Sun – Solar Activity (Jean C. Santos)

Summary

The Sun exhibited moderate activity with the presence of two active regions of high (beta-gamma) magnetic complexity in the solar disk. During this period, five M-class solar flares occurred. The Cactus software identified 42 CMEs, none of which were halo-type (angular width greater than 180 degrees). During this period, the presence of a coronal hole with a significant area (>2.0% of the solar disk area) located at low latitudes and crossing the center of the solar disk was identified, which may have affected the characteristics of the solar wind, giving rise to a region of corotant interaction.

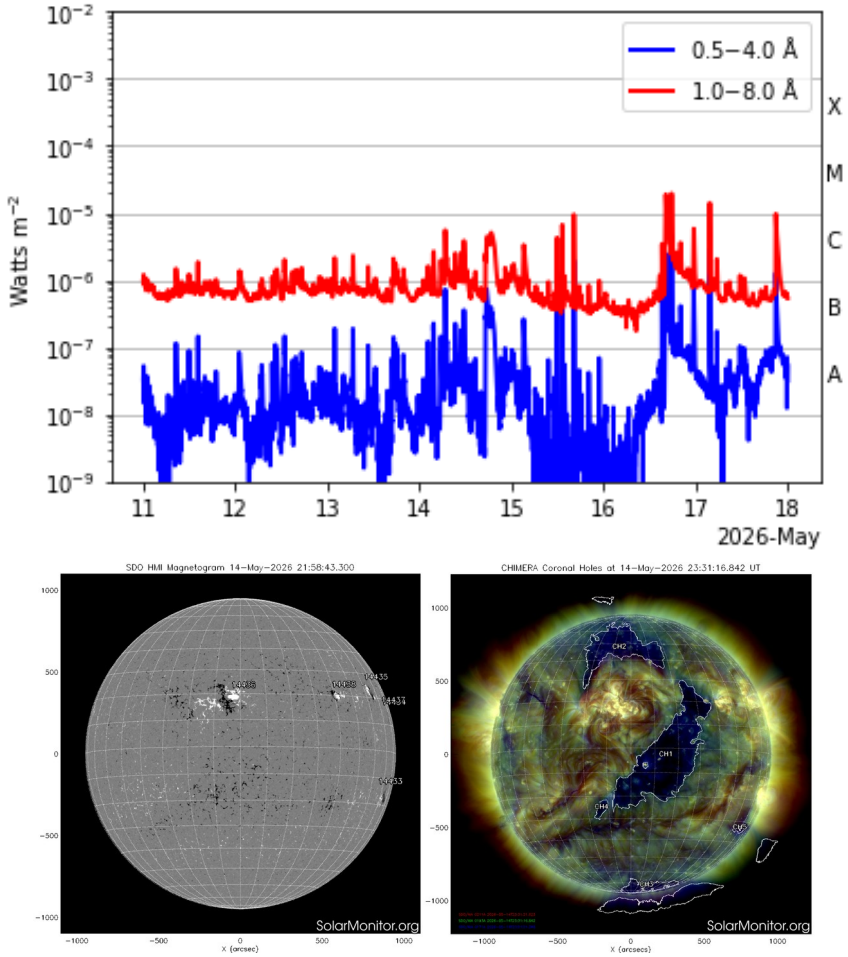

Figure 1 – X-ray flux measured by the GOES satellite (top panel) for the period of May 11-17, magnetic field in the line of sight (bottom left panel) and image at 193 angstroms (bottom right panel) measured on May 14, 2026.

Interplanetary Medium – IM – Daniele da S. F. Medeiros and Paulo R. Jauer
Period: May 11th to 18th

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 DSCOVR 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 May 15th at 16:30 UT at +14.30 nT.

- The BxBy components presented variations in the analyzed period, keeping both oscillating within the interval [-7.80, +11.81] nT. Showing three rotations of the By component.

- The Bz component presents negative values for most of the week with a maximum negative -5.46 nT at 12:30 UT on May 13th. It presented positive value of +9.71 nT on May 13th at 11:30 UT.

- The solar wind density maximum peaked on May 15th at 06:30 UT, reaching 14.05 protons/cm^3.

- The solar wind speed fluctuated between 331 to 741 km/s, with an increase beginning at 08:30 UT on May 15th.

- The magnetopause position remained relaxed almost throughout the analyzed period, reaching maximum compression (8.70 RE) at 22:30 UT on May 15th.

- During the early part of the week, the measured and modeled interplanetary Kp index fluctuated between 1 and 3, reaching values close to 3 (Kp ~ 3) on May 13th, characterizing a calm period, while the modeled Kp index peaked at 5 (Kp = 5), corresponding to a minor storm (G1 level). On May 16th, the modeled Kp index showed a peaked above 6 (Kp > 6), corresponding to a moderate storm (G2 level), and the measured Kp index presented values above 5 (Kp > 5). The week ending with values fluctuating between 1 and below 3 (Kp < 3) for both the measured and modeled Kp indices.

