Briefing Space Weather - 2021/08/30

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Sun

Responsible: José Roberto Cecatto

OBS: On August 26, AR 2859 produced a C3-class flare, associated to filament eruption / CME and solar tsunami (video) !
On August 28 at 06:11 UT, AR 2860 unleashed a M4.8 flare, associated to filament eruption / CME.
08/23 – No fast wind stream; 1 CME can have component toward the Earth;
08/24 – No fast wind stream; 5 CME can have component toward the Earth;
08/25 – No fast wind stream; 3 CME can have component toward the Earth;
08/26 – Fast (< 450 km/s) wind stream; 4 CME can have component toward the Earth;
08/27 – No fast wind stream; No CME toward the Earth; Arrival CME Aug 23 at ~01LT; CME Aug 24 at 11:42LT
08/28 – No fast wind stream; 6 CME can have component toward the Earth ???;
08/29 – No fast wind stream; 4 CME can have component toward the Earth; Arrival CME from Aug 26 pred SB 10:30-22:58 LT.
08/30 –Fast (< 500 km/s) wind stream; no CME toward the Earth;
Prev.: Fast wind stream expected for August 24 and 25; for while low (5% M, 1% X) probability of M / X flares next 2 days; also, occasionally some other CME can present a component toward the Earth.
CME ass M4.7-flare from August 28 can arrive at Earth by August 31 / September 01.

Responsible: Douglas Silva

- CME:
  - Partial halo CMEs were observed at the beginning of day 24 and the end of day 26 in available LASCO imagery
- WSA-ENLIL (Prediction for CME 2021-08-23T06:36Z)
  - According to the simulation, the expected date of arrival: 2021-08-26T20:25Z (-7h, +7h).
- WSA-ENLIL (Prediction for CME 2021-08-24T13:25Z)
  - The simulation indicates that the CME arrival forecast will occur on the following date: 2021-08-28T03:00Z (-7.0h, +7.0h)
- WSA-ENLIL (Prediction for CME 2021-08-27T00:24Z)

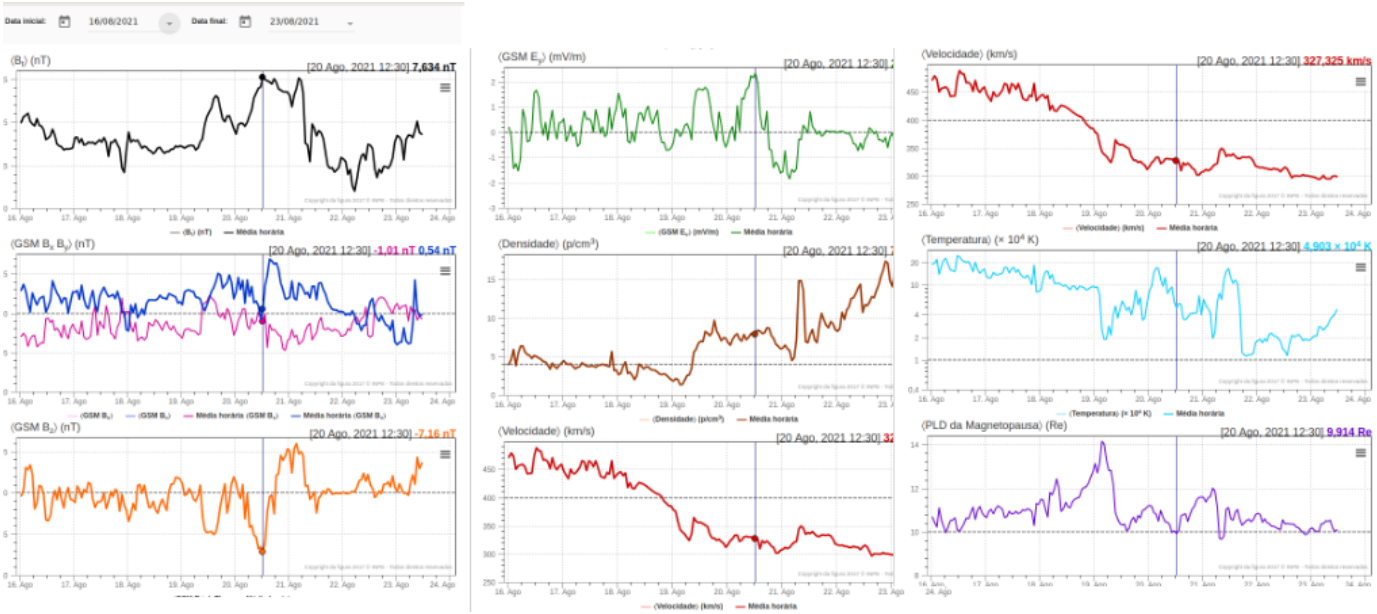
- The simulation indicates that the CME arrival forecast will occur on the following date: 2021-08-31T05:30Z (-7.0h, +7.0h)

- WSA-ENLIL (Prediction for CME 2021-08-28T12:30Z)
  - The simulation indicates that the CME arrival forecast will occur on the following date: 2021-09-02T00:00Z (-7.0h, +7.0h)

- Coronal holes:
  - An extension of the north polar coronal hole was observed on the 23rd of August.

