Sun – Solar Activity (Jean C. Santos)

Summary

The Sun exhibited low activity despite the presence of four active regions of high magnetic complexity (beta-gamma and beta-gamma-delta) on the solar disk during the week. Four M-class solar flares occurred during the period, with no X-class flares. The Cactus software identified 29 CMEs, none of which were of the Halo type (angular width greater than 180 degrees). Two coronal holes with significant area (>2.0% of the solar disk area) were identified crossing the solar disk during this interval.

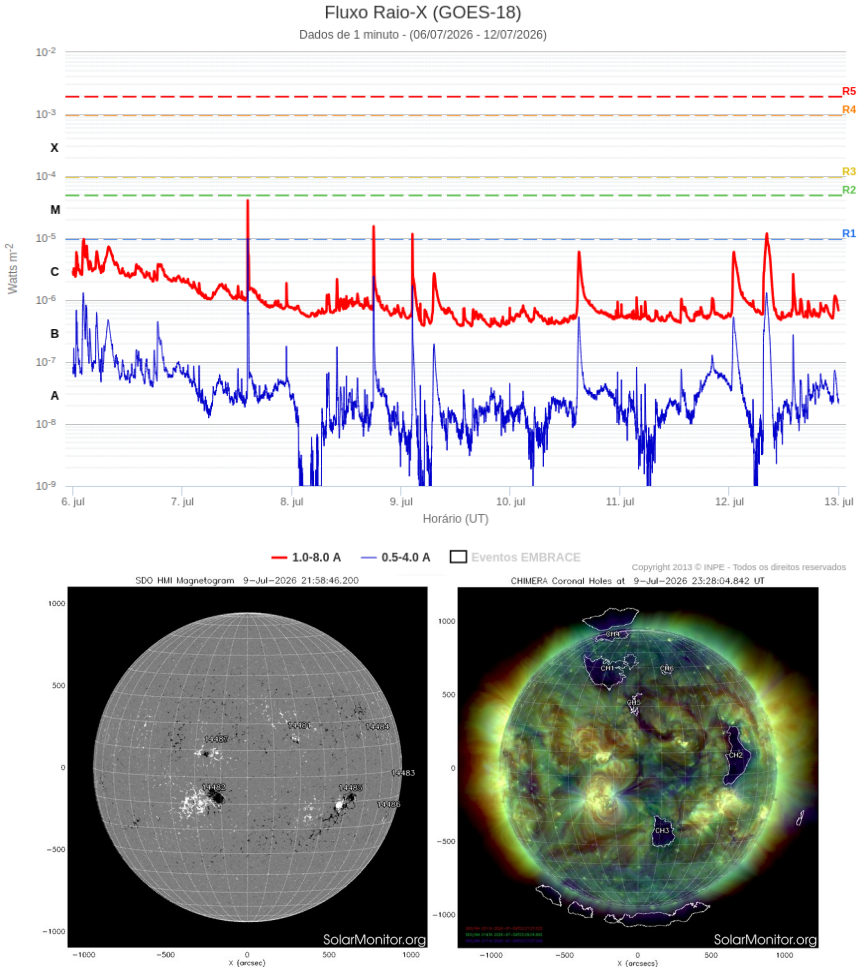

Figure 1 – X-ray flux measured by the GOES satellite (top panel) for the period of July 6–12, line-of-sight magnetic field (bottom left panel), and 193-angstrom image (bottom right panel) measured on July 9, 2026.

Interplanetary Medium – IM – Daniele da S. F. Medeiros and Paulo R. Jauer
Period: July 6th to 13th

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 an 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 July 9th at 15:30 UT at +12.49 nT.

- The BxBy components presented variations in the analyzed period, keeping both oscillating within the interval [-10.19, +9.70] nT. Showing twelve rotations of the By component.

- The Bz component presents negative values for most of the week with a maximum negative -7.13 nT at 02:30 UT on July 8th. It presented positive value of +4.56 nT on July 7th at 07:30 UT.

- The solar wind density maximum peaked on July 9th at 10:30 UT, reaching 14.33 protons/cm^3.

- The solar wind speed fluctuated between 357 to 635 km/s, with an increase beginning at 10:30 UT on July 9th.

- During the early part of the week, the measured and modeled interplanetary Kp index remained fluctuating between 1 and 3 (Kp < 3), characterized a calm period. The modeled and measured Kp index reached values below 5 (Kp < 5) on July 9th and 10th, indicating active levels. On July 12th, both the measured and modeled Kp values showed values ranging between 2 and 5 (Kp < 5).

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.

