Sun – Solar Activity (Jean C. Santos)

Summary

Solar activity was low, with an active region of high magnetic complexity (beta-delta) present on the solar disk during the week. No M- or X-class solar flares occurred during this period. The Cactus software identified 14 CMEs, none of which were of the halo type (angular width greater than 180 degrees). A coronal hole with a significant area (>2.0% of the solar disk area) was identified crossing the solar disk during this interval.

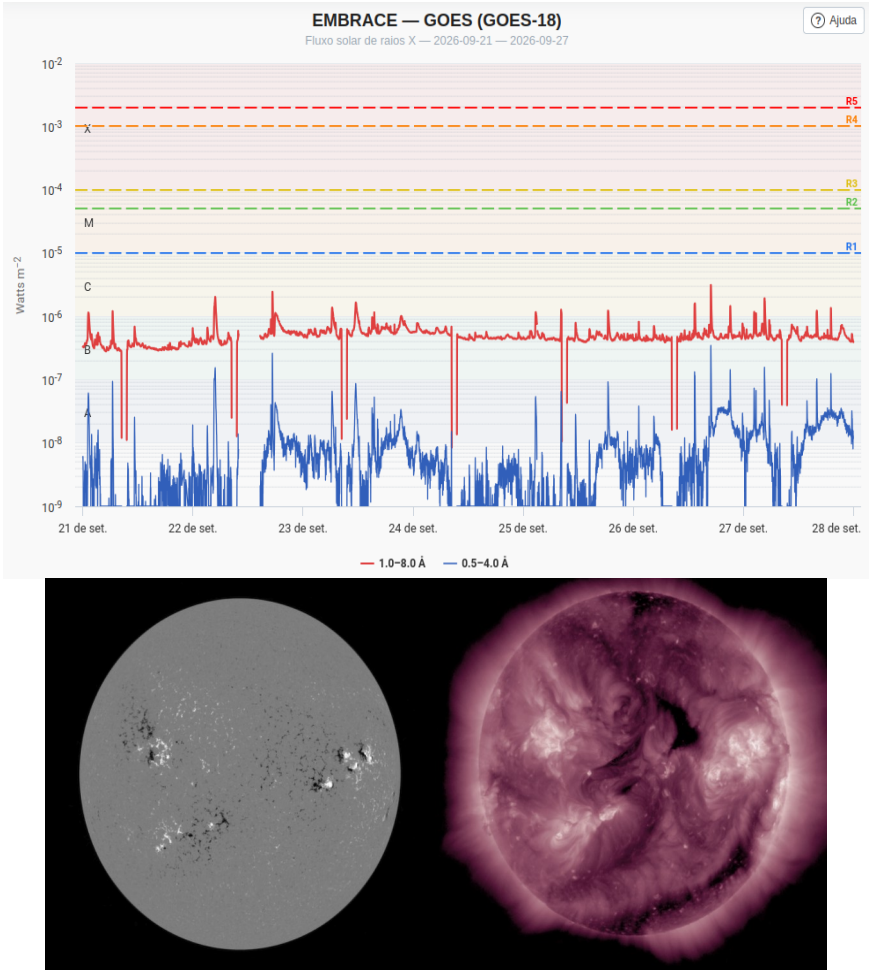


Figure 1 – X-ray flux measured by the GOES satellite (top panel) for the period of September 21–27, line-of-sight magnetic field (bottom left panel), and image at 211 angstroms (bottom right panel) measured on September 24, 2026.

Interplanetary Medium – IM – Daniele da S. F. Medeiros and Paulo R. Jauer
Period: September 21st to 28th

Summary

Summary of interplanetary medium (IM) conditions for the last week. The IM region in the last week showed a moderate level of plasma disturbances due to the possible interaction with a HSS identified by the SOLAR 1 satellite in the interplanetary medium. The interplanetary Kp index obtained by NOAA/SWPC and the modeling.

- The magnitude of the interplanetary magnetic field component peaked on September 24th at 06:30 UT at +13.57 nT.

- The BxBy components presented variations in the analyzed period, keeping both oscillating within the interval [-7.90, +12.25] nT. Showing nine rotations of the By component.

- The Bz component presents negative values for most of the week with a maximum negative -7.98 nT at 07:30 UT on September 24th. It presented positive value of +8.36 nT on September 23rd at 19:30 UT.

- The solar wind density maximum peaked on September 24th at 09:30 UT, reaching 18.27 protons/cm^3.

- The solar wind speed fluctuated between 278 to 519 km/s. An increase was observed beginning at 19:30 UT on September 23rd.

- The modeled and measured Kp index began the week with values below 2 (Kp < 2), indicating a quiet period. However, between September 24th and 27th, the measured and modeled Kp index reached values ranging from 3 (Kp > 3) to below 5 (Kp < 5), characterizing an active period.

Figure 1 illustrates a set of parameters observed in the solar wind by the SOLAR 1 satellite. The measured solar wind parameters can be identified in the following order starting: Interplanetary magnetic field modulus (IMF), the Bx, By, Bz components, Ey component, Solar wind density, speed and temperature.

