Imperial College London

MAG Data Release Report 2310

22 January 2024 (report covers data release for 1 October – 31 October 2023)

Report Version	1	L2 ground processing software version:	V2.26.1
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Data Summary

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

Perihelion was on the 10th of October. There was a large CME on the 11th and a CIR on the 18th. EUI captured and has created some high-resolution videos of events here.

We use a method based on Leinweber [2008] to produce our magnetometer offsets, and we then curate these offsets and apply them to the field. For the period surrounding perihelion, between 6-13/10, this method produced a set of offsets that were ~1nT lower than the surrounding days. These changes in offsets produced were of equal values in IBS & OBS, leading us to believe that these are not reflective of a real spacecraft disturbance, and we have interpolated the offsets across this period. There is no association with these offset deltas and any spacecraft activity. The Davis-Smith equation used in the Leinweber method is only valid for non-compressional solar wind, and due to the large CME and activity during perihelion we believe that interpolation across this period will give a more accurate offset.

The spacecraft started the month at 0.33AU on the 1st of October and at the end of the month it was at 0.55AU.

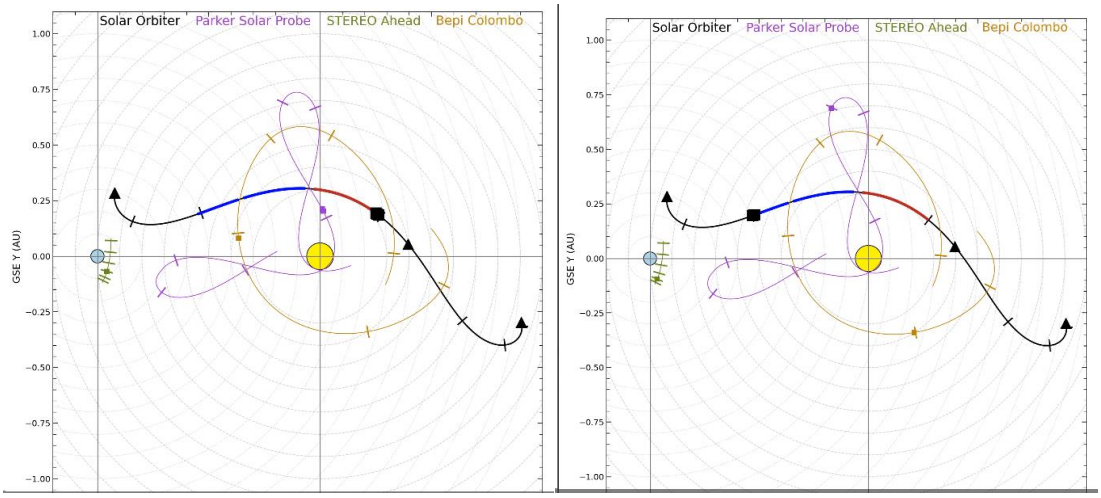
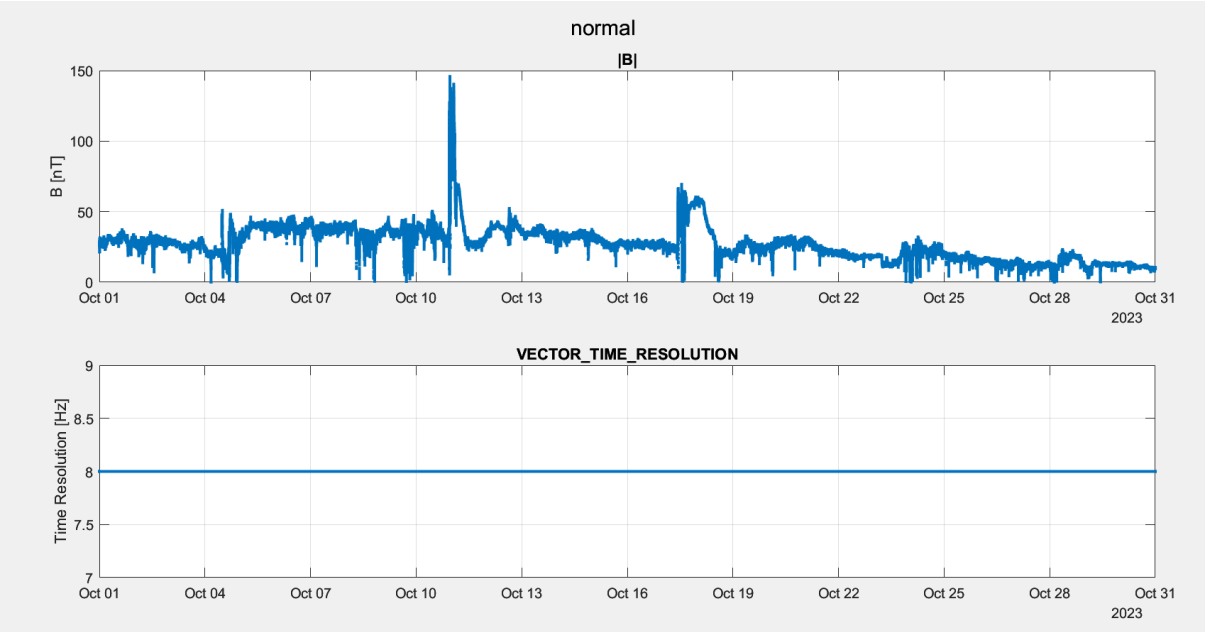
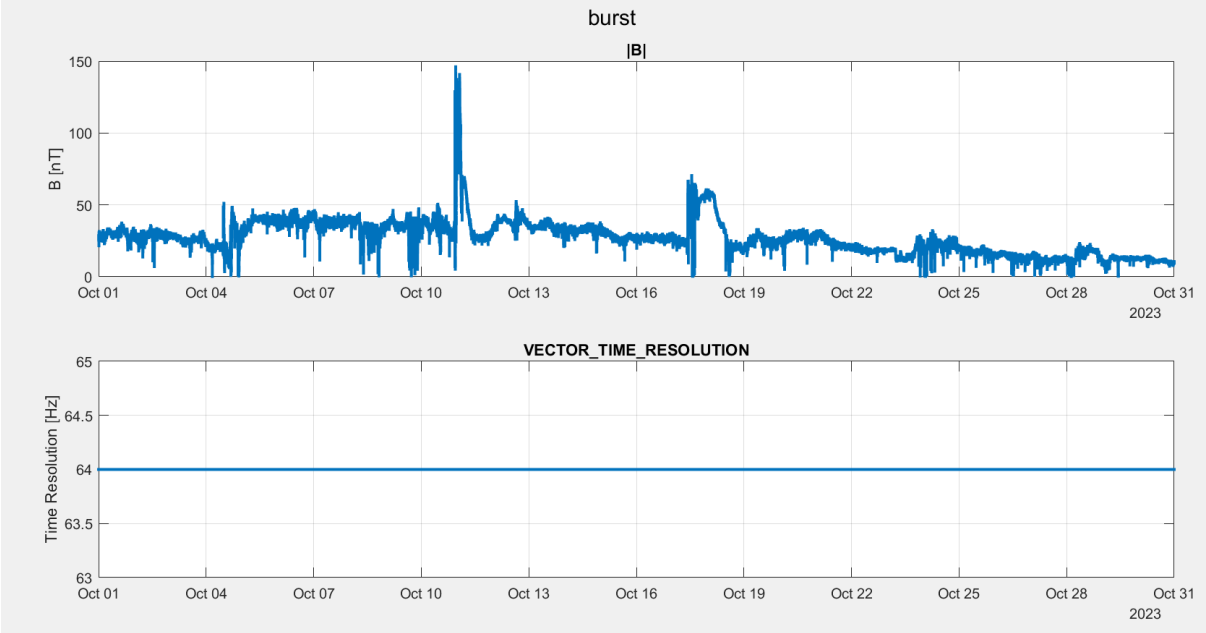


Figure 2 - Orbit plot Oct 1 (left) and Oct 31(right) where Solar Orbiter is represented by the black square.