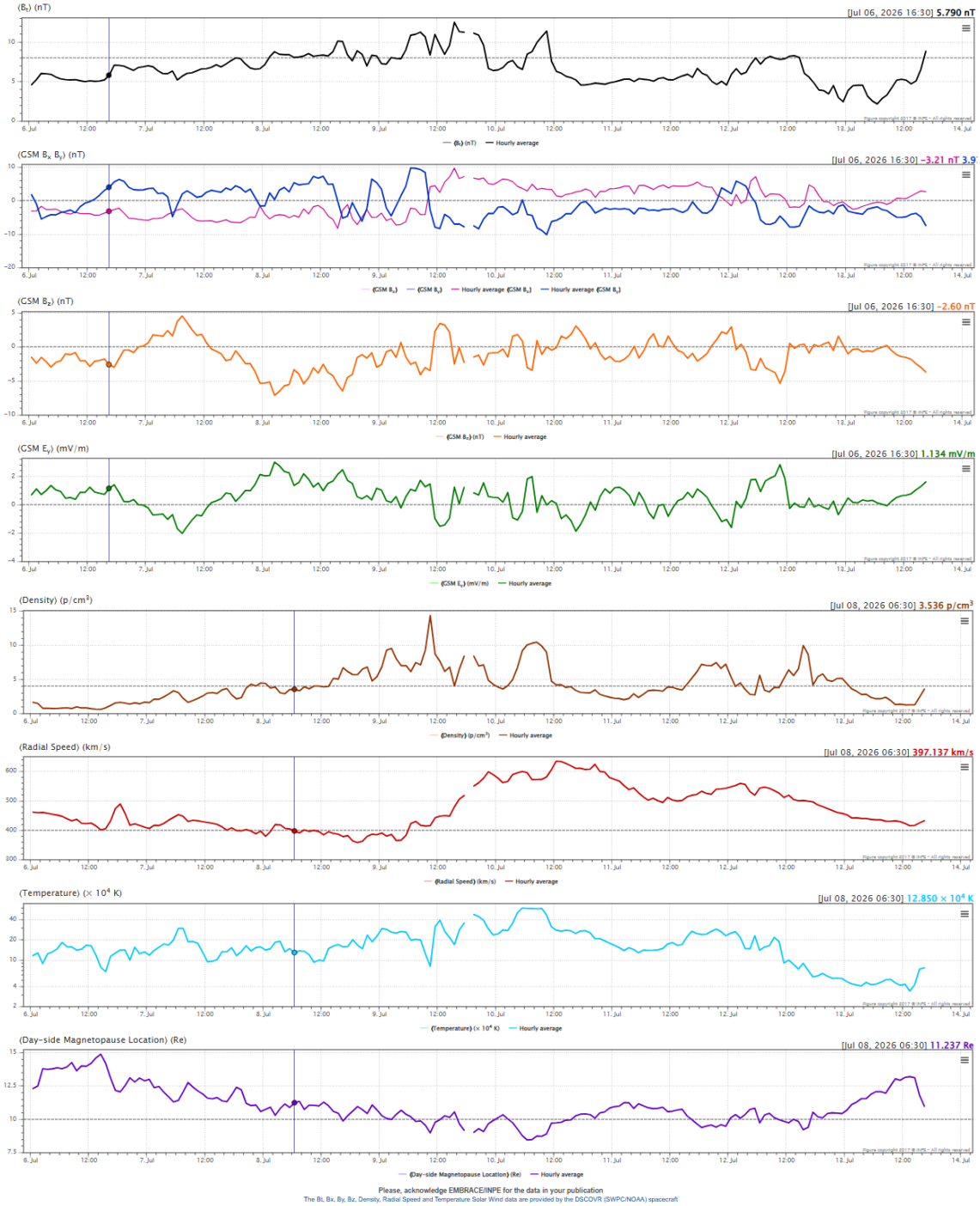

Figure 1: Illustrates a set of parameters observed in the solar wind by the SOLAR 1 satellite.

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.

