

Briefing Space Weather - 2021/09/13



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Sun

Responsible: José Roberto Cecatto

08/30 – Fast (< 450 km/s) wind stream; 2 CME can have component toward the Earth;

08/31 – No fast wind stream; 5 CME can have component toward the Earth;

09/01 – No fast wind stream; 2 CME can have component toward the Earth;

09/02 – No fast wind stream; 1 CME can have component toward the Earth;

09/03 – Fast (< 450 km/s) wind stream; no CME toward the Earth; At ~06:19Z arrival of CME ass flare M4.7, Aug 28.

09/04 – Fast (< 450 km/s) wind stream; 1 CME can have component toward the Earth ???;

09/05 – No fast wind stream; 2 CME can have component toward the Earth;

09/06 – No fast wind stream; 4 CME can have component toward the Earth;

Prev.: Fast wind stream expected for Sept. 05, 07, and 09; 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.

09/07 - No fast wind stream; 1 CME can have component toward the Earth;

09/08 - Fast (< 450 km/s) wind stream; 6 CME can have component toward the Earth;

09/09 - No fast wind stream; no CME toward the Earth;

09/10 - No fast wind stream; 3 CME can have component toward the Earth;

09/11 - No fast wind stream; 4 CME can have component toward the Earth; Expected arrival of one CME from Sept 08;

09/12 - No fast wind stream; 4 CME can have component toward the Earth;

09/13 - Fast (< 500 km/s) wind stream; no CME toward the Earth;

Prev.: Fast wind stream expected for Sept. 14; for while low (10% M, 1% X) probability of M / X flares next 2 days; also, occasionally some other CME can present a component toward the Earth.

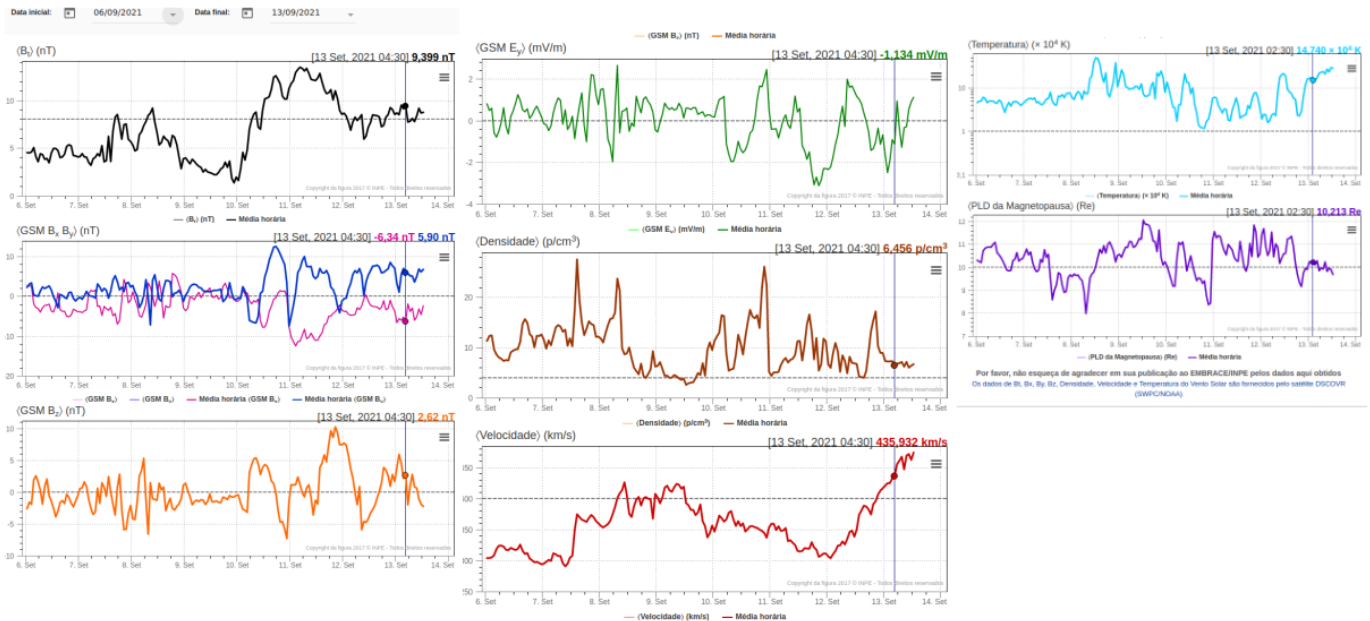
Responsible: Douglas Silva

- CME:
 - No Coronal Mass Ejection (CME) directs to Earth was observed according to * CACTUS data.
- WSA-ENLIL (Prediction for CME 2021-09-04T23:53Z)
 - The simulation indicates that the CME arrival forecast will occur on the following date: 2021-09-09T21:00Z (-7.0h, +7.0h)

- WSA-ENLIL (Prediction for CME 2021-09-05T21:36Z)
 - The simulation indicates that the CME arrival forecast will occur on the following date: 2021-09-09T01:35Z (-7.0h, +7.0h)
- Coronal holes:
 - An extension of the south polar coronal hole was observed between the 06th and 08th of September.

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 DSCOVR satellite in the interplanetary region along with sector boundary crossing.
- The total Bt magnetic field showed oscillations, with a minimum value recorded on September 9 at 22:30 of 1.36nT.
- The IMF Bz component oscillated mostly negative. We observed bz peaks on September 8, 10 and 12 at 7:30 am, 10:30 pm and 8:30 am, with a minimum bz value recorded on September 10 at 10:30 pm from -7.32 nT, and a maximum value on September 11 at 2:30 pm on a.22 nT.
- The occurrence of the change of sector in the BxBy components took place on September 10 at 9:30 am. By had a maximum value of 12.28 nT and bx had a negative minimum value of -11.44 nT.
- The density of the Vsw has oscillations with a maximum value on the 7 of September at 14:30 of 27.53 p/cm³. E minimum value registered on September 9 at 12:30 pm of 2.56p/cm³. It also presented peaks on the 8th, 10th, 11th and 12th.
- The solar wind speed Vsw, remained for most of the period below 400km/s. It peaked on September 8 at 10:30 at 425km/s and on September 13th at 473km/s. It presented a minimum on

September 7 at 10:30 294.5 km/s.

