Briefing Space Weather

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2023/05/18

1 Sun

1.1 Responsible: José Cecatto

05/08 – M2.3 flare; Fast wind stream (=< 550 km/s); 7 CME c.h.c. toward the Earth; 05/09 – M6.5, M1.2, M1.3, M4.2, M5.0 flares; Fast wind stream (=< 500 km/s); 3 CME c.h.c. toward the Earth **;

05/10 - M2.2 flare; Fast wind stream (=< 650 km/s); 9 CME c.h.c. toward the Earth *;

05/11 - M2.1, M1.8 flares; Fast wind stream (=< 550 km/s); 13 CME c.h.c. toward the Earth *;

05/12 – No flare; Fast wind stream (=< 600 km/s); 9 CME c.h.c. toward the Earth *;

05/13 – No flare; Fast wind stream (=< 500 km/s); 7 CME c.h.c. toward the Earth;

05/14 – No flare; Fast wind stream (=< 500 km/s); 2 CME c.h.c. toward the Earth;

05/15 – No flare; Fast wind stream (=< 500 km/s); 3 CME c.h.c. toward the Earth;

Prev.: Fast wind stream for the next 01-02 days; for the next 2 days (15% M, 01% X) probability of M / X flares; also,

occasionally other CME can present component toward the Earth. c.h.c. – can have a component; * partial halo; ** halo

2 Sun

2.1 Responsible: Douglas Silva

- WSA-ENLIL (CME 2023-05-07T23:12 UT)
- The simulation results indicate that the CME will reach the DSCOVR mission between 2023-05-09T10:40 UT and 2023-05-10T00:40 UT.
- WSA-ENLIL (CME 2023-05-09T19:00 UT)
- The simulation results indicate that the Coronal Mass Ejection will reach the DSCOVR mission between 2023-05-11T05:19 UT and 2023-05-11T19:19 UT.
- WSA-ENLIL (CME 2023-05-12T05:29 UT)
- The simulation results indicate that the flank of Coronal Mass Ejection will reach the DSCOVR mission between 2023-05-14T19:00 UT and 2023-05-15T09:00 UT.
- WSA-ENLIL (CMEs 2023-05-11T09:36 UT, 2023-05-11T19:00 and 2023-05-11T19:12 UT)
- The simulation results indicate that the combined Coronal Mass Ejections will reach the DSCOVR mission between 2023-05-11T05:19 UT and 2023-05-11T19:19 UT.







Coronal holes (SPOCA):

Figura: The solid black line depicts the products of the sum of areas for each detection interval performed by SPOCA between May 05 and 13, 2023.

AIA 193.0 Angstrom 2023-05-08 00:42:28 SPoCA_v1.0_CH_39494 250 1000 200 (Solar-Y) 500 abilide 150 0 live I 100 -500 1000 -1000 -500" 0" 500" Helioprojective Longitude (Solar-X) 1000

Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 00:42 UT on May 08, 2023 (red dot line).

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Figura: The solid black line depicts the products of the sum of areas for each detection interval performed by SPOCA between May 05 and 13, 2023.



Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 19:29 UT on May 05, 2023 (green dot line).

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Figura: The solid black line depicts the products of the sum of areas for each detection interval performed by SPOCA between May 05 and 13. 2023. Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 05:50 UT on May 11, 2023 (blue dot line).

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Figura: The solid black line depicts the products of the sum of areas for each detection interval performed by SPOCA between May 05 and 13, 2023.

AIA 193.0 Angstrom 2023-05-12 20:13:04 SPoCA v1.0 CH 39527



1000 500 0 500 10 Helioprojective Longitude (Solar-X)

Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 20:13 UT on May 12, 2023 (pink dot line).

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3 Interplanetary medium

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3.1 Responsible: Paulo Jauer

- The interplanetary medium in the last week showed a moderate to high level of plasma disturbances due to the possible interaction of CME and HSS structures identified by the DSCOVR satellite.
- The modulus of the interplanetary magnetic field component showed a maximum peak of 18 nT on 10/May at 01:30 UT during the analyzed period. Also detected on May 12th and 13th were two peaks of 12 nT at 16:30 and 19:30 UT respectively.
- The BxBy components presented variations in the analyzed period, keeping both oscillating within the interval [+15, -150] nT.
- The bz field component showed a minimum value on May 13 at 19:30 UT of -11 nT and a maximum positive value on May 10 at 03:30 UT of 11 nT.
- The solar wind density showed peaks on May 10th and 12th at 02:30, 13:30 UT of 37 and 19 p/cm^3 due to interplanetary structure interaction.
- $\bullet\,$ The solar wind speed remained on average above 400 km/,s with a peak on May 10 at 12:30 UT of 655 km/s.
- The position of the magnetopause was oscillating with a minimum value recorded on 10/May at 03:30 UT of 7.7 Re. On average, the position of magnetopause has been oscillating below the equilibrium position.



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4 Radiation Belts

4.1 Responsible: Ligia Alves da Silva

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High-energy electron flux (> 2 MeV) in the outer boundary of the outer radiation belt obtained from geostationary satellite data GOES-16 and GOES-18 is below 10^3 particles/($cm^2 ssr$) during the entire period analyzed, with greater variability in the first days and greater stability from May 17th.

5 ULF waves

5.1 Responsible: Graziela B. D. Silva



Figura 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.



Figura 3: a-d) Time evolution of the power spectral density obtained from the filtered timeseries of the geomagnetic field total component (δ 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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Figura 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.



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Figura 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).

- The GOES 16 satellite in geosynchronous orbit (L \sim 6.6) registered significant activity of Pc5 ULF waves throughout the week.
- As observed on the ground, the ISLL station at high latitude registered moderate to intense levels of ULF wave activity over the week.
- The PVE station from Embrace MagNet, located under the dip equator, registered an intense activity of the waves activity during all weekdays.
- The CXP and ARA stations at low latitudes of Brazil rather registered an intense activity of the waves over the whole week.
- The dB/dt rates were enhanced on May 9 up to values ; 30 nT/min in ISLL (high latitude), while they were below ~ 16 nT/min in magnitude at the low latitudes of Brazil. There was occurrence of sudden impulses on May 8, 9, and 12.

6 Geomagnetic activity

6.1 Responsible: Lívia Alves

From May 08 to 14, the following events related to geomagnetic activity stand out:

- Mai 10 and 13: H- component reached its minimum.
- The AE index surpassed 1000 nT in Mai 10 and 13.
- The Dst index reached -28 nT (Mai 13). The highest Kp of the week was 5+.









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Figura 6: Time evolution of the geomagnetic field data and indices during the reported week.

7 Scintilation

7.1 Responsible: Siomel Savio Odriozola

In this report on the S4 scintillation index, data from SLMA in São Luiz/MA, STNT in Natal/RN, STCB in Cuiabá/MT and SJCE in São José dos Campos/SP are presented. The S4 index tracks the presence of irregularities in the ionosphere having a spatial scale ~ 400 m. The S4 index registered scintillation values lower than 0.3 during the whole week in all stations. The behavior was consistent with the well-known seasonality of the bubble period in the South American hemisphere.



Figura 1: Valores do índice S4 para a constelação GPS medidos nas estações SLMA (painel superior esquerdo), STNT(painel superior direito), STCB (painel inferior direito) e SJCE (painel inferior direito) durante a semana 08-15/05.