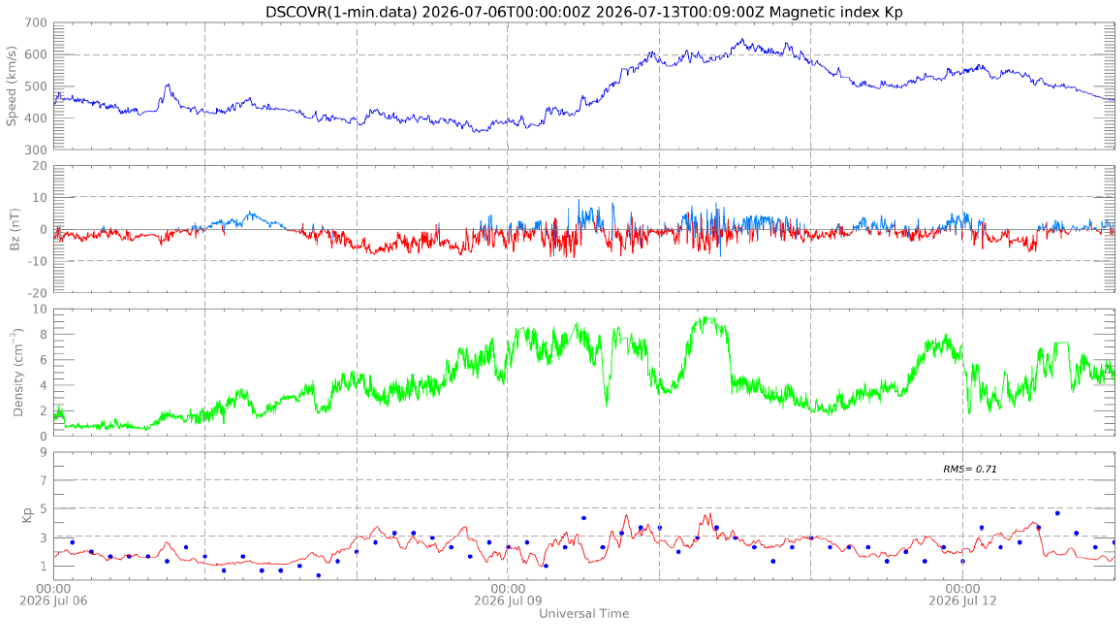

Figure 2: Illustrates a set of parameters observed in the solar wind by the SOLAR 1 satellite and the Kp index by NOAA/SWPC, blue dot, and the modeling, red line.

EARTH'S RADIATION BELT

Responsible: Ligia Da Silva

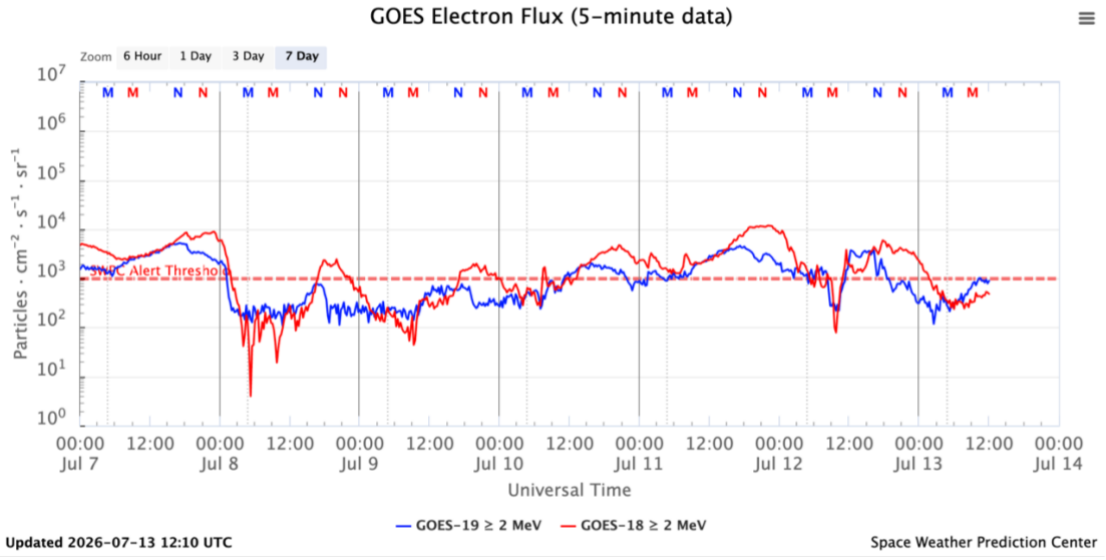

Figure 1: High-energy electron flux (> 2MeV) obtained from GOES-18 and GOES-19 satellite. Source: https://www.swpc.noaa.gov/products/goes-electron-flux

Summary

The high-energy electron flux (>2 MeV) in the outer boundary of the outer radiation belt obtained from the GOES-18 and GOES-19 geostationary satellites (Figure 1) exhibits a dropout on July 8, remaining below the minimum alert threshold [10^3 particles/(cm^2 s sr)] until the middle of that day. A second dropout is observed on July 9, followed by an increase that reached 10^4 particles/(cm^2 s sr) on July 11. A third dropout is also observed, reaching its minimum value at 12:00 UT on July 12.

Geomagnetic field

Responsible: Karen Sarmiento /Lívia Alves/Sony Su Chen

Summary

The period from July 7 to 13 was marked by geomagnetic field disturbances. Despite these variations, geomagnetic activity remained below the G1 (Minor) geomagnetic storm threshold.

At the beginning of the period, the geomagnetic field was still recovering from the geomagnetic storm that began between July 3 and 4. Between July 6 and 7, this recovery progressed steadily. However, by the end of July 7, around 17:00 UT, geomagnetic activity in the auroral region began to intensify. During the following days, geomagnetic activity fluctuated slightly above the threshold for quiet geomagnetic conditions.

In the auroral region, the AE index remained above 500 nT during several intervals, with the most significant enhancements occurring throughout most of July 8, between 10:00 and 11:00 UT and between 17:00 and 18:00 UT on July 9, between 06:00 and 07:00 UT on July 10, and between 11:00 and 12:00 UT on July 12.

