



22 March 2024 (report covers data release for 1 December – 31 December 2023)

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|--------------------|--|--|---------|
| Report Version | 1 | L2 ground processing software version: | V2.26.1 |
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| MAG IM | Helen O'Brien h.obrien@imperial.ac.uk | | |
| Report prepared by | Jean Morris j.morris23@imperial.ac.uk | | |

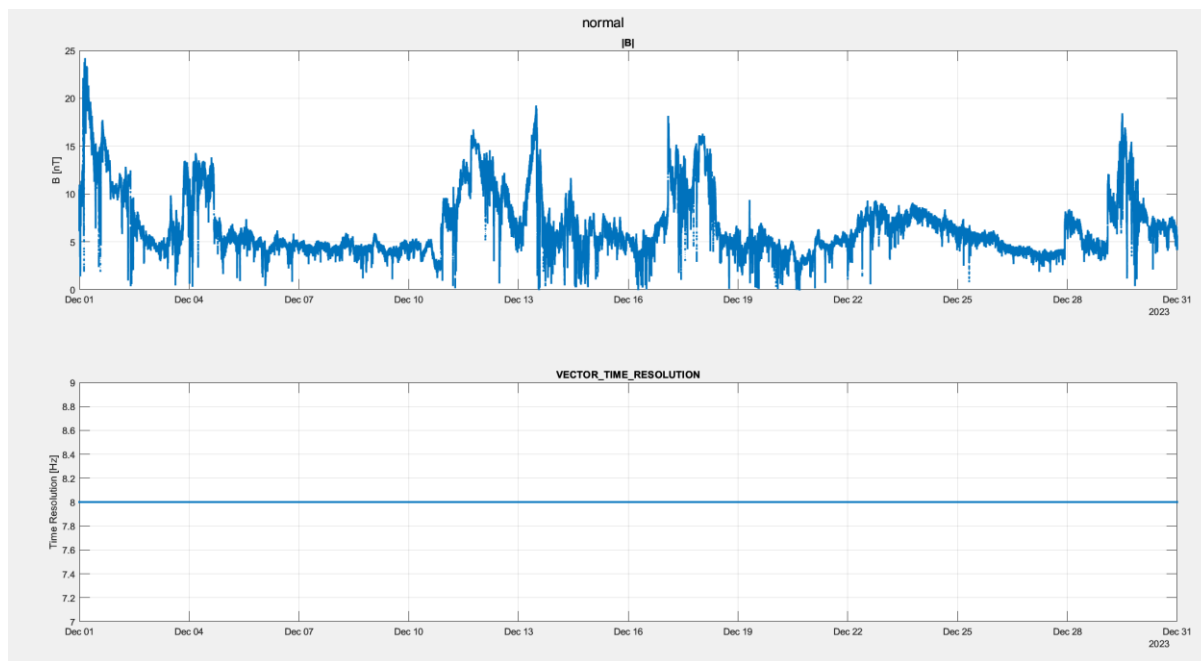
Data Summary

MAG was powered on for December. Burst Mode (BM) was available at 64 vectors/s for 24 hours per day for the whole month.

Between 28-12-2023 05:30 and 30-12-2023 10:40 there was a spacecraft roll to enable METIS to take measurements simultaneously with Parker Solar Probe (PSP). The HGA was also raised to an unusually high elevation for this period, which affected our offsets. Due to these events, we have introduced NaNs into the short periods of the roll and HGA manoeuvres and lowered the quality level of the data to 2 for the entire roll (because we are less certain of our offsets during this period). Please see the relevant section below for further information.

