Interplanetary Medium – IM – Daniele da S. F. Medeiros and Paulo R. Jauer
Period: October 5th 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 a CME identified by the SOLAR-1 and ACE 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 October 10th at 15:20 UT at +42.40 nT.

- The BxBy components presented variations in the analyzed period, keeping both oscillating within the interval [-35.88, +26.50] nT. Showing rotations of the By component.

- The Bz component presents negative values for most of the week with a maximum negative -24.33 nT at 16:59 UT on October 10th. It presented positive value of +26.70 nT on October 10th at 15:47 UT.

- The solar wind density maximum peaked on October 10th at 14:38 UT, reaching 101 protons/cm^3.

- The solar wind speed fluctuated between 346 to 867 km/s. An increase was observed beginning at 14:24 UT on October 10th.

- The modeled and measured Kp index began the week with values below 4 (Kp < 4), indicating a quiet period. However, on October 10th, both the measured and modeled Kp indices reached values above 7 (Kp > 7), indicating a strong storm (level G3). Following this storm, the indices fluctuated during a calm period below 4 (Kp < 4).

Figure 1 illustrates a set of parameters observed in the solar wind by the SOLAR-1 and ACE 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.

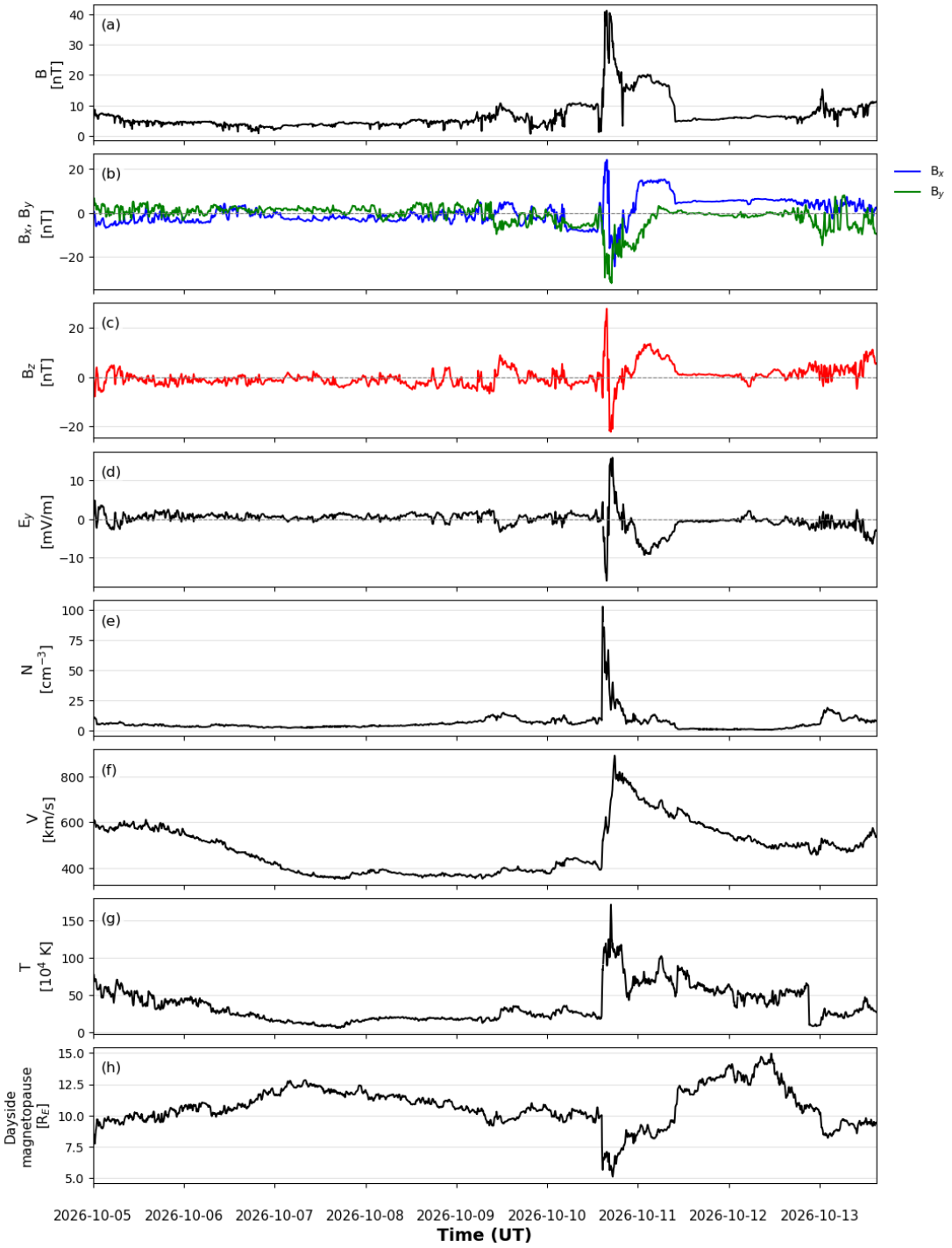


Figure 1: Illustrates a set of parameters observed in the solar wind by the SOLAR-1 and ACE satellite.

