



Interplanetary Medium – IM – Daniele da S. F. Medeiros and Paulo R. Jauer
Period: January 19th to January 26th.

Summary

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

- The magnitude of the interplanetary magnetic field component peaked on January 19th at 21:30 UT at +77.84 nT due to CME.
- The BxBy components presented variations in the analyzed period, keeping both oscillating within the interval [-24.78, +38.46] nT. Showing five rotations of the By component.
- The Bz component presents negative values for most of the week with a maximum negative -19.63 nT at 06:30 UT on January 20th. It presented positive value of +57.37 nT on January 19th at 22:30 UT.
- The solar wind density maximum peaked on January 19th at 19:30 UT, reaching 17.65 protons/cm³.
- The solar wind speed fluctuated between 287 to 1082 km/s, with a increase on January 19th starting at 20:30 UT due to CME.
- The magnetopause position remained relaxed almost throughout the analyzed period, reaching maximum compression (7.66 RE) at 10:30 UT on January 20th.
- The measured interplanetary Kp index reached a peak above 8 (Kp > 8) on January 19th, corresponding to a G4-level geomagnetic storm (severe geomagnetic storm), while the modeled interplanetary Kp index exhibited values above 9 (Kp > 9) characterizing an extreme geomagnetic storm (G5) after 18:00 UT on January 19th.

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.