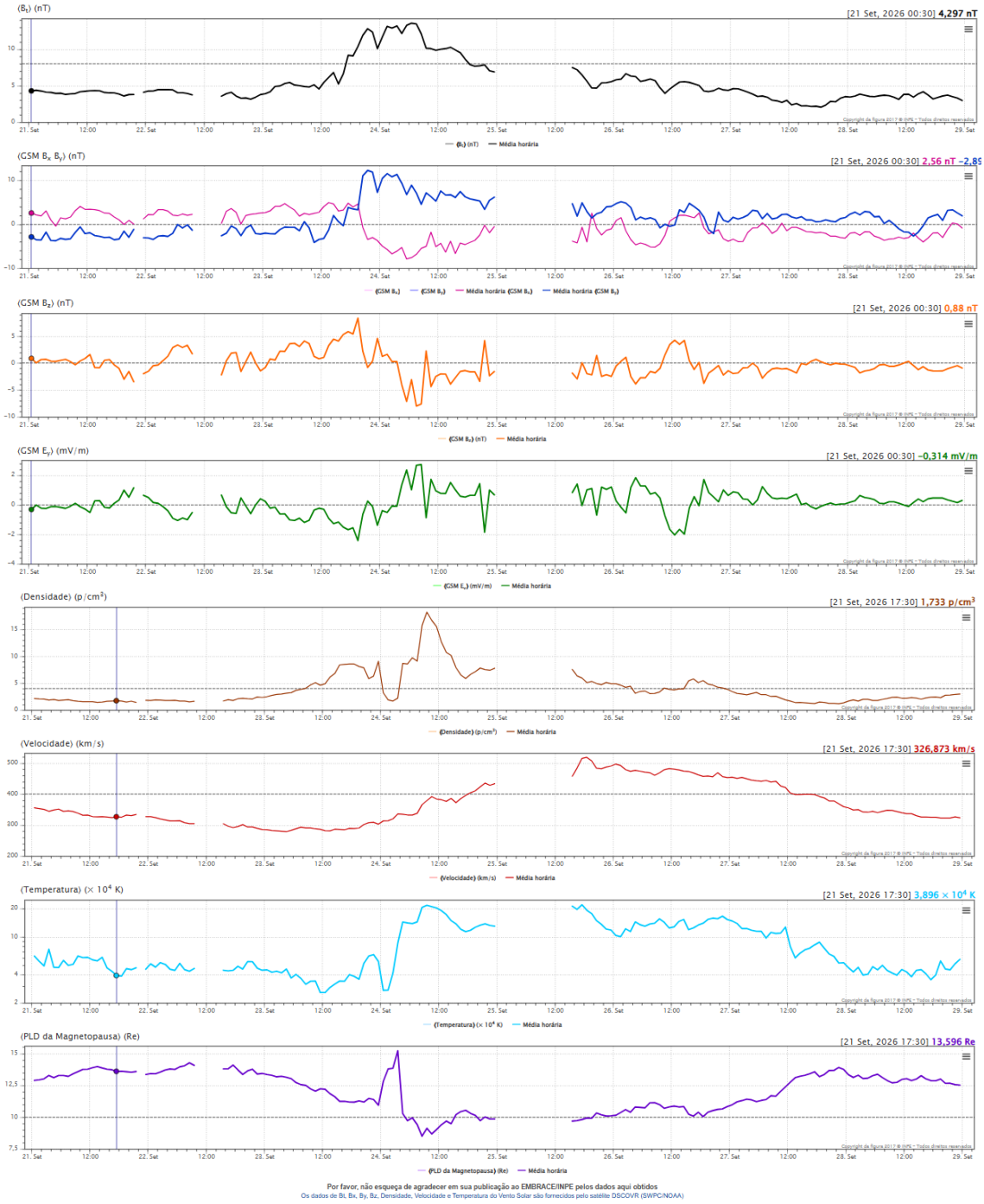


Figure 1: Illustrates a set of parameters observed in the solar wind by the SOLAR 1 satellite.

Figure 2 illustrates a set of parameters observed in the solar wind by the SOLAR 1 satellite. The measured solar wind parameters can be identified in the following order, starting with the panels below: solar wind speed, Bz component of the interplanetary magnetic field (IMF), solar wind density, and the last graph represents the Kp index obtained by NOAA/SWPC and the modeling.

