Briefing Space Weather

2023/06/14

1 Sun

1.1 Responsible: José Cecatto

06/05 – No (M/X) flare; Fast wind stream (=< 450 km/s); 4 CME c.h.c. toward the Earth;
06/06 – No (M/X) flare; No fast wind stream; 3 CME c.h.c. toward the Earth *;
06/07 – M4.7 flare; No fast wind stream; 4 CME c.h.c. toward the Earth;
06/08 – No (M/X) flare; No fast wind stream; 7 CME c.h.c. toward the Earth;
06/09 – M2.5 flare; No fast wind stream; 3 CME c.h.c. toward the Earth *;
06/10 – No (M/X) flare; No fast wind stream; 2 CME c.h.c. toward the Earth;
06/11 – No (M/X) flare; Fast wind stream (=< 450 km/s); 1 CME c.h.c. toward the Earth;
06/12 – No (M/X) flare; Fast wind stream (=< 500 km/s); 1 CME c.h.c. toward the Earth *
Prev.: Fast wind stream for the next 01-02 days; for the next 2 days (20% M, 05% 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 2023-06-04T10:24 UT)
  - The simulation results indicate that the CME will reach the DSCOVR mission between 2023-06-07T06:14 UT and 2023-06-07T20:14 UT.
- WSA-ENLIL (CME 2023-06-06T03:48 UT)
  - The simulation results indicate that the flank of CME will reach the DSCOVR mission between 2023-06-09T08:00 UT and 2023-06-09T22:00 UT.
- WSA-ENLIL (CME 2023-06-07T07:00 UT)
  - The simulation results indicate that the flank of CME will reach the DSCOVR mission between 2023-06-10T11:00 UT and 2023-06-11T01:00 UT.
- WSA-ENLIL (CME 2023-06-08T21:24 UT)
  - The simulation results indicate that the flank of CME will reach the DSCOVR mission between 2023-06-12T00:30 UT and 2023-06-12T14:30 UT.

Coronal holes (SPOCA):

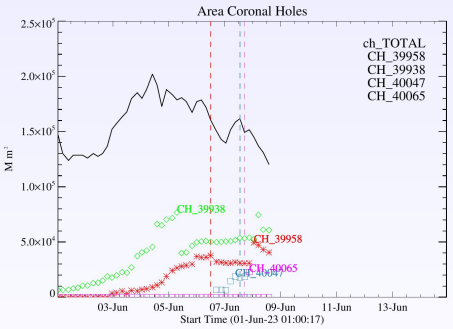


Figura: The solid black line depicts the products of the sum of areas for each detection interval performed by SPOCA between June 01 and 09, 2023.

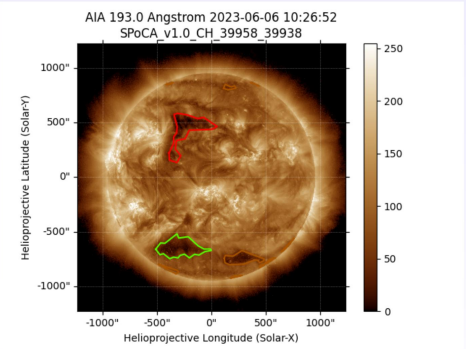


Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 10:20 UT on June 06, 2023 (red dot line).

Coronal holes (SPOCA):

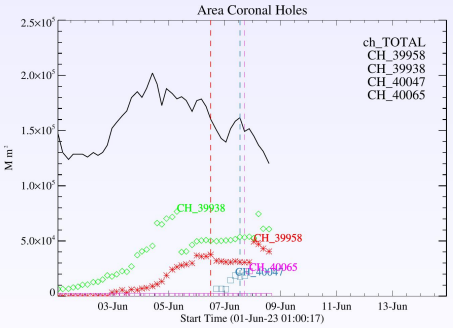


Figura: The solid black line depicts the products of the sum of areas for each detection interval performed by SPOCA between June 01 and 09, 2023.

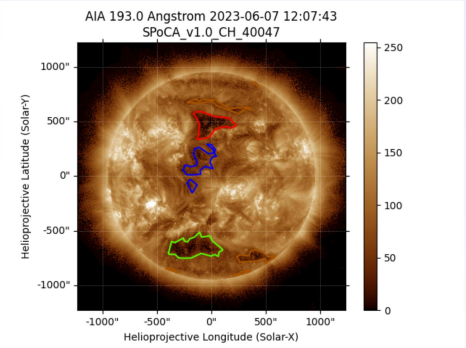


Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 12:00 UT on June 07, 2023 (blue dot line).

Coronal holes (SPOCA):

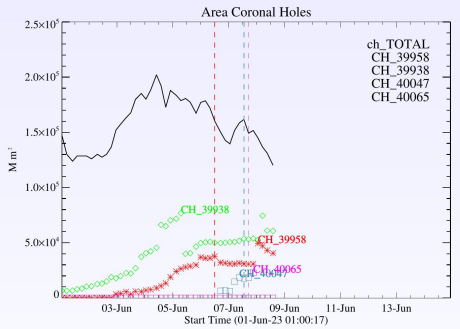


Figura: The solid black line depicts the products of the sum of areas for each detection interval performed by SPOCA between June 01 and 09, 2023.