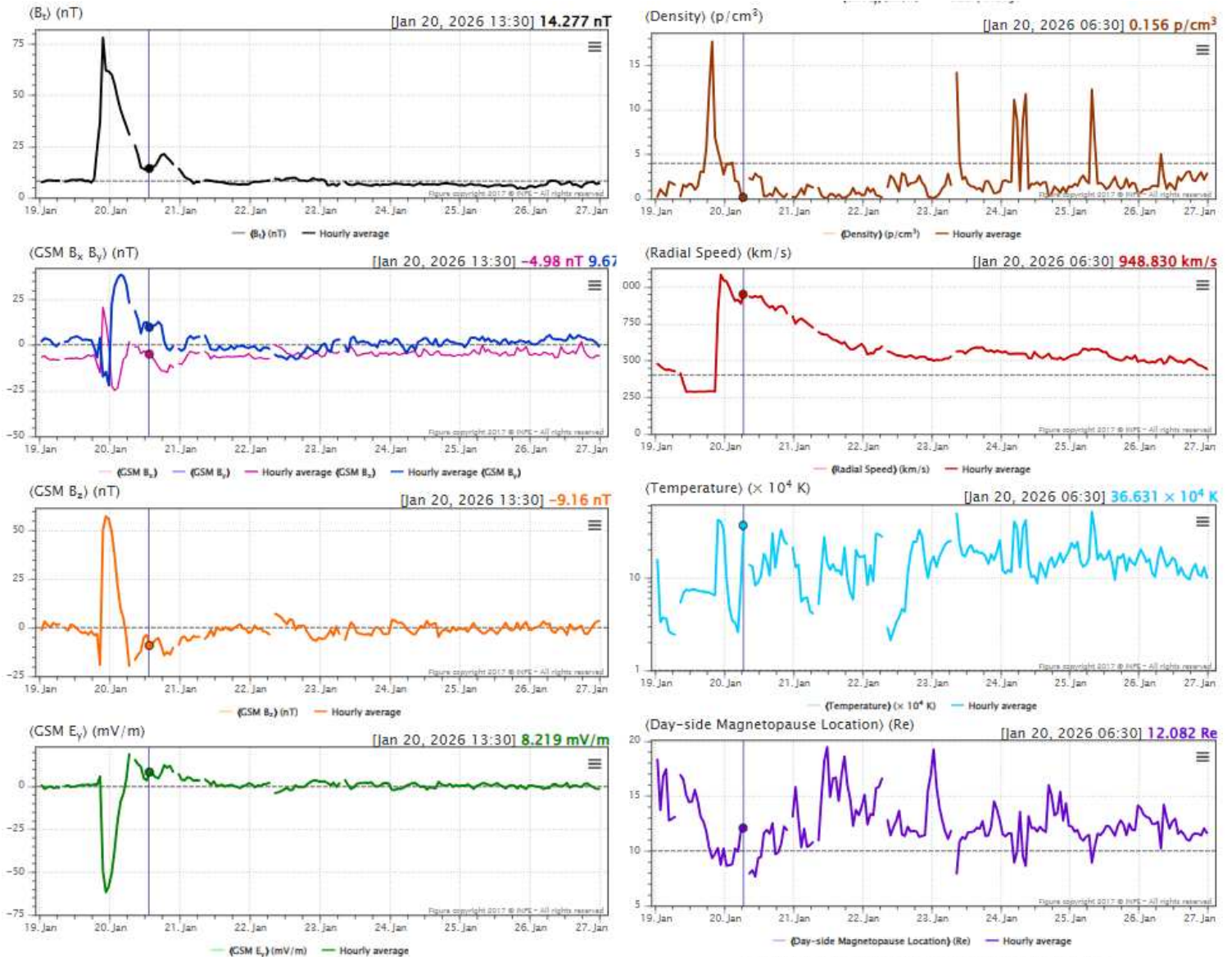


Figure 1: Illustrates a set of parameters observed in the solar wind by the DSCVR satellite.

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.