Figure 2 presents the temporal evolution of the Kp index. The upper panel covers the period from October 6th to 10th, whereas the lower panel provides a detailed view from October 10th to 13th. The measured Kp data were obtained from NOAA/SWPC and are compared with the 1-minute Kp values estimated by the proposed model.

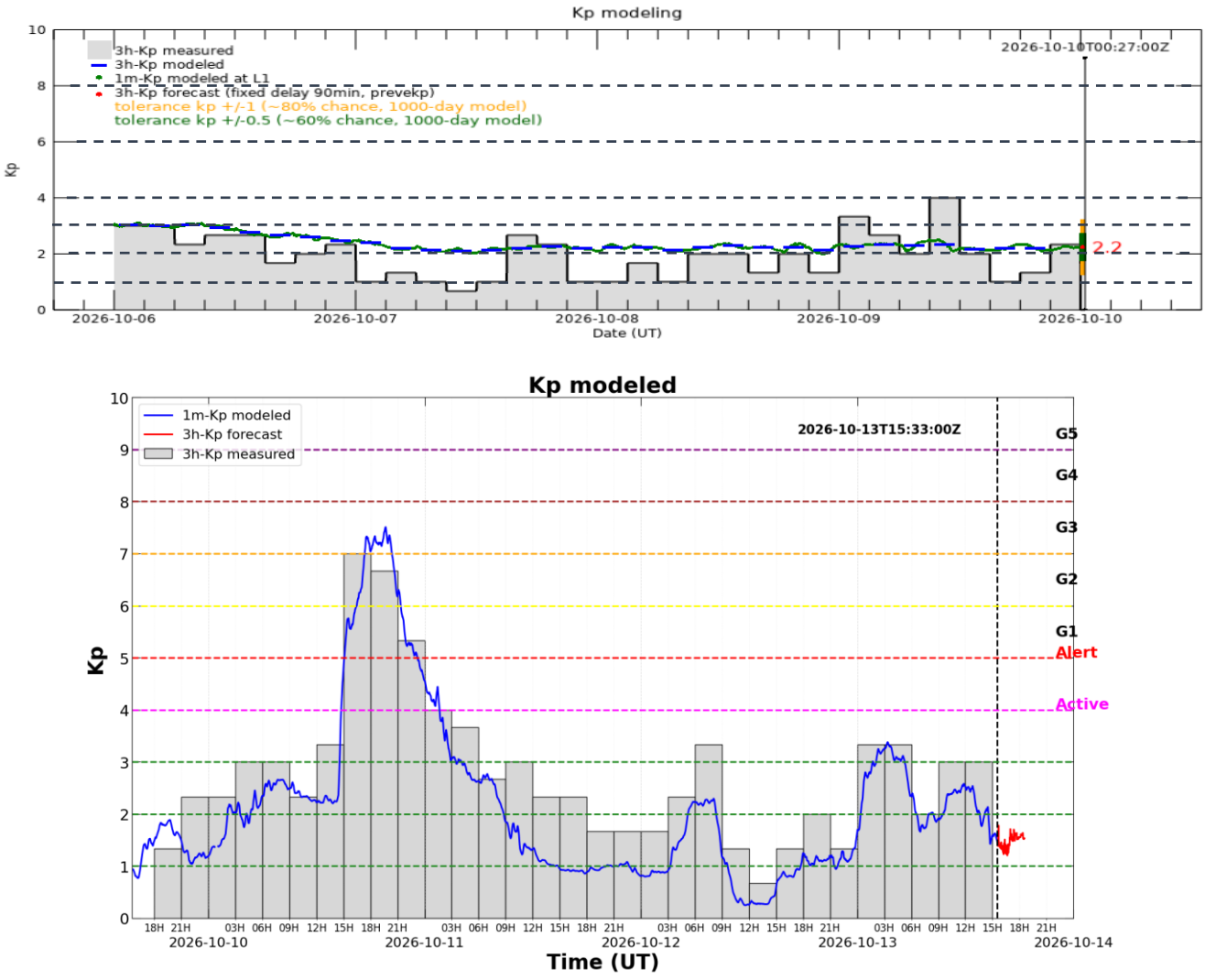


Figure 2: The Kp index data obtained from NOAA/SWPC. Modeled Kp index, blue line and the red line represents the forecast for the index.

Geomagnetic field

Responsible: Karen Sarmiento /Lívia Alves/Sony Su Chen

Summary

The period from October 5 to 13 was characterized by episodes of heightened geomagnetic activity associated with two geomagnetic storms: a G1-level (minor) event that began on October 4, and a G3-level (strong) event recorded subsequently.

Residual instabilities in the geomagnetic field were observed between October 5 and 6, associated with the G1-level (minor) storm that had started on the 4th. The event's main phase occurred on that day, peaking around 16 UT, when the Dst and dHsa indices reached -60 nT and -111 nT, respectively. The Kp index reached the G1 geomagnetic storm threshold (Kp=5o) between October 4 and 5, peaking at 6- during the 18–21 UT interval on the 4th. The Ksa index showed a similar trend, reaching the G1 level (Ksa=5o) and a peak of 6- between 15 and 18 UT. Geomagnetic activity in the auroral region intensified starting at 07 UT on the 4th. The AE index remained above 500 nT during several intervals, with peaks near 1000 nT, indicating an intensification of auroral electrojet currents and increased electrodynamic activity at high latitudes.