Figure 1 illustrates a set of parameters observed in the solar wind by the DSCVR satellite. The measured solar wind parameters can be identified in the following order starting in column 1: Interplanetary magnetic field modulus (IMF), the Bx and By components, Bz component, convection electric field Ey. Column 2: Solar wind density, speed, temperature and the last graph represents the position of the subsolar magnetopause.

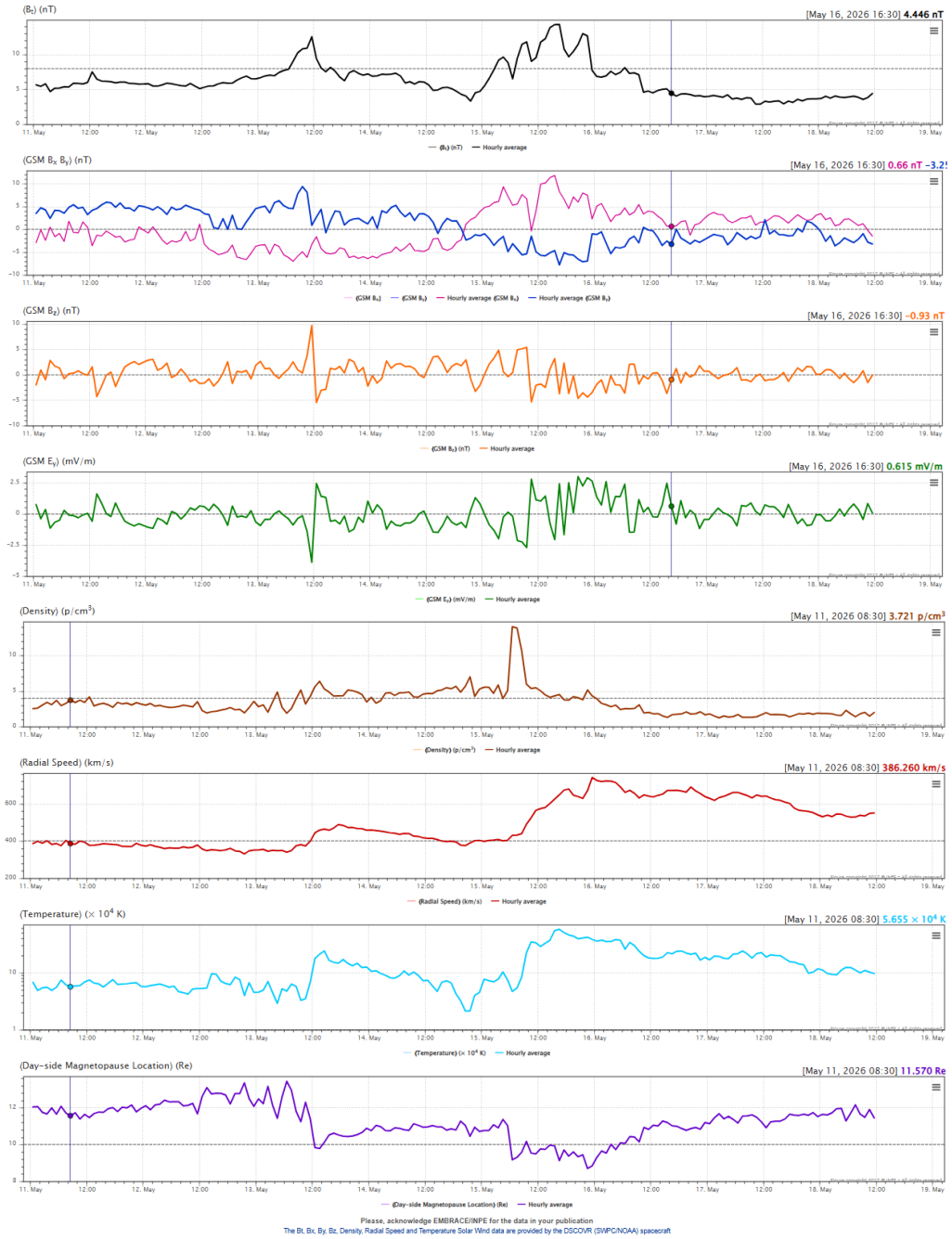

Figure 1: Illustrates a set of parameters observed in the solar wind by the DSCVR satellite.

Figure 2 illustrates a set of parameters observed in the solar wind by the DSCOVR 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.