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 showed oscillations, however, it remained below 8 nT during the analyzed period.
- The IMF Bz component oscillated mostly negative. We observed two peaks in bz on August 19 at 11:30 am ~-4.85nT and on August 20 at 12:30 am at -7.16nT.
- The occurrence of the change of sector in the BxBy components took place on August 22 at 05:30. In the rest of the interval there is no clear change of sector in the BxBy components.
- The Vsw density showed peaks on days 19, 21 and 22 at 03:30, 07:30 and 22:30, of 1.33, 14, 8, and 17.44 p/cm³ respectively. The solar wind speed Vsw peaked on August 16 at 12:30 at 488km/s. Remaining below 400 km/s on the 18 at 19:30, and reaching a minimum value on the 23 of August at 03:30 at 293 km/s.
- Subsolar Mp showed maximum expansion on August 19 at 4:30 am of 14Re and minimum compression on August 21st at 8:30 am of 9.65 Re

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Radiation Belts

Responsible: Ligia Alves da Silva

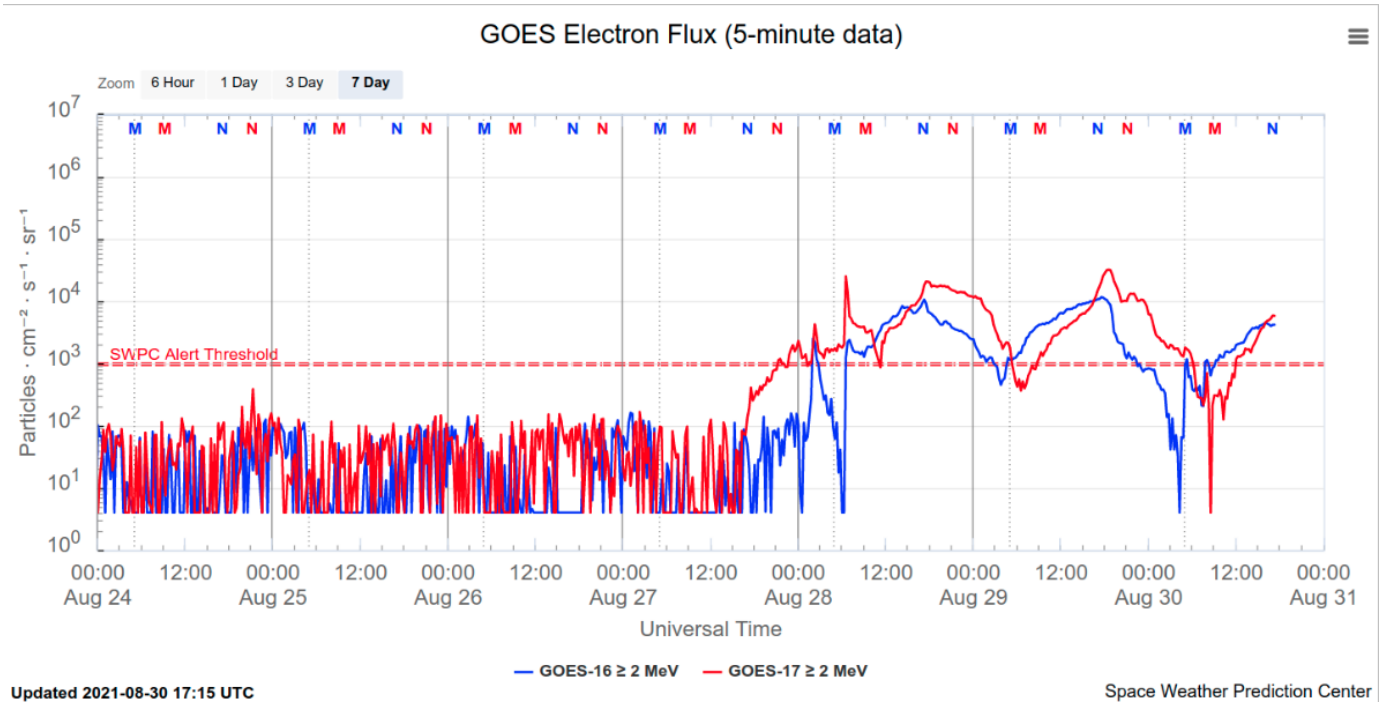


Figure 1: High-energy electron flux (> 2MeV) obtained from GOES satellite. Source: https://www.swpc.noaa.gov/products/goes-electron-flux