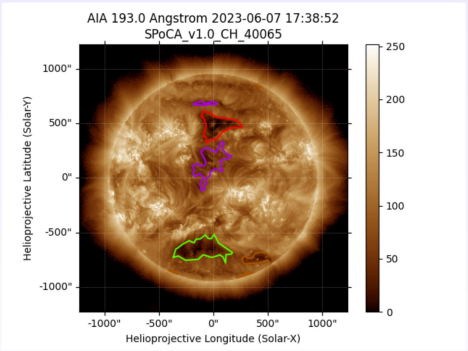
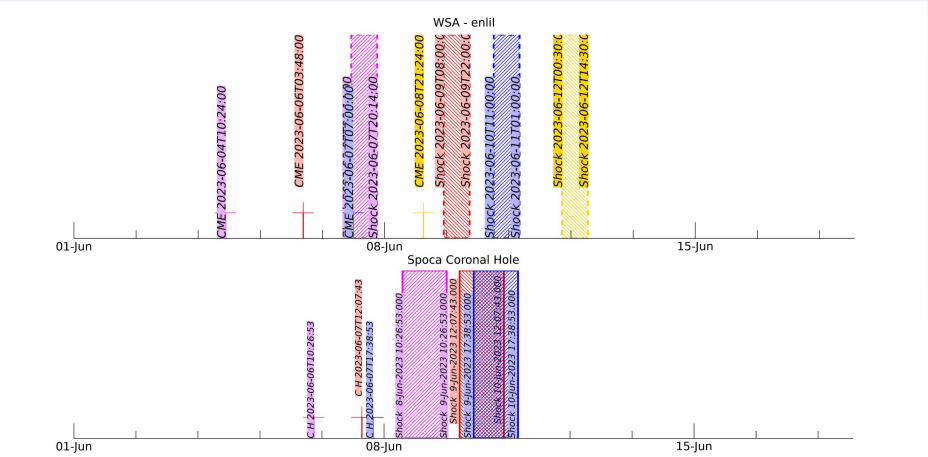


Figura: Above the 193 Å image of the Sun are highlighted coronal holes observed by SPOCA around 17:30 UT on June 07, 2023 (purple dot line).

WSA - ENLIL and SPOCA

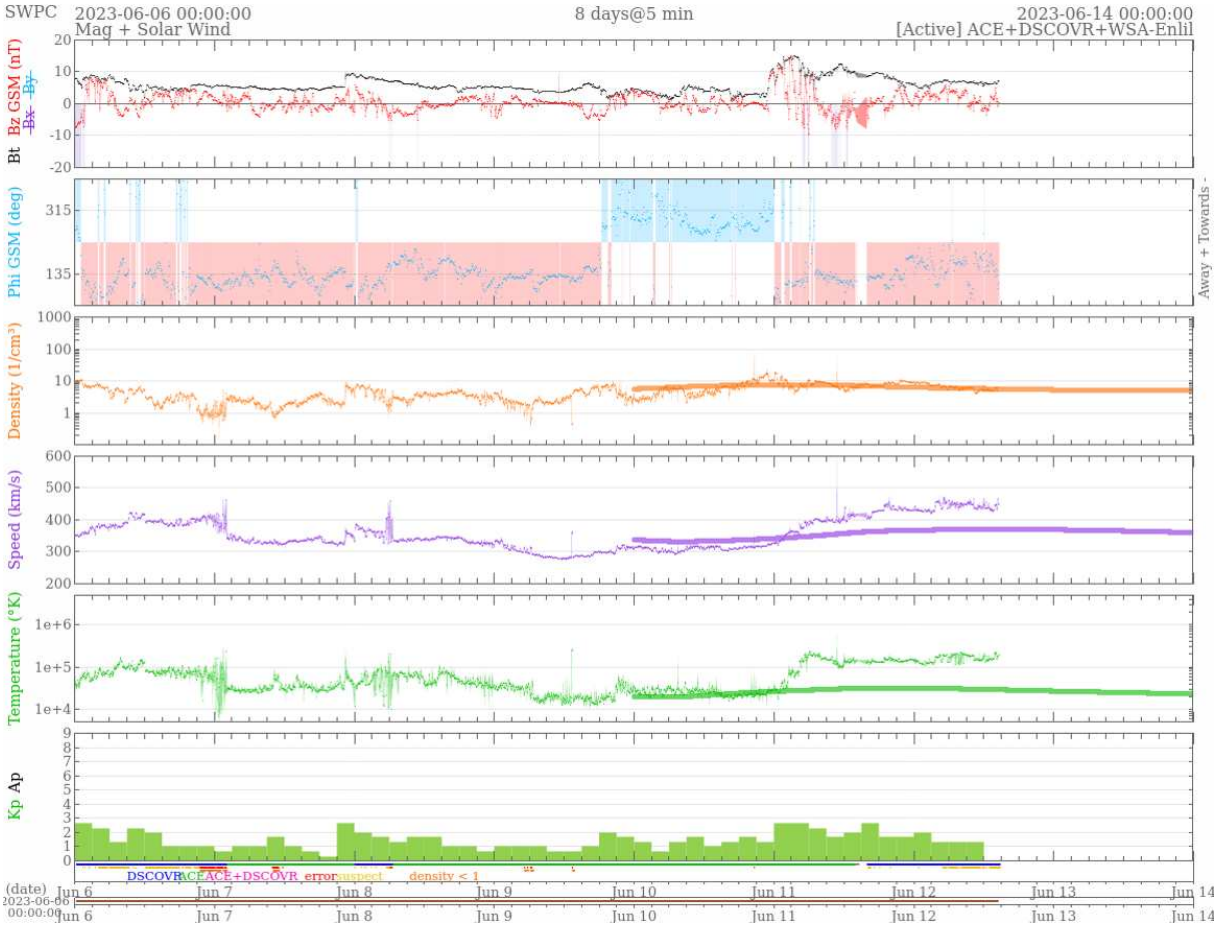


3 Interplanetary medium

3.1 Responsible: Paulo Jauer

- The interplanetary medium region in the last two weeks showed a moderate of plasma perturbations due to the possible interaction of CME and HSS-like structures identified by the DSCOVR satellite in the interplanetary medium.
- The magnitude of the interplanetary magnetic field component on average oscillated below 14 nT.
- The BxBy components showed variations in the analyzed period, keeping both oscillating within the interval [+10, -10] nT, with the presence of sector change on June 3rd at 16:30 UT.
- The component of the bz field showed variations in the analyzed period, remaining oscillating in the range of [+10, -6] nT.
- The solar wind density oscillated with peaks recorded on 09-10/June at 22:30 and 12:40 UT of 25 and 22 p/cm^3.