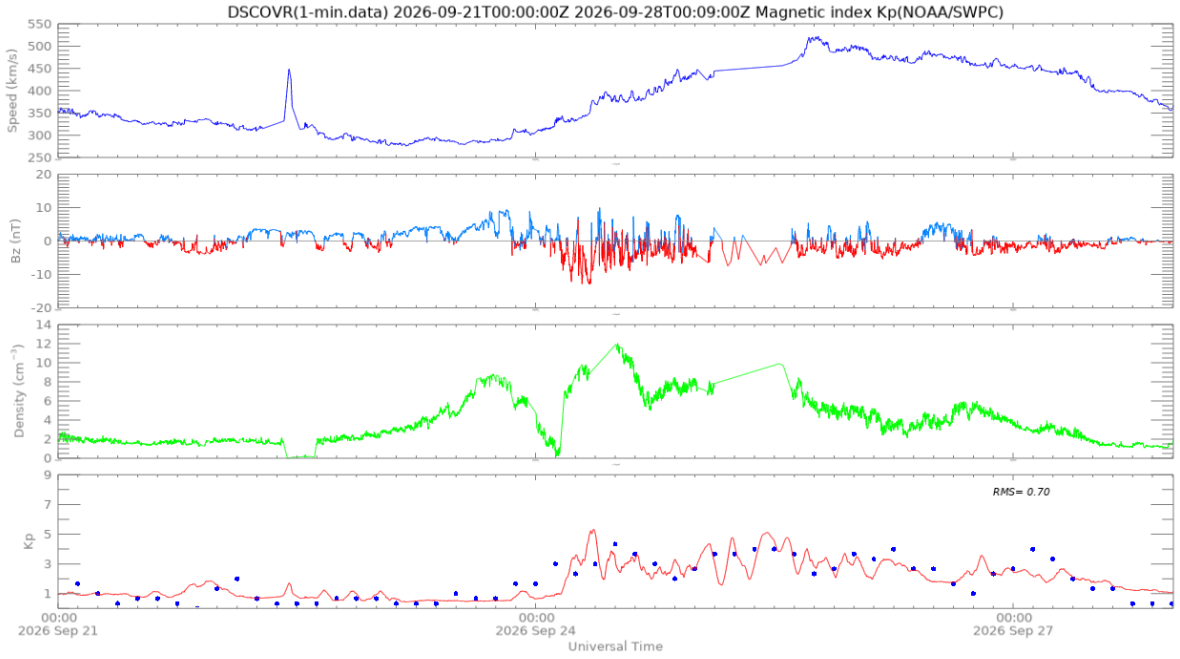


Figure 2: Illustrates a set of parameters observed in the solar wind by the SOLAR 1 satellite and the Kp index by NOAA/SWPC, blue dot, and the modeling, red line.

Geomagnetic field

Responsible: Karen Sarmiento /Lívia Alves/Sony Su Chen

Summary

The period from September 21 to 28 was characterized by initially quiet conditions, followed by a temporary increase in geomagnetic activity between September 23 and 27. The disturbances were primarily associated with the passage of an interplanetary magnetic structure observed beginning on September 23. Despite the variations recorded in the geomagnetic indices, no G1 or greater geomagnetic storm conditions were observed.

Between September 21 and 23, geomagnetic conditions remained predominantly quiet, with only minor intermittent disturbances. Beginning at 05 UT on September 23, the Dst index showed a progressive increase from +5 nT, reaching +32 nT around 22 UT. Geomagnetic activity increased between September 24 and 27. On September 24, the AE index intensified around 09 UT, exceeding 1000 nT, while the Kp index reached 4o between 09 and 12 UT. The Dst index reached -33 nT around 18 UT.

On September 25, the AE index remained near 500 nT for most of the period, with values exceeding 1000 nT between 09 and 11 UT. The Kp index reached 4o, while the Ksa index remained below 4o for most of the day, reaching 4o between 18 and 24 UT. The Dst index reached a minimum of -43 nT at 14 UT, followed by a recovery trend. The dHsa index exhibited a similar response, reaching a minimum of -43 nT at approximately 21 UT.

A new period of enhanced activity occurred on September 27, when the Kp index reached 4+ between 00 and 03 UT. Following this interval, the indices indicated a progressive decrease in activity, with a return to predominantly quiet conditions.

During the past 24 hours, geomagnetic conditions remained predominantly quiet. The AE index remained below 250 nT, Kp ranged from 0o to 1o, and Ksa ranged from 1o to 2o. The Dst index fluctuated between -5 and 0 nT, with no indication of significant geomagnetic disturbances.

In summary, geomagnetic activity experienced a temporary enhancement between September 23 and 27, with maximum values of Kp 4+ and Dst -43 nT. Following September 27, activity decreased, with predominantly quiet conditions observed during the past 24 hours. No G1 or greater geomagnetic storm conditions were recorded during the period.