The Dst index reached a minimum value of -54 nT at approximately 06:00 UT on July 8, while the dHsa index recorded a minimum of -70 nT around 14:00 UT on the same day. During the period, the highest Kp value was 4+, recorded between 12:00 and 15:00 UT on July 12. The Ksa index, in turn, reached its highest value of 5- during several intervals on July 8.

During the last 24 hours of the analyzed period, the geomagnetic field remained predominantly quiet, with only isolated disturbances.

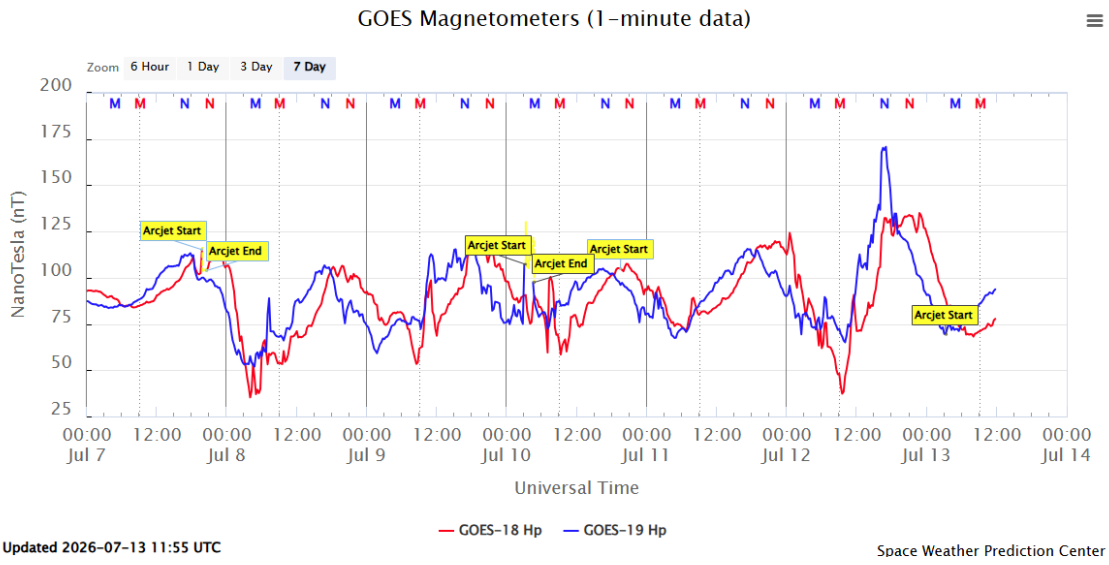

Figure 1 - Magnetic field measurement at the GOES satellite position.

