind density
  - day 07 presents a possible HSS that should be generating fluctuations in the geomagnetic field
- Possible auroral activity on the 2nd and 7th of August.

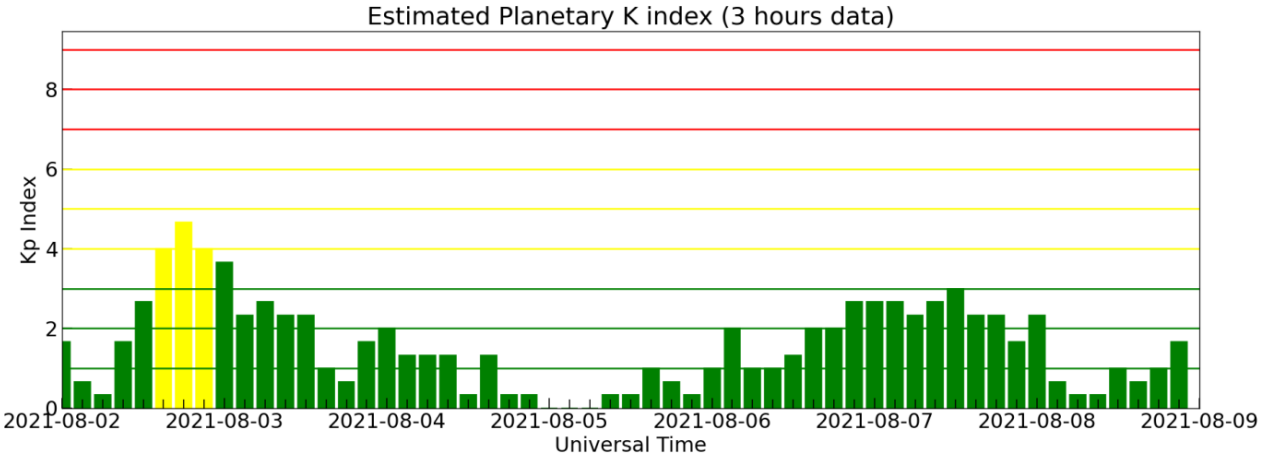


Figure 4:Geomagnetic Kp index

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

- The MagNet network magnetometers detected geomagnetic storms on 02/08 decrease of the component H up to 100 nT @ 21:00 UT 06 - 07/08 @01:40 decrease of the component H up to -90 nT @ 03:00 on the 8th
- The MagNet network also recorded several short-period perturbations superimposed on diurnal variation