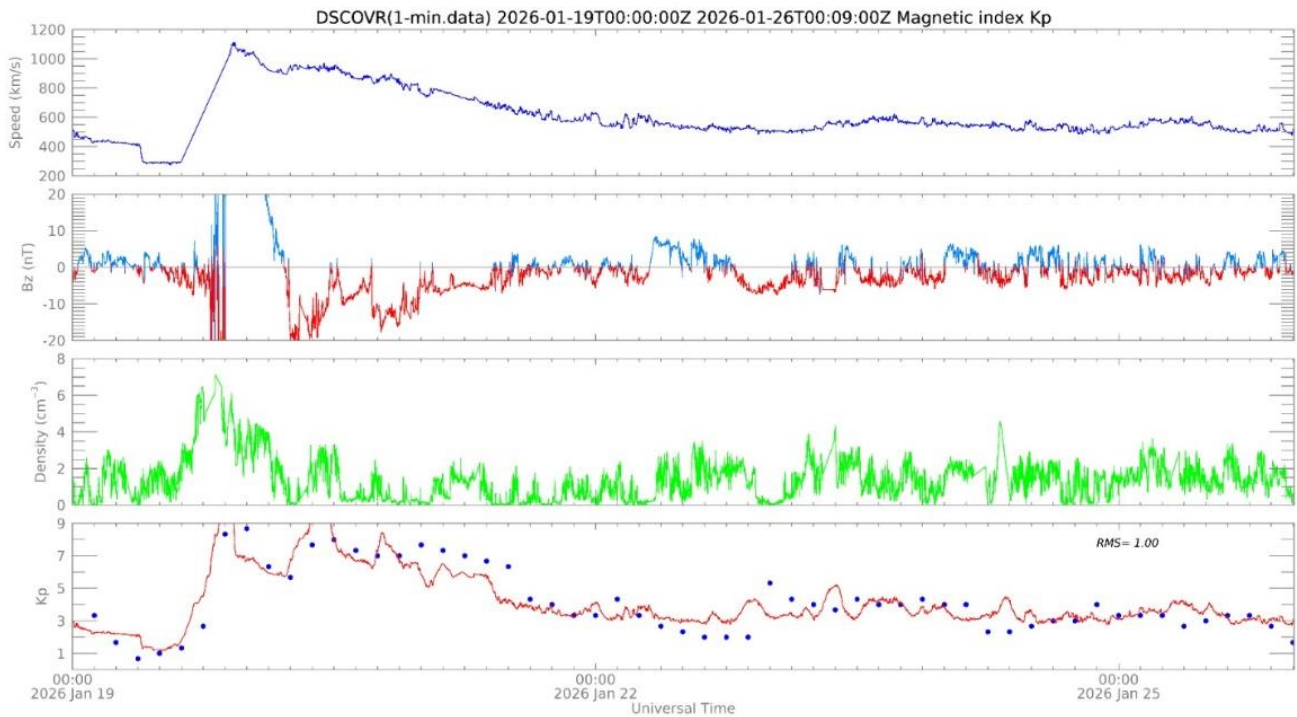


Figure 2: Illustrates a set of parameters observed in the solar wind by the DSCVR satellite and the Kp index by NOAA/SWPC, blue dot, and the modeling, red line.

EARTH'S RADIATION BELT

Responsible: Ligia Da Silva

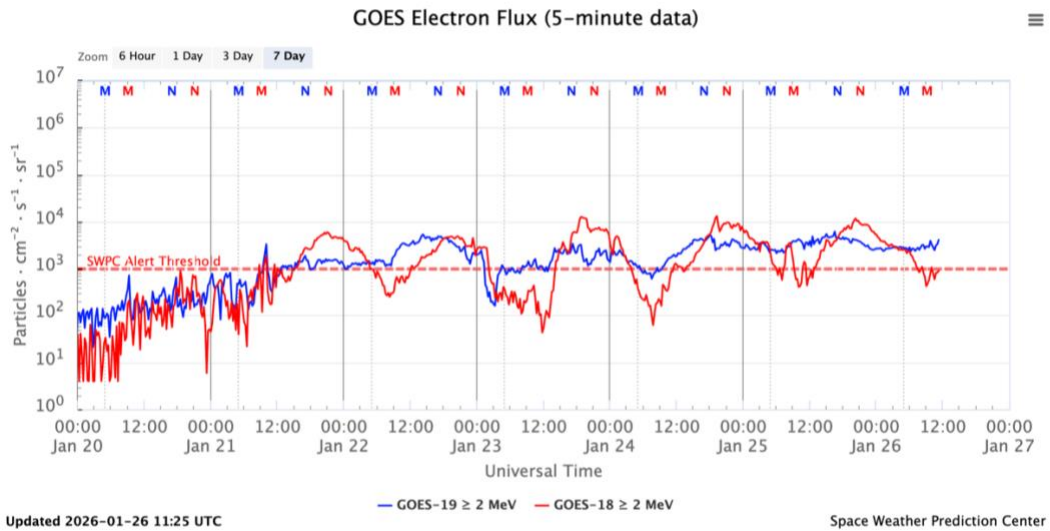


Figure 1: High-energy electron flux (> 2MeV) obtained from GOES-18 and GOES-19 satellite. Source: <https://www.swpc.noaa.gov/products/goes-electron-flux>