- The solar wind speed has been oscillating with maximum peaks on June 9-12 at 14:30 and 23:30 UT of 291 and 477 km/s.
- The position of the magnetopause was oscillating on average above the equilibrium position.



4 Radiation Belts

4.1 Responsible: Ligia Alves da Silva

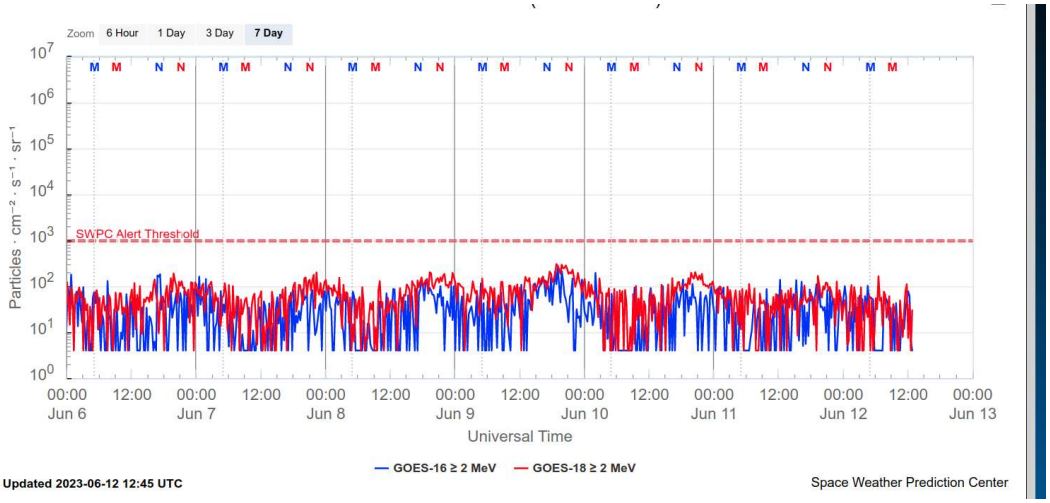


Figura 1: High-energy electron flux (> 2MeV) obtained from GOES-16 and GOES-18 satellite. Source: `https://www.swpc.noaa.gov/products/goes-electron-flux`

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 (Figure below) is below 10^2 particles/$(cm^2 ssr)$ throughout the analyzed period without presenting a significant variability.

5 ULF waves

5.1 Responsible: Graziela B. D. Silva

Figura 2: a) Map describing the geographic location of the stations together with the magnetic isolines to show that magnetic equator (blue) and the SAMA region (red). Cortesy: Karen Sarmiento.

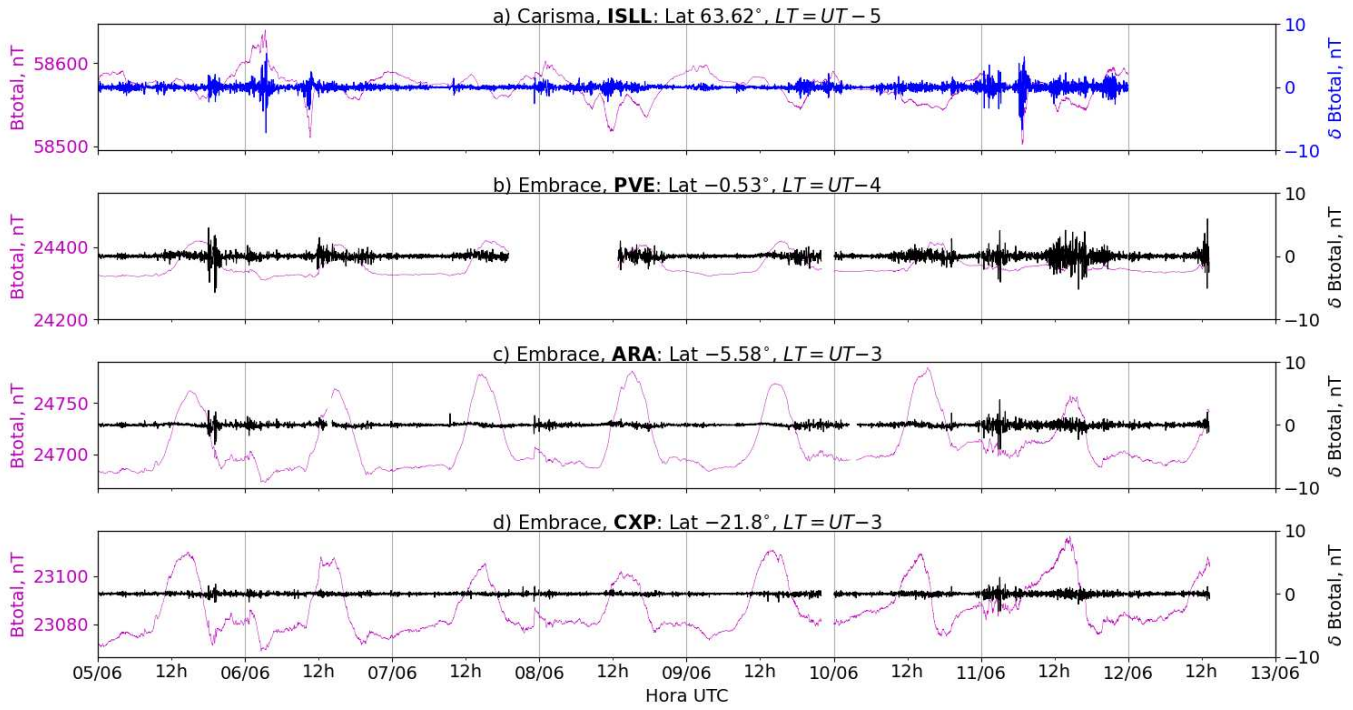


Figura 3: a) Timeseries of the geomagnetic field total component measured at ISLL station (Island Lake) of the CARISMA magnetometer network in magenta, along with the associated perturbation in the Pc5 band shown in blue. b-d) timeseries of the geomagnetic field total component measured at stations PVE (Porto Velho), ARA (Araguatins), and CXP (Cachoeira Paulista) of the EMBRACE network in magenta, along with the Pc5 perturbation in blue.