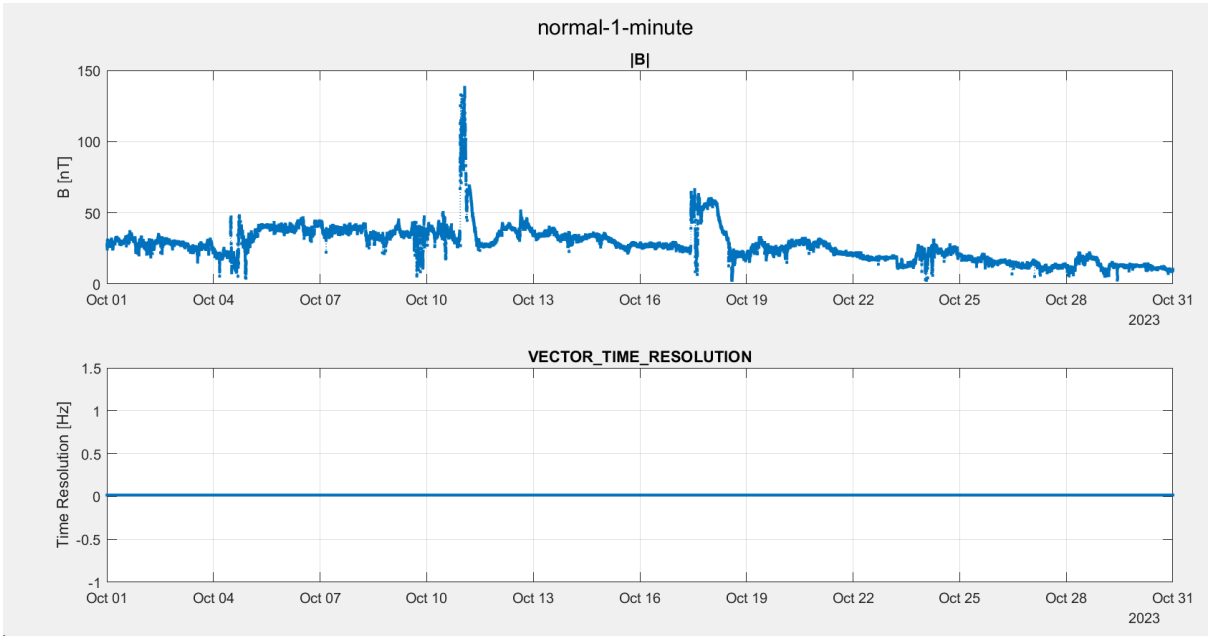
Normal Mode		
		
Operations	1 October – 31 October	Science phase throughout period, normal data produced.
Operational Events of Note		