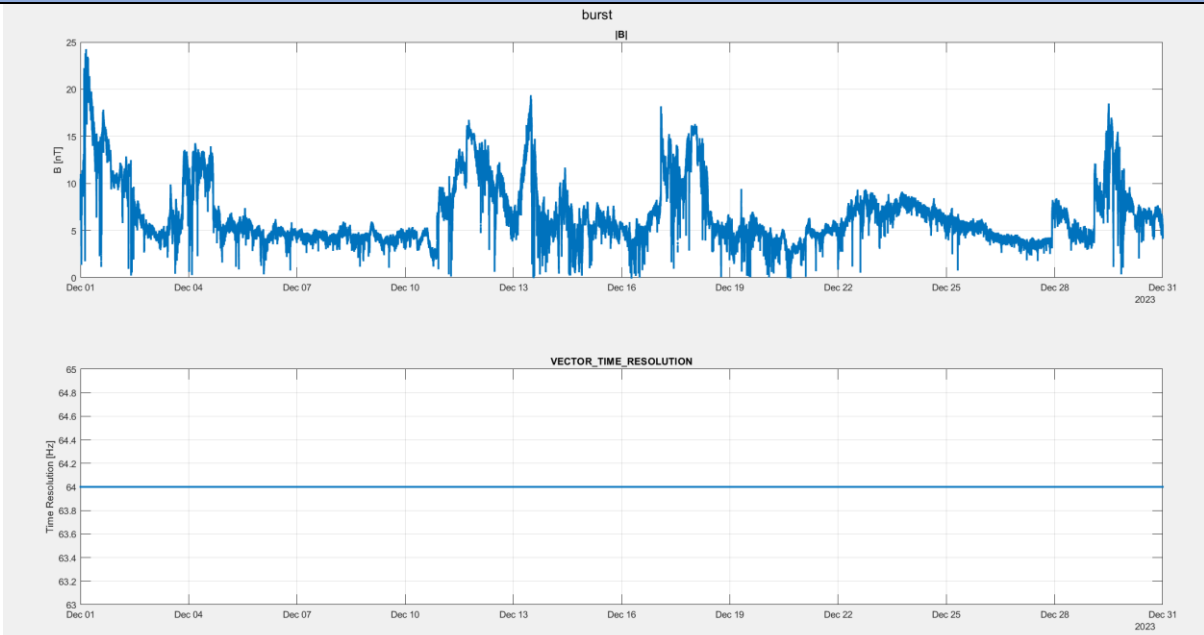
The spacecraft started the month at 0.84AU on the 1st of December and at the end of the month it was at 0.95AU.

Normal Mode



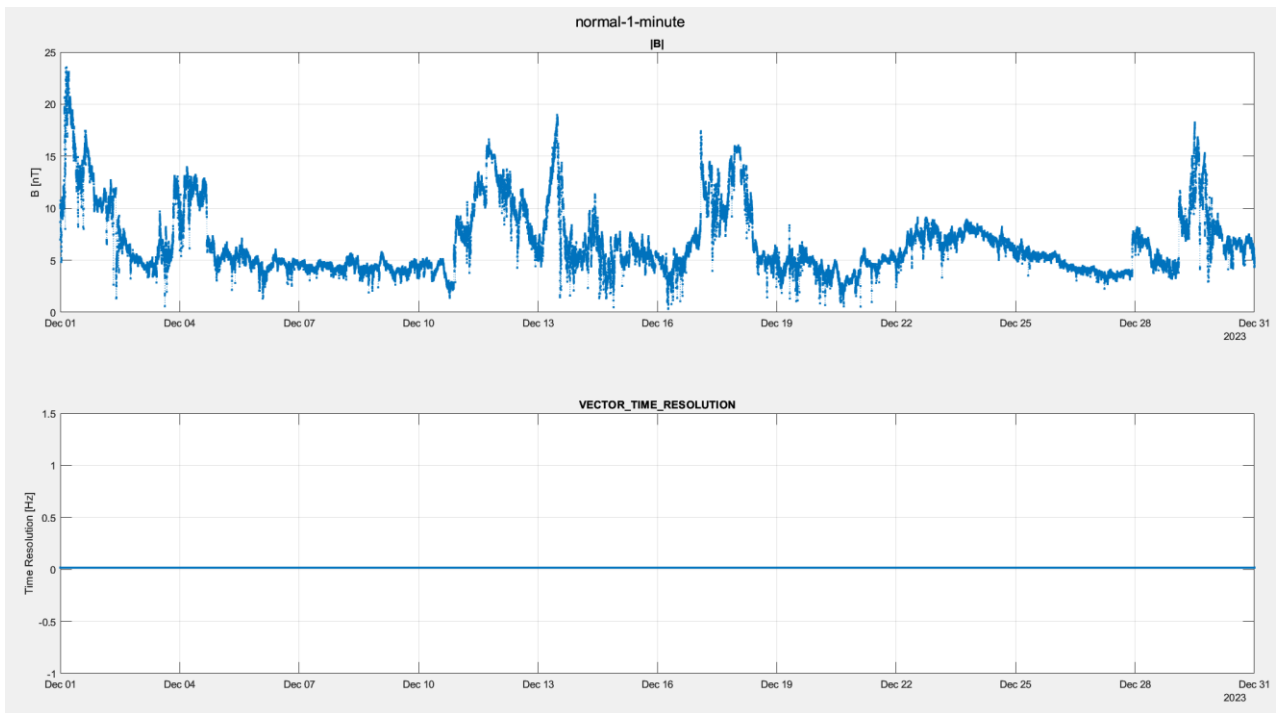
| | | |
|----------------------------|---|--|
| Operations | 1 December – 31 December | Science phase throughout period, normal data produced. |
| Operational Events of Note | Spacecraft Roll 28-12-2023 05:30-06:20 METIS Parker Solar Probe measurement with rotated spacecraft 28-12-2023 06:20-30-12-2023 04:40 Spacecraft Roll 30-12-2023 04:40-5:30 HGA elevation change at 28-12-2023 10:35-11:00 and 30-12-2023 10:40-10:55 NaNs during roll manoeuvre and HGA movement | |