- The subsolar Mp showed maximum compression on September 8 at 7:30 am of ~ 7.98 Re. It exhibited compression peaks on the 07, two on the 10th and 1 peak on the 12 of September at 2:30 pm, 3:30 am, 9:30 pm, 8:30 pm from 8.58, 9.17, 8.36 and 9.15 Re respectively.

Radiation Belts

Responsible: Ligia Alves da Silva

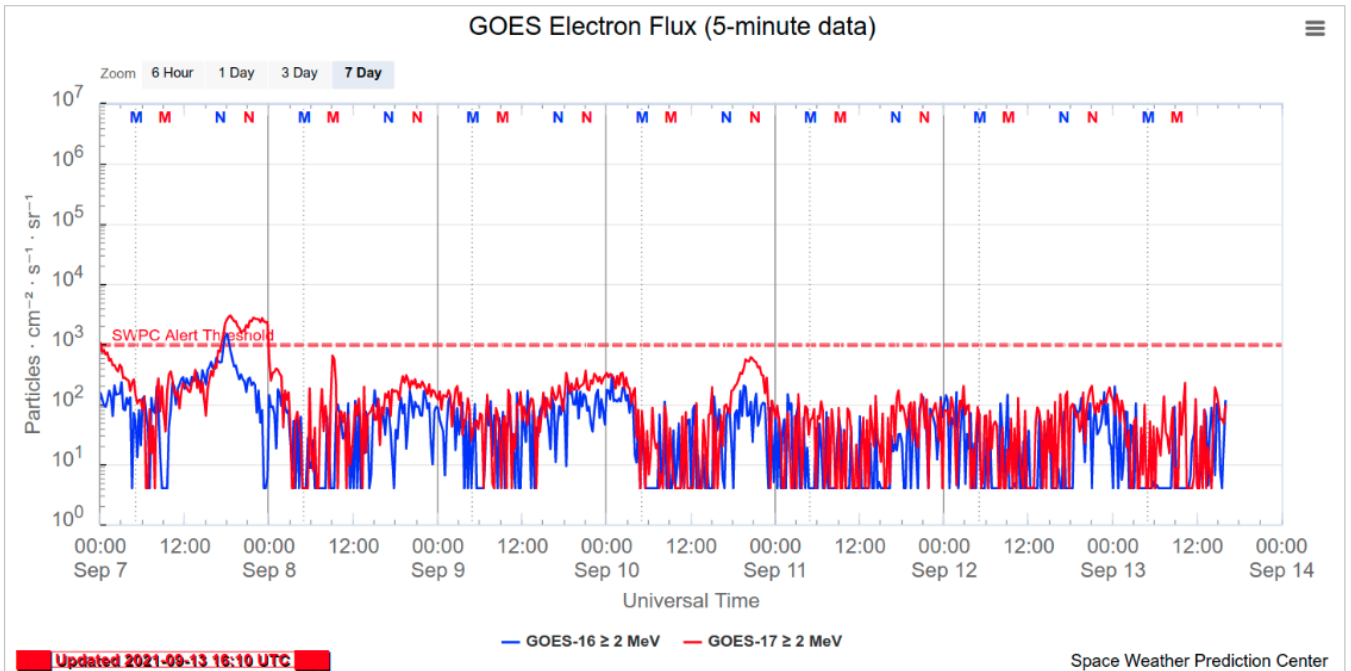


Figure 1: High-energy electron flux (> 2 MeV) obtained from GOES satellite. Source:

<https://www.swpc.noaa.gov/products/goes-electron-flux>

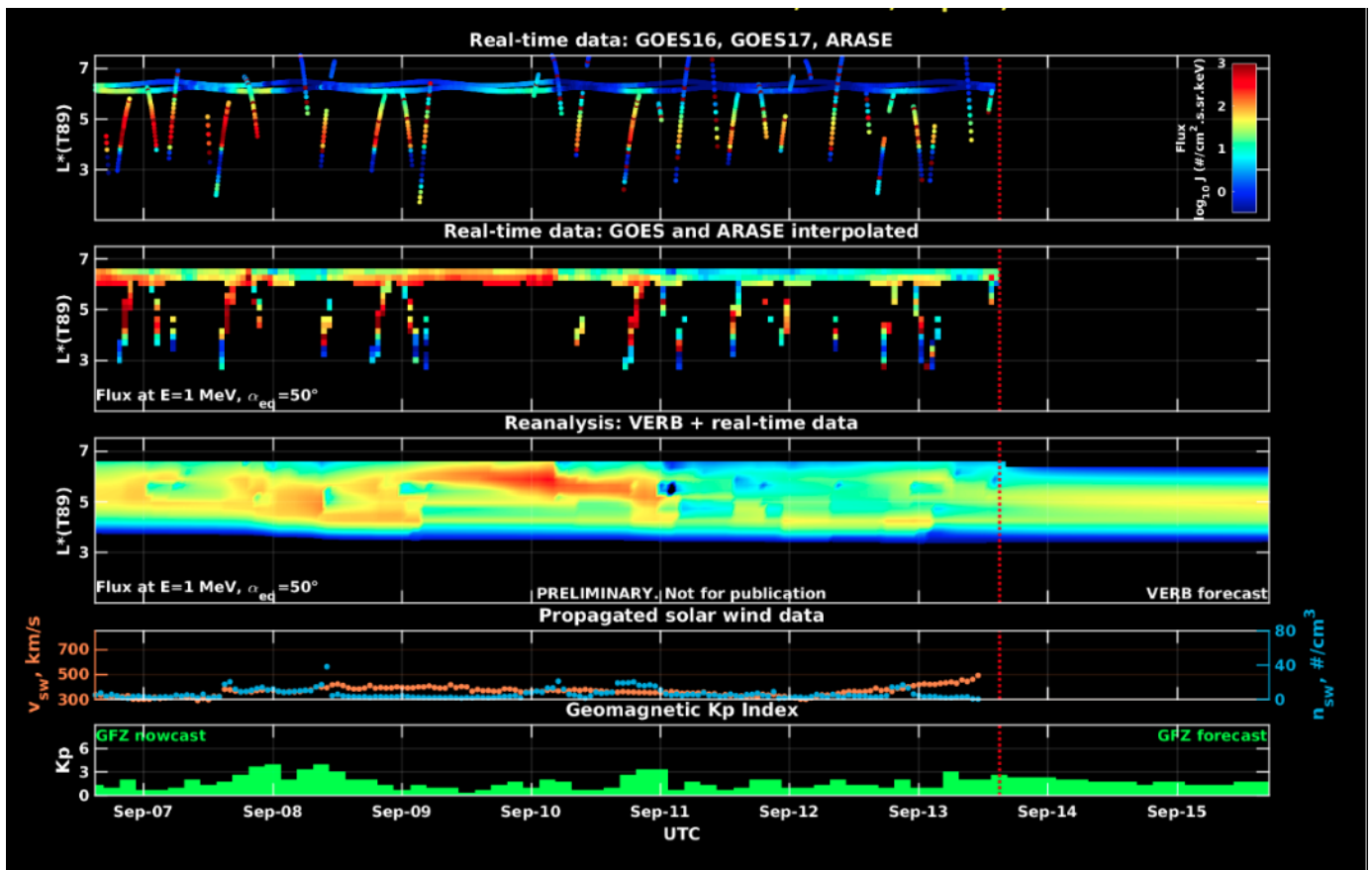


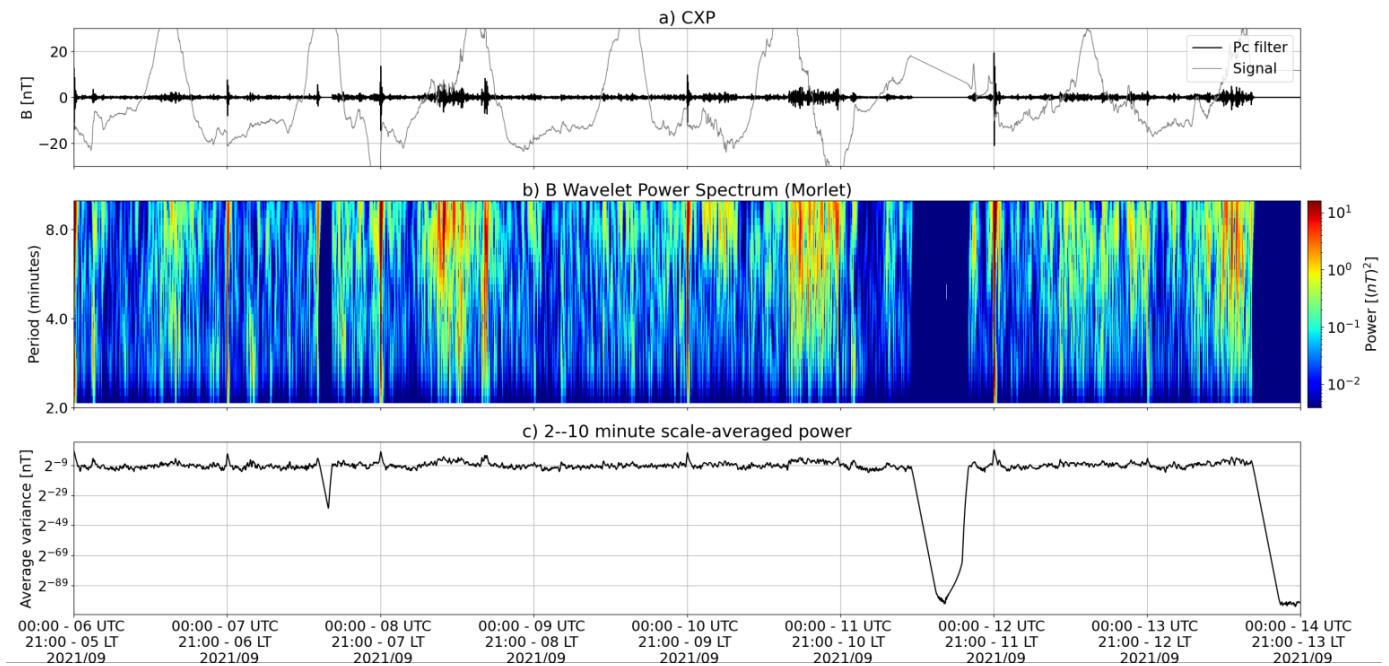
Figure 2: high-energy electron flux data (real-time and interpolated) obtained from ARASE, GOES 16, POES satellites. Reanalysis's data from VERB code and interpolated electron flux. Solar wind velocity and proton density data from ACE satellite. Source: Fonte: <https://rbm.epss.ucla.edu/realtime-forecast/>

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 103 particles/(cm² s sr) on September 7th. The electron flux decreases are observed on September 7th, 8th, 10th, and 11th, persisting below 102 particles/(cm² s sr) from September 11th. All the electron flux decreases occurred concomitantly with the magnetopause compressions.

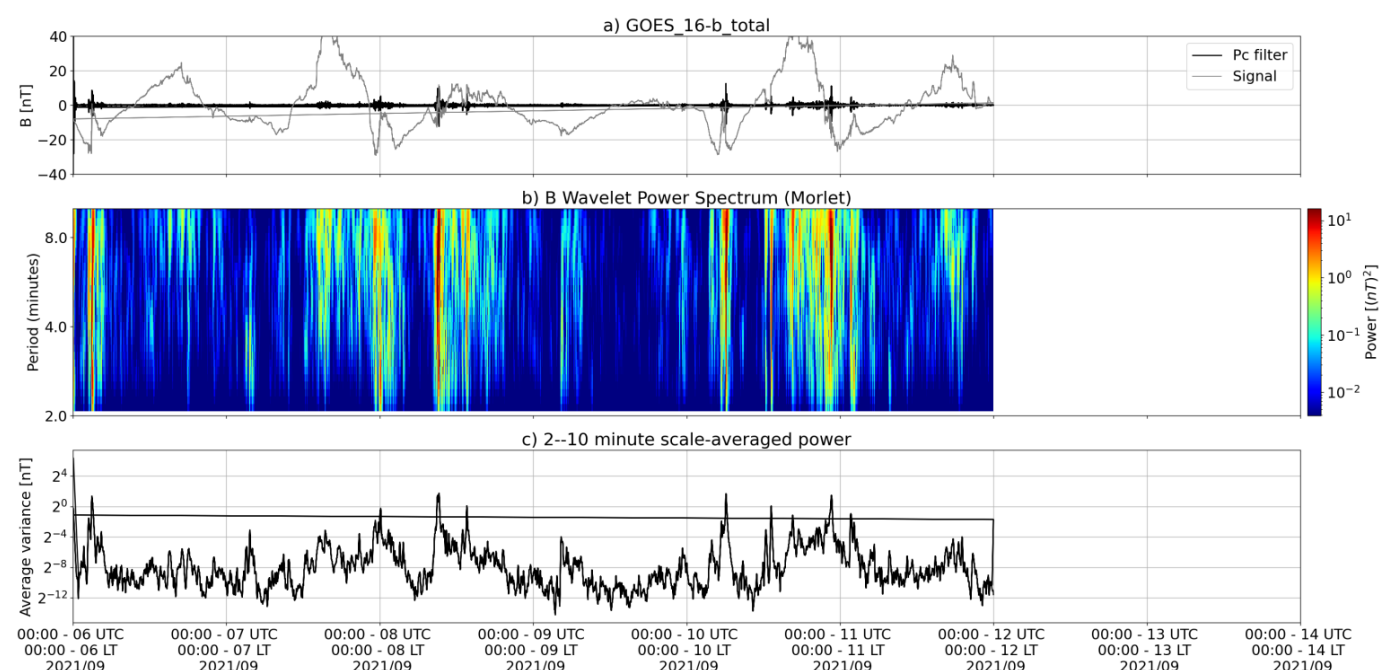
The GOES-16, GOES-17, and Arase satellite data are analyzed and interpolated to observe the high-energy electron flux variability (1 MeV) in the outer radiation belt (Figure 2). Additionally, the VERB code rebuilds this electron considering the ULF waves' radial diffusion. All the electron flux decreases observed at the outer radiation belt's outer boundary occurred concomitantly with Ultra Low Frequency (ULF) wave activities. However, the electron flux decrease from September 11th reaches L-shell > 3 only from September 11th.