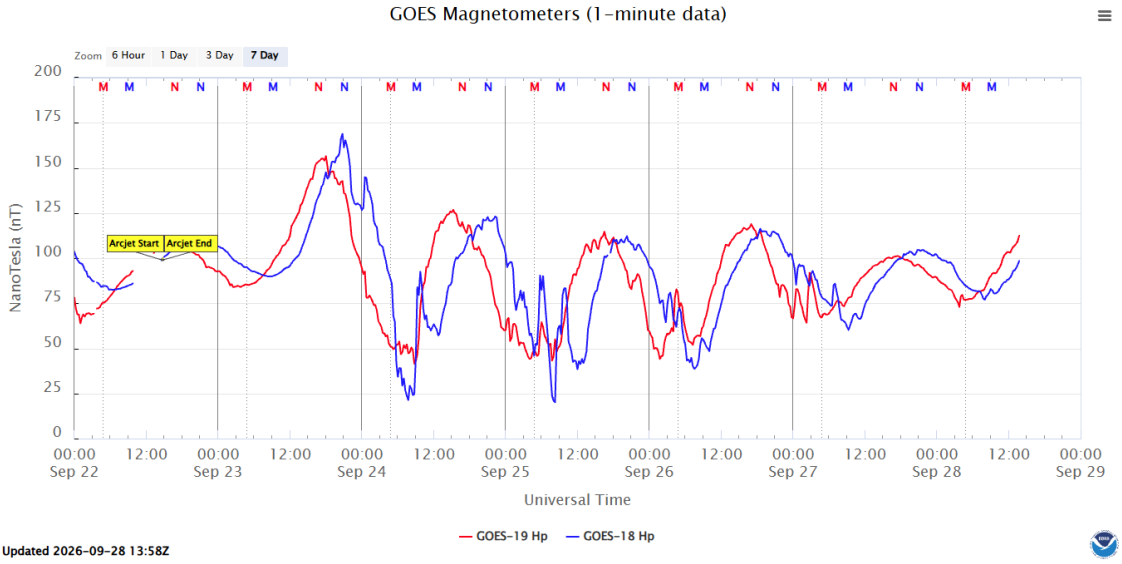


Figure 1 - Magnetic field measurement at the GOES satellite position.

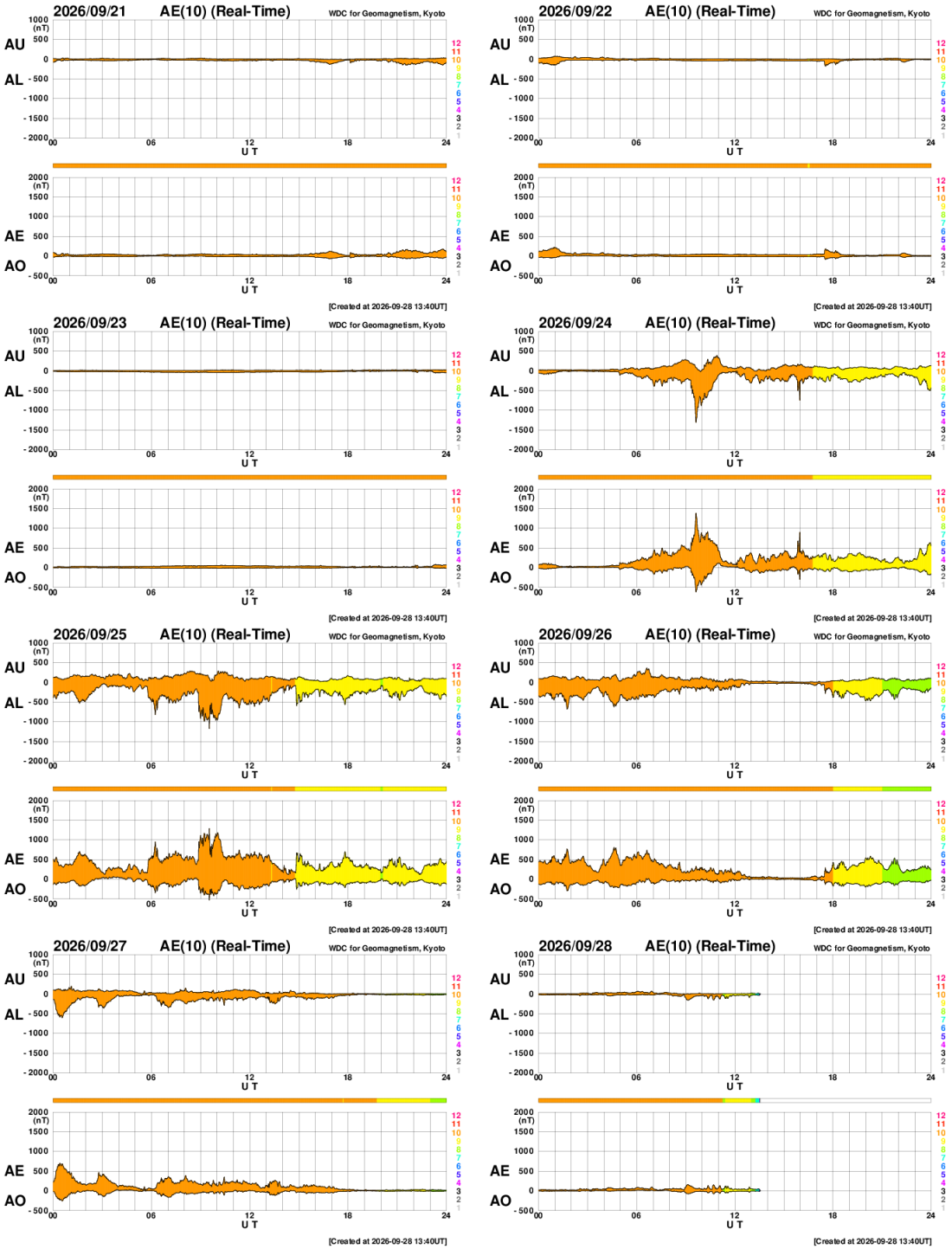


Figure 2 - AE index for the days of the week.