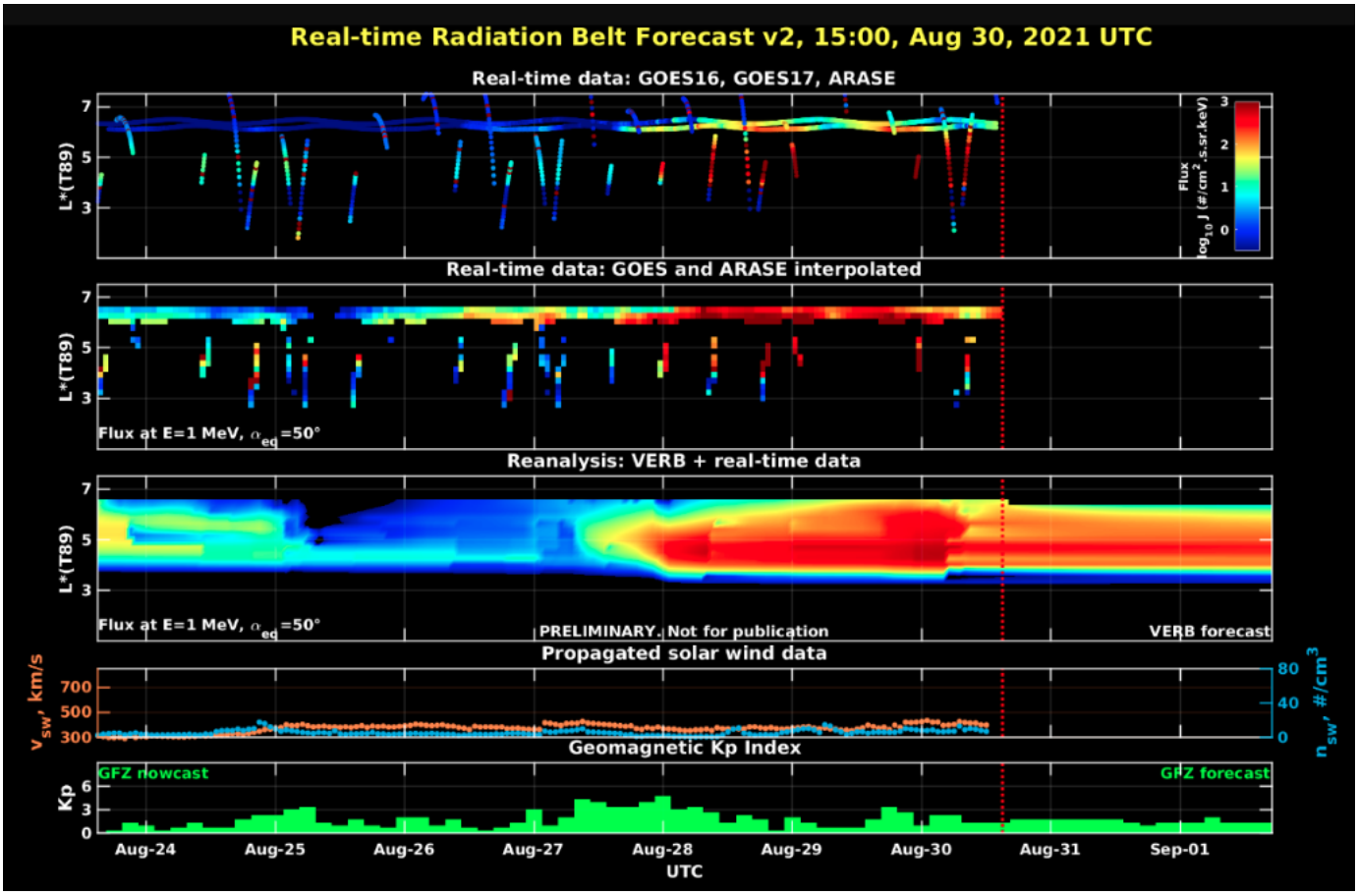


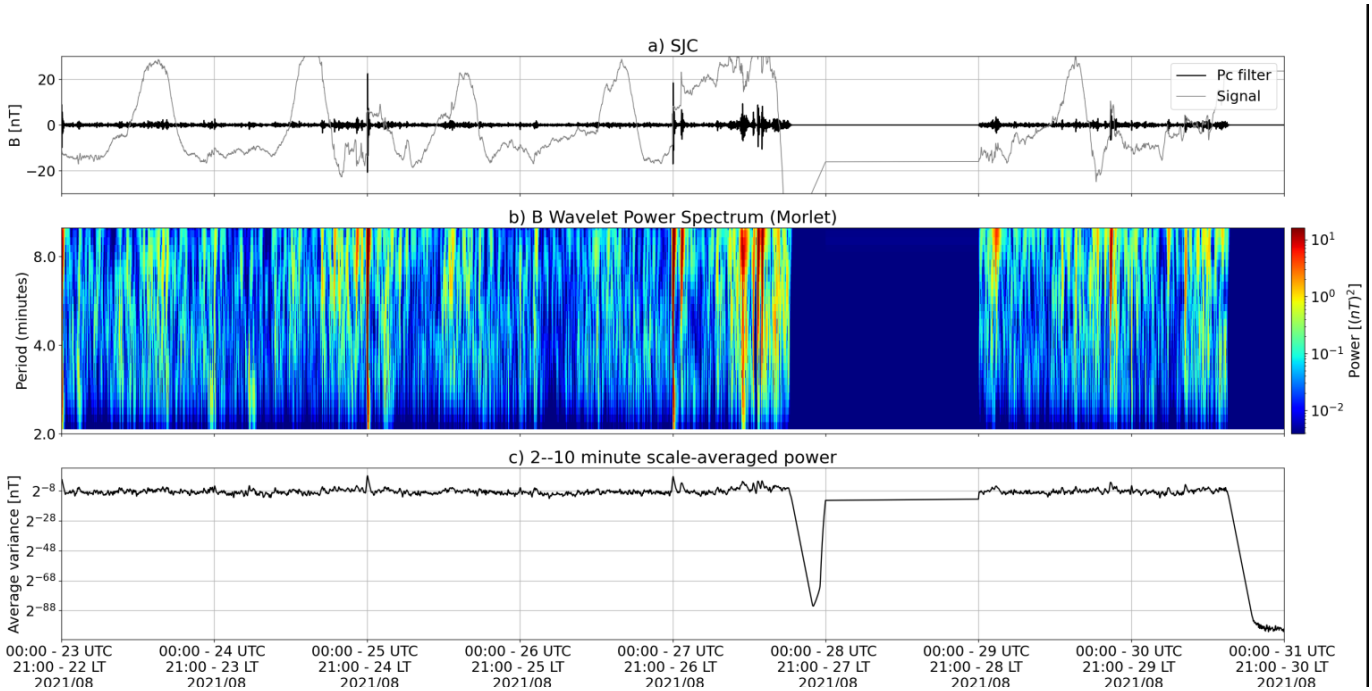
Figure 2: high-energy electron flux data (real-time and interpolated) obtained from ARASE, GOES 16, POES satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: Fonte: https://rbm.epss.ucla.edu/realtime-forecast/

High-energy electron flux (>2 MeV) in the outer boundary of the outer radiation belt obtained from geostationary satellite data GOES-16 and GOES-17 (Figure 1) is shown to be close to 102 particles/(cm2 s sr) between August 24-27. An electron flux increase is observed from 15:00 UT on August 27th, exceeding two orders of magnitude. This flux increase may be associated with the arrival of a coronal mass ejection. At the beginning of August 29th, there is an electron flux decrease reaching 102 particles/(cm2 s sr) for a very short time, returning to a population close to 104 particles/(cm2 s sr).

