

# **Briefing Space Weather**

## 1 Sun (Douglas Silva)

#### 1.1 Summary

#### Solar - WSA-ENLIL

WSA-ENLIL (CME 2023-09-07T19:24:00 UT)

The simulation results indicate that the flank of CME will reach the DSCOVR mission between 2023-09-10T16:30:00 UT and 2023-09-11T06:30:00 UT.

WSA-ENLIL (CME 2023-09-11T01:48:00 UT and 2023-09-11T05:00 UT)

The simulation results indicate that the flank of CME will reach the DSCOVR mission between 2023-09-13T18:00 UT and 2023-09-14T08:00 UT.

WSA-ENLIL (CME 2023-09-11T15:36:00 UT)

The simulation results indicate that the flank of CME will reach the DSCOVR mission between 2023-09-14T13:00 UT and 2023-09-15T03:00 UT.

WSA-ENLIL (CME 2023-09-14T07:24:00 UT)

The simulation results indicate that the flank of CME will reach the DSCOVR mission between 2023-09-16T13:00 UT and 2023-09-17T03:00 UT.

WSA-ENLIL (CME 2023-09-14T23:12 UT)

The simulation results indicate that the CME will reach the DSCOVR mission between 2023-09-18T02:58 UT and 2023-09-18T16:58 UT.

WSA-ENLIL (CME 2023-09-16T09:12:00 UT)

The simulation results indicate that the CME will reach the DSCOVR mission between 2023-09-19T11:55 UT and 2023-09-20T01:55 UT.



**Figura:** The solid black line depicts the products of the sum of areas for each detection interval performed by SPOCA between September 08 and 16, 2023.



**Figura:** Above the 193 °A image of the Sun are highlighted coronal holes observed by SPOCA around 00:40 UT on September 10, 2023 (red dot line).





**Figura:** Above the 193 °A image of the Sun are highlighted coronal holes observed by SPOCA around 23:50 UT on September 10, 2023 (blue dot line).



**Figura:** Above the 193 °A image of the Sun are highlighted coronal holes observed by SPOCA around 17:30 UT on September 14, 2023 (purple dot line).



## 2 Interplanetary Medium (Paulo Jauer)



# Meio interplanetário – IM – Paulo Ricardo Jauer 11/09 to 18/09 2023

#### Summary

Summary of IM conditions for the last week. The interplanetary medium region in the last week showed a moderate to high level of plasma disturbances due to the possible interaction of CME-like structures identified by the DSCOVR satellite in the interplanetary medium.

- The magnitude of the interplanetary magnetic field component showed two significant peaks: On September 12th and 18th at 13:30 UT of 14 nT and 21 nT respectively during the analyzed period.
- The BxBy components showed variations during the analyzed period, keeping both oscillating within the interval [+11, -20] nT, with the presence of a sector boundary crossing on September 14th at 2:30 pm UT.
- The bz field component presented a minimum value on 12/Sep at 14:30 UT of ~ 17.7 nT and on 18/Sep at 16:30 UT of ~ 13.07 nT respectively. In the remainder of the period, the bz component fluctuated in the interval [+5, -5] nT.
- The density of the solar wind showed oscillations with a maximum peak recorded on 12/Sep at 12:30 pm of 52 p/cm<sup>3</sup> and on 14/Sep at 7:30 pm of 23 p/cm<sup>3</sup>. During the remainder of the period, the density fluctuated on average below 15 p/cm<sup>3</sup>.
- The average speed of the solar wind remained on average above 400 km/s. The speed had a maximum value on 18/Sep at 17:30 UT of 568 km/s and a minimum value on 12/Sep at 19:30 UT of 338 km/s. Discontinuities were found in the velocity component due to the interaction of interplanetary structures.
- The position of the magnetopause fluctuated on average around the equilibrium position. It presented abrupt compressions whose minimum values recorded were on the days: 12-14-17-18 September at 1:30 pm-7:30 pm-02:30 am and at 4:30 pm UT of 7.18-8.0-8.4 and 6.87 Re respectively.