Subsequently, between October 7 and 9, geomagnetically quiet conditions prevailed, with only isolated instabilities. Geomagnetic activity indices generally remained close to levels characteristic of quiet conditions, with no indication of geomagnetic storms during this interval. Starting on October 10, a new intensification of geomagnetic activity was observed, with conditions corresponding to a G3 (strong) level storm. The Dst index reached -95 nT around 22:00 UT, while the dHsa index recorded -180 nT at approximately 19:30 UT. The Kp index reached the G3 level (Kp=7o) during the 15:00–18:00 UT and 18:00–21:00 UT intervals, peaking at 7+ between 15:00 and 18:00 UT. Subsequently, G2 (moderate) level conditions were recorded between 21:00 and 24:00 UT. The Ksa index showed similar behavior, reaching the G3 level (Ksa=7o) between 15:00 and 18:00 UT and dropping to the G2 level during the 18:00–21:00 UT and 21:00–24:00 UT intervals. After this period, the indices remained below the G1 storm threshold. In the auroral region, activity intensified starting at 14:00 UT, with the AE index remaining above 500 nT during several intervals and exceeding 2000 nT around 18:00 UT. Following the period of peak disturbance, a recovery trend in the geomagnetic field was observed, accompanied by a reduction in activity indices and a gradual return to predominantly quiet conditions.

Over the past 24 hours, geomagnetic activity remained predominantly quiet, with isolated instances of instability.

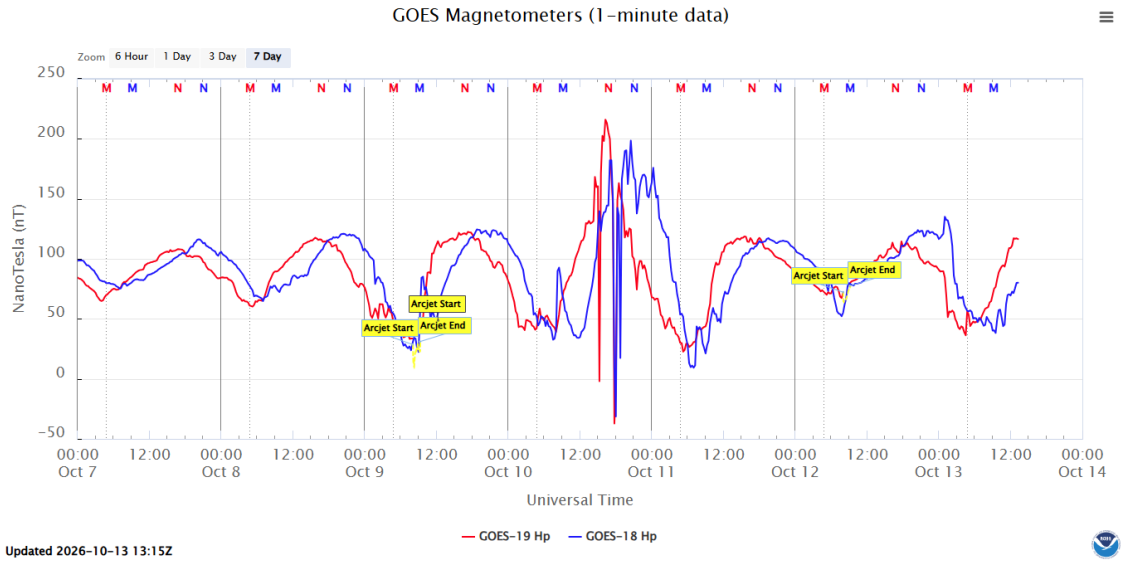


Figure 1 - Magnetic field measurement at the GOES satellite position.