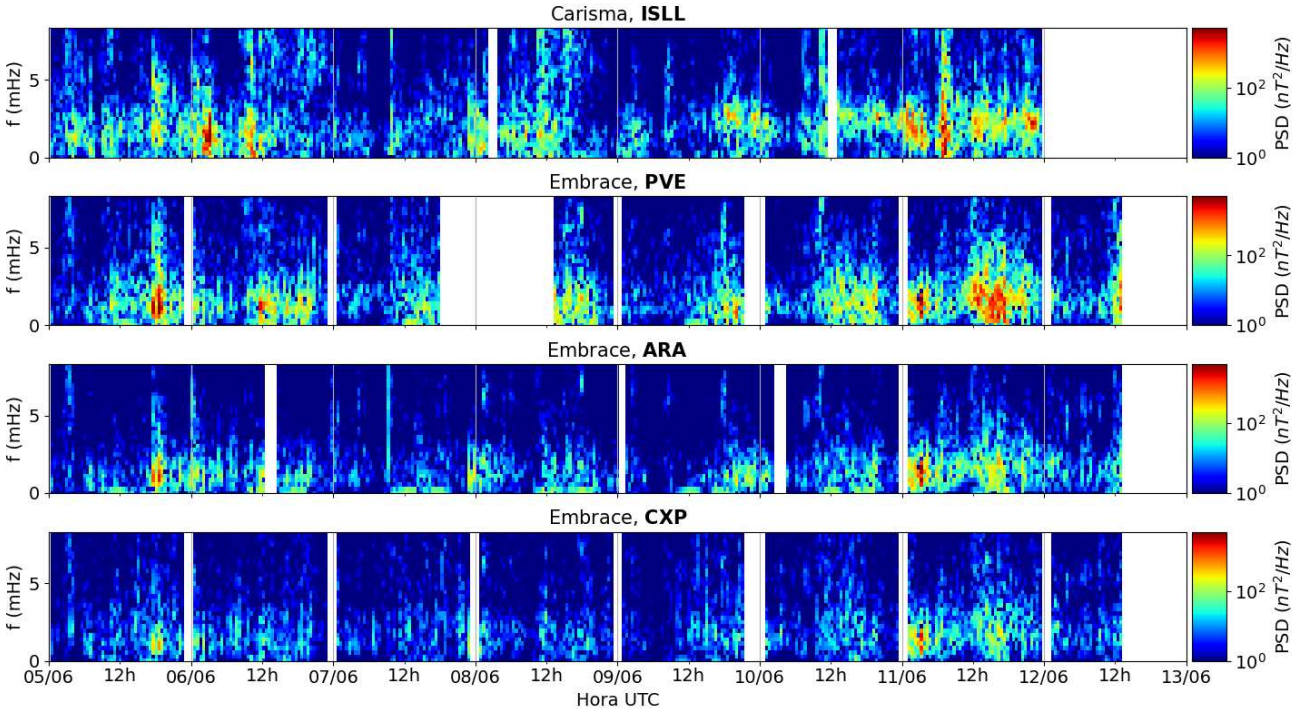


Figura 4: a-d) Time evolution of the power spectral density obtained from the filtered timeseries of the geomagnetic field total component (δ Btotal) for a) the high latitude station (ISLL-CARISMA), and b-d) for the low latitude stations of EMBRACE (PVE, ARA, CXP).