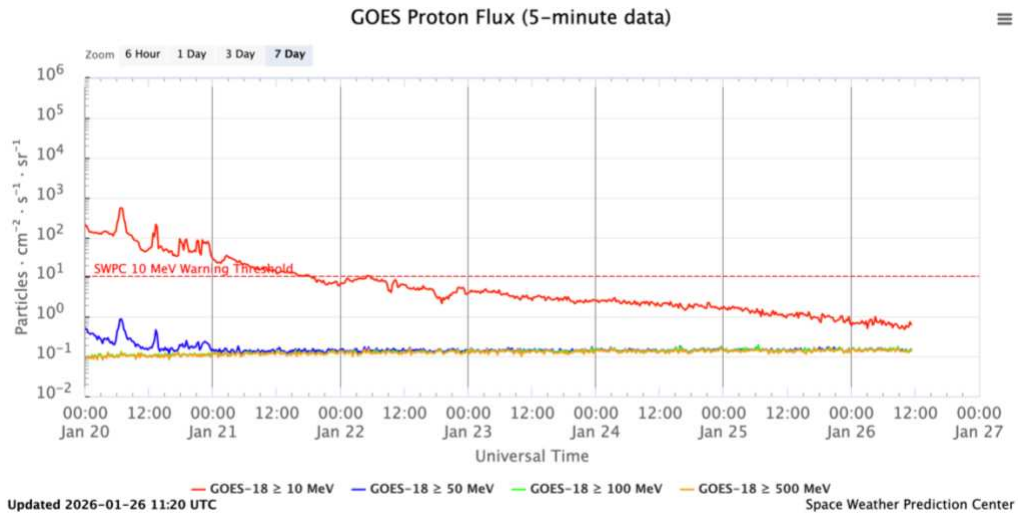


Figure 2: Proton flux (≥ 10 MeV, ≥ 50 MeV, ≥ 100 MeV, ≥ 500 MeV) obtained from GOES-18 satellite. Source: <https://www.swpc.noaa.gov/products/goes-proton-flux>



Summary

The high-energy electron flux (>2 MeV) in the outer boundary of the outer radiation belt obtained from the GOES-18 and GOES-19 geostationary satellites (Figure 1) is very low on January 20th and early January 21st. From mid-January 21st onwards, the electron flux is around the alert threshold (10^3 particles/(cm^2 s sr)), showing dropouts of more than two orders of magnitude on January 23rd and 24th.

Proton fluxes ≥ 10 MeV and ≥ 50 MeV at the outer boundary of the outer radiation belt, obtained from the GOES-18 geostationary satellite (Figure 2) are declining. The proton flux ≥ 50 MeV shows considerable values only on January 20th, while the proton flux ≥ 10 MeV shows values below the alert threshold [10^1 particles/(cm^2 s sr)], but still considerable from January 21st onwards.



Geomagnetic field

Responsible: Karen Sarmiento /Lívia Alves/Sony Su Chen

Summary

On January 19th, an interplanetary coronal mass ejection (ICME), originating from an X1.9 solar flare the previous day, reached Earth and triggered a severe geomagnetic storm (G4). During the initial hours of the event, between 18 and 21 UT, the Kp index reached 8+, and disturbances in the geomagnetic field reached extreme levels, particularly the AE index, which exceeded 2000 nT, peaking near 4000 nT. The storm continued to intensify until 24 UT on January 19th, when the Kp index rose to 9-, and the Dst index reached its minimum value of -119 nT. The EMBRACE/INPE magnetometers recorded this geomagnetic storm as being at level G3.

On January 20th, the storm entered its main phase, with the Dst index reaching -218 nT around 14 UT. The Kp index remained between 7+ and 8- throughout the day, keeping the storm at a strong level (G3). The AE index continued to show high values, exceeding 1000 nT for most of the day, with the peak occurring between 07 and 12 UT, when it surpassed 2000 nT. Geomagnetic activity remained intense, and the EMBRACE/INPE magnetometers recorded the lowest values of the dHsa index, reaching -282 nT at 19:20 UT. The storm continued to evolve through the early hours of January 21st but began to enter a recovery phase as geomagnetic activity gradually decreased.

Between January 21st and 27th, the geomagnetic field entered a recovery phase. During this period, the storm reached G2 and G1 levels. The AE index fluctuated around 500 nT, with peaks above 1000 nT on January 23rd and 25th. Geomagnetic activity still presented some instabilities, particularly between 09 and 12 UT on January 23rd and between 12 and 15 on January 25th, when the Ksa and Kp indices indicated G1 storms. Over the past 24 hours, the EMBRACE/INPE magnetometers continued to record oscillations typical of the geomagnetic storm recovery phase, and instability is expected to persist in the coming hours, although the geomagnetic field is gradually stabilizing.