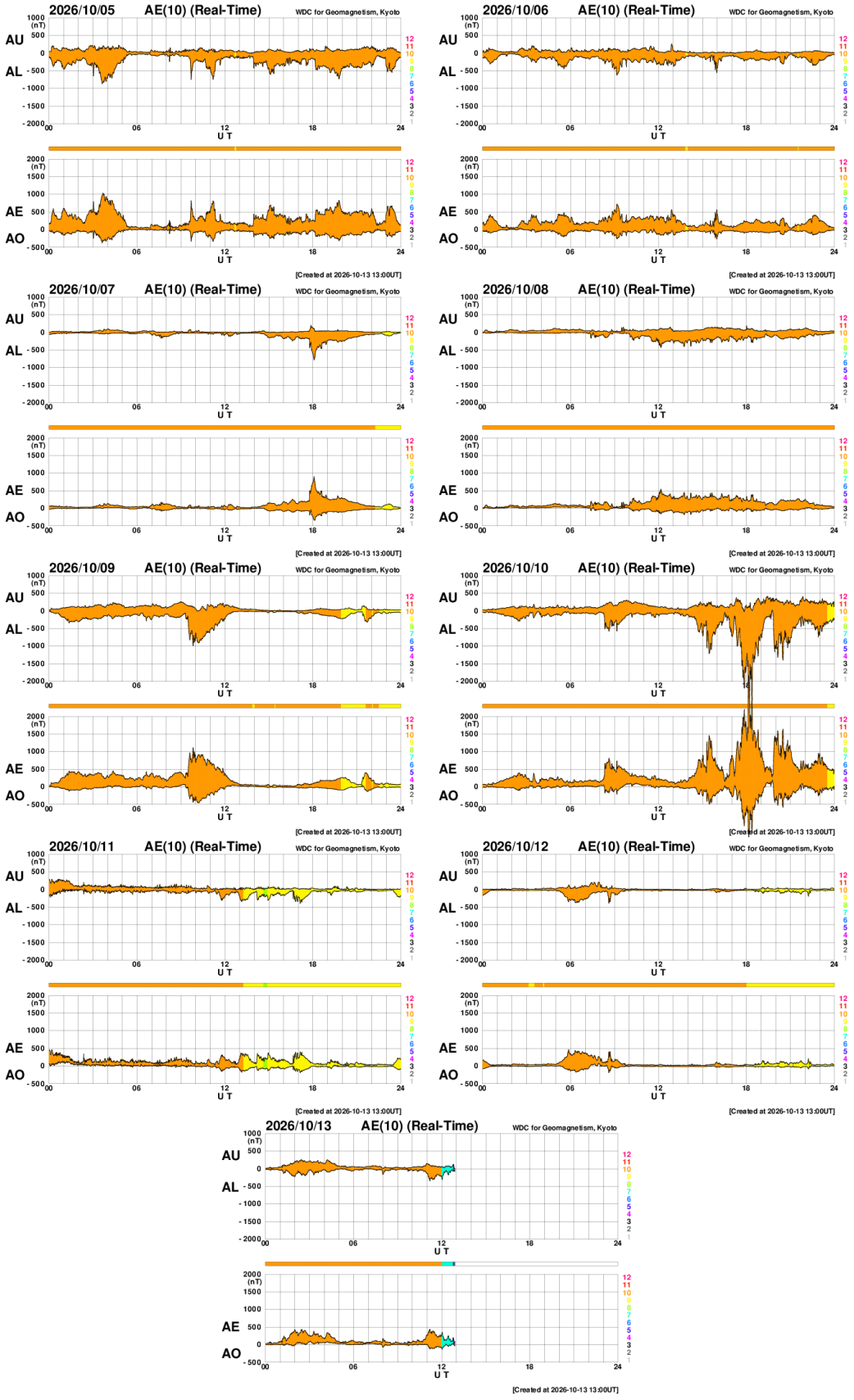


Figure 2 - AE index for the days of the week.



Figure 3 - Kp index on a logarithmic scale.

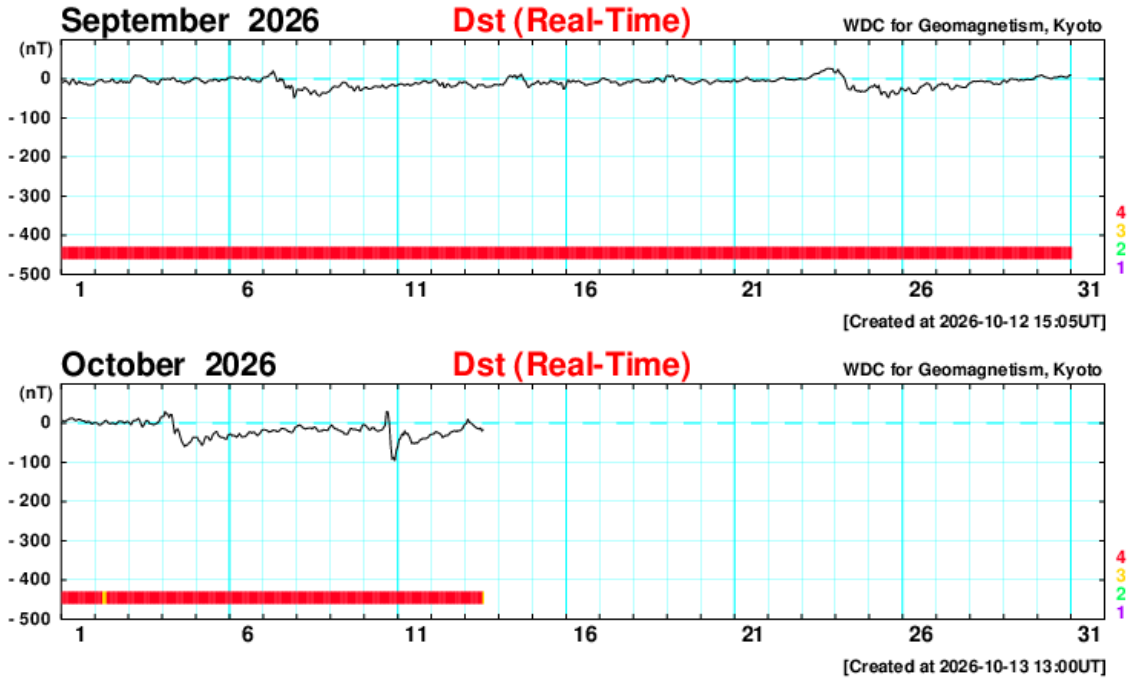


Figure 4 - Dst index.