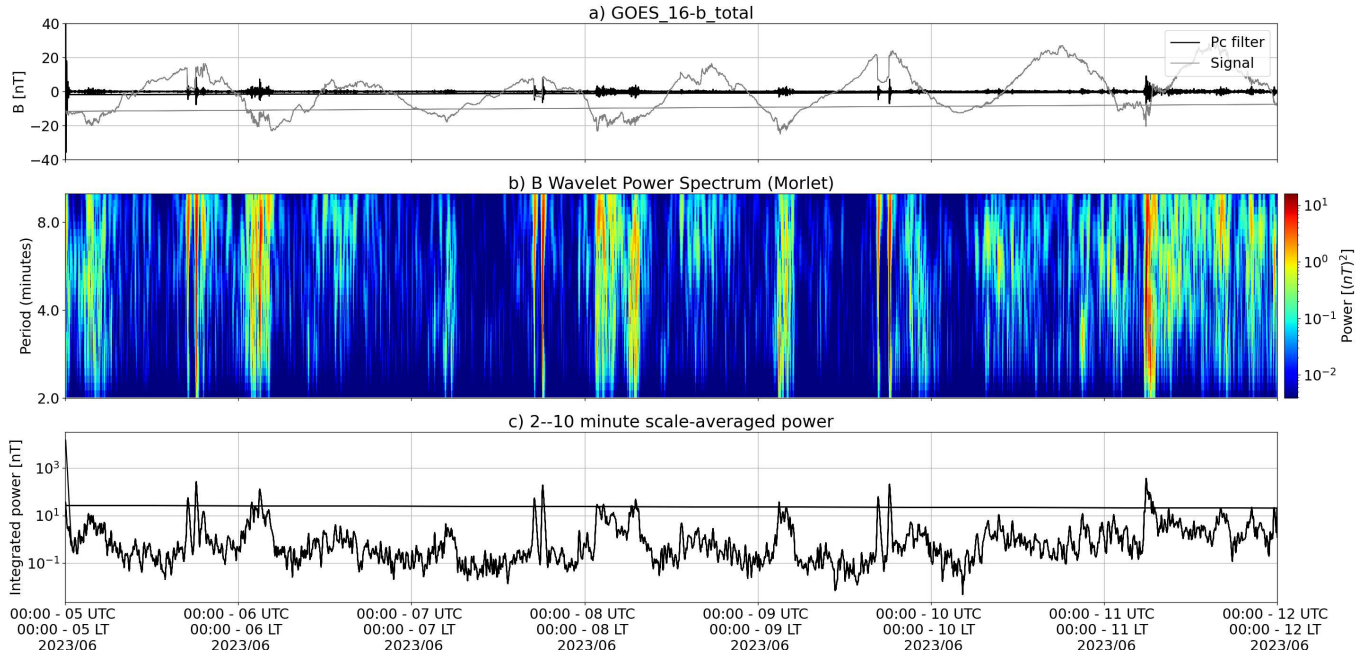


Figura 5: a) Timeseries of the geomagnetic field total component measured by GOES 16, together with the Pc5 fluctuation in black. b) Wavelet power spectrum of the filtered timeseries. c) Average ULF power in the period range from 2 to 10 minutes.

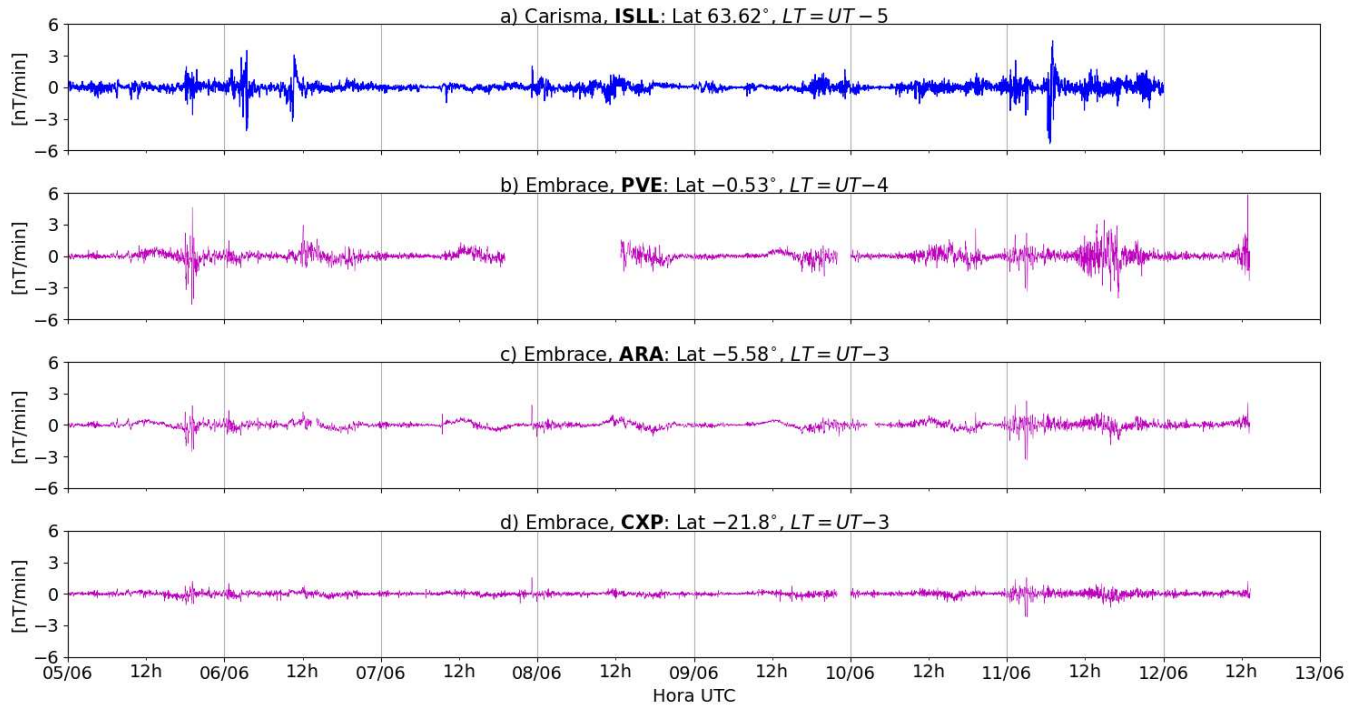


Figura 6: a-d) The rate of change of the geomagnetic field total component (dB/dt) obtained for a) the high latitude station (ISLL-CARISMA), and b-d) for the low latitude stations of EMBRACE (PVE, ARA, CXP).

- The GOES 16 satellite in geosynchronous orbit (L $\sim$ 6.6) registered significant activity of Pc5 ULF waves over the week, despite data gaps.
- As observed on the ground, the ISLL station at high latitude registered low ULF wave activity

over the week, as well as the dB/dt activity.

- The PVE, CXP and ARA stations at low latitudes of Brazil also registered low activity of the waves over the week, but enhanced activity was reported through June 05 and 11.
- The dB/dt rates were below 6 nT/min in magnitude both at ISLL (high latitude) the Embrace stations at lower latitudes.
- There was no detection of significant events of SI (sudden impulses or SCs with dB/dt $>$ 5nT/min) over the week.

6 Geomagnetic activity

6.1 Responsible: Lívia Alves

From June 06 to 11, the geomagnetic field was quiet.