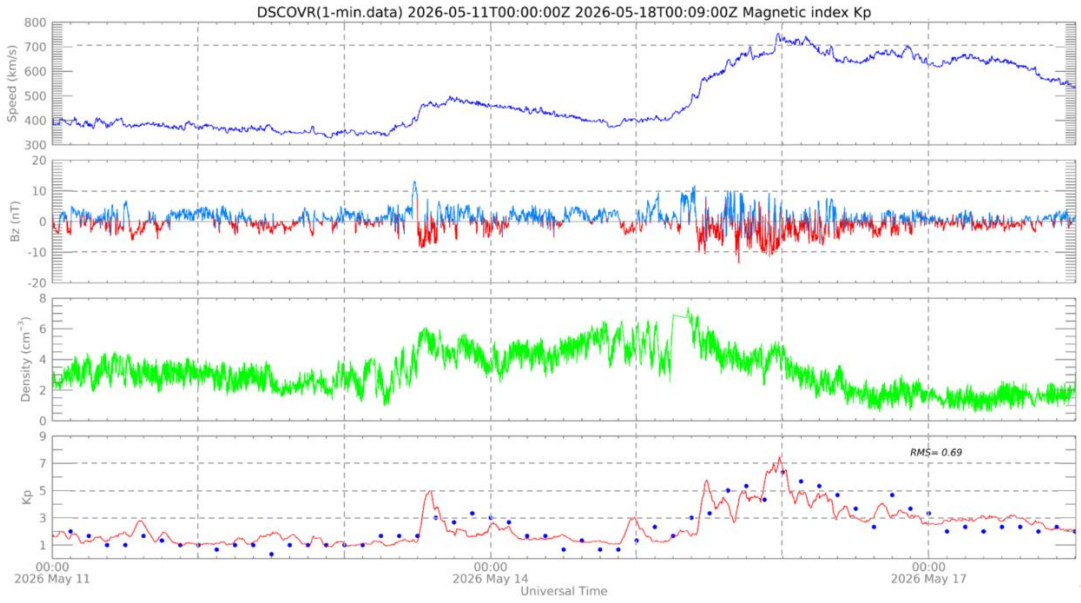

Figure 2: Illustrates a set of parameters observed in the solar wind by the DSCVR satellite and the Kp index by NOAA/SWPC, blue dot, and the modeling, red line.

EARTH'S RADIATION BELT

Responsible: Ligia Da Silva

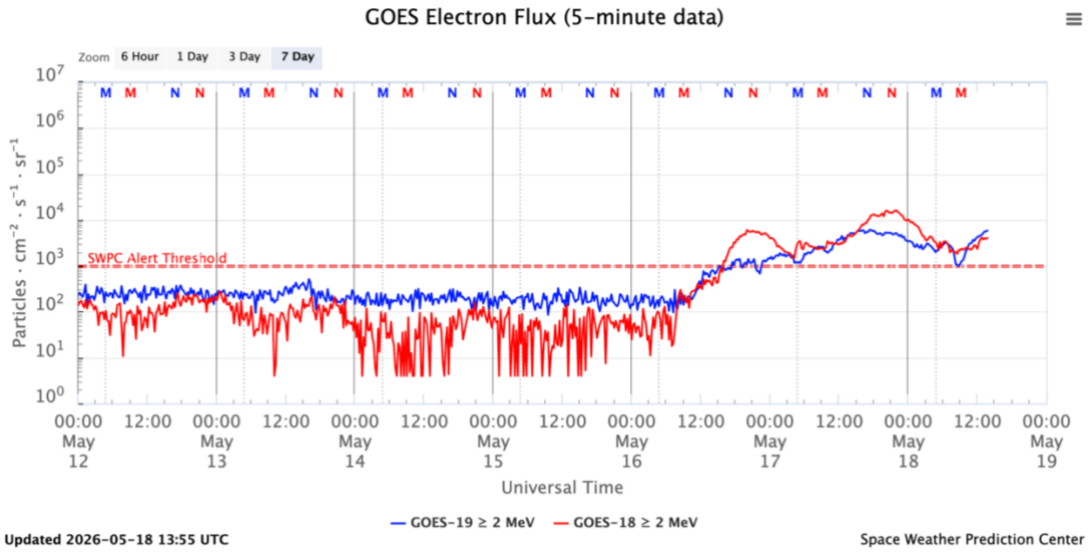

Figure 1: High-energy electron flux (> 2MeV) obtained from GOES-18 and GOES-19 satellite. Source: https://www.swpc.noaa.gov/products/goes-electron-flux

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) is below the alert threshold (103 particles/(cm2 s sr)) from the beginning of the week until approximately 12:00 UT of May 16th. A flux increase was observed that exceeded the alert threshold (10^3 particles/(cm^2 s sr)) in the middle of the 16th, exceeding 104 particles/(cm2 s sr) on the 17th/May.

Geomagnetic field

Responsible: Karen Sarmiento /Lívia Alves/Sony Su Chen

Summary

The period from May 11 to 18 was characterized by a transition from predominantly quiet geomagnetic conditions to a geomagnetic storm scenario, with intensity varying between G1 (minor) and G2 (moderate).

Between May 11 and 14, geomagnetic activity was predominantly quiet, with indices oscillating near their nominal values. During this period, the Kp index ranged between 0+ and 3+, while the Ksa index recorded values between 0+ and 4+. In the auroral region, the AE index remained below 500 nT, and the Dst index varied between -5 and 25 nT.