GOES Magnetometers (1-minute data)

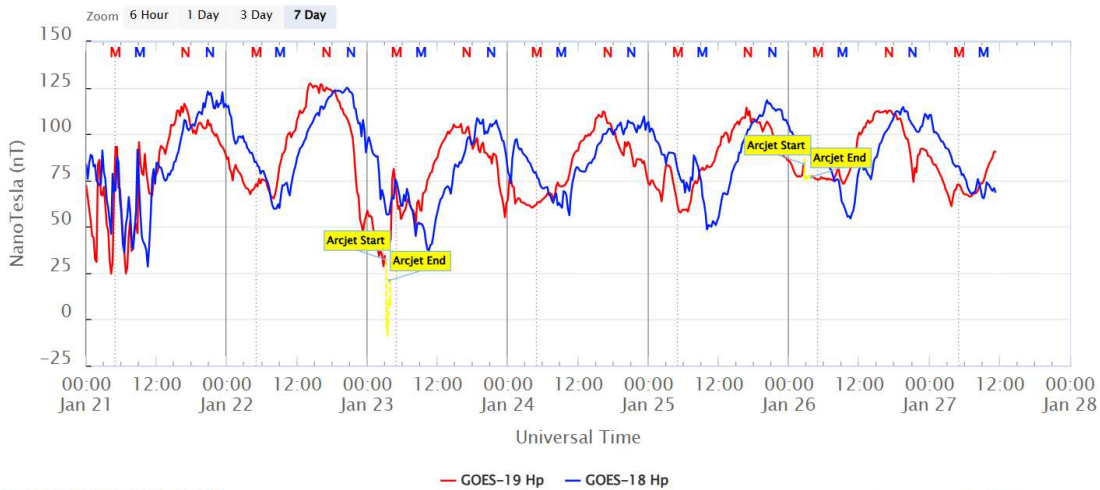


Figure 1 - Magnetic field measurement at the GOES satellite position.