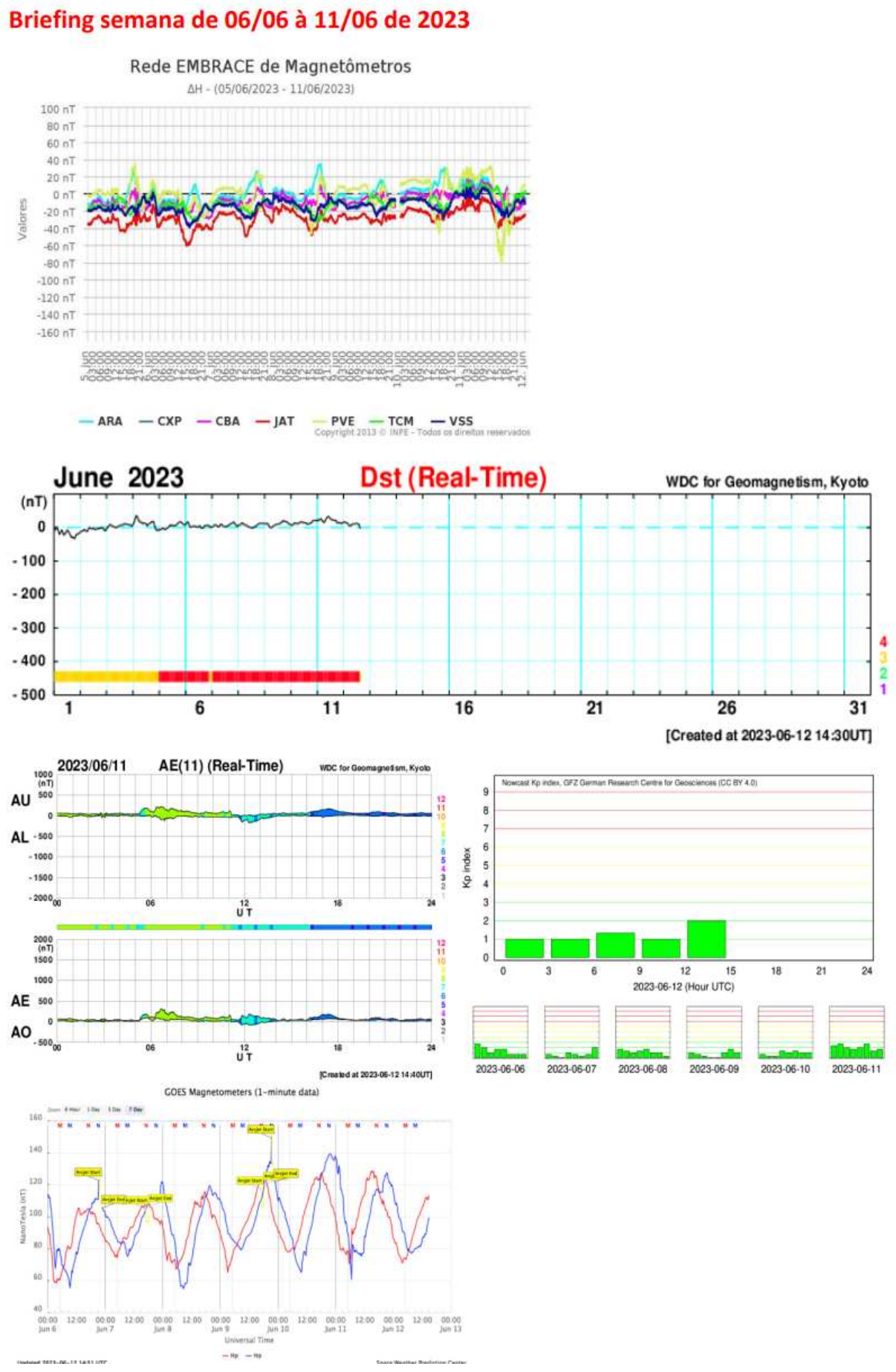


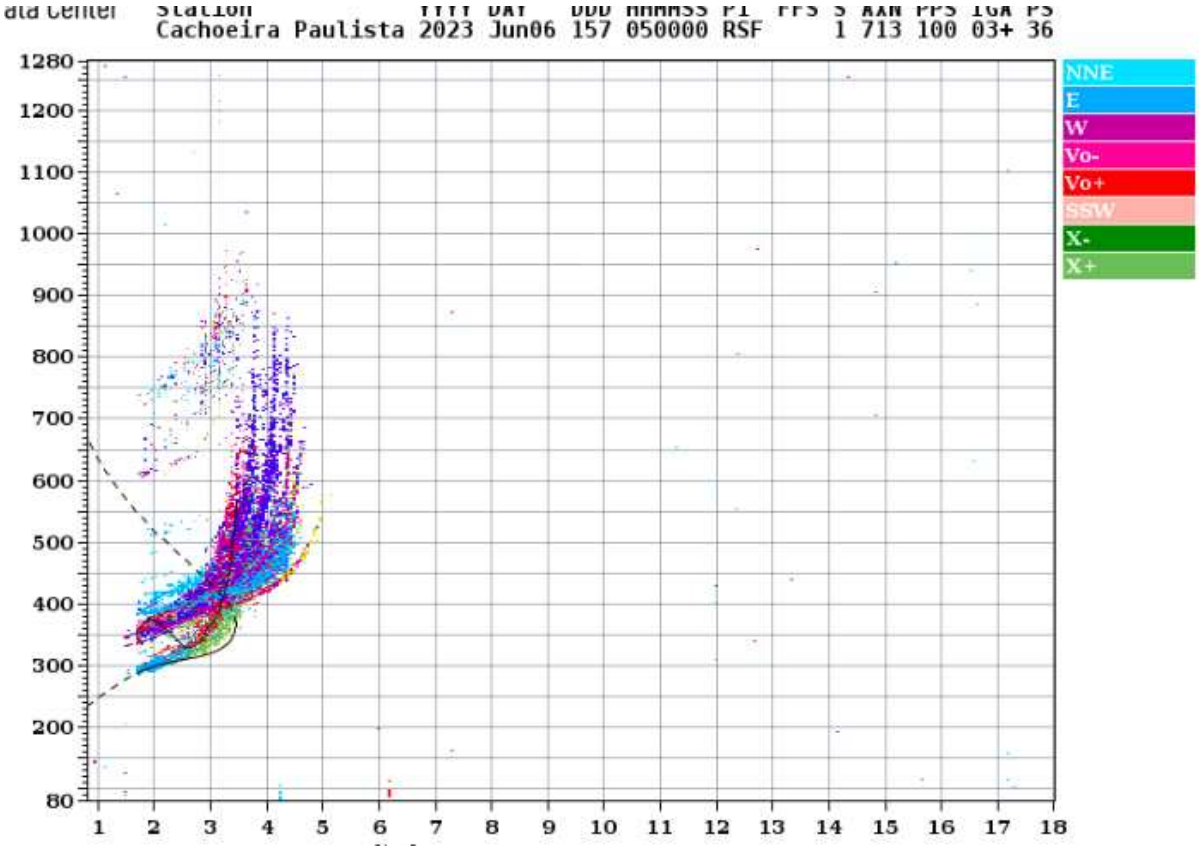
Figura 7: Time evolution of the geomagnetic field data and indices during the reported week.