Starting on May 15, instabilities began to appear in the geomagnetic activity indices, marking the onset of a geomagnetic storm that reached levels between G1 and G2. The event began around 08h UT on May 15, with the main phase starting at 11h UT. The storm's minimum was recorded between 24h UT on May 15 and 01h UT on May 16, with Dst = -53 nT and dHsa = -115 nT. The recovery phase began shortly afterward, with the Dst index reaching -3 nT around 07h UT on May 18.

The storm's intensity evolved, progressing from G1 (Kp = 5o, between 12h and 15h UT on May 15) to G2 (Kp = 6o, between 21h and 24h UT on the same day), before weakening back to G1 (Kp = 6-, between 00h and 03h UT on May 16). Geomagnetic activity in the auroral region remained elevated throughout the period, with the AE index exceeding 500 nT and peaking above 2000 nT between 21h and 22h UT on May 15.

In the last 24 hours, geomagnetic instabilities are still observed, associated with the storm of May 15.

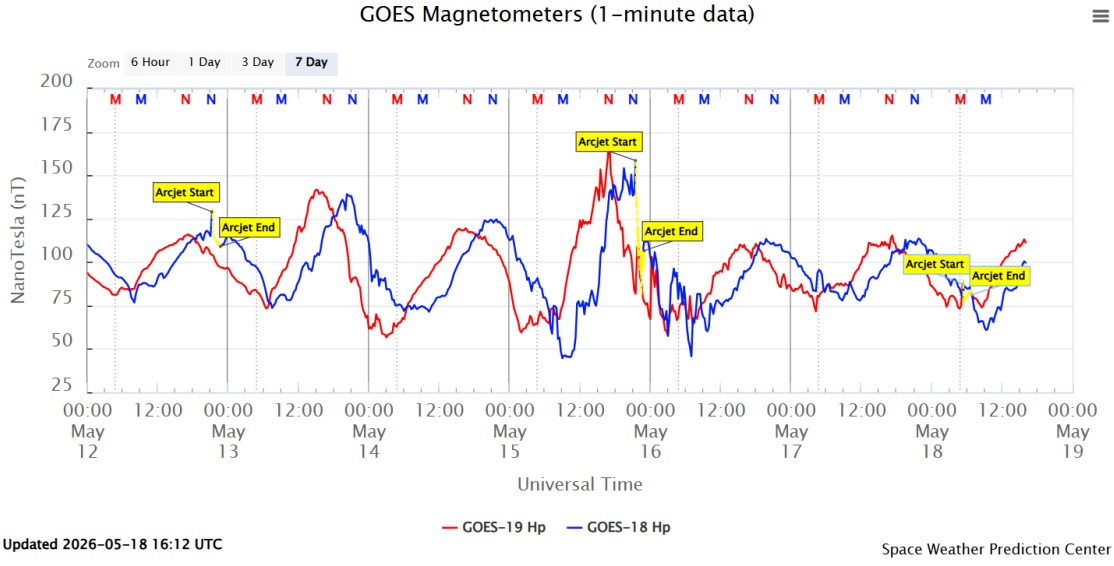

Figure 1 - Magnetic field measurement at the GOES satellite position.