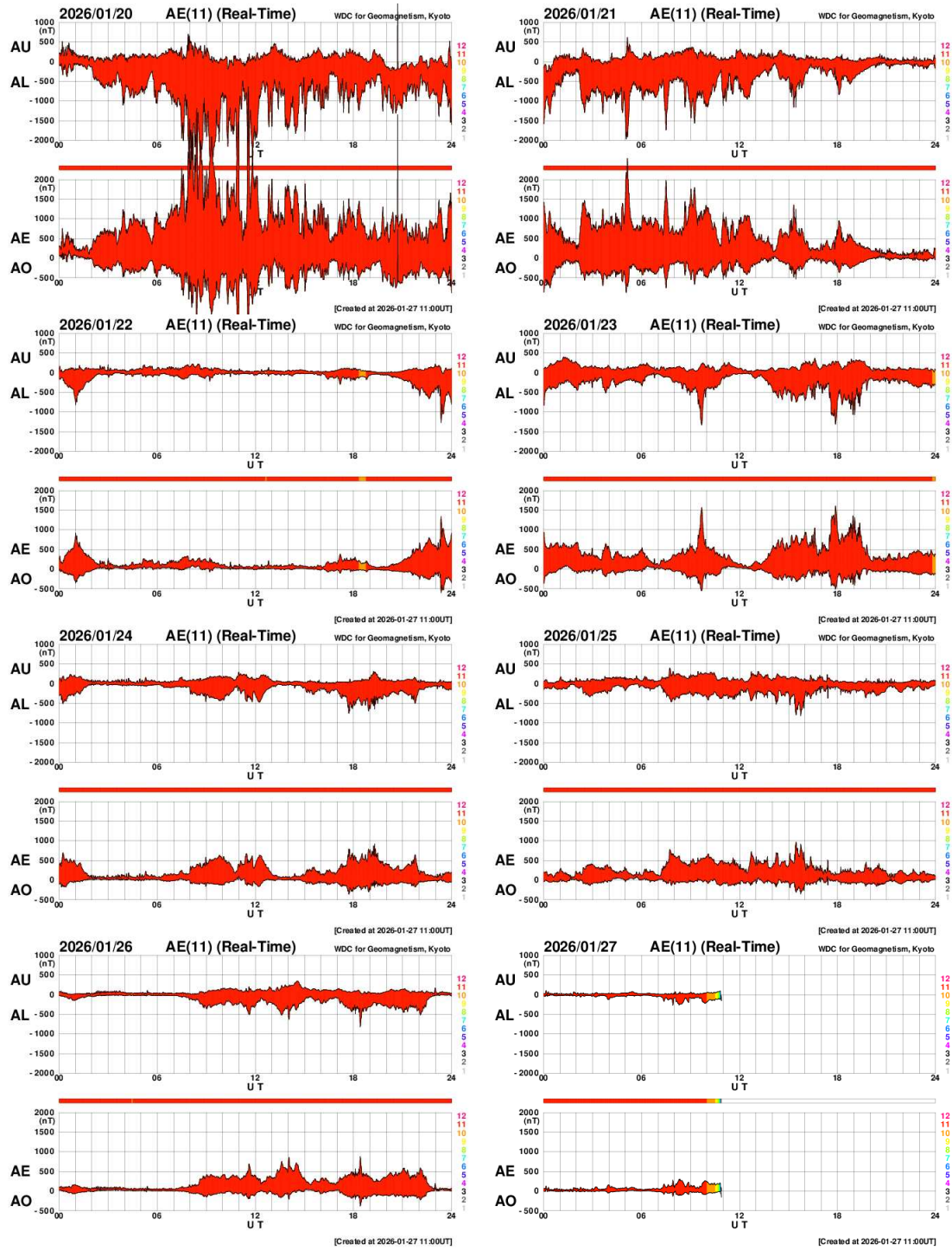


Figure 2 – AE index for the days of the week.

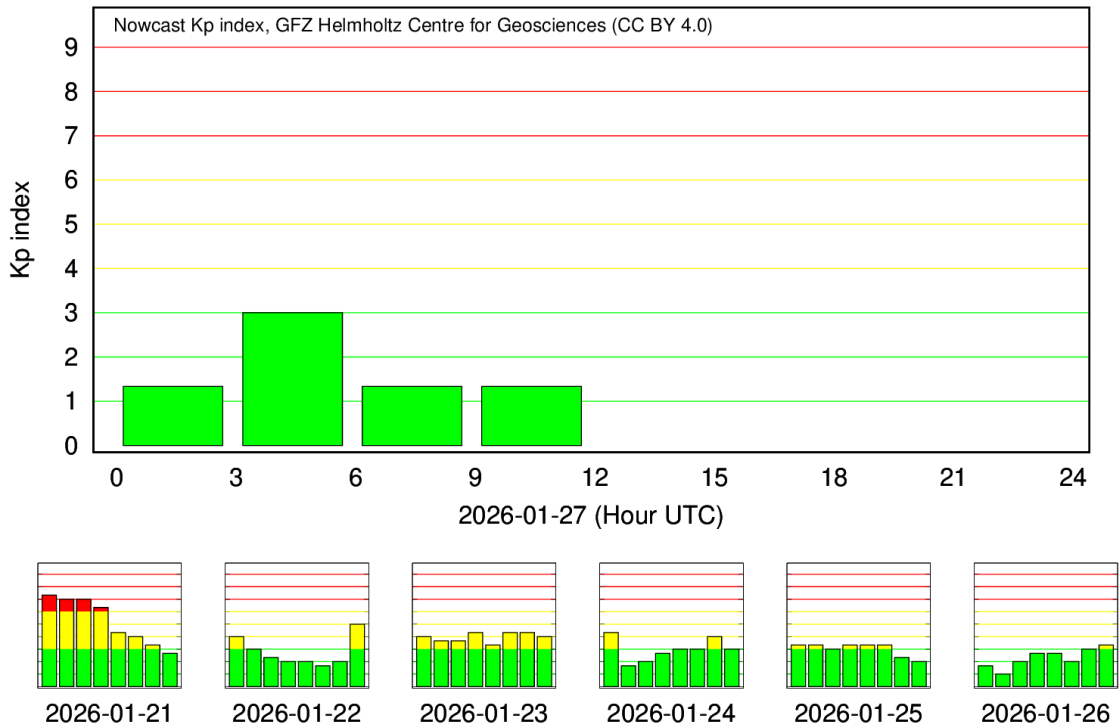


Figure 3 – Kp index on a logarithmic scale.