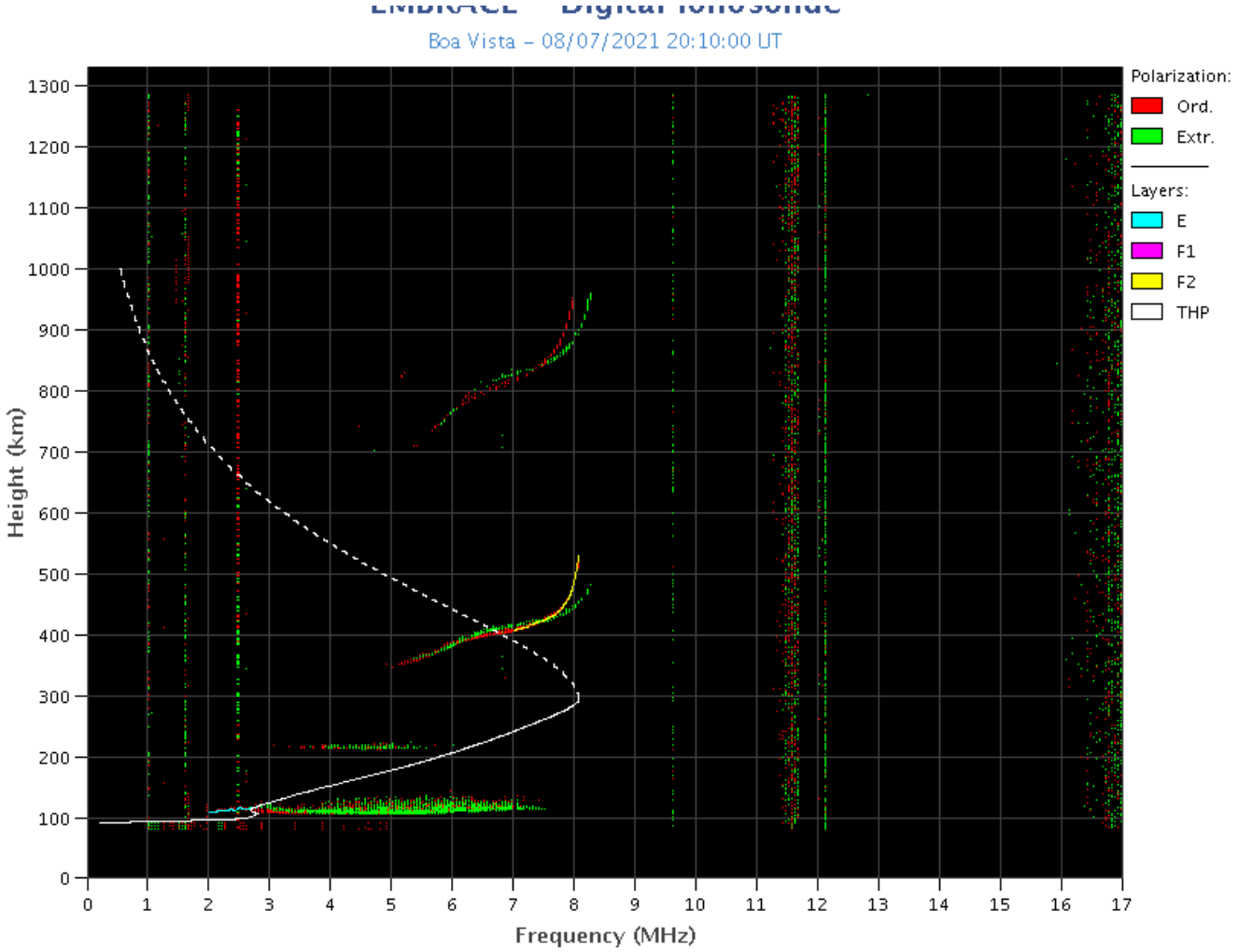
- The geomagnetic activity changed from high to active during the week, with the Dst index reaching its minimum value on 02/08. The highest Kp was 5- also recorded on 02/08
- The auroral activity remained unstable throughout the period, with significant increases on the 2nd, 6th, and 7th of August.
- Magnetic field measured in the GOES satellite orbit showed a decrease in the H component on the night side on August 6, characteristic of the magnetotail current activity signature.