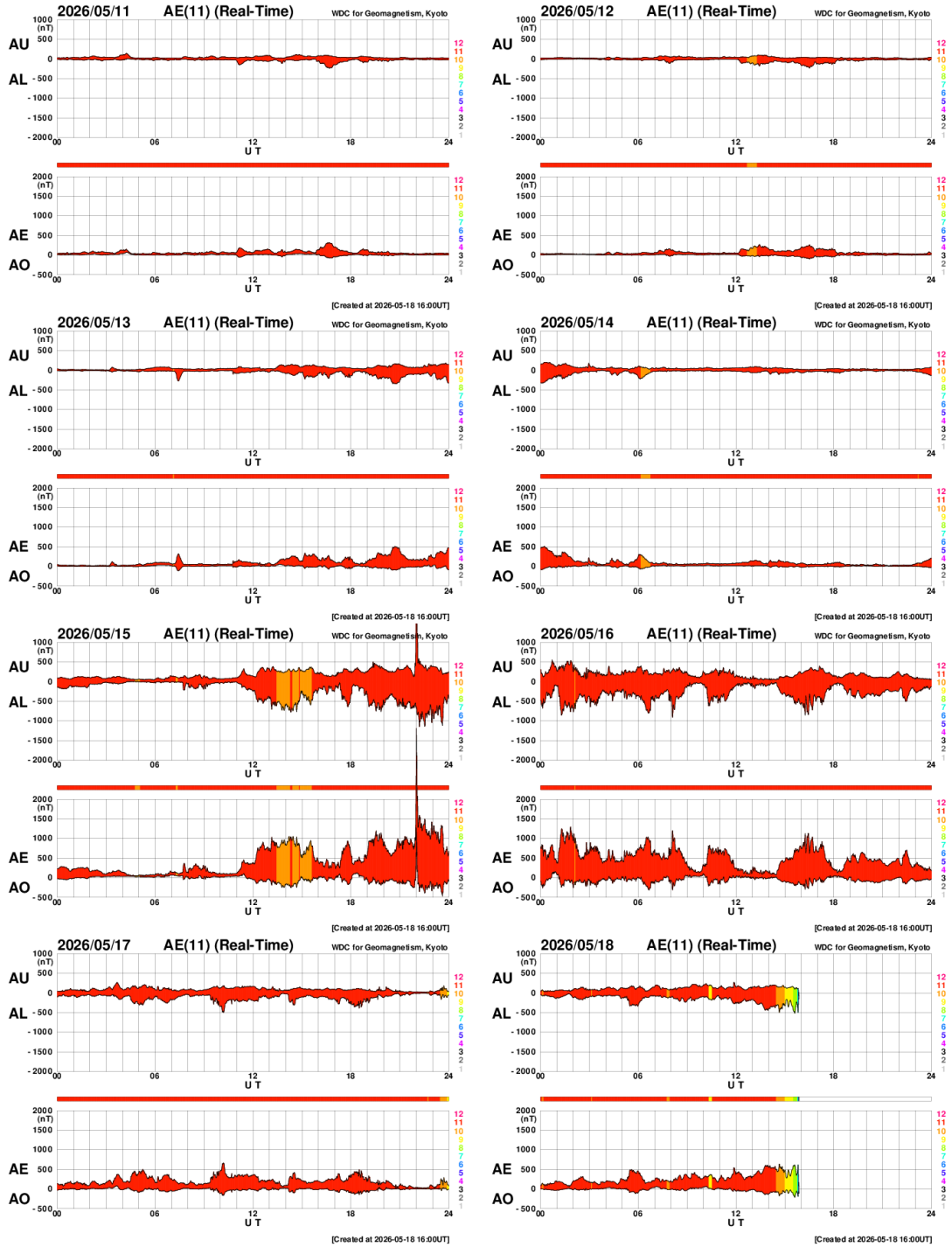

Figure 2 - AE index for the days of the week.

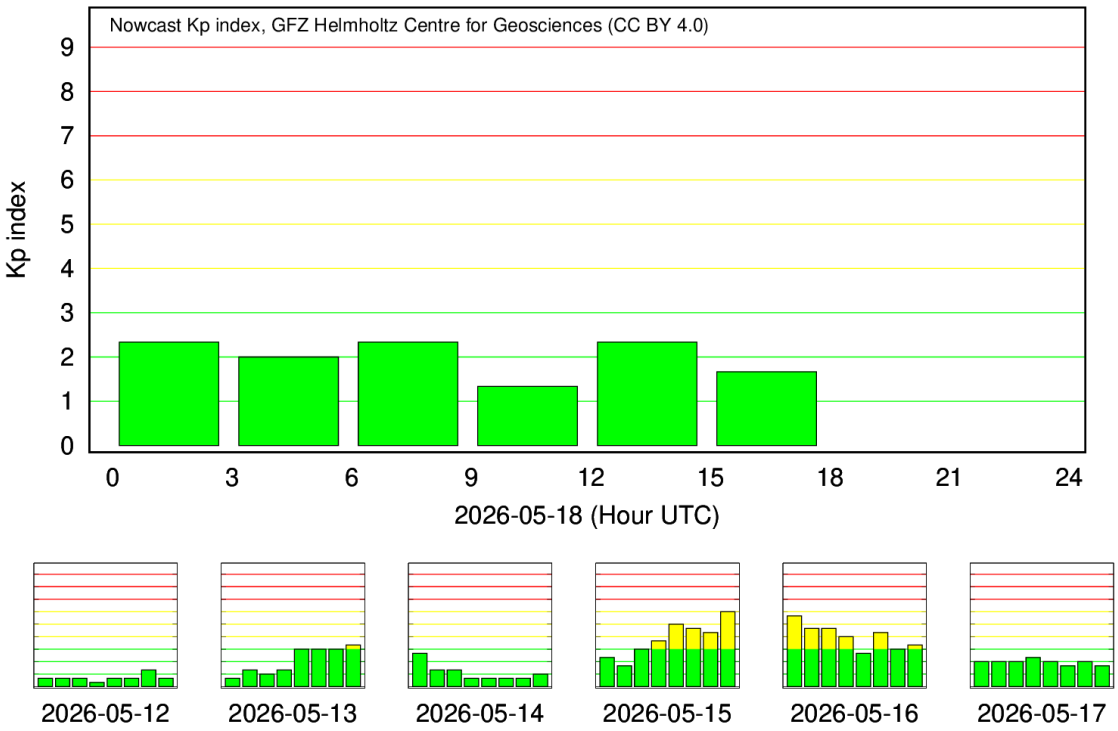

Figure 3 - Kp index on a logarithmic scale.