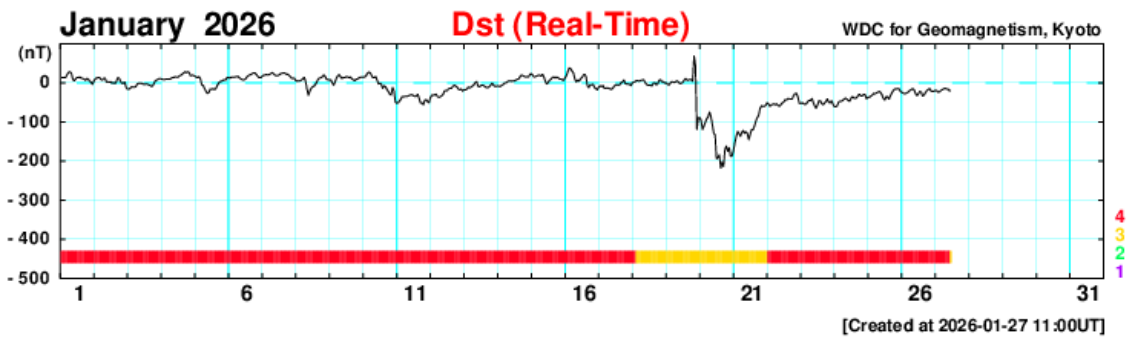
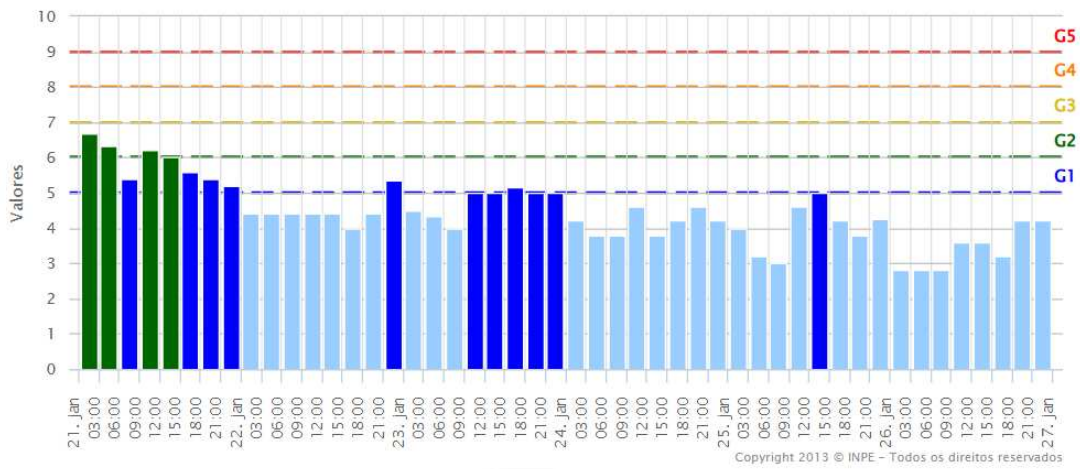


Figure 4 – Dst index.