Ionosphere

Responsible: Laysa Resende

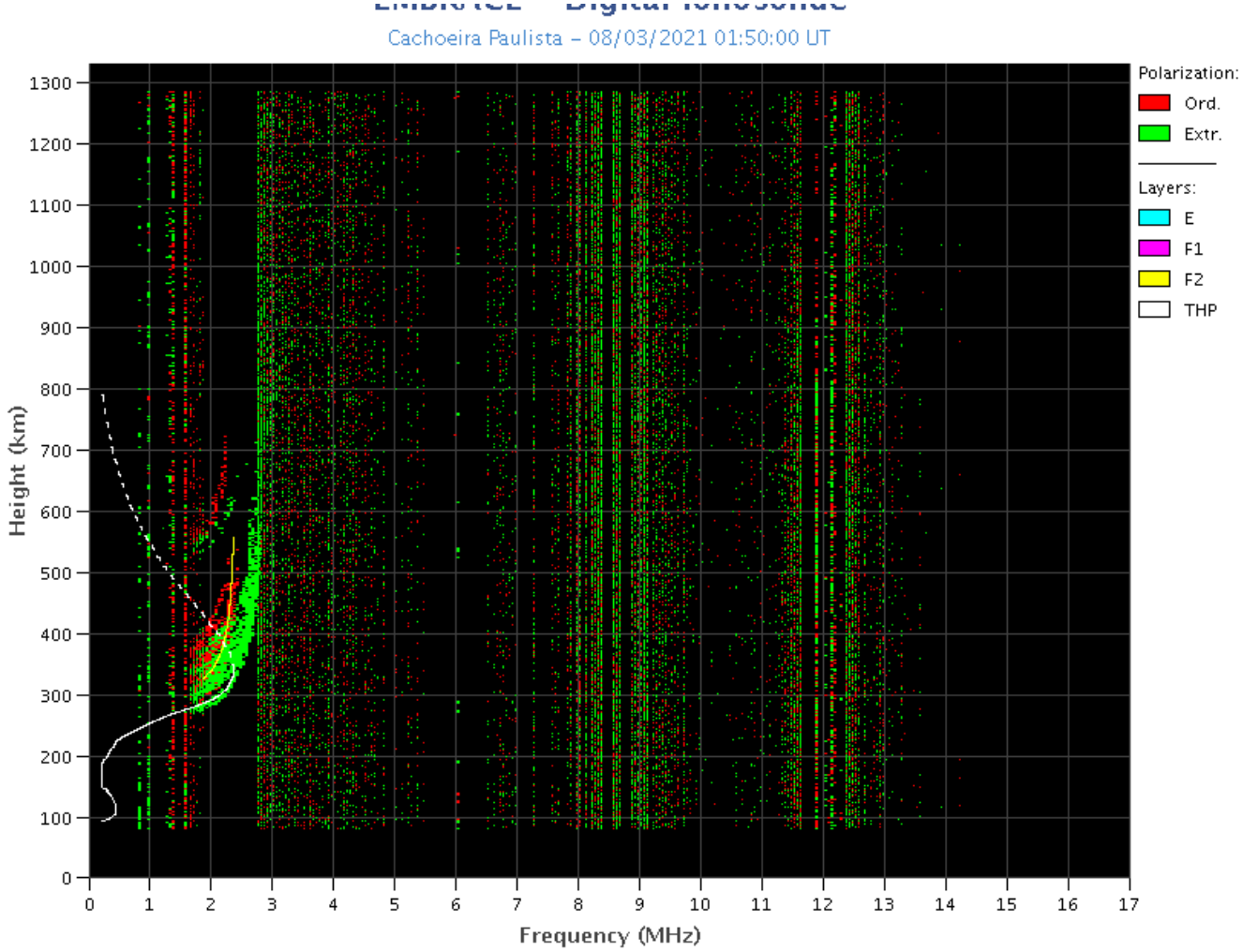
Boa Vista

- There were spread F on days August 03, 07, and 08.
- The Es layers reached scale 4 on August 07. .