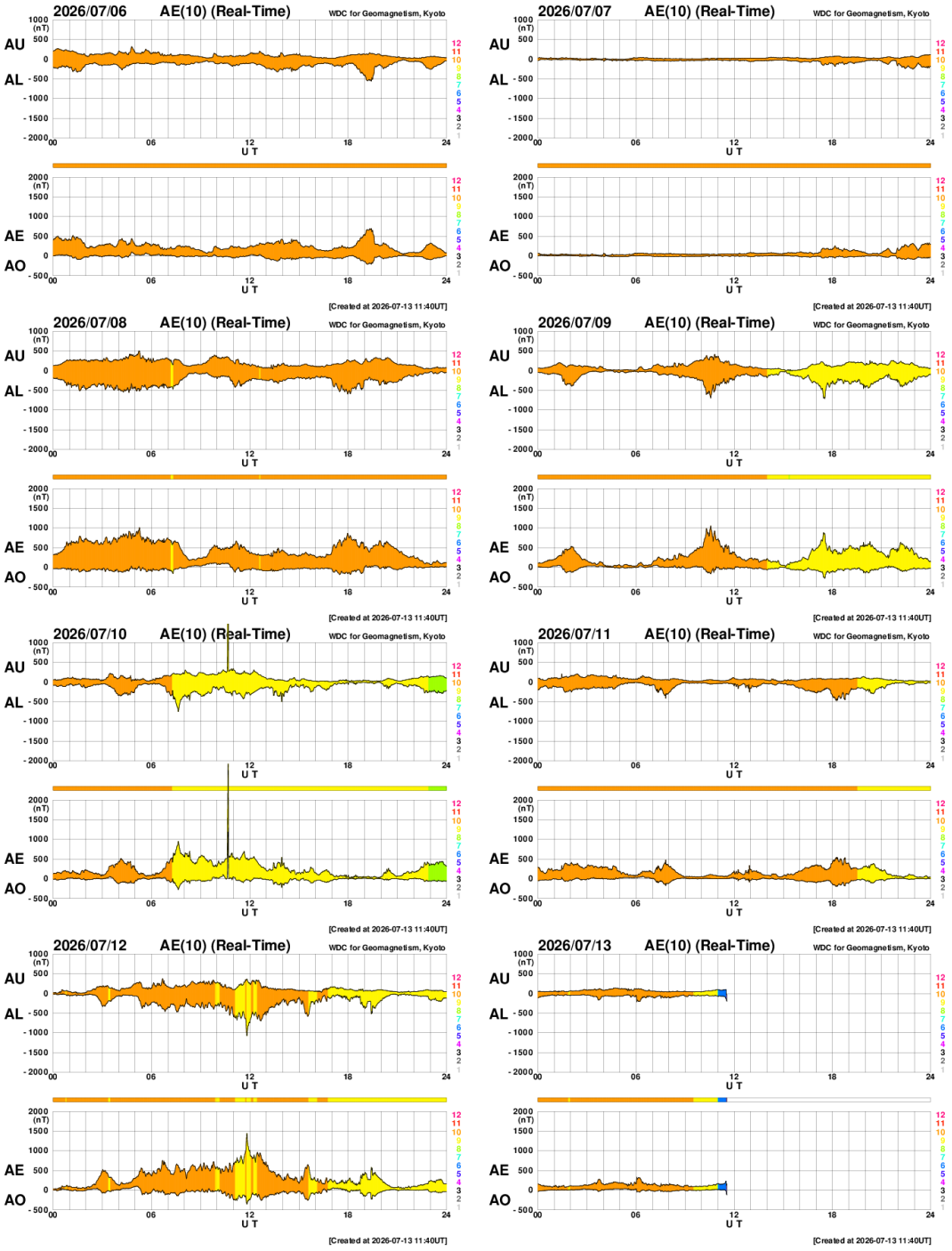

Figure 2 - AE index for the days of the week.

Figure 3 - Kp index on a logarithmic scale.

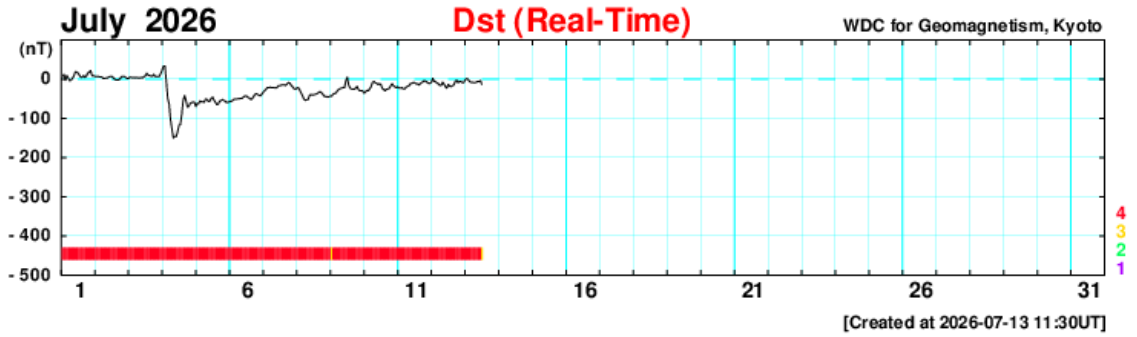

Figure 4 - Dst index.

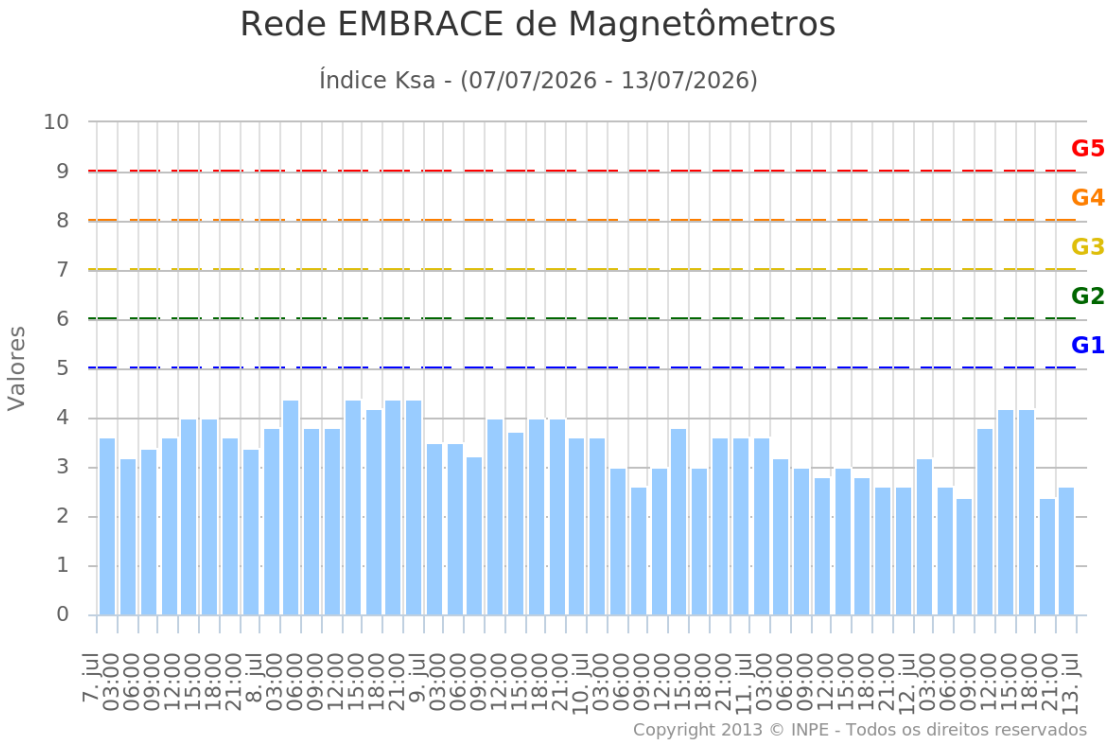

Figure 5 - Geomagnetic index in South America - Ksa Index.