Burst Mode

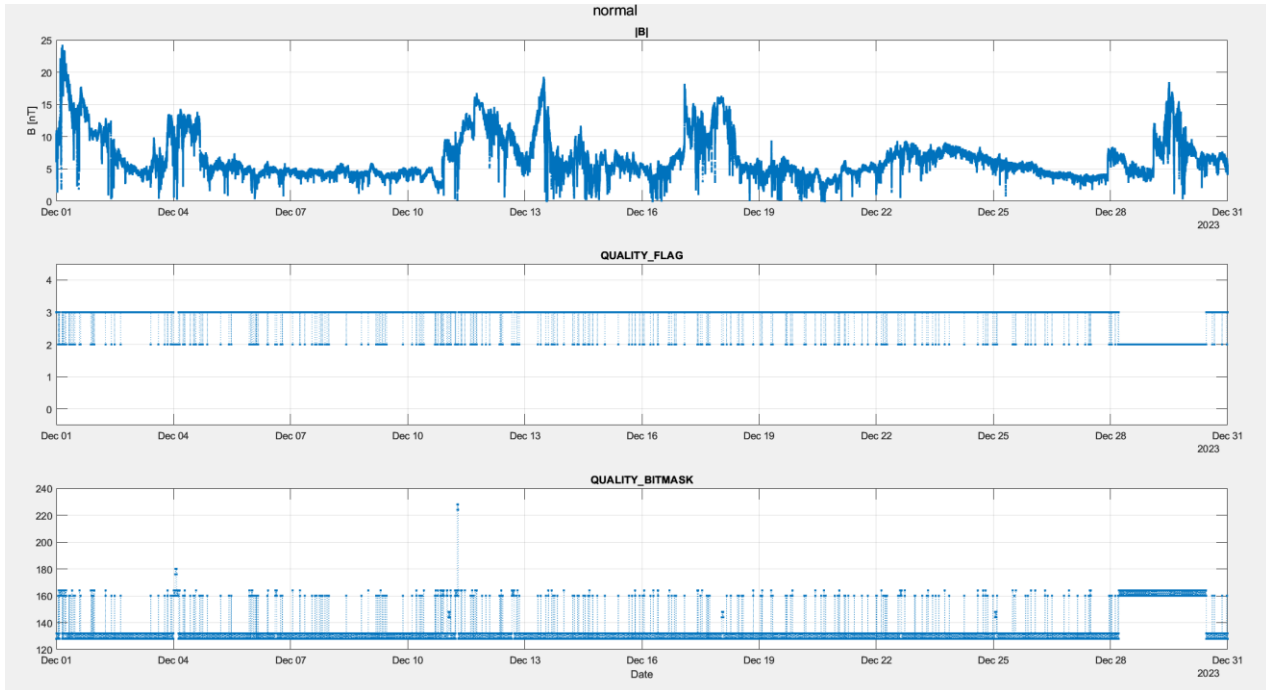


| Coverage | From | To | Coverage |
|----------|-------|-------|-----------------------------|
| | 01/12 | 31/12 | 24h per day of 64 vectors/s |