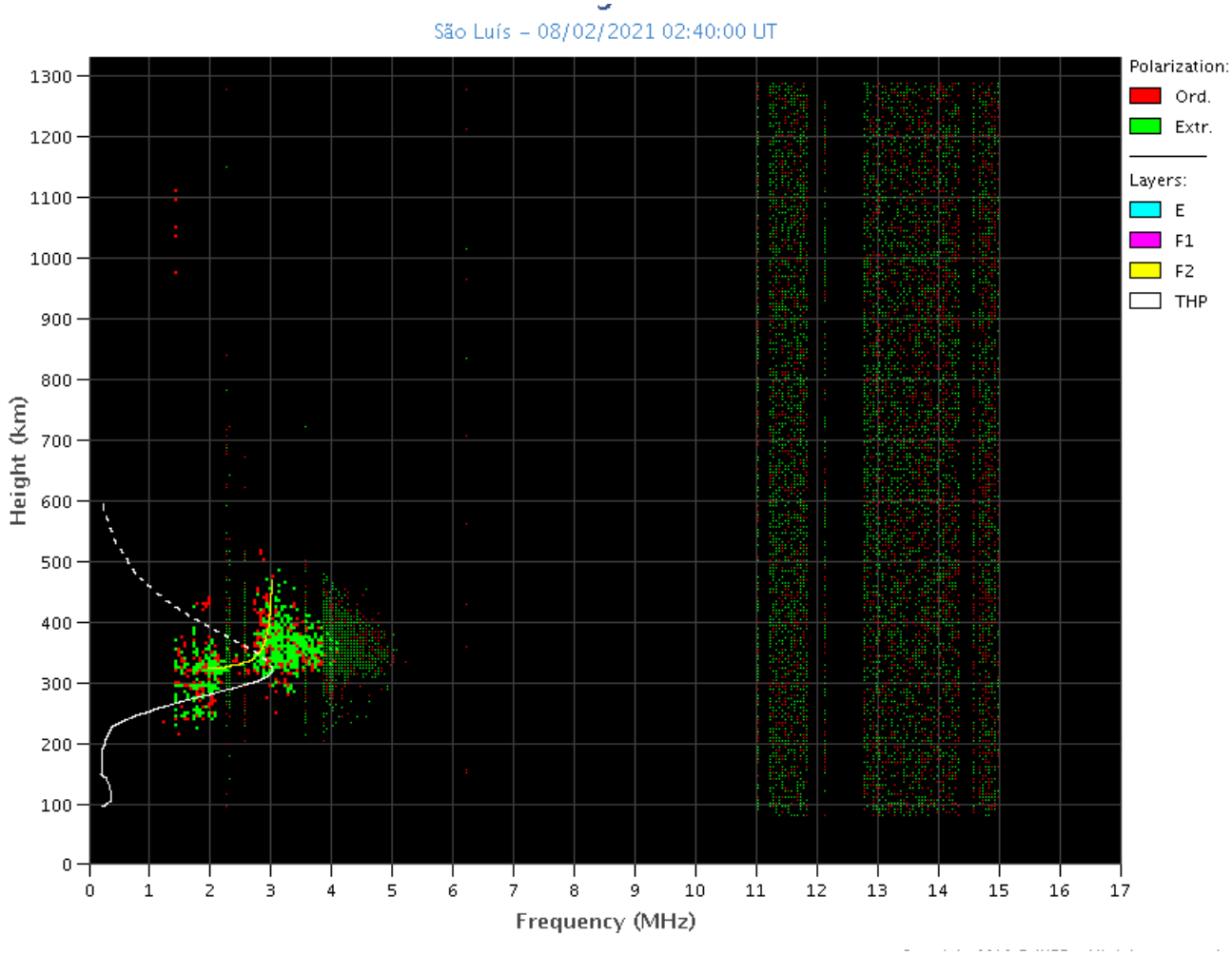
Cachoeira Paulista

- There were spread F on days August 03, 05, and 06.
- The Es layers reached scale 4 on August 06.



São Luis

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



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.

SLMA, STSN and SJCE stations did not show appreciable values above the noise value in the analyzed period. The UFBA station recorded localized S4 of up to 0.35, approximately, around 18:30 UT on August 6th and 7th. The other stations showed a calm behavior (S4 < 0.4) typical of the winter season in the southern hemisphere where the manifestation of irregularities is low.

Figure 1 shows the S4 values on day 6/08 (upper panel) and day 7/08 (upper panel) between 1800 and 1900 (UT). The behavior above the noise level of the S4 is very similar on the two days. This indicates that the values of S4 may be due to non-geophysical causes which is confirmed through the S4 values obtained with satellites of the Glonass and Galileo constellations (Figure 2). Additionally, the local time (UT-3) in which these values appear are not typical times for plasma bubbles formation.