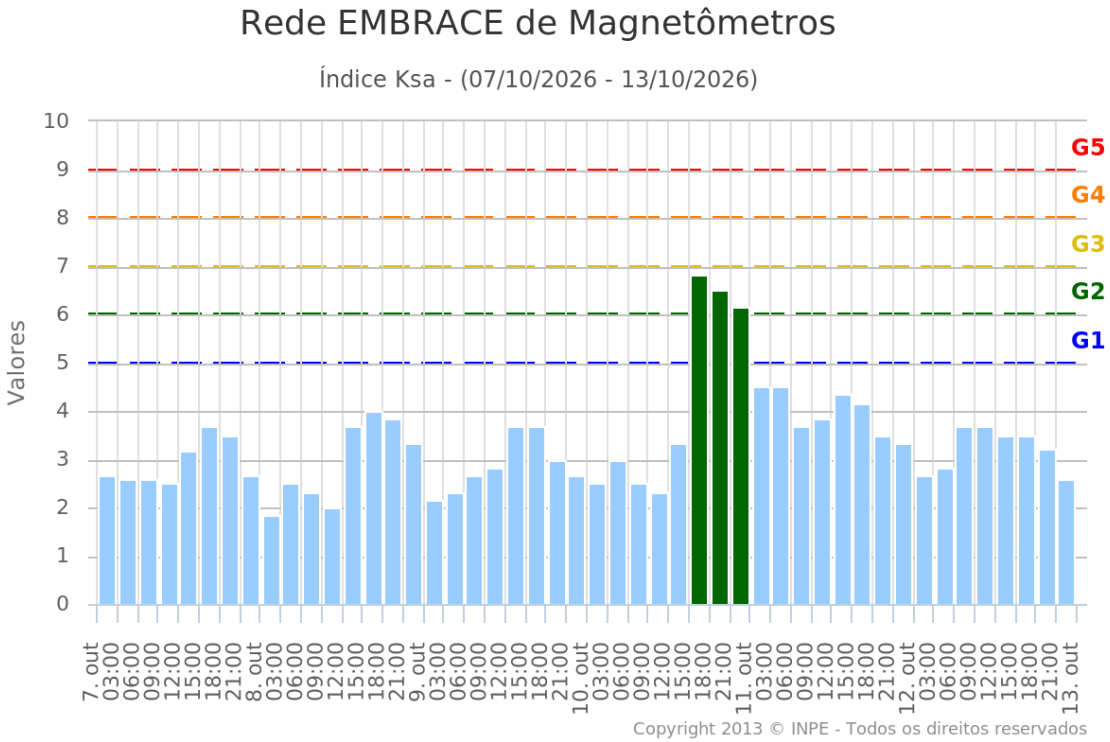


Figure 5 - Geomagnetic index in South America - Ksa Index.