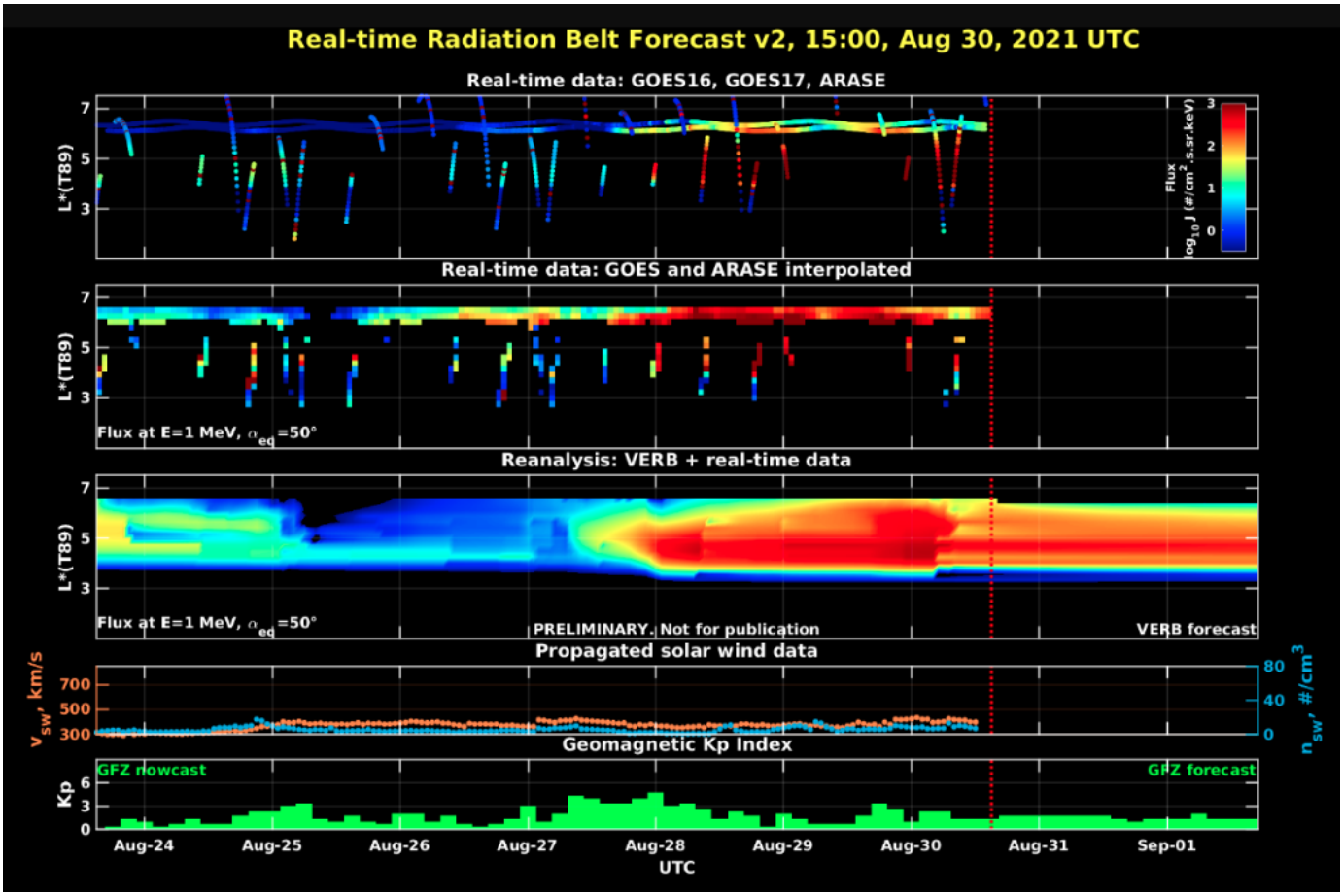
The GOES-16, GOES-17, and Arase satellite data are analyzed and interpolated to observe the high-energy electron flux variability (1 MeV) in the outer radiation belt (Figure 2). Additionally, the VERB code rebuilds this electron considering the ULF waves' radial diffusion. The electron flux increase observed from 15:00 UT on August 27th reaches L-shell > 3. The electron flux increase/decrease always occurred concomitantly with Ultra Low Frequency (ULF) wave activities.

ULF waves in the magnetosphere

Responsible: José Paulo Marchezi



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).



a) signal of the total magnetic field measured at the GOES 16 satellite 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).

- Main period is between the 27th and 28th of August - Geomagnetic storm
  - Imposive fluctuations on the 27th, onset of storm
  - Continuous fluctuations in the main and recovery phase
- August 25th also presents high wave activity
  - Relation with fluctuations of the Bz component of the EMI and increase in the speed of the solar wind.