Burst Mode

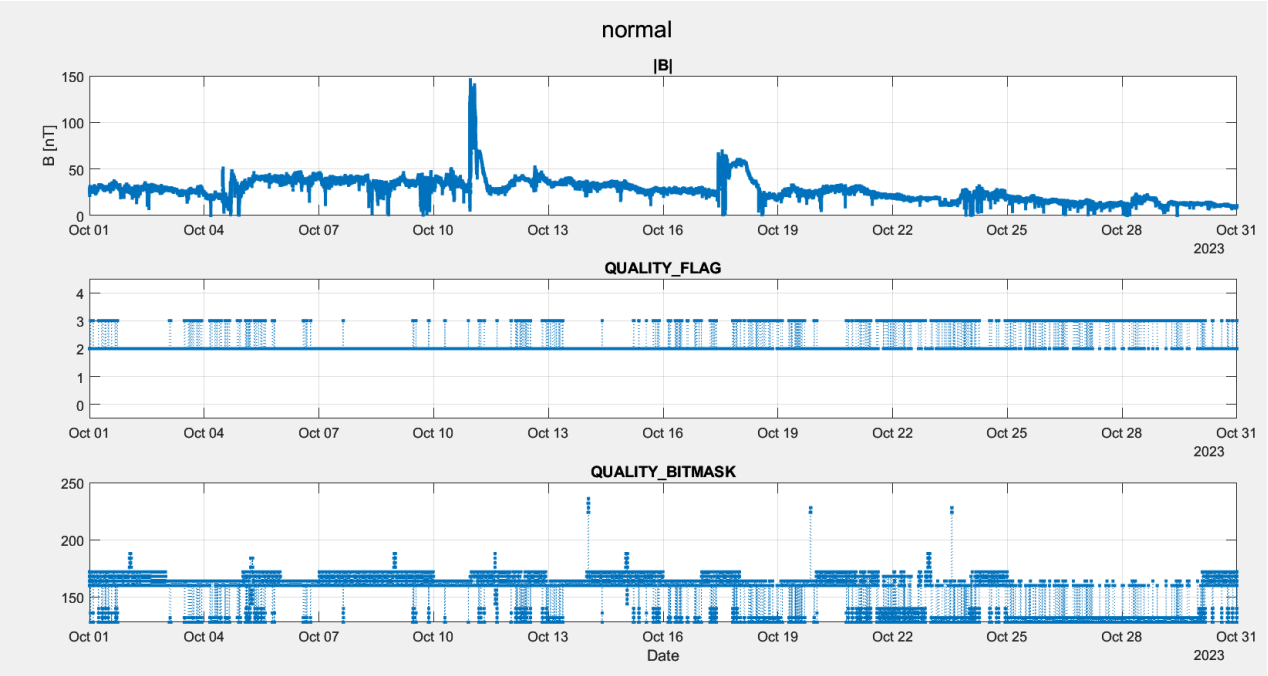


Coverage	From	To	Coverage
	01/10	31/10	24h per day of 64 vectors/s

Normal – 1min

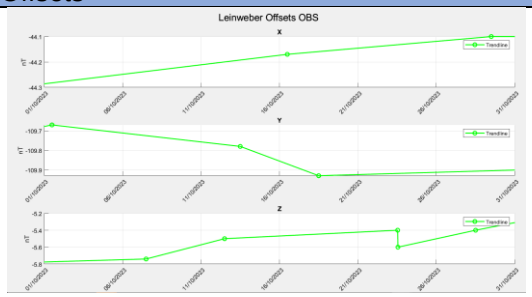


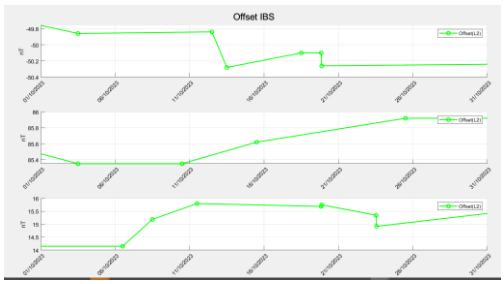
Quality bitmask



Quality bit mask events		
SC events which disturb the field	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	22/10/2023 21:08- 23/10/2023 00:04	Battery top up event interference affecting IBS

Offsets





1 Oct – 31 Oct

The OBS Z offsets were very stable throughout September, changing by less than 0.5nT in all axes. The OBS Z offset was disturbed by an SA event on the 23rd that also affected IBS. The IBS offsets were disturbed by several SA events (14th,19th,23rd), and the temperature of the sensor rose during perihelion which is reflected in the Z offset.

OffsetNumber	Date	OBSX	OBSY	OBSZ	IBSX	IBSY	IBSZ	Comment
221007	26/09/2023 12:00		-109.75	-5.8				OBS Y, Z trend
221008	30/09/2023 12:00	-44.29			-49.74	85.5	14.15	OBS X, IBS X, Z trend
221009	01/10/2023 12:00		-109.67					OBS trend
221010	03/10/2023 12:00				-49.86	85.35		IBS trend
221011	06/10/2023 12:00						14.15	IBS trend
221012	07/10/2023 12:00			-5.74				OBS trend
221013	08/10/2023 12:00						15.19	IBS trend
221014	10/10/2023 12:00					85.35		IBS trend
221015	11/10/2023 12:00						15.8	IBS trend
221016	12/10/2023 12:00			-5.5	-49.84			IBS & OBS trend
221017	13/10/2023 12:00		-109.78		-50.28			IBS & OBS trend
221018	15/10/2023 12:00					85.62		IBS trend
221019	16/10/2023 12:00	-44.17						OBS trend
221020	18/10/2023 12:00		-109.93		-50.1			OBS trend
221021	19/10/2023 20:12				-50.1		15.69	SA event
221022	19/10/2023 20:58				-50.26		15.75	SA event
221023	23/10/2023 12:48			-5.4			15.35	SA event
221024	23/10/2023 13:12			-5.6			14.92	SA event
221025	25/10/2023 12:00					85.92		IBS trend
221026	28/10/2023 12:00			-5.4				OBS trend
221027	29/10/2023 12:00	-44.1						OBS trend
221028	31/10/2023 12:00	-44.1	-109.9		-50.24	85.92	15.45	IBS & OBS trend
221029	02/11/2023 12:00			-5.22				OBS trend

Appendix

Appendix A: Files within this release

Filename
solo_L2_mag-rtn-burst_20231001_V01.cdf
solo_L2_mag-rtn-burst_20231002_V01.cdf
solo_L2_mag-rtn-burst_20231003_V01.cdf
solo_L2_mag-rtn-burst_20231004_V01.cdf
solo_L2_mag-rtn-burst_20231005_V01.cdf
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solo_L2_mag-rtn-burst_20231011_V01.cdf

solo_L2_mag-rtn-burst_20231012_V01.cdf
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