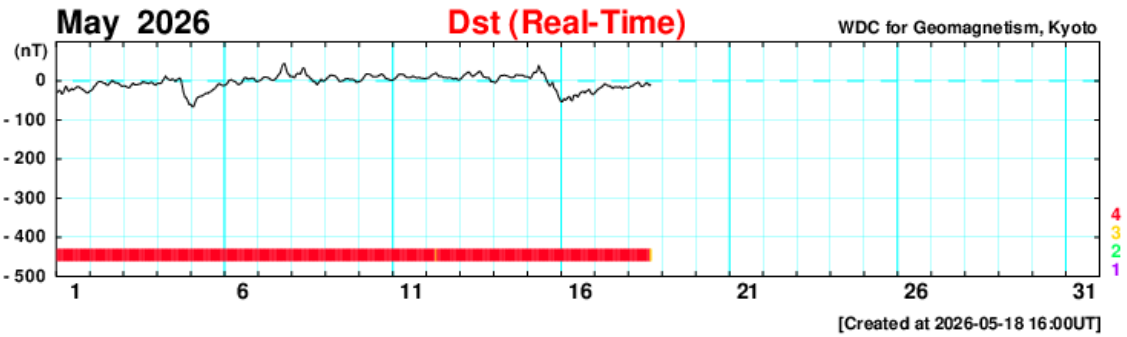

Figure 4 - Dst index.

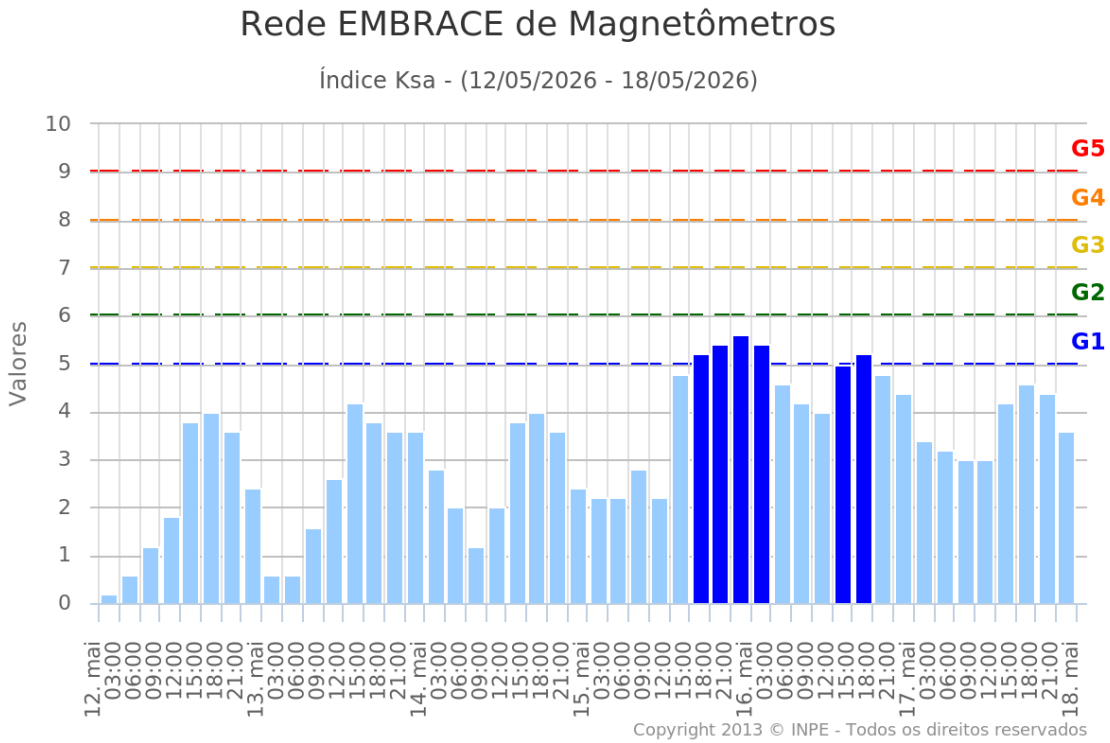

Figure 5 - Geomagnetic index in South America - Ksa Index.