Figure 3 - Kp index on a logarithmic scale.

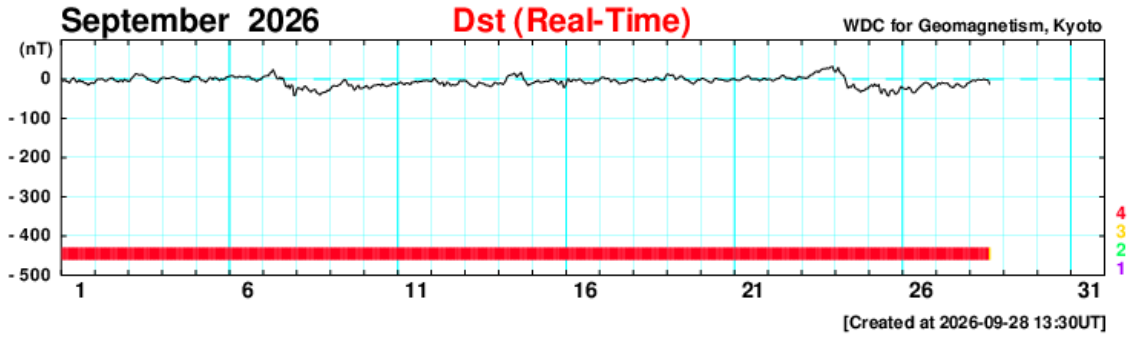


Figure 4 - Dst index.

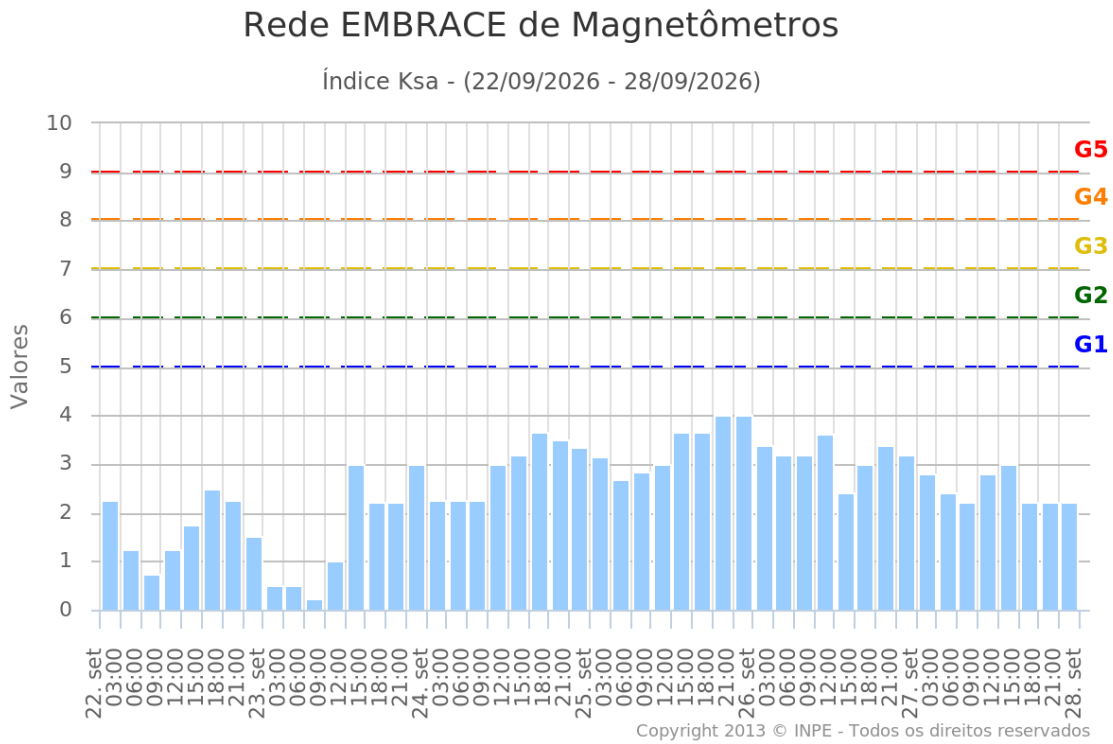


Figure 5 - Geomagnetic index in South America - Ksa Index.