7 Ionosphere

7.1 Responsible: Laysa Resende

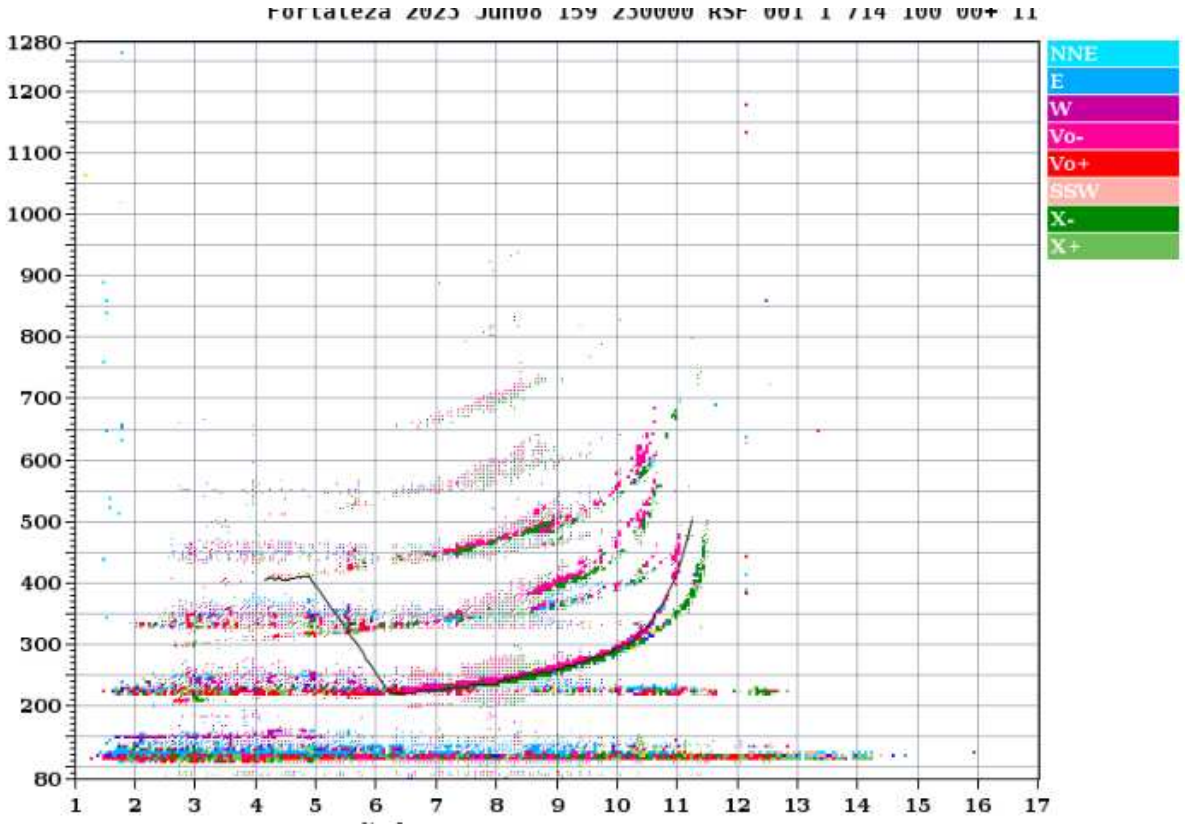
Cachoeira Paulista:

- There were spread F on Jun,06.
- The Es layers reached scale 2 and 3 during the week.



Fortaleza:

- There were spread F all days during this week.
- The Es layers reached scale 5 on days in Jun 08 and 10.



8 Scintilation

8.1 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 $\sim$ 400 m. The S4 index registered scintillation values lower than 0.3 during the whole week in all stations (Figure below). The behavior is expected for the month of June, taking into account the well-known seasonality of the bubble period in the South American hemisphere.