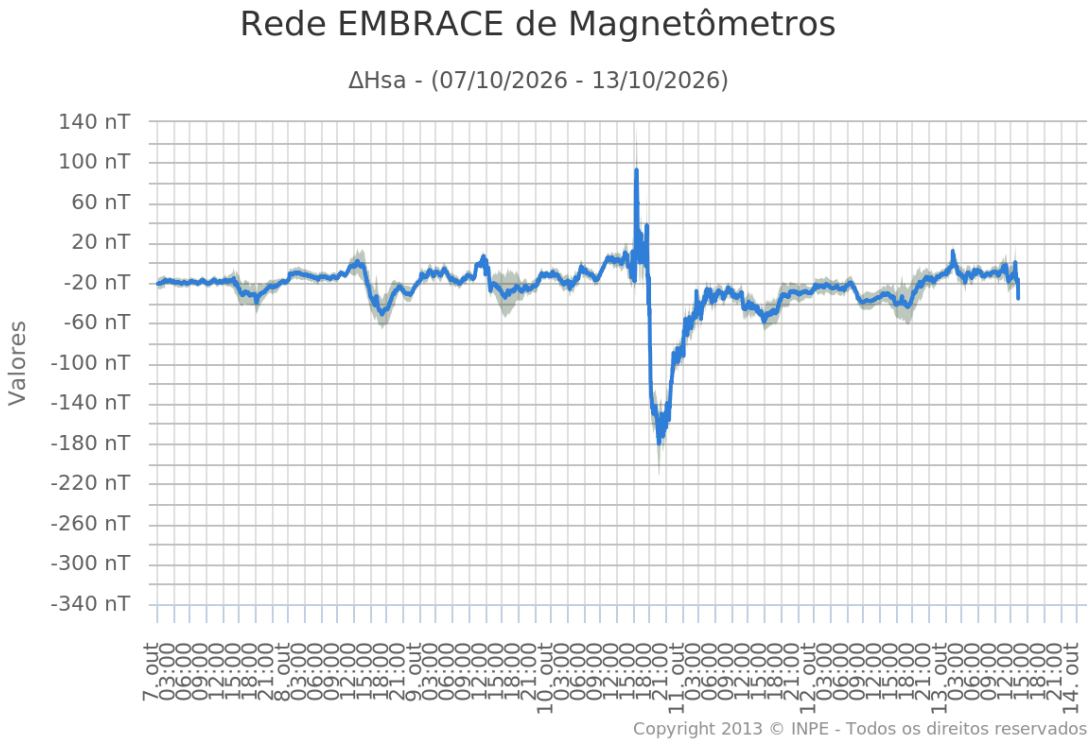


Figure 6 - Geomagnetic index in South America - ΔHsa index of the EMBRACE Program.

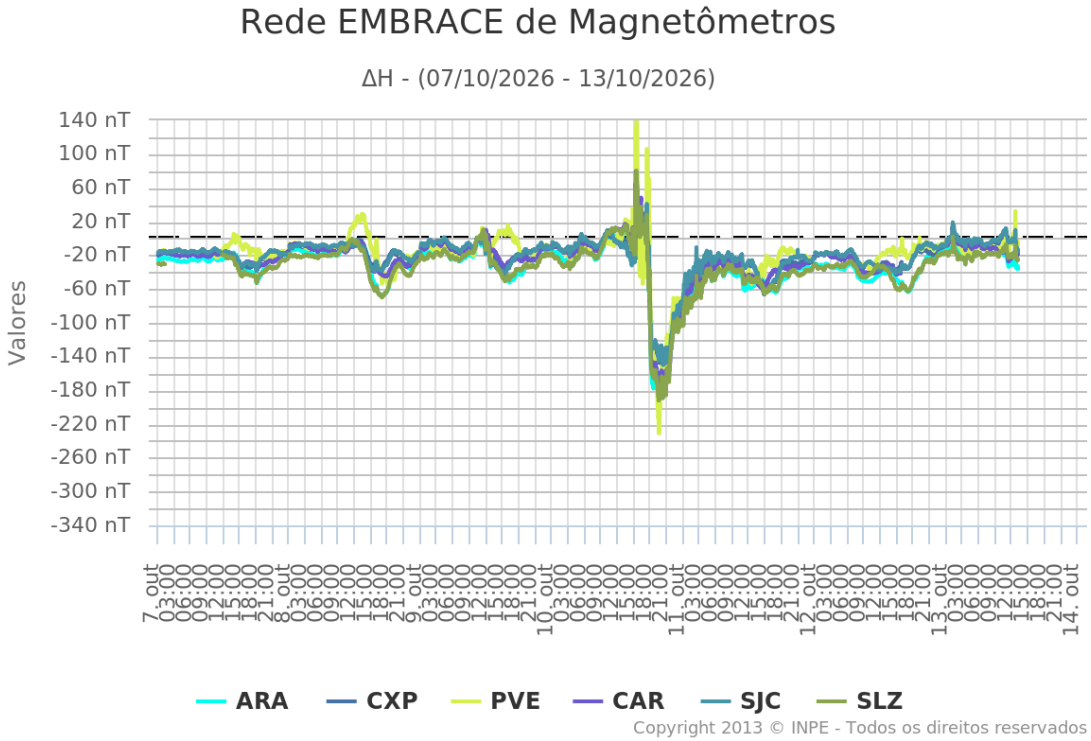


Figure 7 - Geomagnetic index in South America - ΔH index at magnetic stations of the EMBRACE Program.