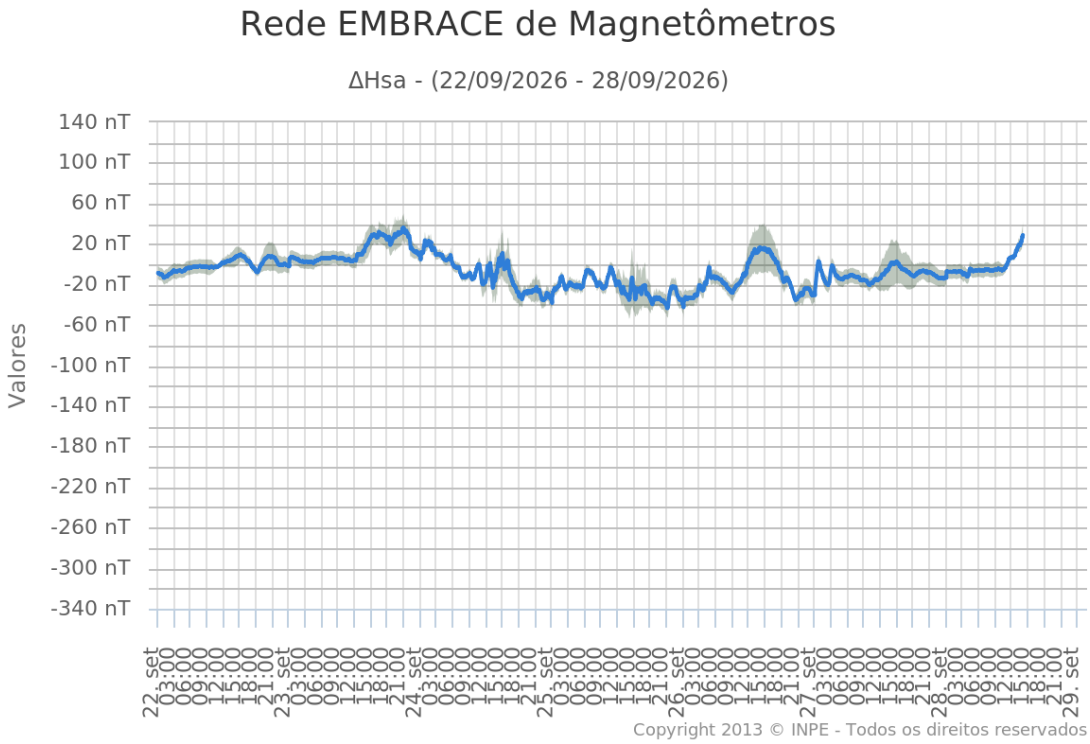


Figure 6 - Geomagnetic index in South America - ΔHsa index of the EMBRACE Program.

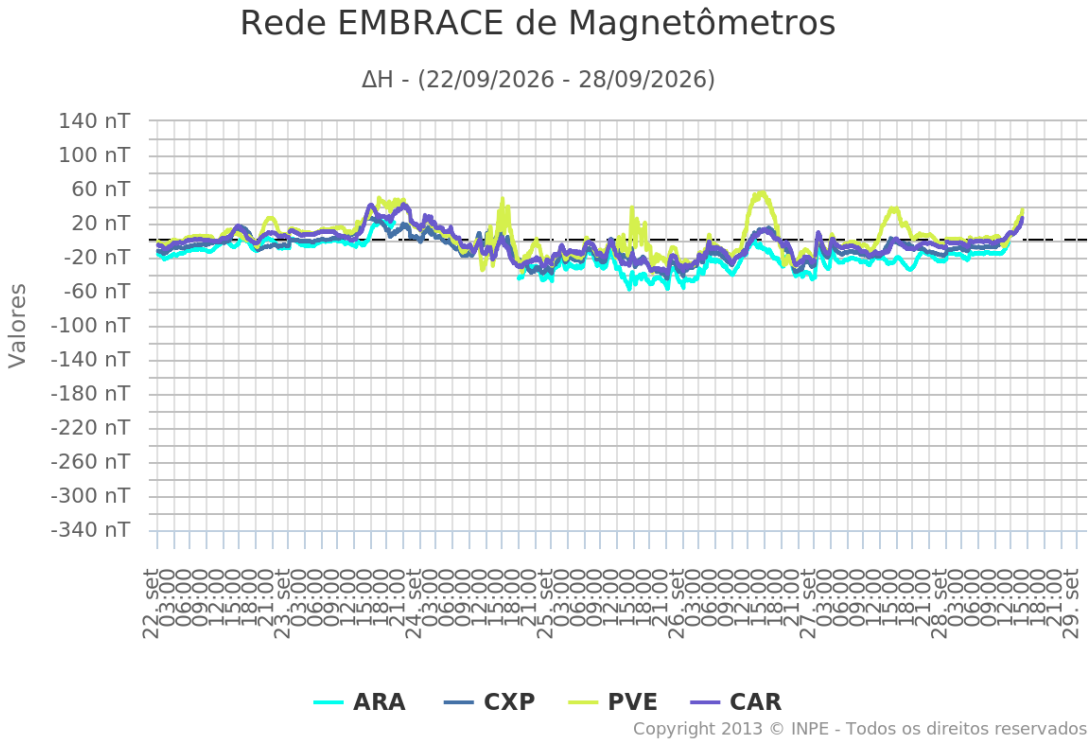


Figure 7 - Geomagnetic index in South America - ΔH index at magnetic stations of the EMBRACE Program.