ULF waves in the magnetosphere

Responsible: José Paulo Marchezi



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).



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).

- On the 8th of September there is an impulsive variation, registered in the high latitudes' magnetometers
 - Same signal is observed on CXP and GOES satellite
 - Possibly related to increased pressure in the solar wind and negative oscillations of the B_z component of the IMF.

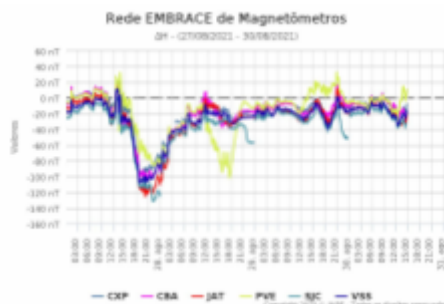
- On September 10th there is a more regular wave activity.
 - Also observed at low latitudes, with greater intensity than on the 8th.
 - This activity is followed by an increase in the speed of the solar wind and an increase in the total component of the interplanetary Magnetic field

Geomagnetism

Responsible: Livia Ribeiro Alves

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

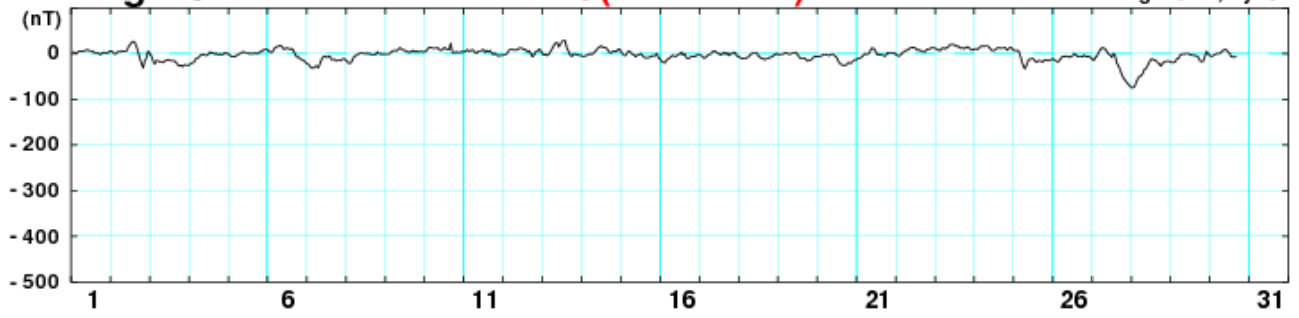
- Data from the Embrace magnetometer network showed instabilities throughout the period
- A geomagnetic storm was developed on August 27, reached the main phase at 21:00 UT
- At least two signatures compatible with SI were registered, at 03:00 on 08/27 and at 06:00 UT on 08/28
- The geomagnetic activity 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.