Normal – 1min



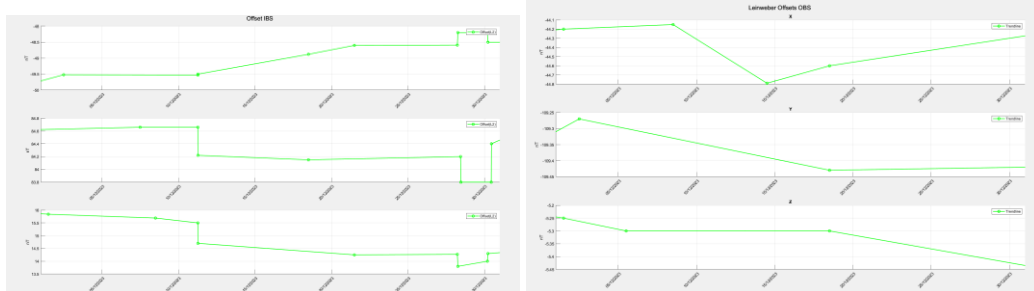
Quality bitmask



Quality bit mask events

| | | |
|-----------------------------------|--|--|
| SC events which disturb the field | <ol style="list-style-type: none"> 1. Solar array movements (solar array angle is changed, and then remains at new angle due to sun-SC distance thermal constraints) 2. High gain antenna movements 3. Battery Top Up | |
| SC related issues | 04-12-2023 00:05-03:05 | Battery Top Up affecting IBS |
| | 28-12-2023 05:30 to 30-12-2023 10:40 | Quality level reduced to 2 due to spacecraft roll manoeuvre for METIS PSP measurement. |
| | 28-12-2023 05:30 to 30-12-2023 10:55 | HGA + roll movement affecting IBS and potentially OBS |

Offsets



1 Dec – 31 Dec

IBS offset was disturbed by an SA event on the 11th of December, and by the spacecraft roll and HGA movement between the 28th-30th of December. Y,Z OBS offsets remained relatively stable and the OBS X offset is believed to have been affected by the SA movement causing a gradual change in the thermal environment of the boom and recovers later on in the month.

| OffsetNumber | Date | OBSX | OBSY | OBSZ | IBSX | IBSY | IBSZ | Comment |
|--------------|------------------|--------|---------|-------|--------|-------|-------|------------------|
| 221001 | 26/11/2023 12:00 | -44.28 | -109.43 | -5.2 | | | 16.27 | November Offsets |
| 221002 | 30/11/2023 12:00 | | | | -49.78 | 84.62 | 15.88 | November Offsets |
| 221003 | 01/12/2023 12:00 | -44.2 | | -5.25 | | | 15.84 | |
| 221004 | 02/12/2023 12:00 | | -109.27 | | -49.52 | | | |
| 221006 | 05/12/2023 12:00 | | | -5.3 | | | | |
| 221007 | 07/12/2023 12:00 | | | | | 84.66 | | |
| 221008 | 08/12/2023 12:00 | -44.15 | | | | | 15.69 | |
| 221009 | 10/12/2023 12:00 | | | | | | | |
| 221010 | 11/12/2023 06:32 | | | | -49.53 | 84.66 | 15.5 | SA event |
| 221011 | 11/12/2023 06:38 | | | | -49.5 | 84.22 | 14.7 | SA event |
| 221014 | 14/12/2023 12:00 | -44.79 | | | | | | |
| 221015 | 18/12/2023 12:00 | -44.6 | -109.43 | -5.3 | -48.88 | 84.15 | | OBS Trend |
| 221016 | 21/12/2023 12:00 | | | | -48.6 | | 14.25 | |
| 221017 | 28/12/2023 05:30 | | | | -48.59 | | 14.27 | Roll |
| 221018 | 28/12/2023 06:20 | | | | -48.2 | | 13.8 | Roll end |
| 221019 | 28/12/2023 10:35 | | | | | 84.2 | | HGA |
| 221020 | 28/12/2023 11:00 | | | | | 83.8 | | HGA end |
| 221021 | 30/12/2023 10:40 | | | | | 83.8 | | HGA |
| 221022 | 30/12/2023 10:55 | | | | | 84.4 | | HGA end |
| 221023 | 30/12/2023 04:40 | | | | -48.2 | | 14 | Roll |
| 221024 | 30/12/2023 05:30 | | | | -48.5 | | 14.3 | Roll end |
| 221025 | 31/12/2023 12:00 | -44.26 | -109.42 | -5.44 | -48.5 | 84.51 | 14.36 | End of month |