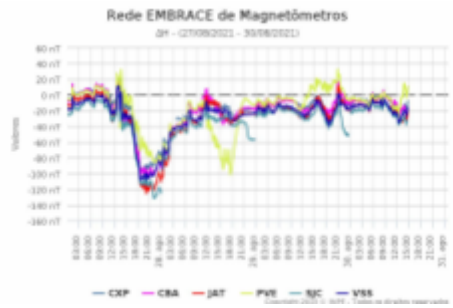
Geomagnetism

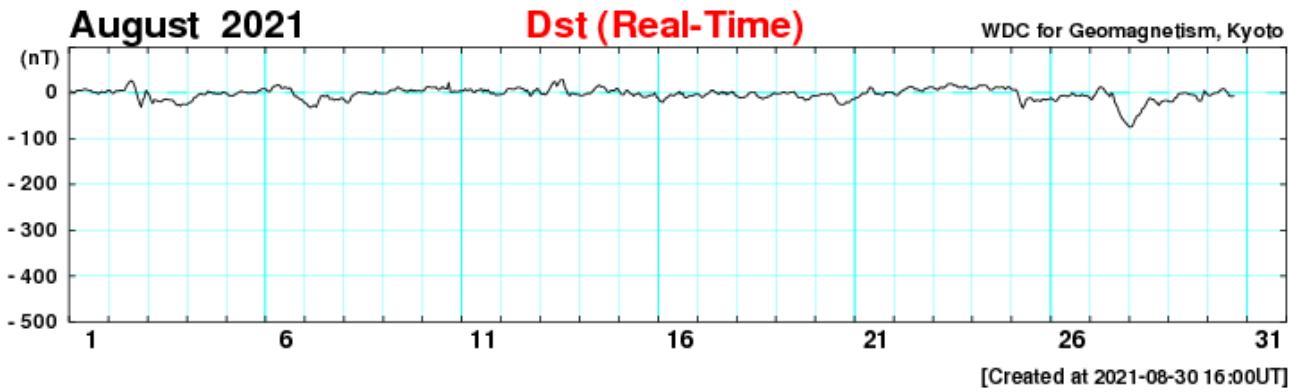
Responsible: Livia Ribeiro Alves

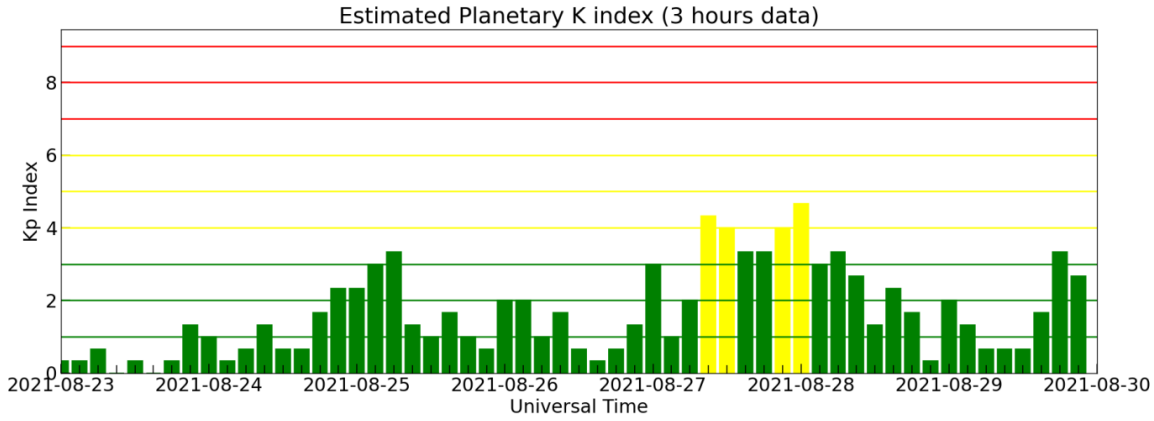
The geomagnetic events that are representative of this period are listed below:

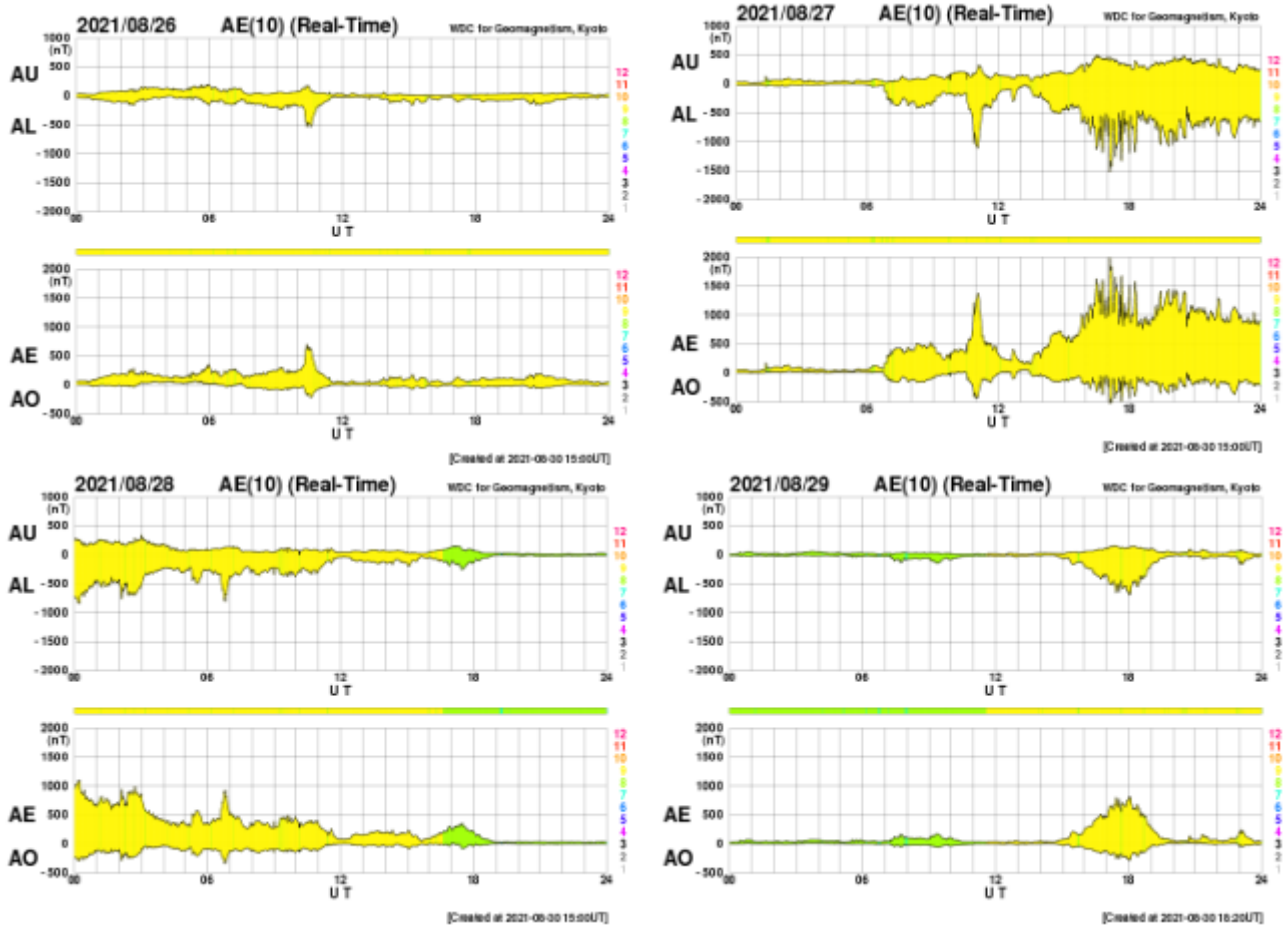
- Data from the Embrace magnetometer network showed instabilities throughout the period
- A geomagnetic storm was developed on August 27, reached the main phase at 21:00 UT
- At least two signatures compatible with SI were registered, at 03:00 on 08/27 and at 06:00 UT on 08/28
- The geomagnetic activity went from quiet to active during the week, with the Dst index reaching its minimum value of -74 nT on 27/08. The highest Kp of the week was 4+ recorded on August 27