Figure 8 – Variation of the geomagnetic field at the magnetic stations of the EMBRACE Program.

Ionosfera – Digisonde (Laysa Resende)

Summary

During this week, spread-F was observed over Boa Vista, a station located near the geographic equator, while no spread-F events were detected over Cachoeira Paulista. Sporadic E (Es) layers reached a maximum intensity of scale 3. Variations in the Maximum Usable Frequency (MUF) remained below the threshold required to classify the ionospheric conditions as moderate.

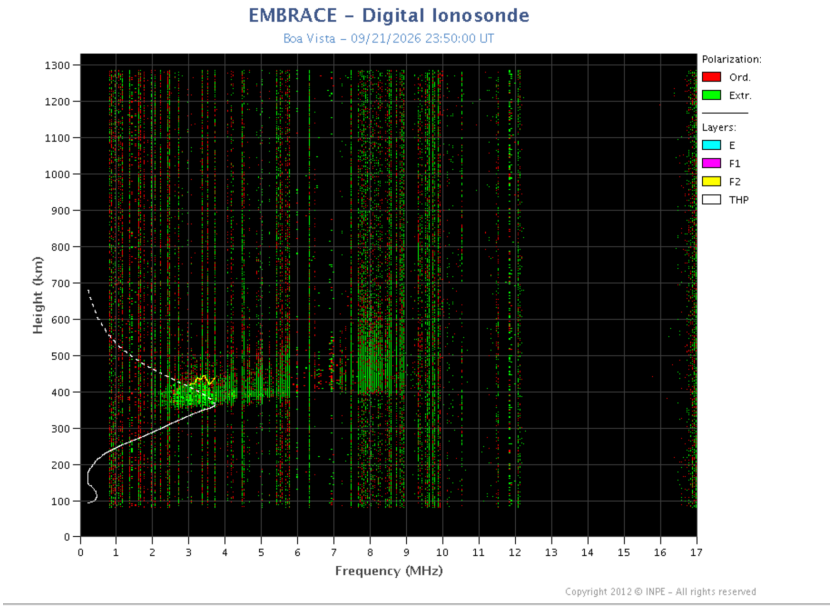


Figure 1 – Ionograms over Boa Vista showing the spread F.

Ionospheric F2-Layer Irregularities

Summary

During the period from September 20 to September 27, 2026, the parameters of F2-layer height (derived from the mean ionosonde fixed frequencies in the 3–10 MHz range), vertical drift velocity, total electron content (TEC), ionospheric scintillation index (S4), and images of the atomic oxygen red-line emission (OI 630 nm) were analyzed in order to monitor F2-layer ionospheric irregularities over South America.

The maximum F2-layer height associated with the pre-reversal enhancement ranged from 416 to 465 km, while the vertical drift velocity varied between 11 and 17 m/s (Figura 1).

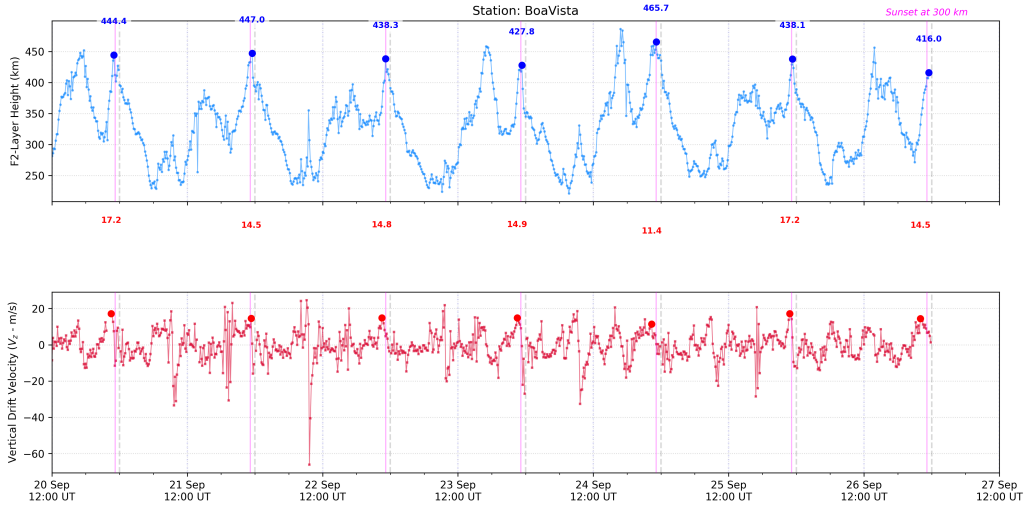


Figure 1: F2-layer height (upper panel) and vertical drift velocity (lower panel).

The Equatorial Ionization Anomaly (EIA) was observed throughout the entire study period, with maximum TEC values exceeding 80 TECU. Signatures of equatorial plasma bubble (EPB) events were also identified in the TEC maps. Furthermore, high S4 values were observed throughout the week (S4 $>$ 0.8), indicating severe scintillation conditions (Figure 2).