Spacecraft Roll for METIS PSP Measurement

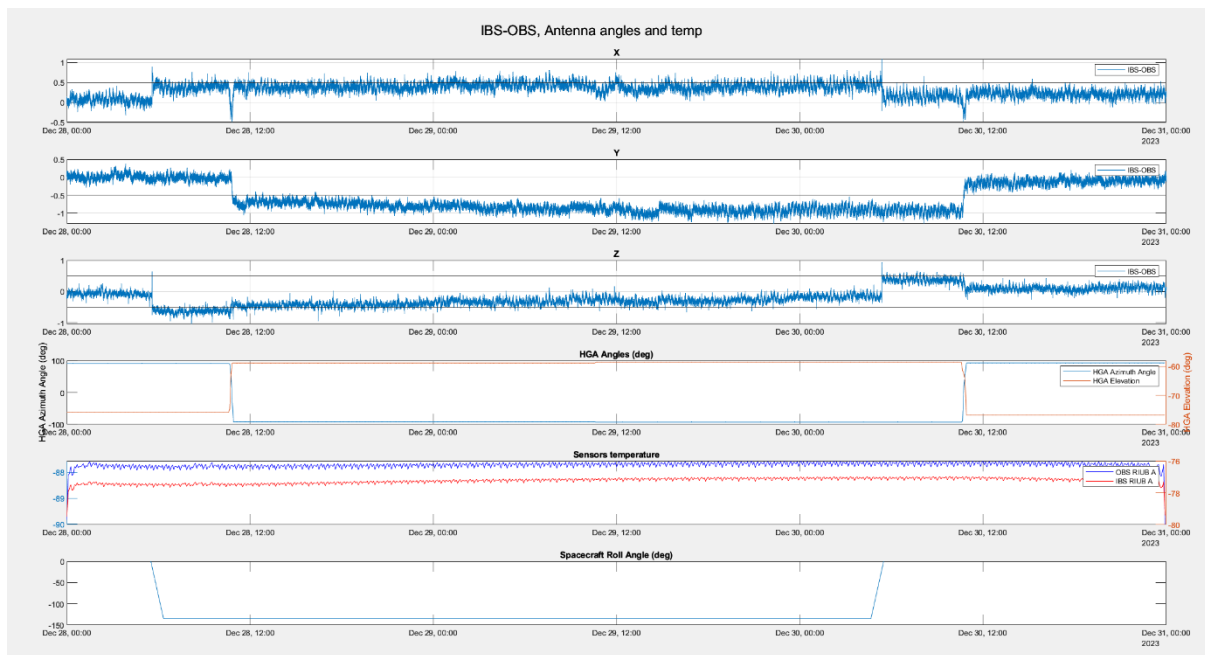
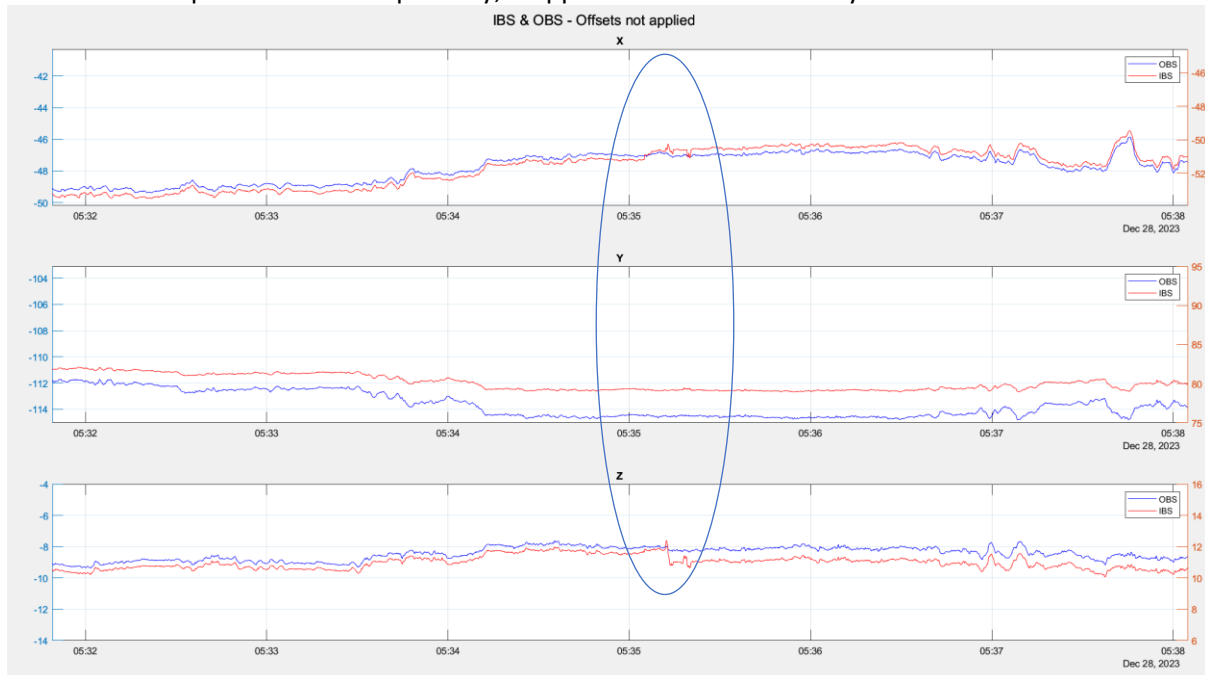
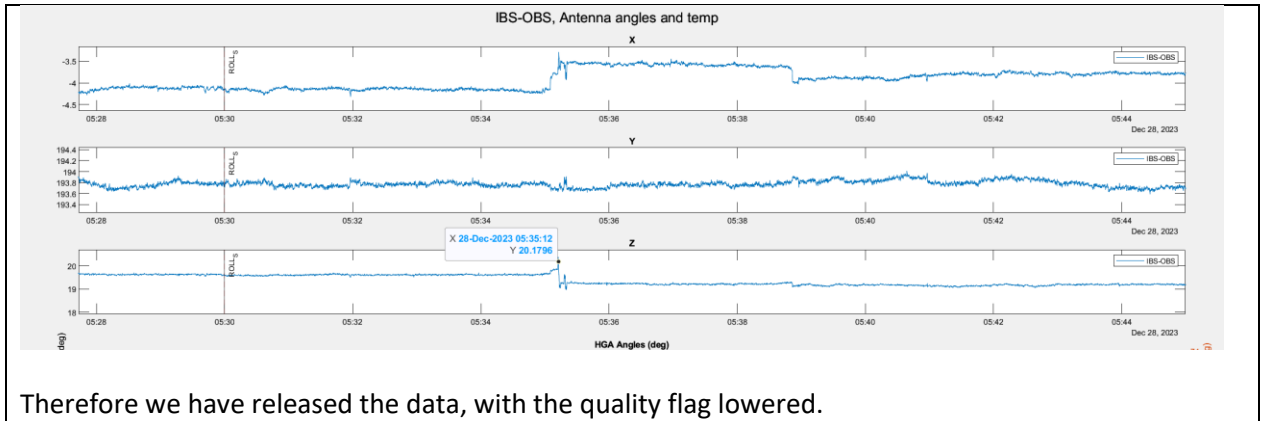