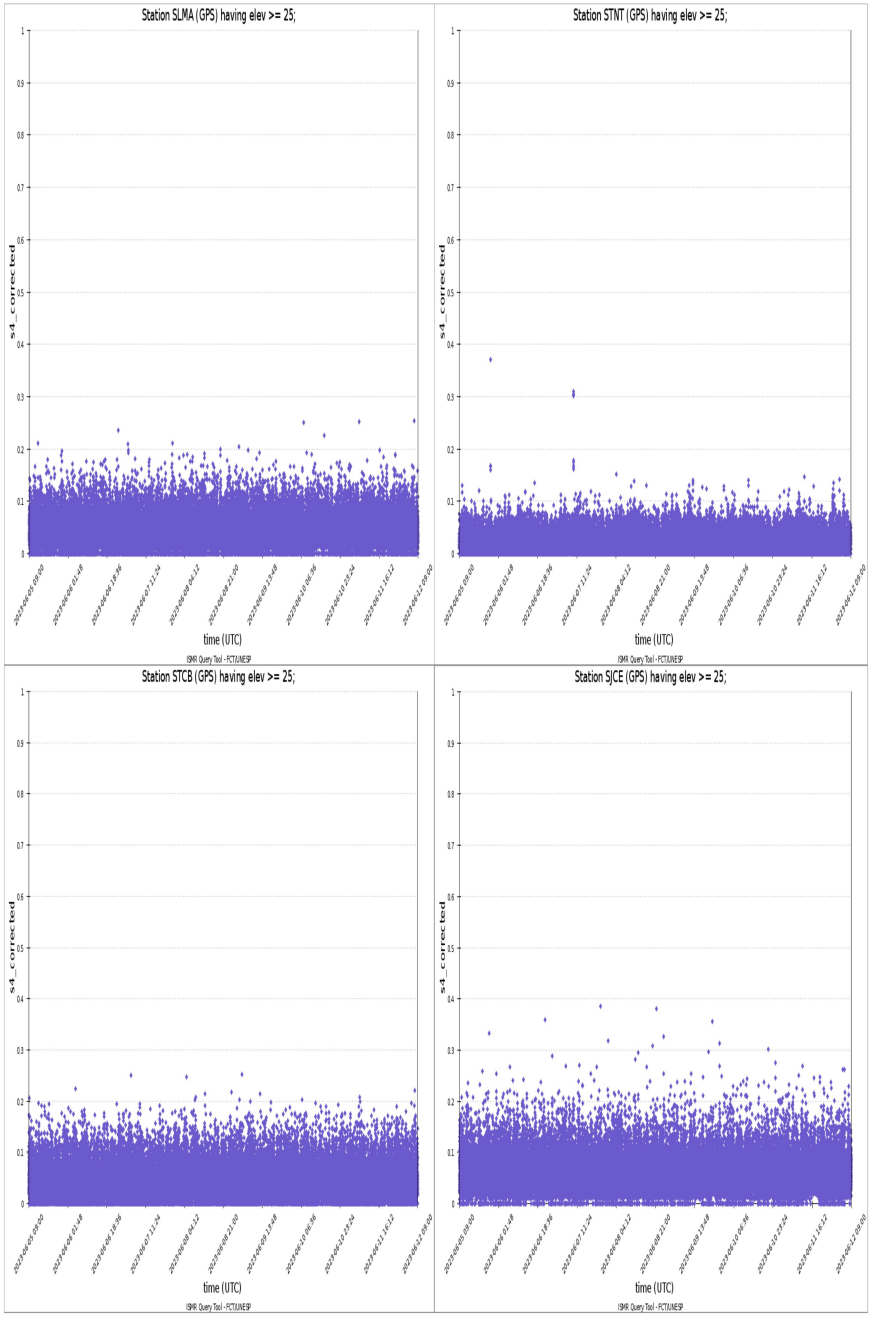


Figure 1: S4 index values for the GPS constellation measured at SLMA (upper left panel), STNT (upper right panel), STCB (lower left panel) and SJCE(lower right panel), during the week 06/05—12.

9 ROTI

9.1 Responsible: Carolina de Sousa do Carmo

In the week 2265 (June 04-10, 2023) there were no ionospheric irregularities (plasma bubble), on all analyzed days. Figure below shows the ROTI time series for four stations in the Brazilian sector (Natal (RNNA), Bacabal (MABB), Cuiabá (CUIB) and São José dos Campos (SJSP)).

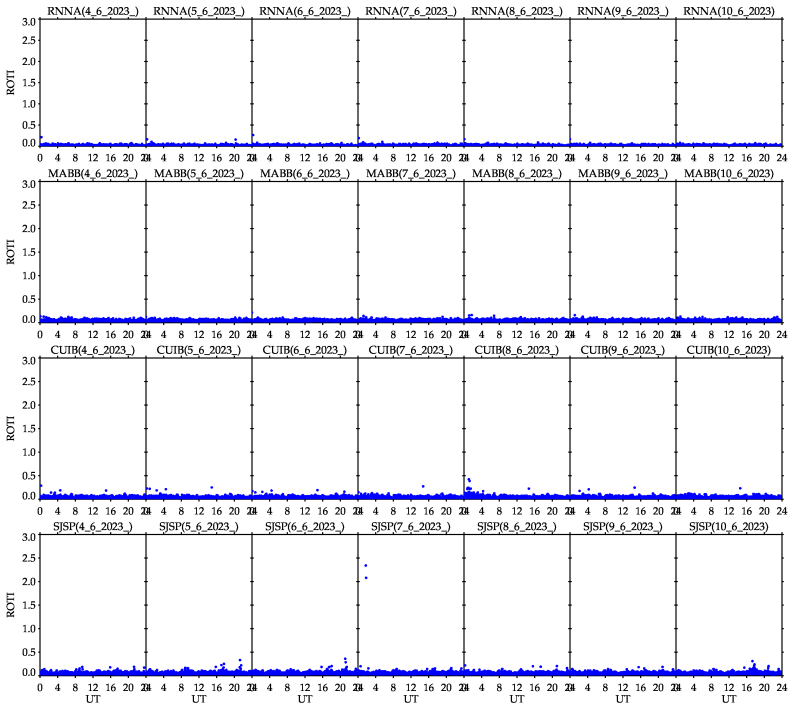


Figura 8: ROTI time series for four stations in the Brazilian sector (Natal (RNNA), Bacabal (MABB), Cuiabá (CUIB) and São José dos Campos (SJSP)), from June 04-10, 2023.