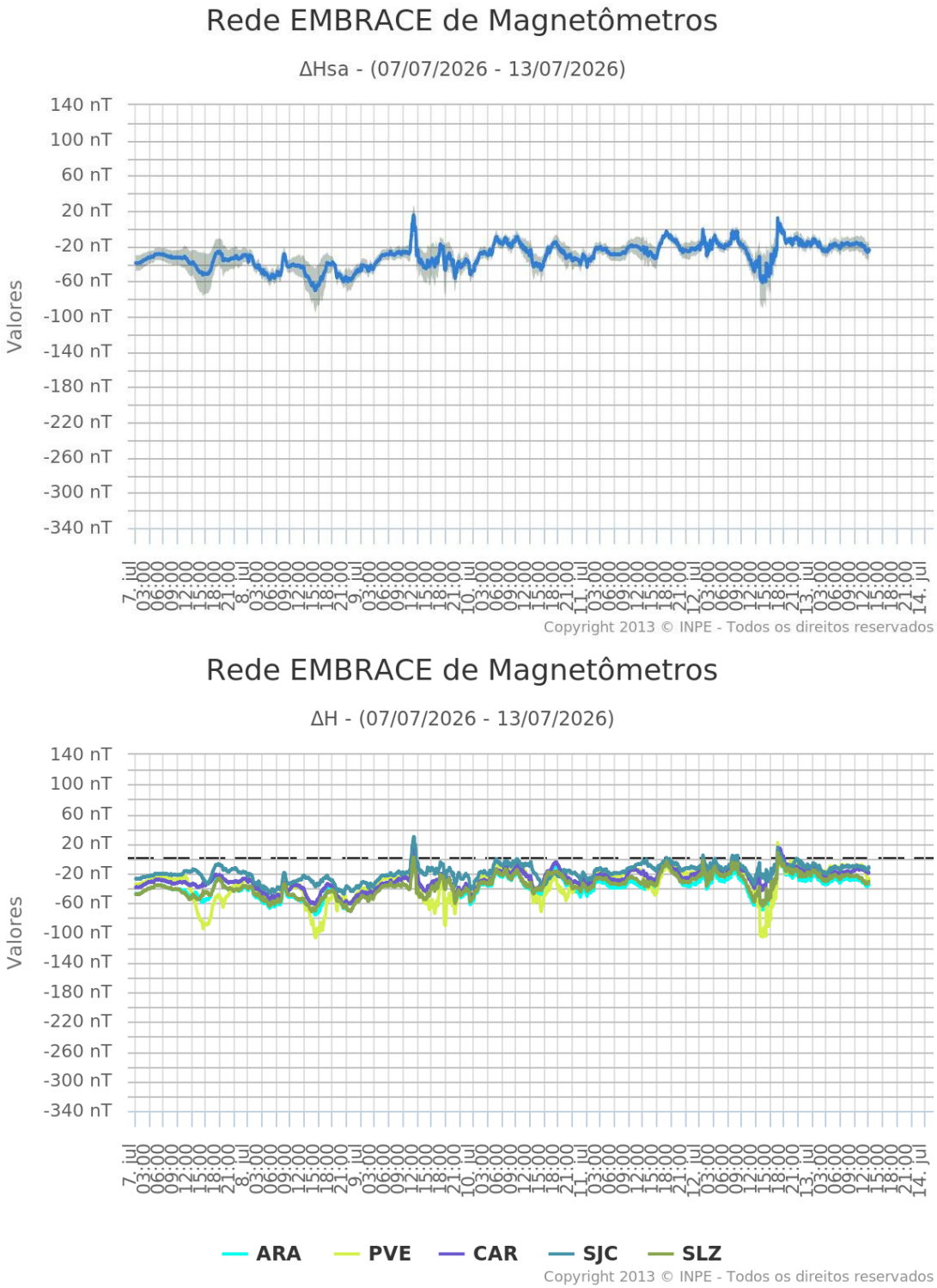

Figure 6 - Geomagnetic index in South America - ΔH index and at magnetic stations of the EMBRACE Program.

Figure 7 – Variation of the geomagnetic field at the magnetic stations of the EMBRACE Program.

Ionosfera – Digisonde (Laysa Resende)

Summary

This week, spread F and an F3 layer were observed over Boa Vista. Sporadic E (Es) layers reached scale 4 over Boa Vista on July 7 (Figure 1).