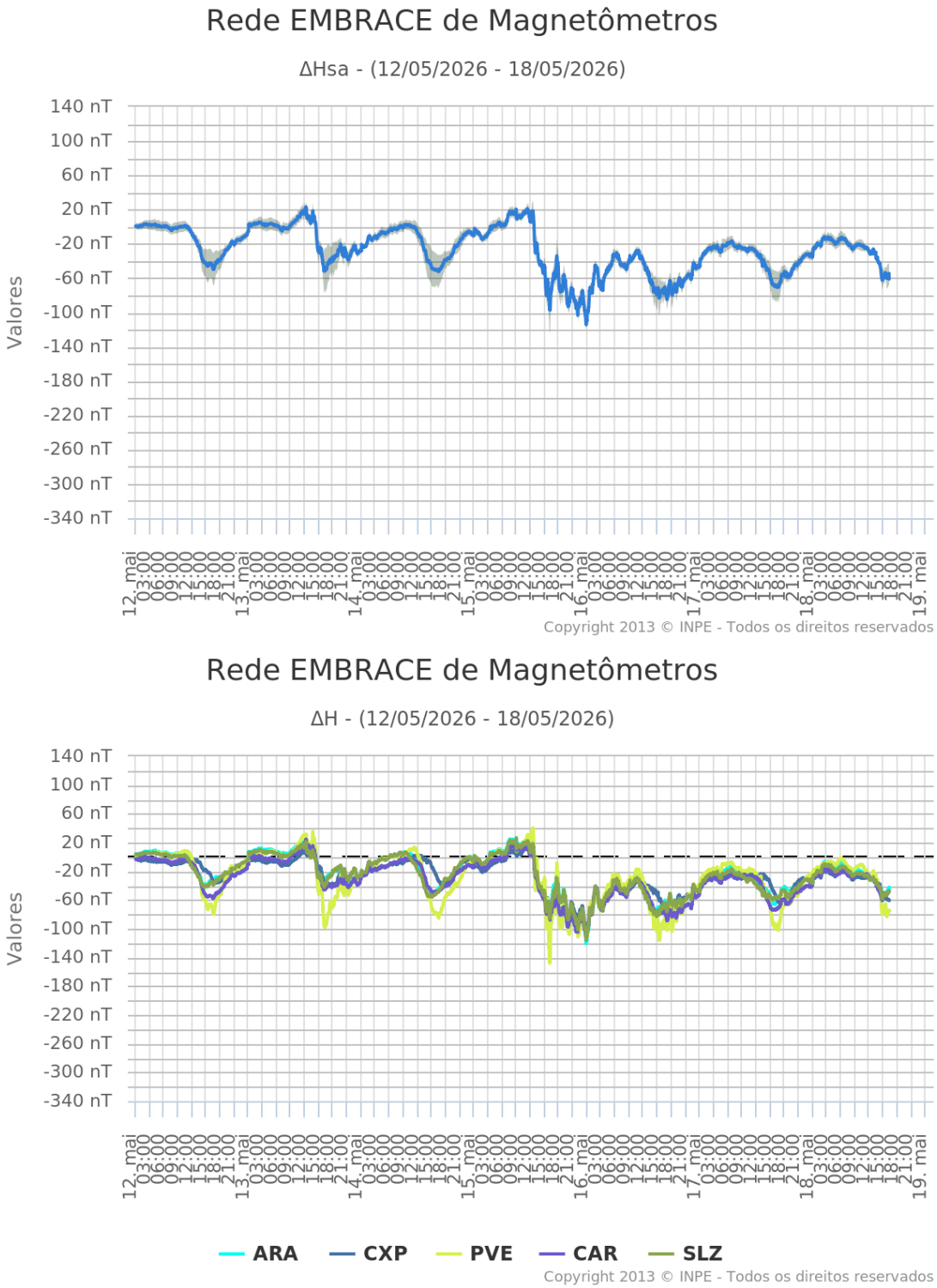

Figure 6 - Geomagnetic index in South America - ΔH index and at magnetic stations of the EMBRACE Program.

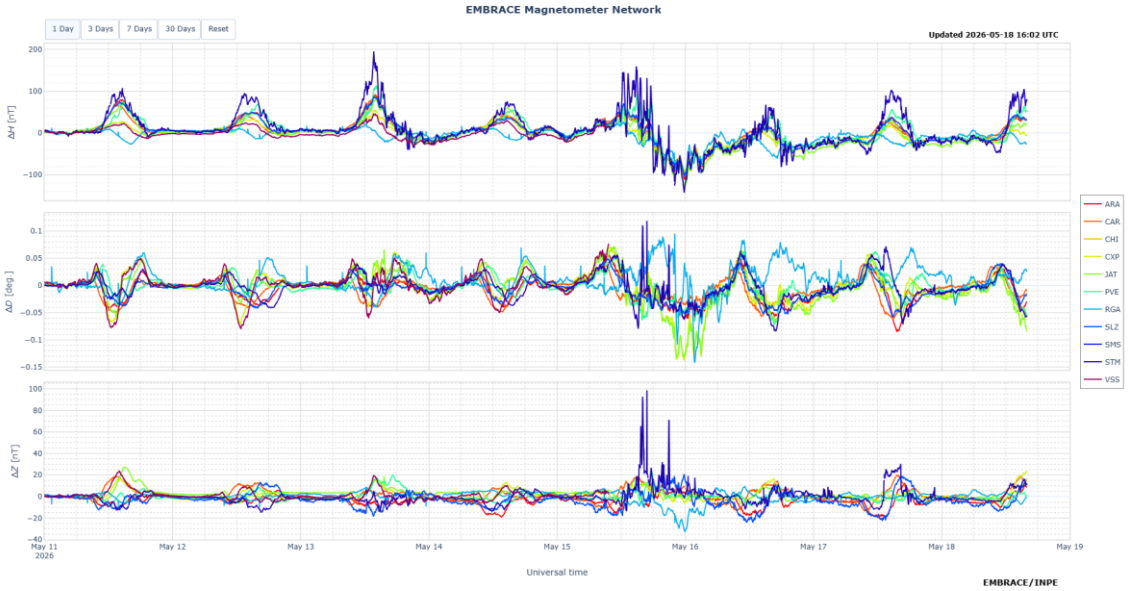

Figura 7 – Variation of the geomagnetic field at the magnetic stations of the EMBRACE Program.