Figure 1 - IBS-OBS and Sensor temperatures, Roll and HGA angles

Between 28-12-2023 05:30 and 30-12-2023 10:40 there was a spacecraft roll to enable METIS to take measurements simultaneously with Parker Solar Probe (PSP). The HGA was also raised to an unusually high elevation for this period, which affected our offsets. Due to these events, we have introduced NaNs into the short periods of the roll and HGA manoeuvres and lowered the quality level of the data to 2 for the entire roll. We use IBS-OBS as a tool to calibrate our data, and if an event brings IBS-OBS to greater than $\pm 0.5nT$ we will lower the quality level of our data. In this case, we observed the superposition of two events – the spacecraft roll and HGA manoeuvre, causing multiple steps in IBS-OBS. When we plot IBS & OBS separately, it appears as if the roll mostly affects IBS:





Appendix

Appendix A: Files within this release

| Filename |
|--|
| solo_L2_mag-rtn-burst_20231201_V01.cdf |
| solo_L2_mag-rtn-burst_20231202_V01.cdf |
| solo_L2_mag-rtn-burst_20231203_V01.cdf |
| solo_L2_mag-rtn-burst_20231204_V01.cdf |
| solo_L2_mag-rtn-burst_20231205_V01.cdf |
| solo_L2_mag-rtn-burst_20231206_V01.cdf |
| solo_L2_mag-rtn-burst_20231207_V01.cdf |
| solo_L2_mag-rtn-burst_20231208_V01.cdf |
| solo_L2_mag-rtn-burst_20231209_V01.cdf |
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