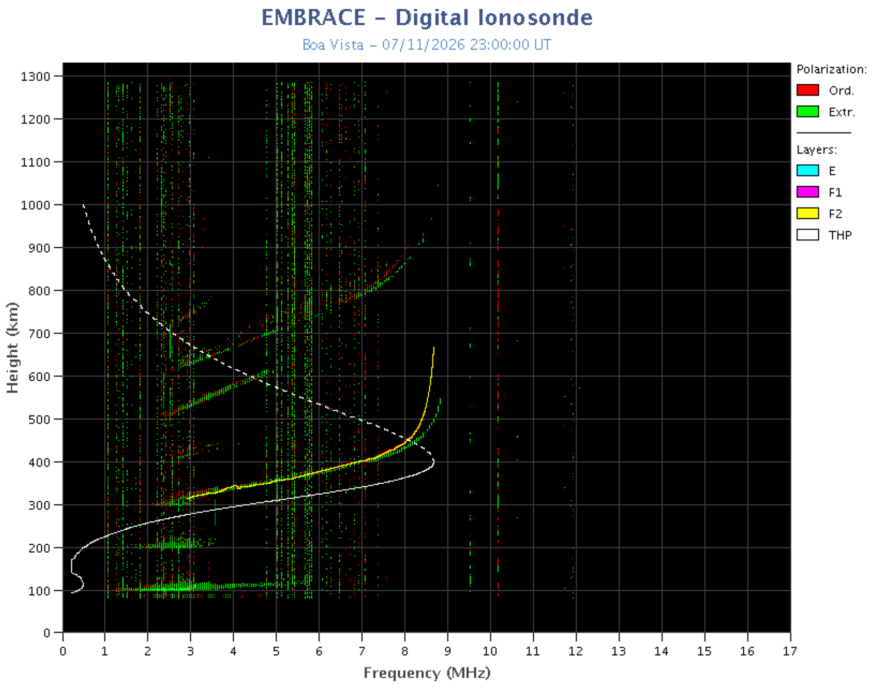

Figure 1 –Ionogram over Boa Vista, showing the Es layer on scale 4.

Ionospheric F2-Layer Irregularities

Summary

During the period from June 5 to July 11, 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 362 to 456 km, while the vertical drift velocity varied between 9 and 31 m/s (Figure 1).

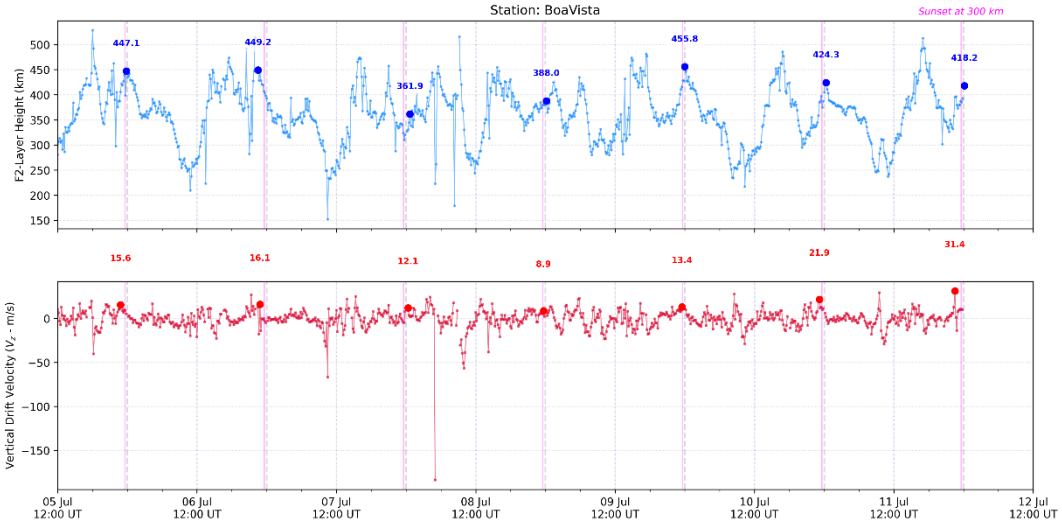

Figure 1 – F2-layer height (upper panel) and vertical drift velocity (lower panel).

The Equatorial Ionization Anomaly (EIA) was not presented on all days of the analyzed period. TEC reached maximum values of approximately 55 TECU. No signatures of equatorial plasma bubble (EPB) events were detected in the TEC maps. Furthermore, S4 values remained low throughout the week (S4 < 0.5), indicating quiet conditions. (Figure 2).