Ionospheric F2-Layer Irregularities

Summary

During the period from May 10 to May 16, 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), and ionospheric scintillation index (S4) 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 423 to 508 km, while the vertical drift velocity varied between 14 and 29 m/s (Figure 1).

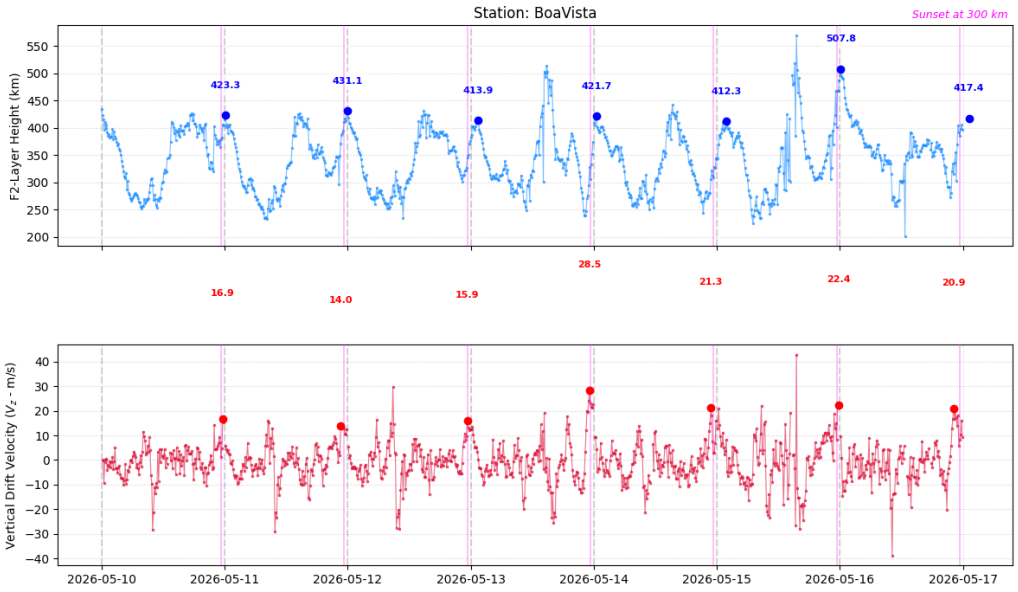

Figure 1 – F2-layer height (upper panel) and vertical drift velocity (lower panel).

The equatorial ionization anomaly (EIA) was observed only on May 10, 11, 15, and 16. TEC reached maximum values of approximately 50 TECU at the dip equator. Regarding scintillation, S4 values remained low (S4 < 0.5), indicating quiet conditions. No events associated with equatorial plasma bubbles were observed (Figure 2).

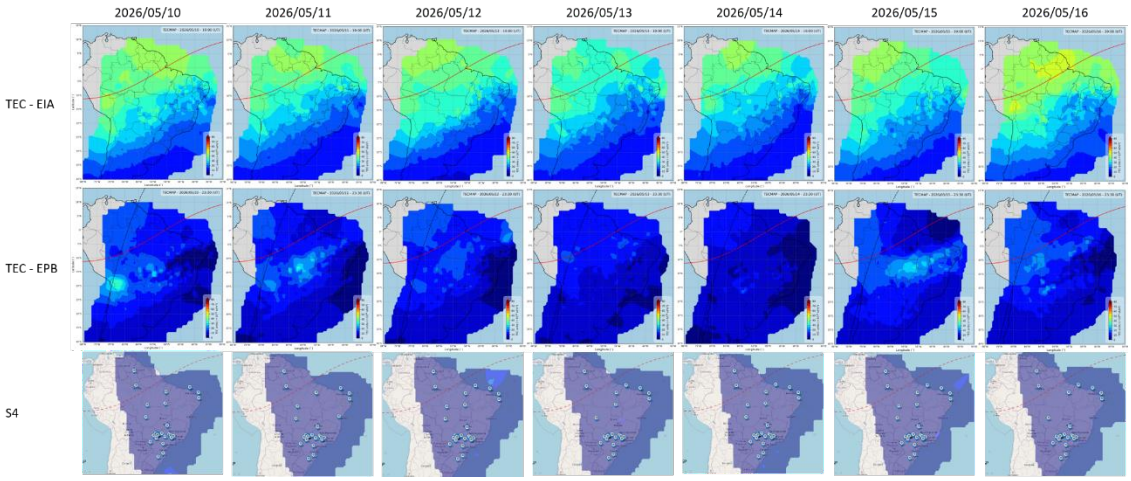

Figure 2 – Total electron content (TEC) maps (upper and middle panels) and S4 index (lower panel).

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/.*