Rede EMBRACE de Magnetômetros

Índice Ksa – (21/01/2026 – 27/01/2026)



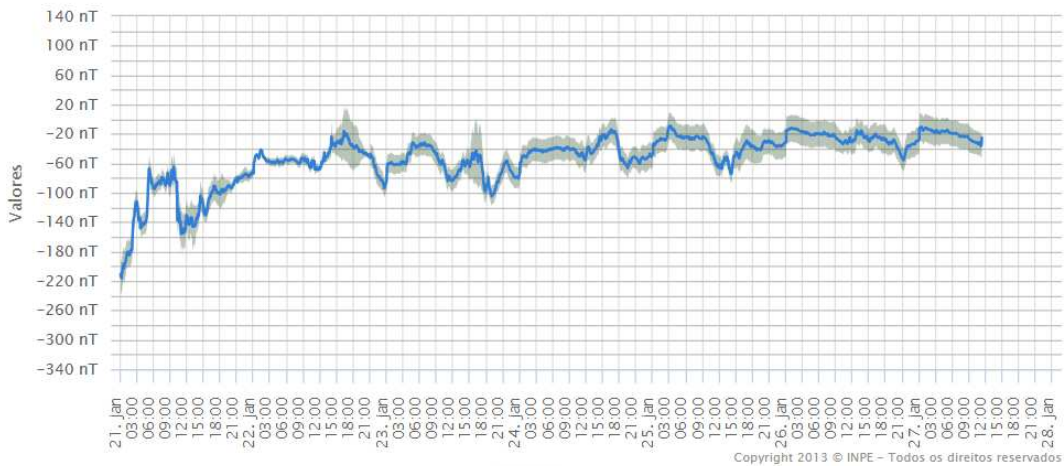
[Ajuda](#)

Por favor, não esqueça de agradecer em sua publicação ao EMBRACE/INPE pelos dados aqui obtidos.

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

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ΔH_{sa} – (21/01/2026 – 27/01/2026)



[Ajuda](#)

Por favor, não esqueça de agradecer em sua publicação ao EMBRACE/INPE pelos dados aqui obtidos.

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

Ionosfera – Digisonde (Laysa Resende)

Summary

During this week, a suppression of spread F was observed at equatorial (São Luís) and low-latitude stations (Boa Vista and Cachoeira Paulista) on 19–20 January, during the main phase of the geomagnetic storm. On 20 January, the Es layer exhibited characteristics similar to an auroral-type sporadic E (Es), suggesting the influence of particle precipitation over the Brazilian stations (Figure 1-São Luís). Subsequently, the ionospheric layers recovered rapidly. During the main storm phase, MUF variations reached the threshold associated with a moderate index on 19–20 January 2026 over Cachoeira Paulista and Boa Vista.

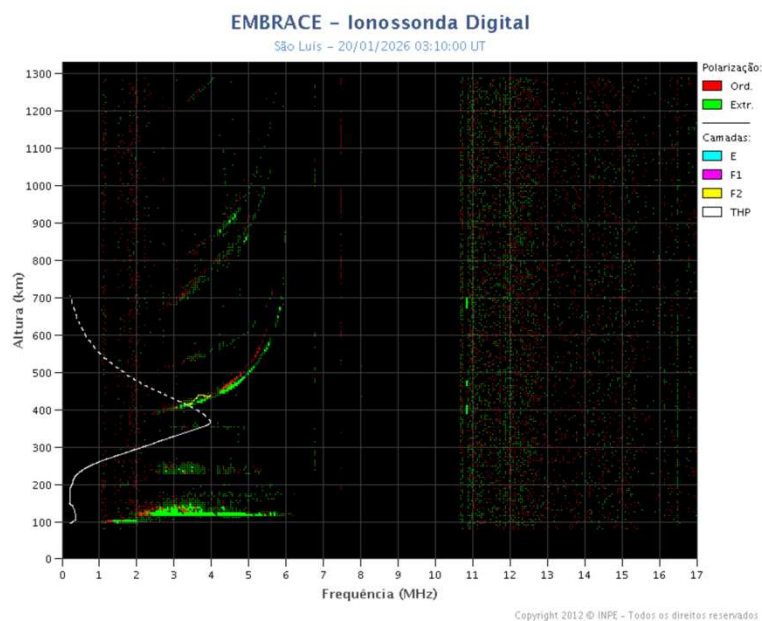


Figure 1 – Ionogram over São Luís, showing the atypical spread Es layer.