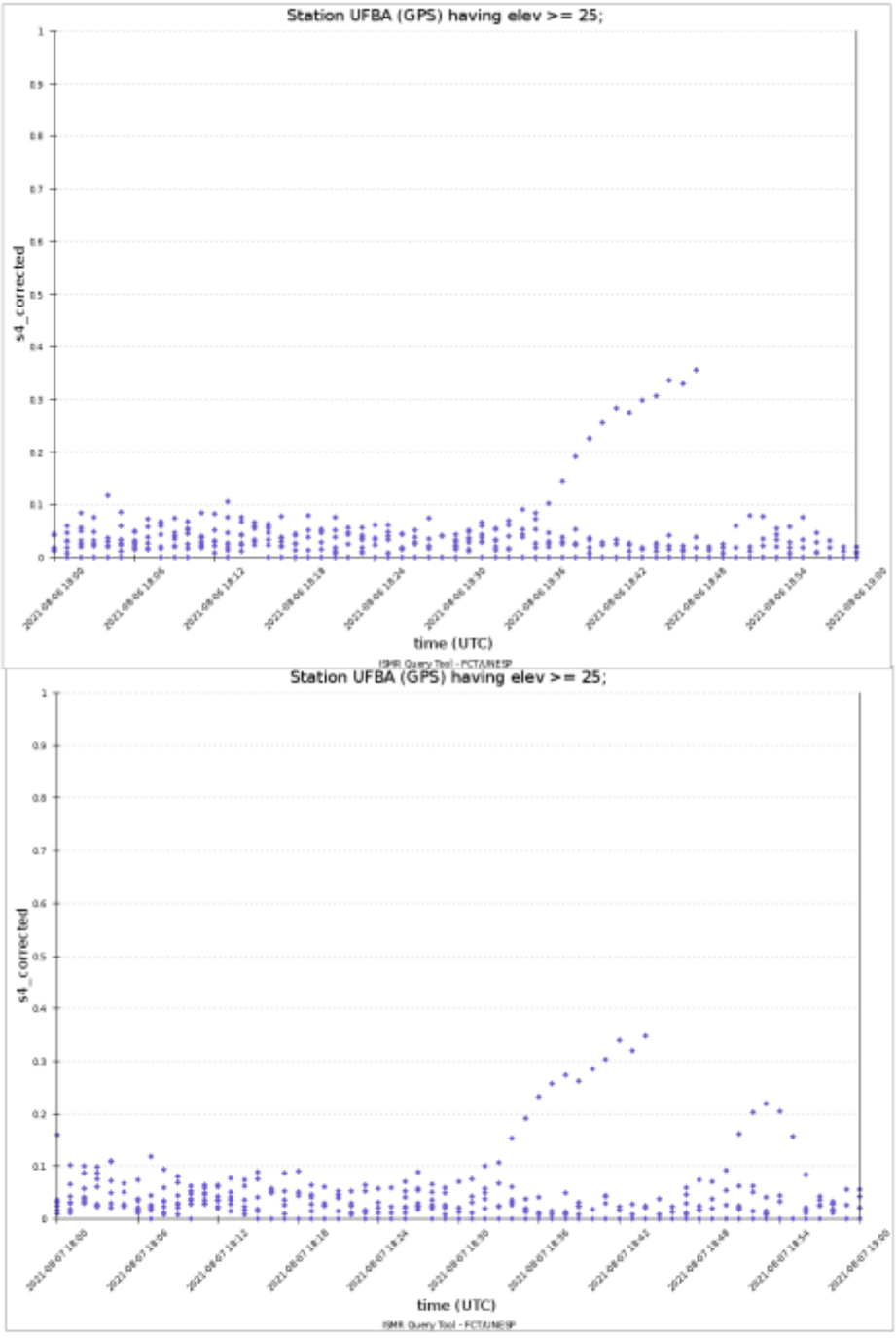


Figure 1: Corrected scintillation index S4 between 1800 and 1900 UT on 08/06 (upper panel) and on 08/07 (lower panel) for the Bahia station.