August 2021

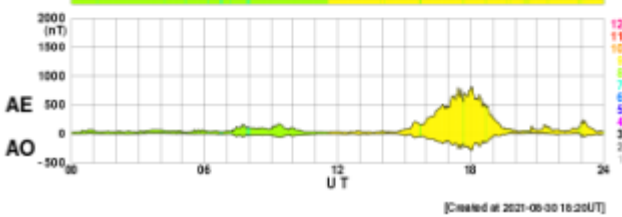
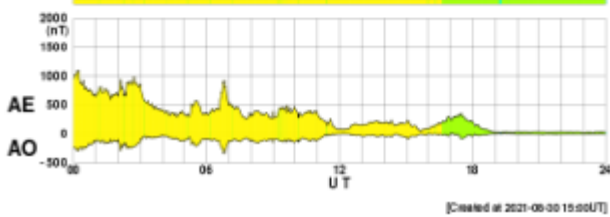
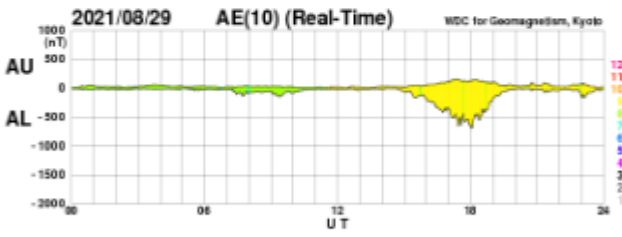
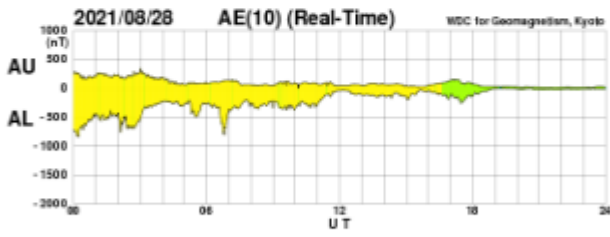
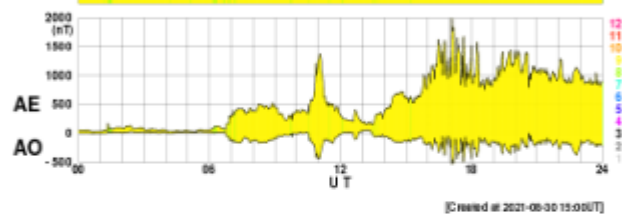
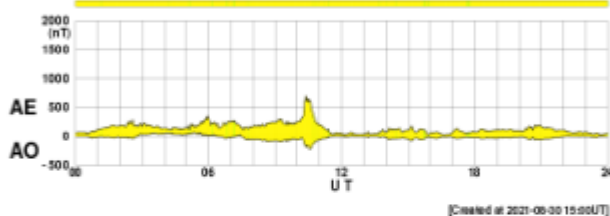
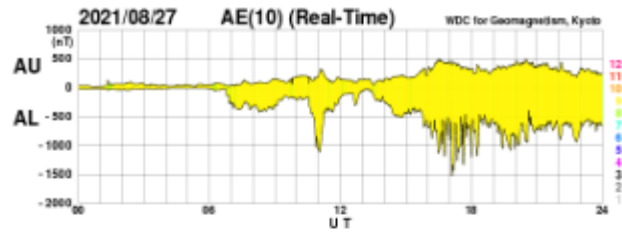
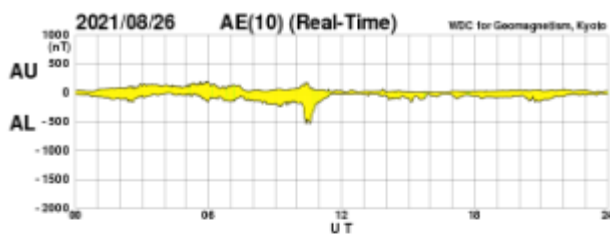
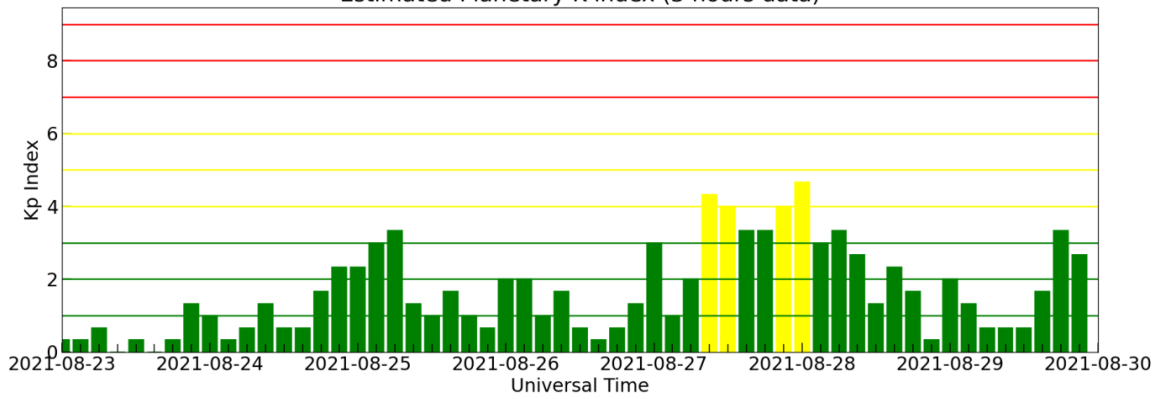
Dst (Real-Time)

WDC for Geomagnetism, Kyoto

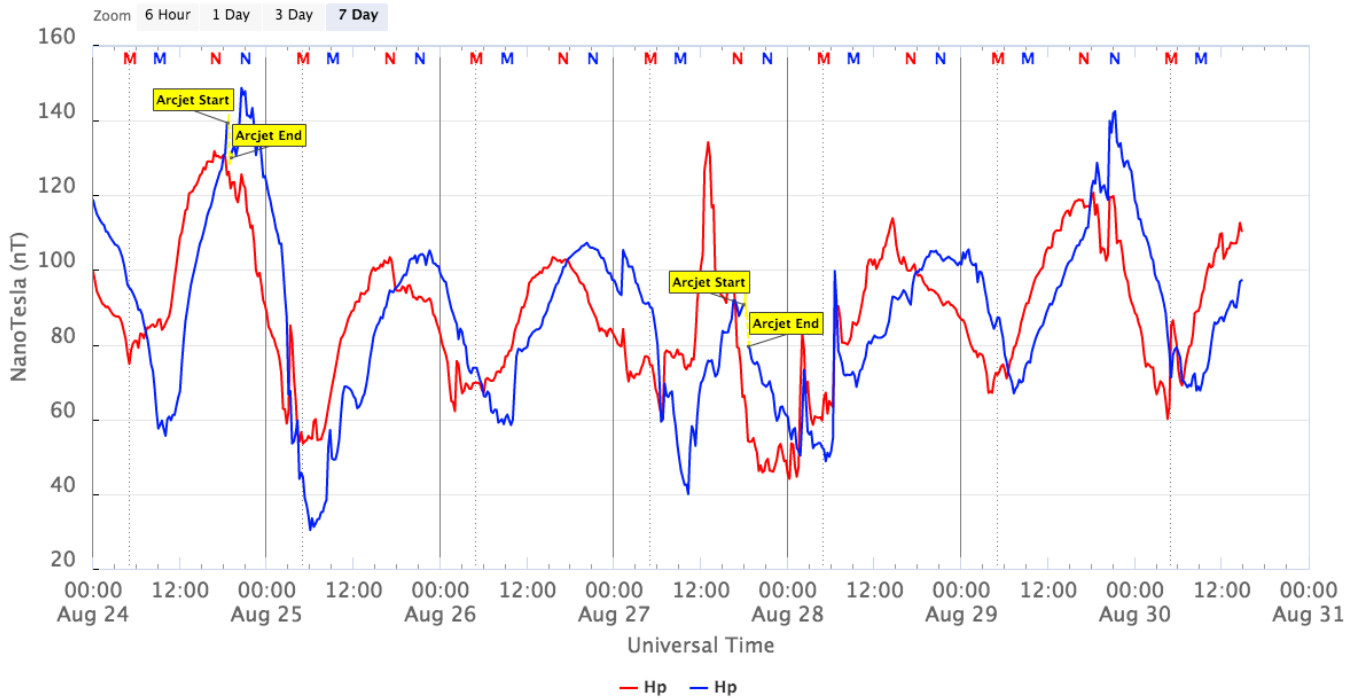


[Created at 2021-08-30 16:00UT]