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, solar wind density, speed, temperature and the last graph represents the position of the subsolar magnetopause. Note that some profile are repeated in column 2.



**Figure 1** – illustrates a set of parameters observed in the solar wind by the DSCVR satellite.



## 3 Geomagnetismo (Livia Ribeiro Alves)

## 3.1 Summary

In the week of Sep 12-18, the following events related to geomagnetic activity stand out: • 12 and 18/09: the data from the Embrace magnetometer network registered two SSCs of 47 nT and 45 nT, respectively and a drop of -120 nT in VSS

• The AE index reached 1500 nT on 12 and 18/09. The Dst index reached -79 nT. The highest Kp of the week was 5+.



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Figure 1.: Daily variation of the geomagnetic field from H (nT) measured at Embrace MagNet from 12 to 18 September 2023



Figure 2: Dst index for September 2023



[Created at 2023-09-18 19:20UT]



Figure 3.: AE index for the most disturbed days in the current week.



Figure 4: Kp index for the current week (12-18 September 2023)



# 4 ULF waves (Graziela B. D. Silva.)

# 4.1 Summary

- The GOES 16 satellite in geosynchronous orbit (L ~ 6.6) registered significant activity of Pc5 ULF waves over the week, especially from Sep. 12 to 13.
- As observed on the ground, the ISLL station at high latitude registered intense ULF wave activity over the week.
- The PVE station from Embrace MagNet, located under the dip equator, registered regular activity of the waves during the week, despite data gaps until Sep. 13.
- The ARA and CXP stations at low latitude of Brazil registered an intense activity of the waves on Sep. 12.
- The dB/dt rates were higher than 100 nT/min in magnitude at ISLL (high latitude). The rates were above 6 nT/min at the Embrace stations in lower latitudes.





**Figure 1**: Map describing the geographic location of the stations together with the magnetic isolines to show the magnetic equator (blue) and the SAMA region (red).



**Figure 2:** a) Timeseries of the geomagnetic field total component measured at ISLL station (Island Lake) of the CARISMA magnetometer network in magenta, along with the associated perturbation in the Pc5 band shown in blue. b-d) timeseries of the geomagnetic field total component measured at stations PVE (Porto Velho), ARA (Araguatins), and CXP (Cachoeira Paulista) of the EMBRACE network in magenta, along with the Pc5 perturbation in blue.



**Figure 3:** From top to bottom: Time evolution of the power spectral density obtained from the filtered timeseries of the geomagnetic field total component ( $\delta$ Btotal) for a) the high latitude station (ISLL-CARISMA), and b-d) for the low latitude stations of EMBRACE (PVE, ARA, CXP).



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**Figure 4:** a) Timeseries of the geomagnetic field total component measured by GOES 16, together with the Pc5 fluctuation in black. b) Wavelet power spectrum of the filtered timeseries. c) Average ULF power in the period range from 2 to 10 minutes.



**Figure 5:** a-d) The rate of change of the geomagnetic field total component (dB/dt) obtained for a) the high latitude station (ISLL-CARISMA), and b-d) for the low latitude stations of EMBRACE (PVE, ARA, CXP).



#### 5 Ionosphere - ROTI (Carolina de Sousa do Carmo)

#### 5.1 Summary

In the week 2279 (September 10 to 16, 2023) there were ionospheric irregularities (plasma bubble) on September 10, 11, 15 and 16. Figure 1 shows the ROTI time series for four stations in the Brazilian sector (Natal (RNNA), Bacabal (MABB), Cuiabá (CUIB) and São José dos Campos (SJSP)).



**Figure** – ROTI time series for four stations in the Brazilian sector (Natal (RNNA), Bacabal (MABB), Cuiabá (CUIB) and São José dos Campos (SJSP)), from September 10 to 16, 2023.