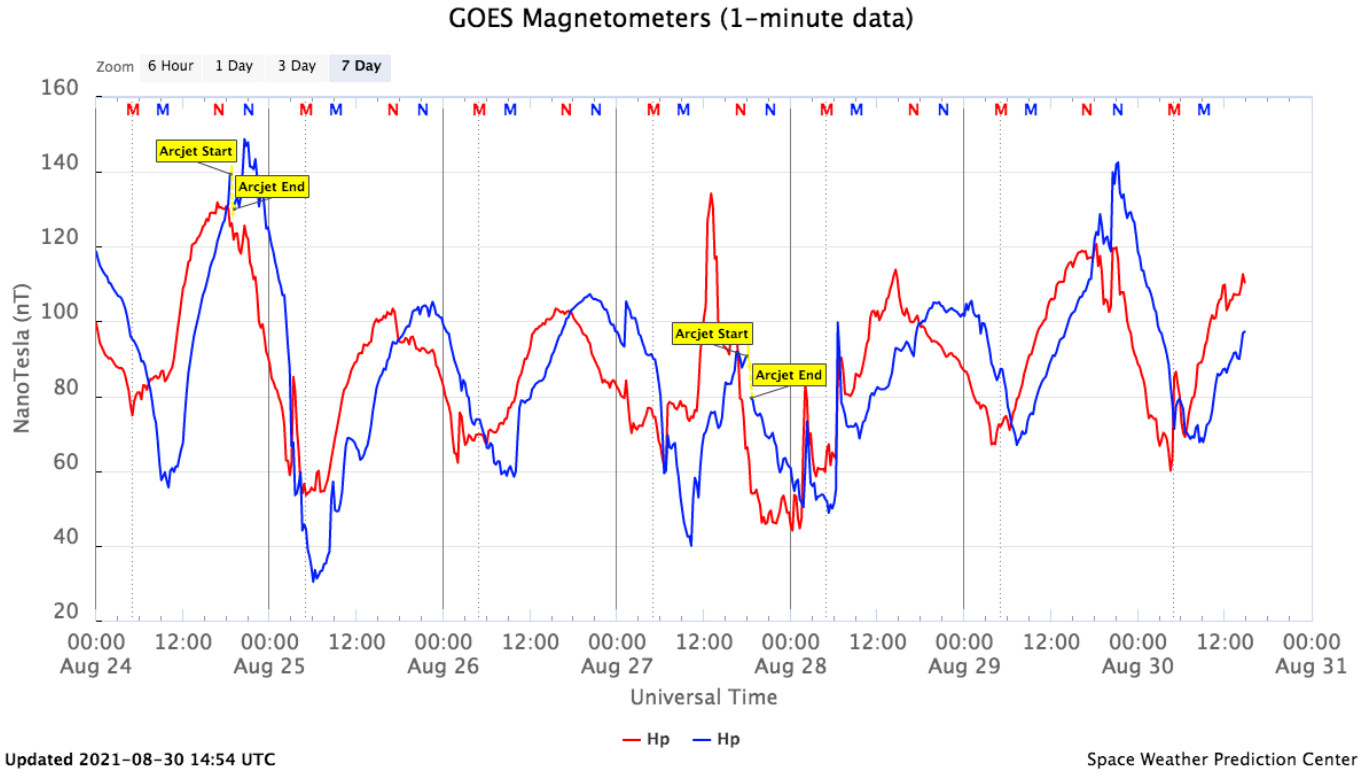
- The auroral activity remained stable throughout the period, with an expressive increase on August 27-28.
- Magnetic field measured in the GOES satellite orbit showed peaks in the H component on the night side on August 27.