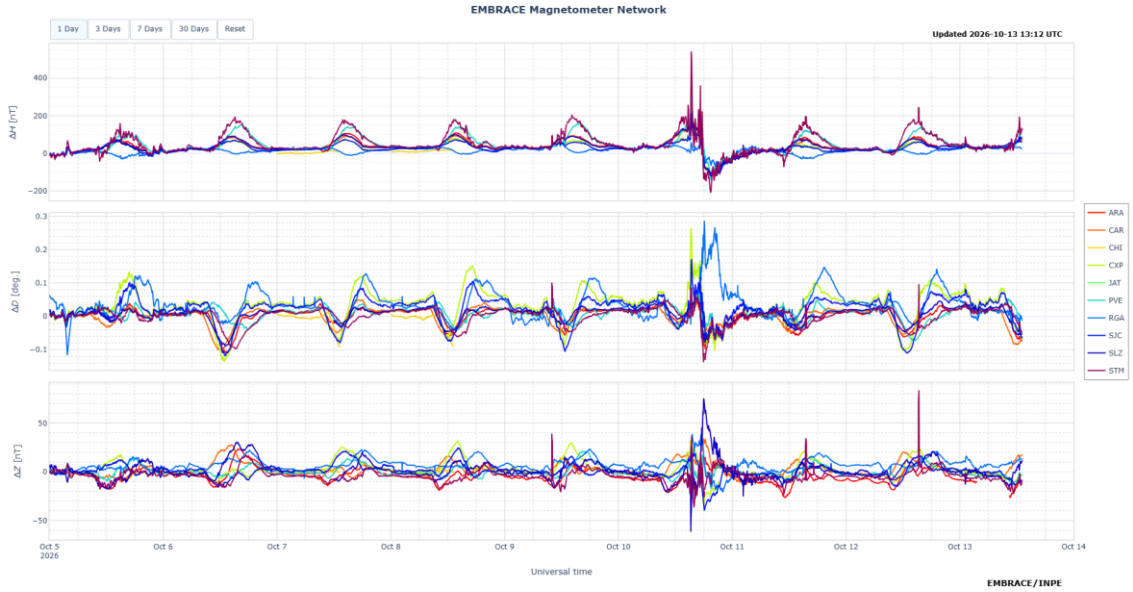


Figure 8 – Variation of the geomagnetic field at the magnetic stations of the EMBRACE Program.

Responsible: José Paulo Marchezi

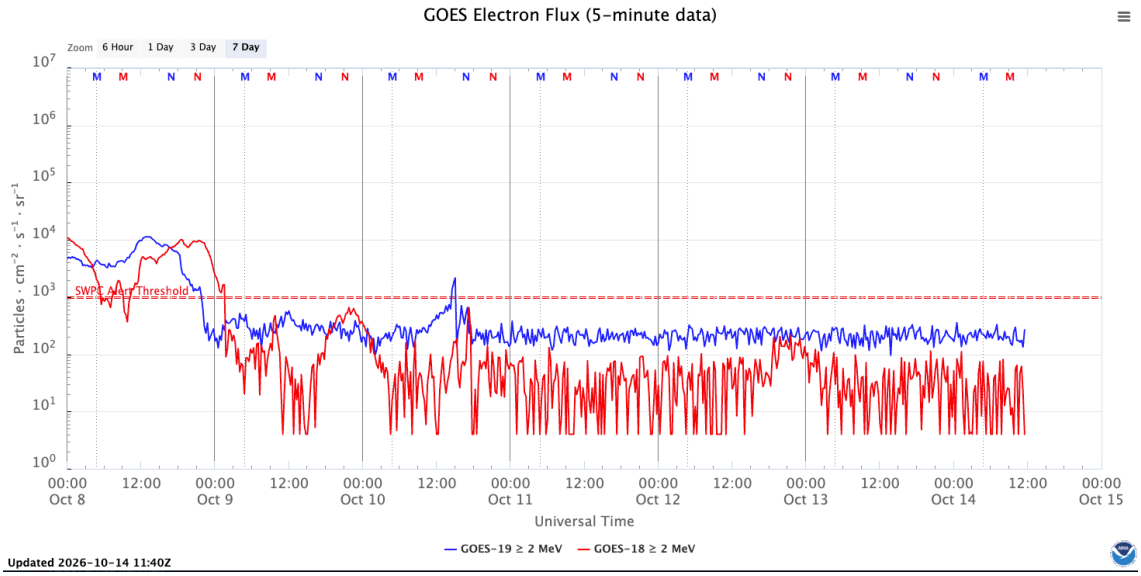


Figure 1: High-energy electron flux (> 2MeV) obtained from GOES-18 and GOES-19 satellite. Source: https://www.swpc.noaa.gov/products/goes-electron-flux

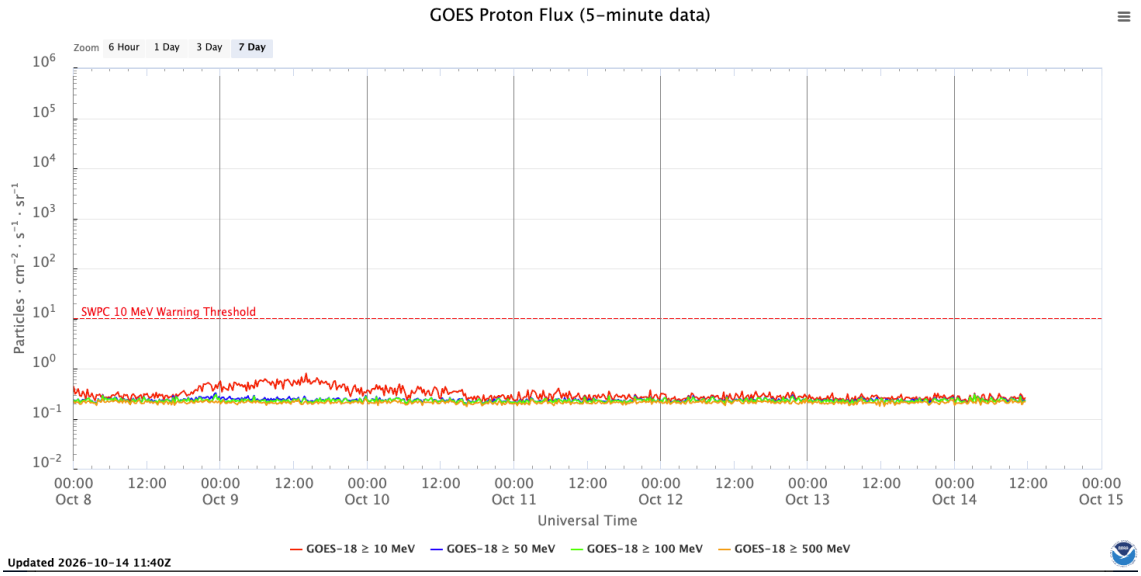


Figure 2: Proton flux (≥ 10 MeV, ≥ 50 MeV, ≥ 100 MeV, ≥ 500 MeV) obtained from GOES-18 satellite. Source: https://www.swpc.noaa.gov/products/goes-proton-flux