Estimated Planetary Kp index (3 hours data)



GOES Magnetometers (1-minute data)

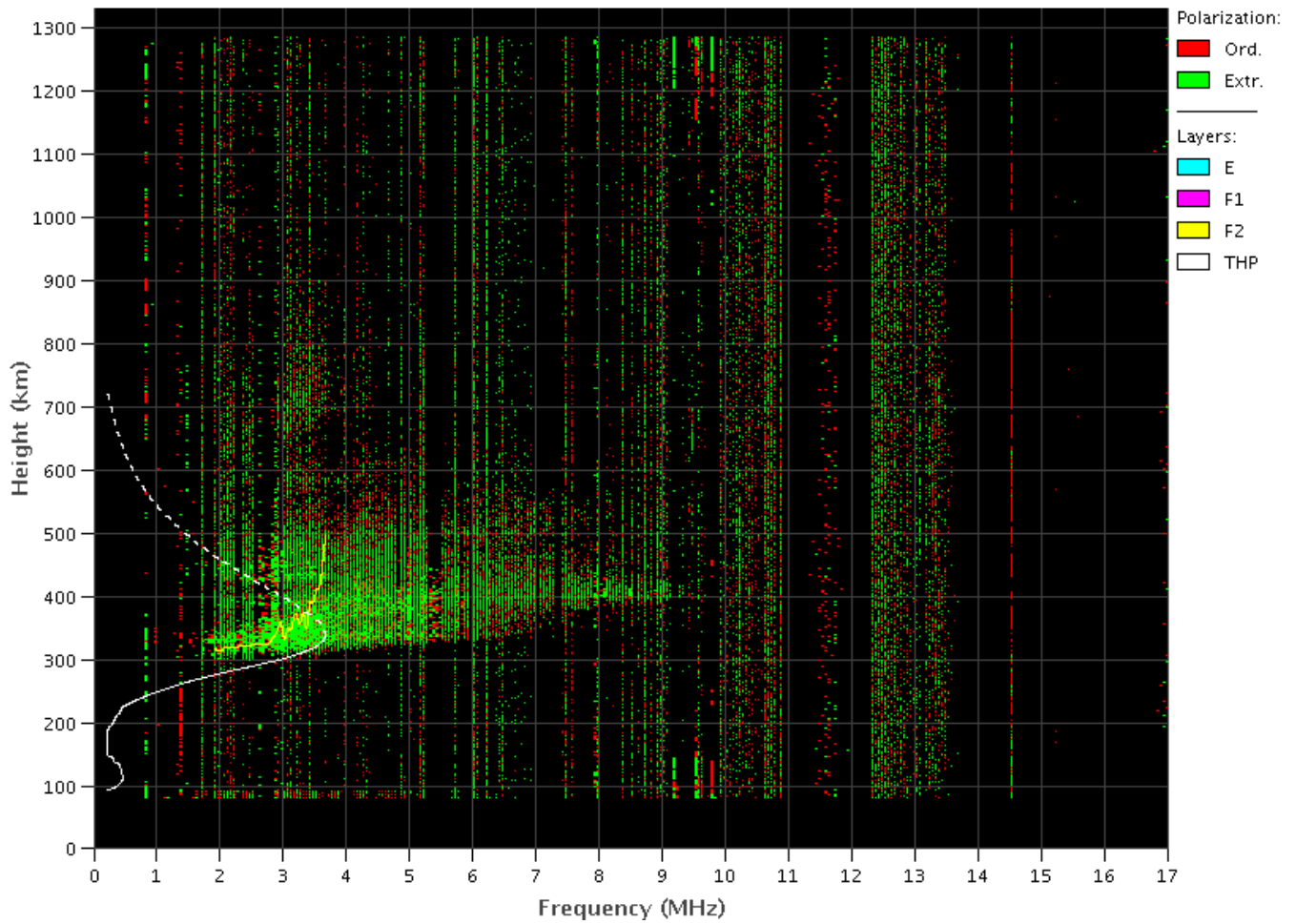


Ionosphere

Responsible: Laysa Resende

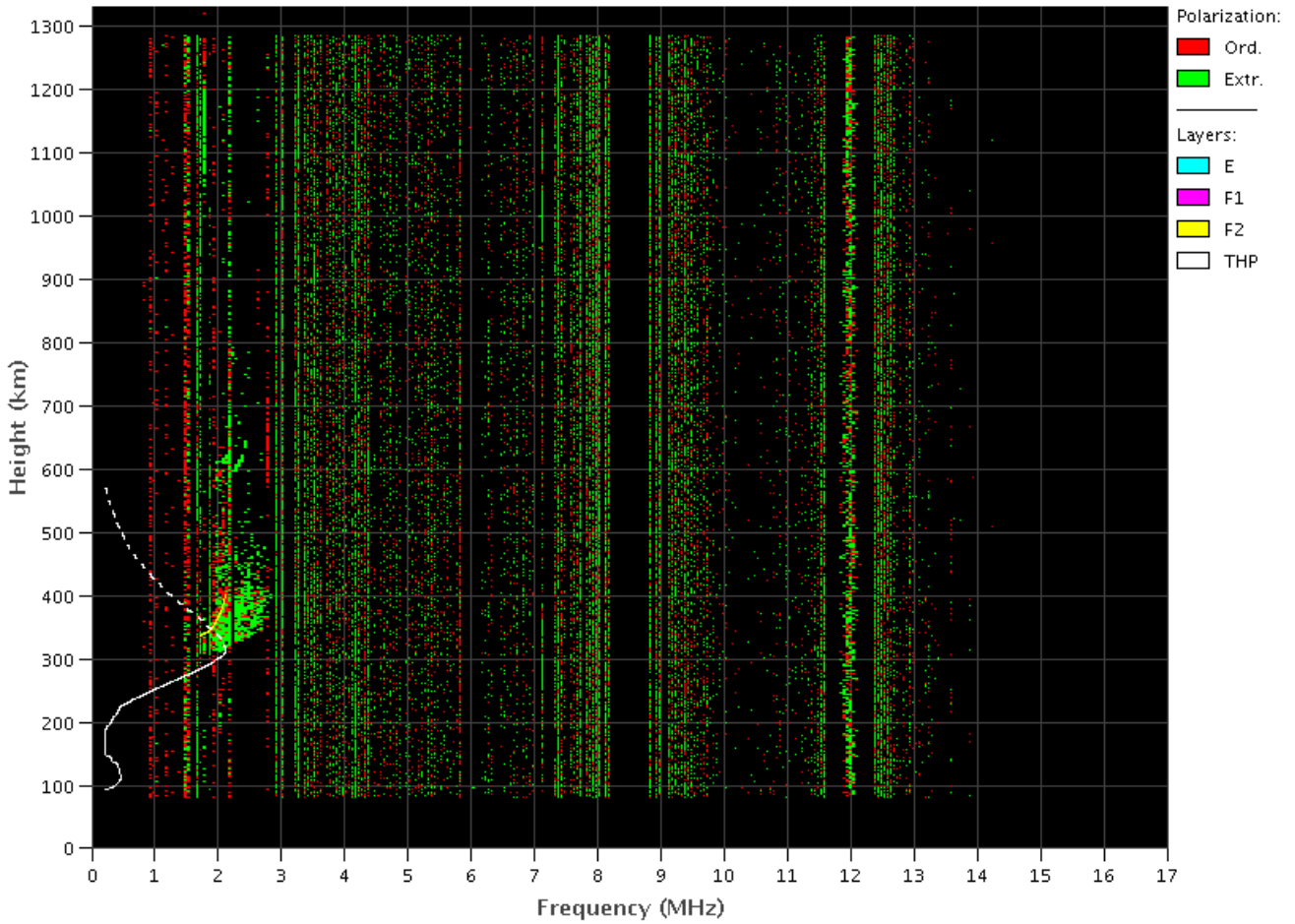
Boa Vista

- There were spread F on days September 06, 07, 08, and 10.
- The Es layers reached scale 4 on September 12.



Cachoeira Paulista

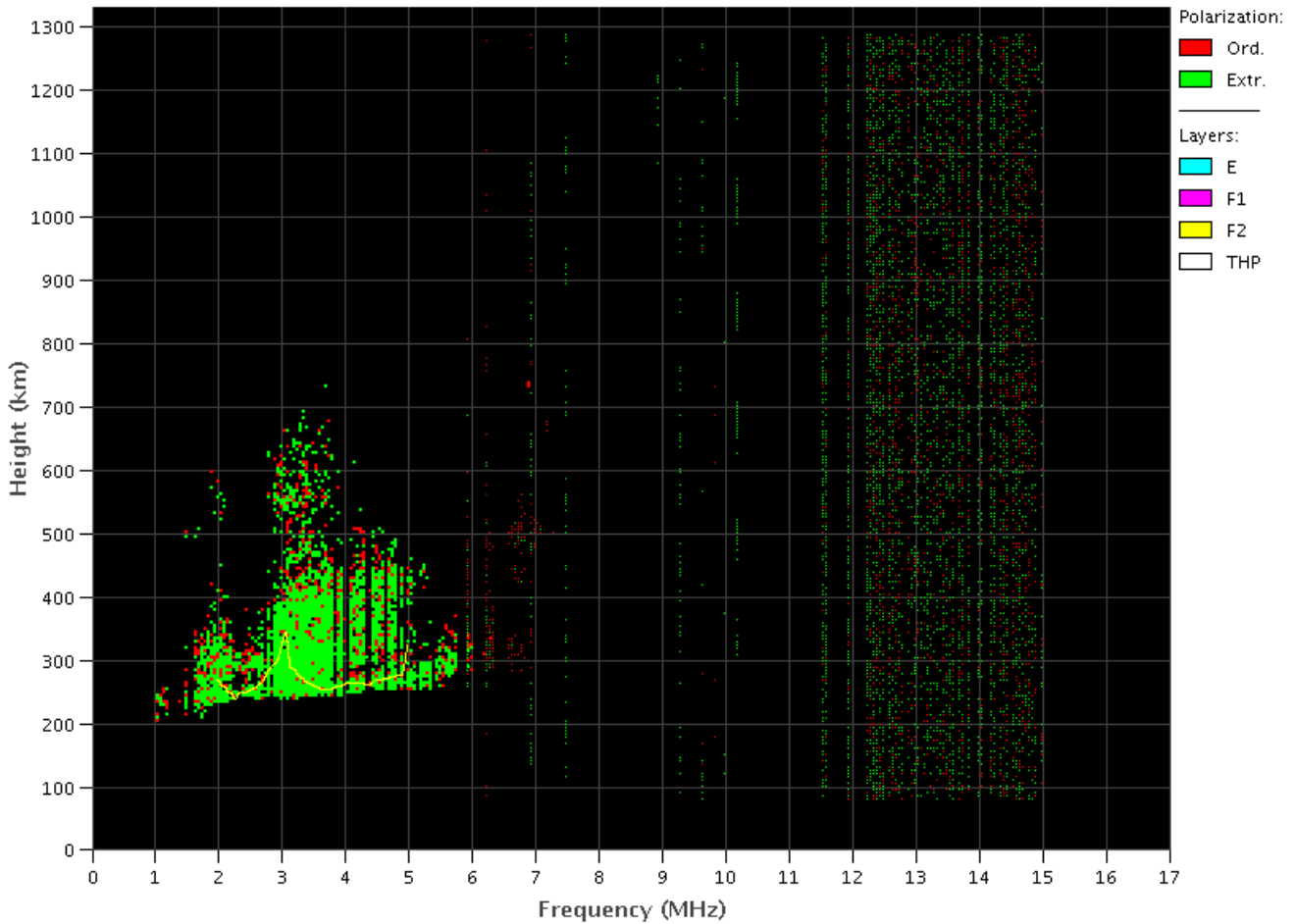
- There was not spread F during the week.
- The Es layers reached scale 2 during all day in the week.



São Luis

- There was not spread F on September 12 only.
- The Es layers reached scale 3 on September 08, and 11.

São Luís – 09/08/2021 02:00:00 UT



Cintillation 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 Bahia / 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 STSN, SLMA and UFBA stations showed moderate scintillations on different days during the analyzed period beginning on September 5th. This confirms that the period of bubbles in the Brazilian region is starting.