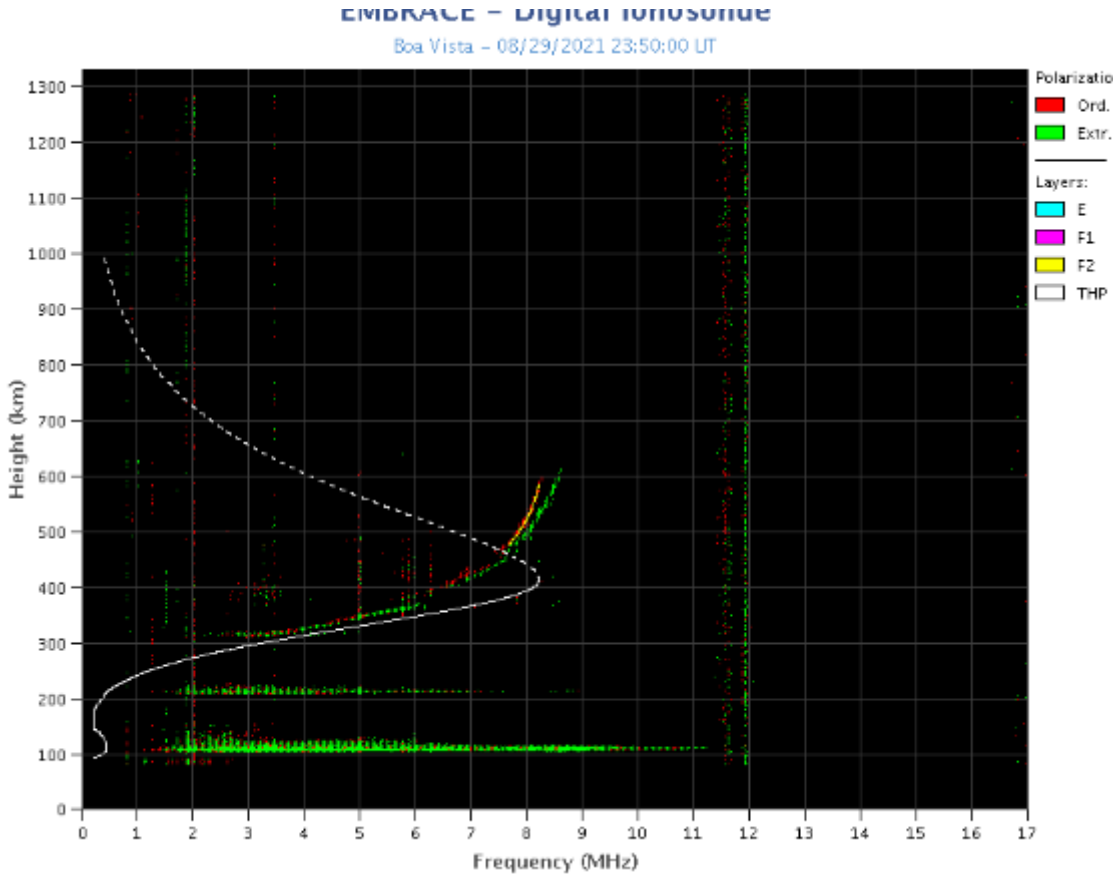


Ionosphere

Responsible: Laysa Resende

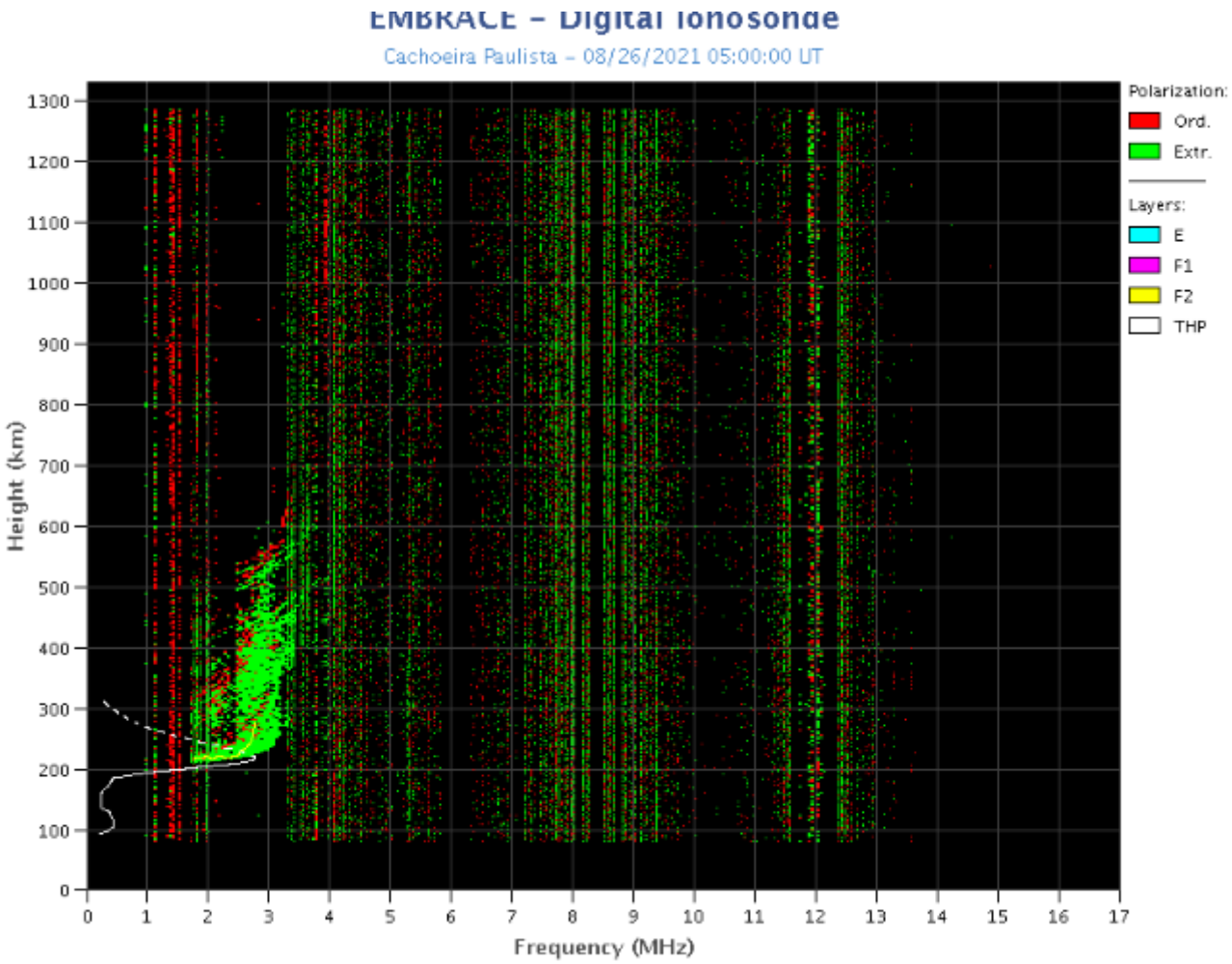
Boa Vista

• There were spread F on days August 23, and 28.
• The Es layers reached scale 5 on August 29.



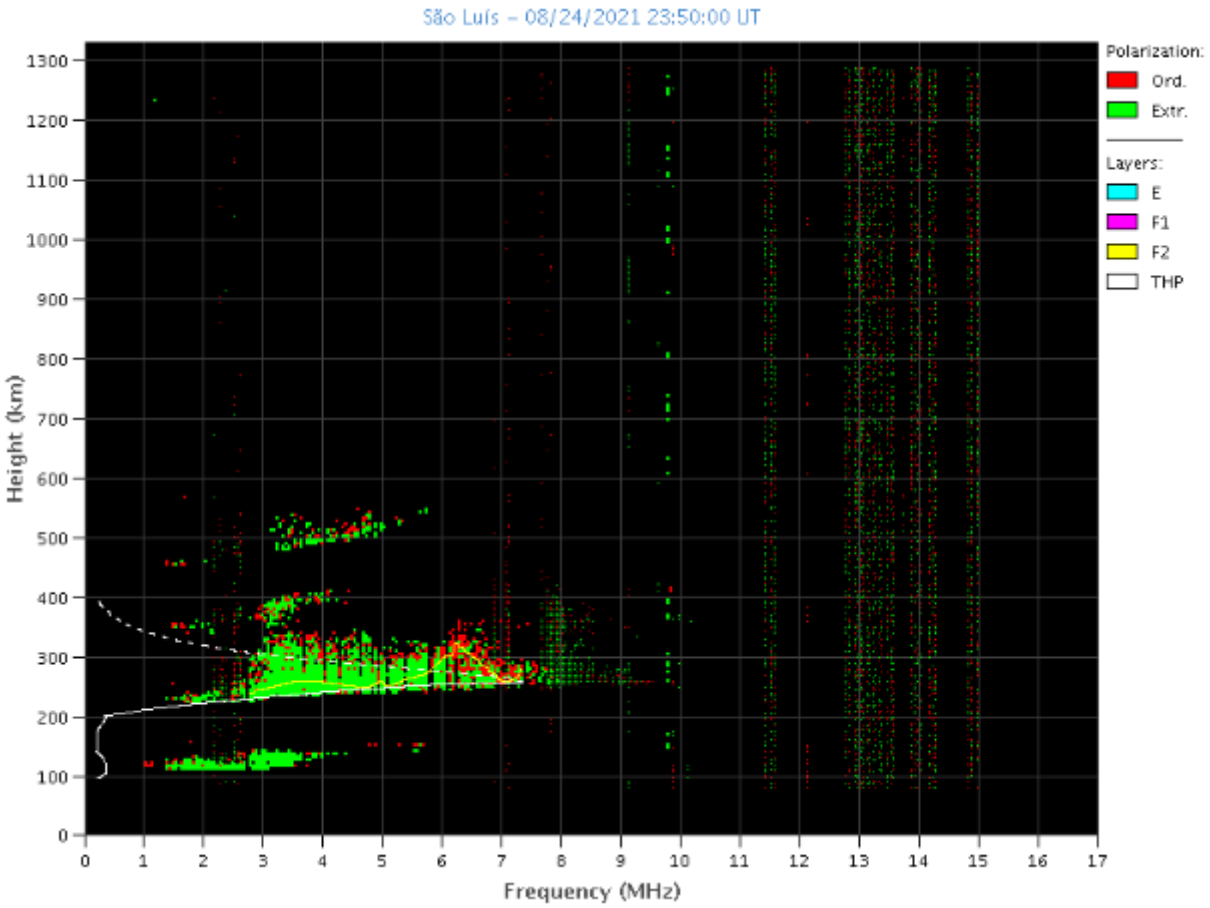
Cachoeira Paulista

• There were spread F on days August 24, 26 and 27.
• The Es layers reached scale 2 during all day in the week.



São Luis

- There was not spread F on August 23, and 26
- The Es layers reached scale 3 on August 23, and 25.



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 SLMA station had no data between August 25 until night of August 29. The Sinop/MT station showed slight changes on different days of the period analyzed, all at the same time and in a similar way to last week. On the night of the 29th, however, signs of moderate scintillation appeared (Figure 1). The other two stations (UFBA and SJCE) did not show appreciable values above the noise value.

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