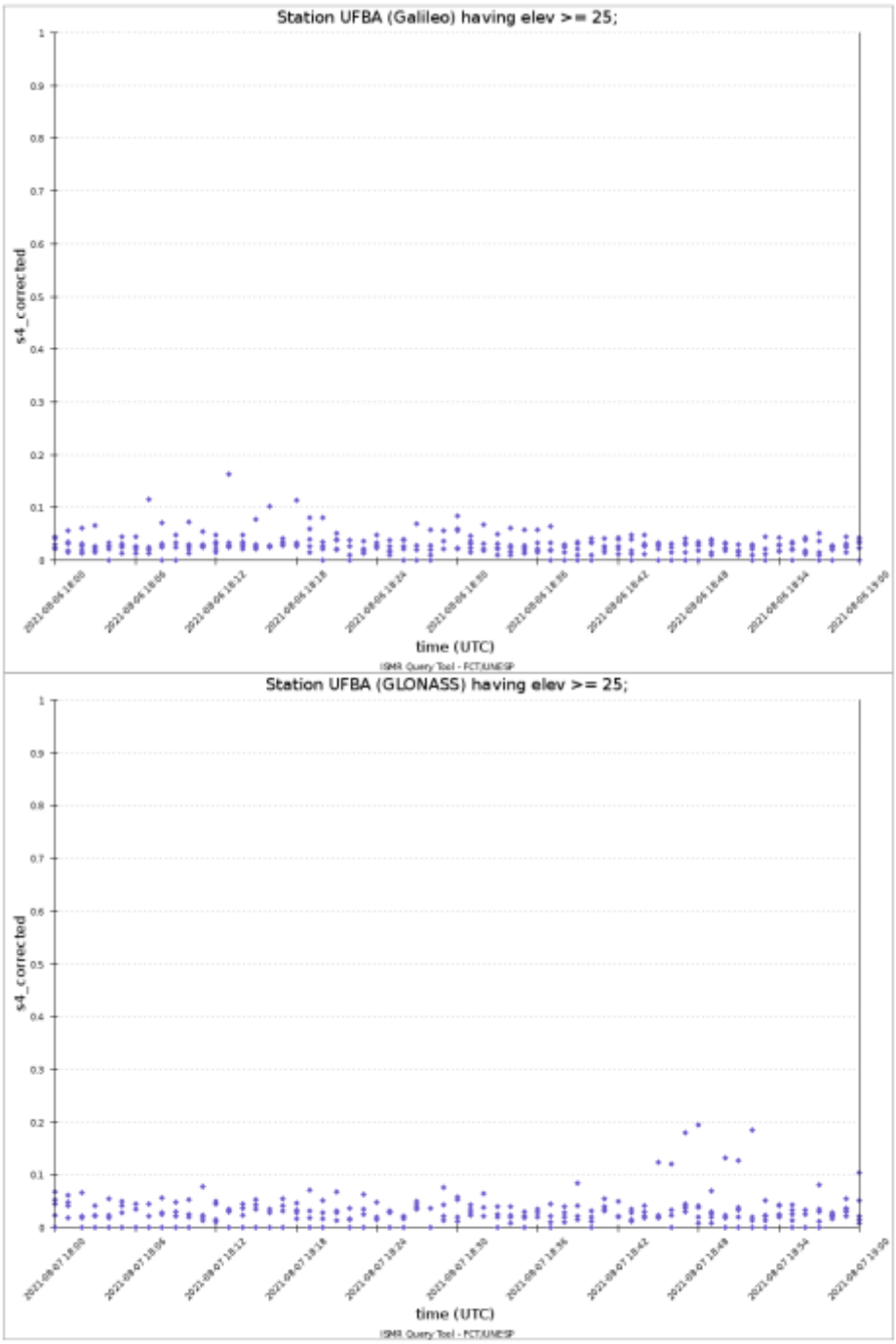


Figure 2: S4 between 1800 and 1900 UT on 08/06 for the Galileo constellation (upper panel) and on 08/07 for the Glonass constellation (lower panel) recorded in the Bahia station