Summary

The high-energy electron flux (≥ 2 MeV) at the outer edge of the outer radiation belt, measured by the GOES-18 and GOES-19 geostationary satellites (Figure 1), exhibited significant variations between October 9 and 10, 2026. On October 9, a substantial decrease in electron flux was observed, with values dropping below 10^2 particles/(cm² s sr). On October 10, the flux showed signs of recovery; however, it decreased again at approximately 13:00 UT and remained below the alert threshold through the end of October 13.

The proton fluxes at energies ≥ 10 MeV, ≥ 50 MeV, ≥ 100 MeV, and ≥ 500 MeV, measured by the GOES-18 geostationary satellite (Figure 2), remained at background levels between October 8 and 13, 2026. A slight enhancement was observed on October 9 for protons ≥ 10 MeV, although the flux remained below the alert threshold.

Ionosfera – Digisonde (Laysa Resende)

Summary

During this week, spread-F was observed over Cachoeira Paulista, Boa Vista, and São Luís (Figure 1). Sporadic E (Es) layers were generally weak at these stations, while MUF variations remained below the threshold corresponding to a moderate disturbance level.

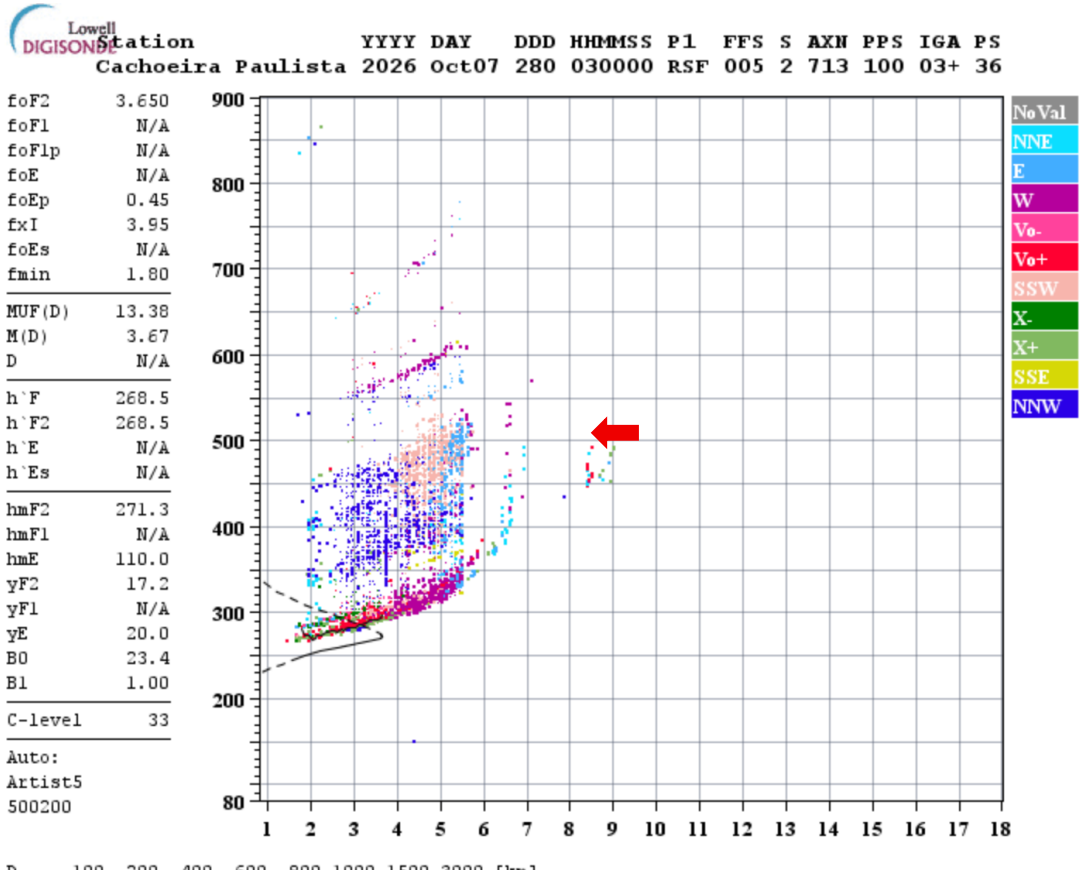


Figure 1 – Ionogram over Cachoeira Paulista, showing the spread F.