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. In the case of the STSN station, S4 values in the range 0.3 and 0.6 were observed between 0135 and 0300 UT on 05/09 (Figure 1 panel A). In the week 06-12/09, SLMA, STSN and UFBA stations reported S4 S4 values above 0.3 (Figure 2 panel A, B and C respectively)

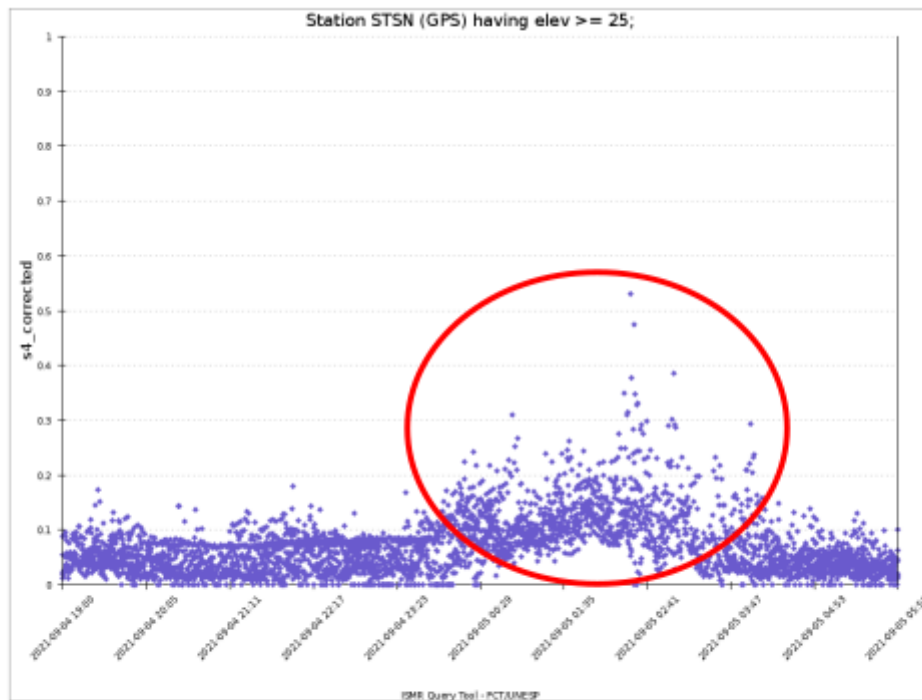


Figure 1: Values of the S4 index for the GPS constellation between September 4th and September 5th for the SLMA station in São Luís\MN.

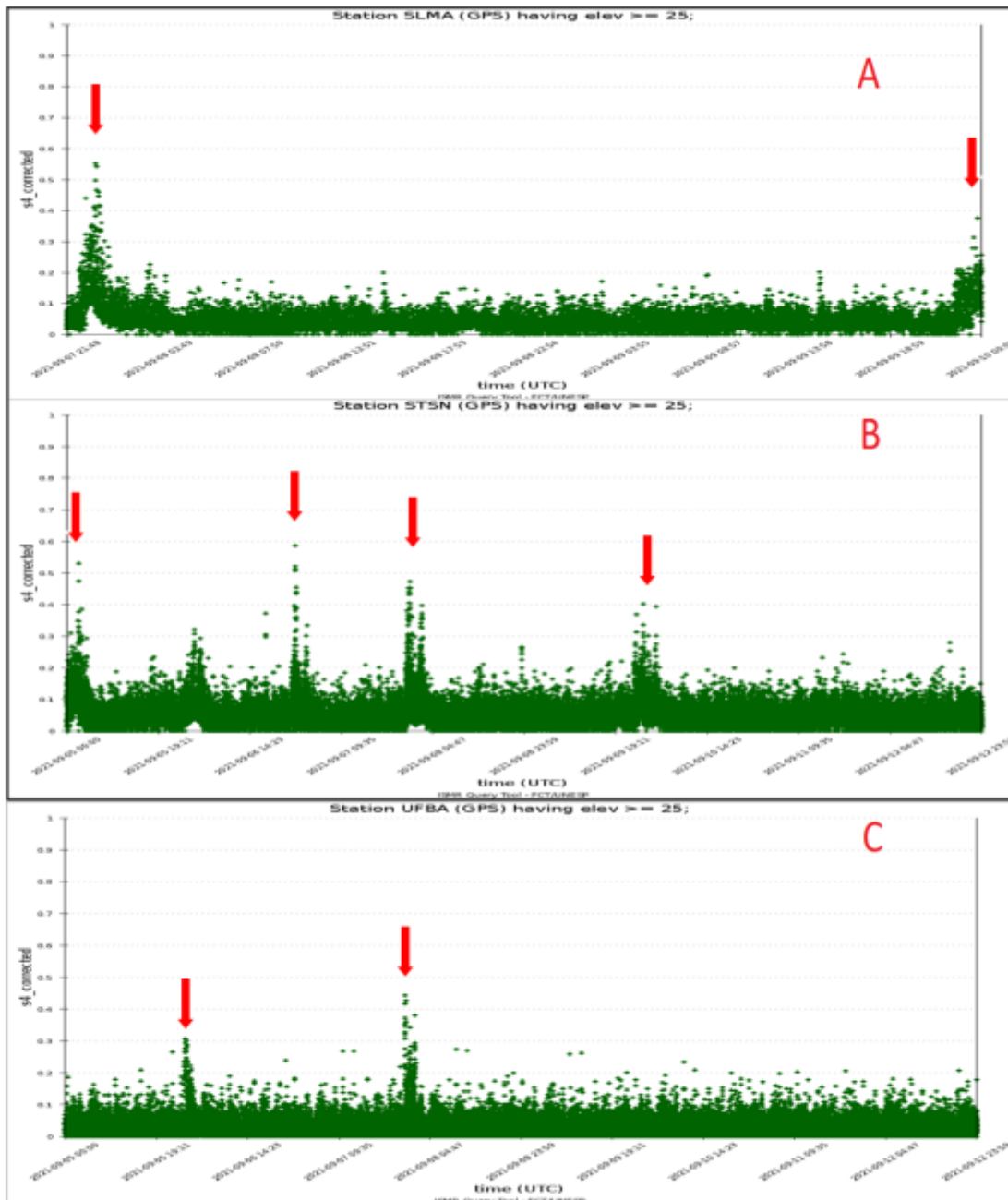


Figure 2: Values of the S4 index for the GPS constellation between September 5th and September 12th for the SLMA station (panel A), STSN (panel B) and UFBA (panel C). S4 values evidencing moderate scintillation are indicated with red arrows.