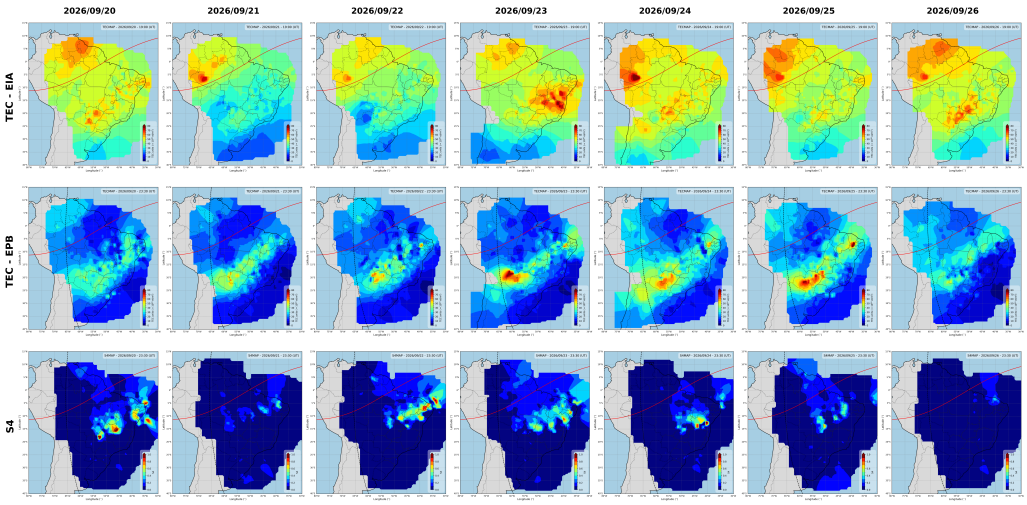
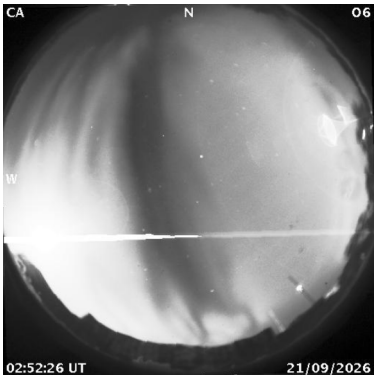


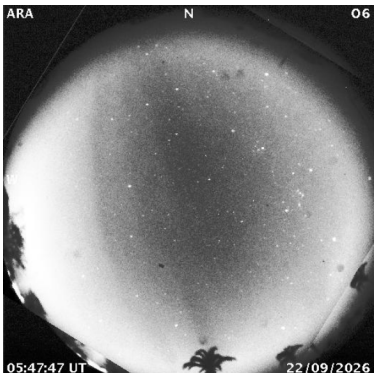
Figure 2: Total electron content (TEC) maps (upper and middle panels) and S4 index (lower panel).

1. All data presented are under the domain and responsibility of the Embrace Program. Todos os dados apresentados são de domínio e responsabilidade do Programa Embrace.
2. The figures presented were selected to represent ionospheric dynamics and may correspond to different times. As figuras apresentadas foram selecionadas para representar a dinâmica ionosférica e podem corresponder a horários distintos entre si.
3. For additional information and access to the complete dataset, please visit: https://www2.inpe.br/climaespacial/portal/en/home/. Para informações adicionais e acesso aos dados completos, consulte: https://www2.inpe.br/climaespacial/portal/

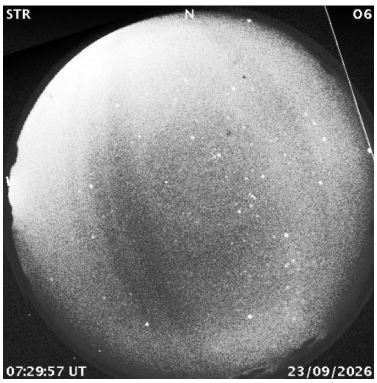
Signatures of EPBs were also observed in the atomic oxygen red-line emission (OI 630 nm) images obtained at Santarém (STR), Araguatins (ARA), and São João do Cariri (CA) throughout the week (Figure 3).



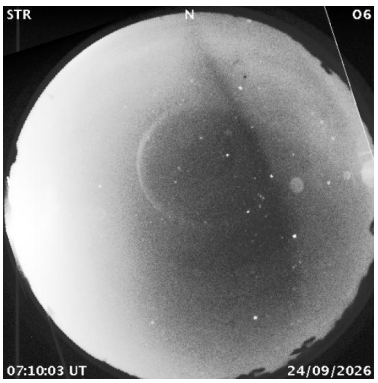
(a) CA (20–21/09/2026–02:52 UT)



(b) ARA (21–22/09/2026–05:47 UT)



(c) STR (22–23/09/2026–07:29 UT)



(d) STR (23-24/09/2026–07:29 UT)

Figure 3: Atomic oxygen red-line emission (OI 630 nm) images acquired over Brazil.

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