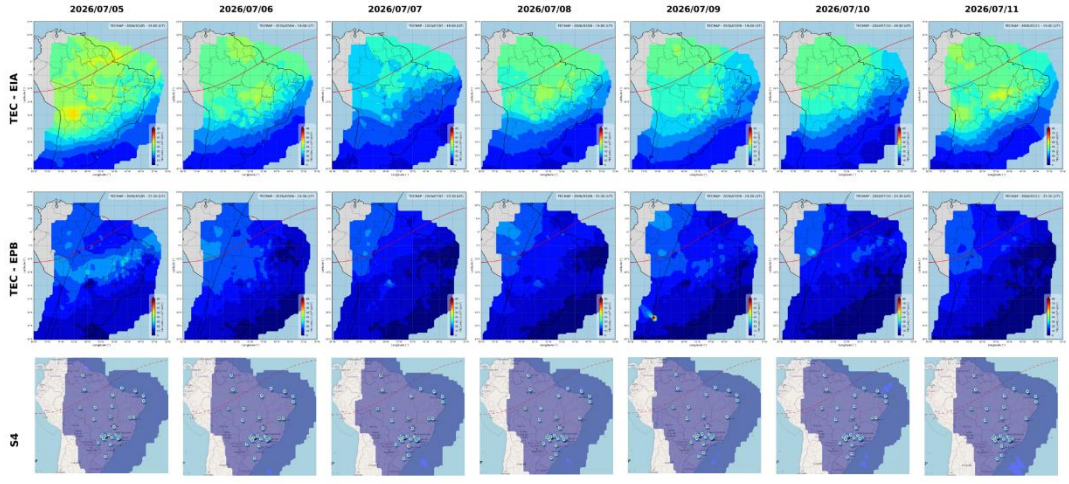

Figure 2 – Total electron content (TEC) maps (upper and middle panels) and S4 index (lower panel).

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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/.*

Although no signatures of ionospheric irregularities were identified in the previously analyzed parameters, images of the atomic oxygen red-line emission (OI 630 nm) obtained at Santarém (STR), Araguatins (ARA), and São João do Cariri (CA) revealed the occurrence of EPBs on the nights of June 7–8 and 9–10, 2026 (Figure 3).

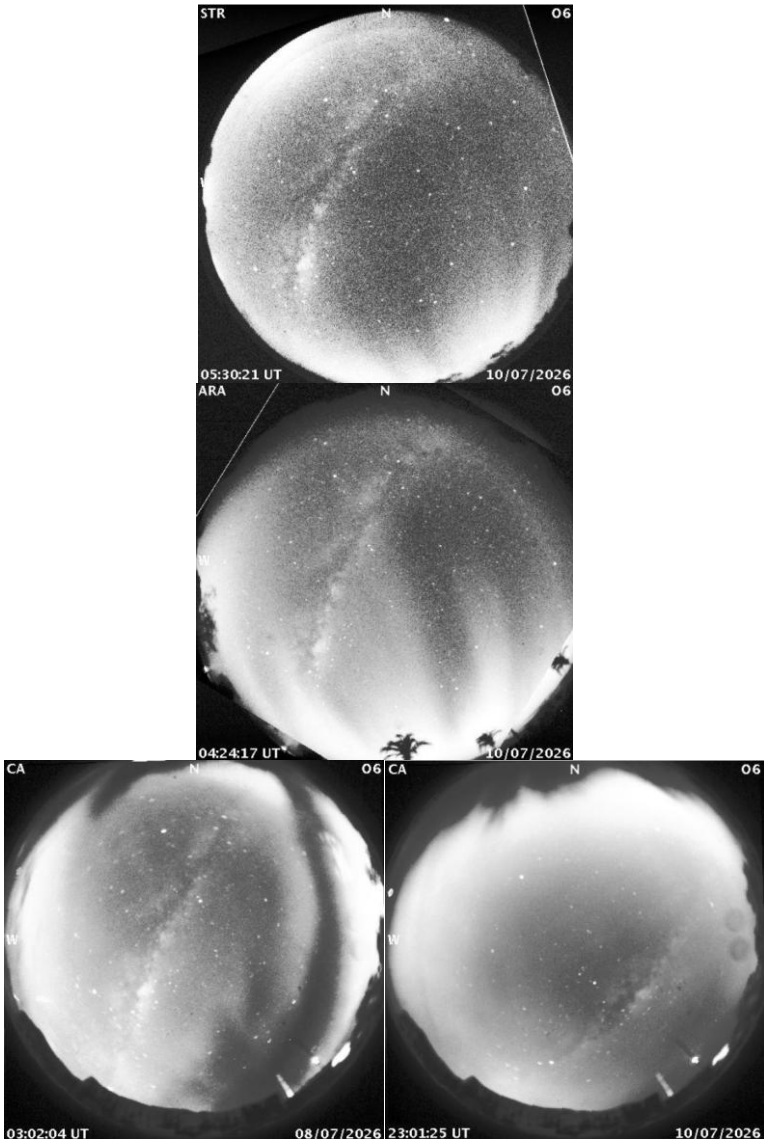

Figure 3 – Atomic oxygen red-line emission (OI 630 nm) images acquired by the Santarém (STR), Araguatins (ARA), and São João do Cariri (CA) all-sky imagers on the nights of June 7-8 and 9–10, 2026.

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