



7 September 2023 (report covers data release for 1 April – 30 April 2023)

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		
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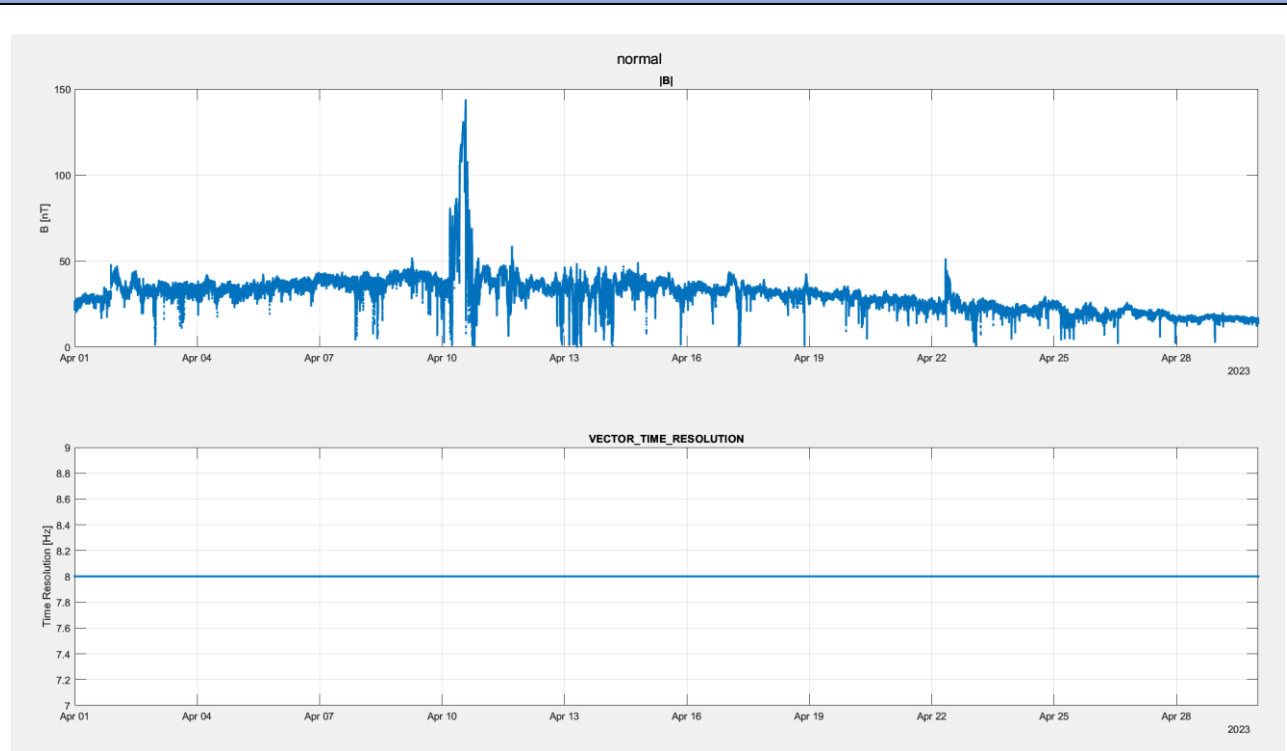
Data Summary

MAG was powered on for April. Perihelion was on the 10/04. There were some small data gaps on 17/04 due to downlink issues at CEB (Cebreros) on 2023-06-01.

BM is available at 64 vectors/s from 01-30/04.

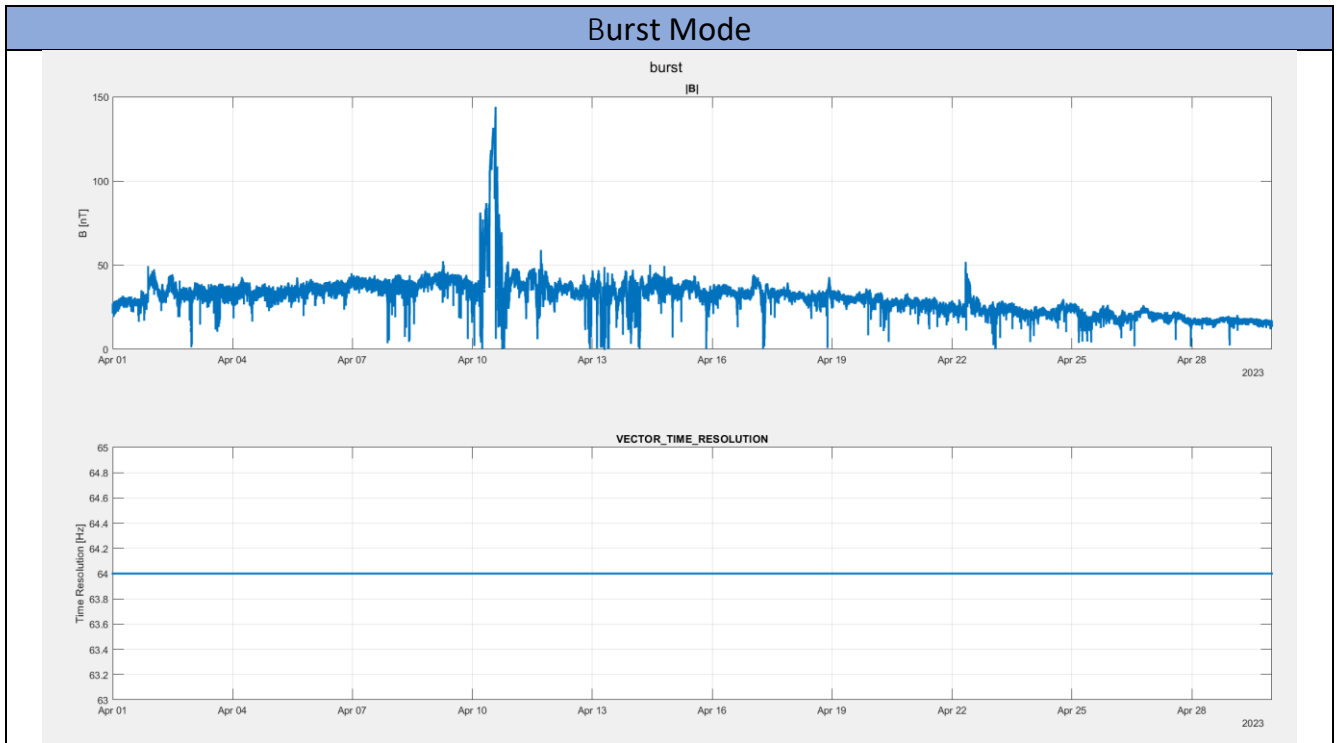
The spacecraft started the month at 0.36AU on the 1st of April and at the end of the month it was at 0.49AU from the Sun.

Normal Mode



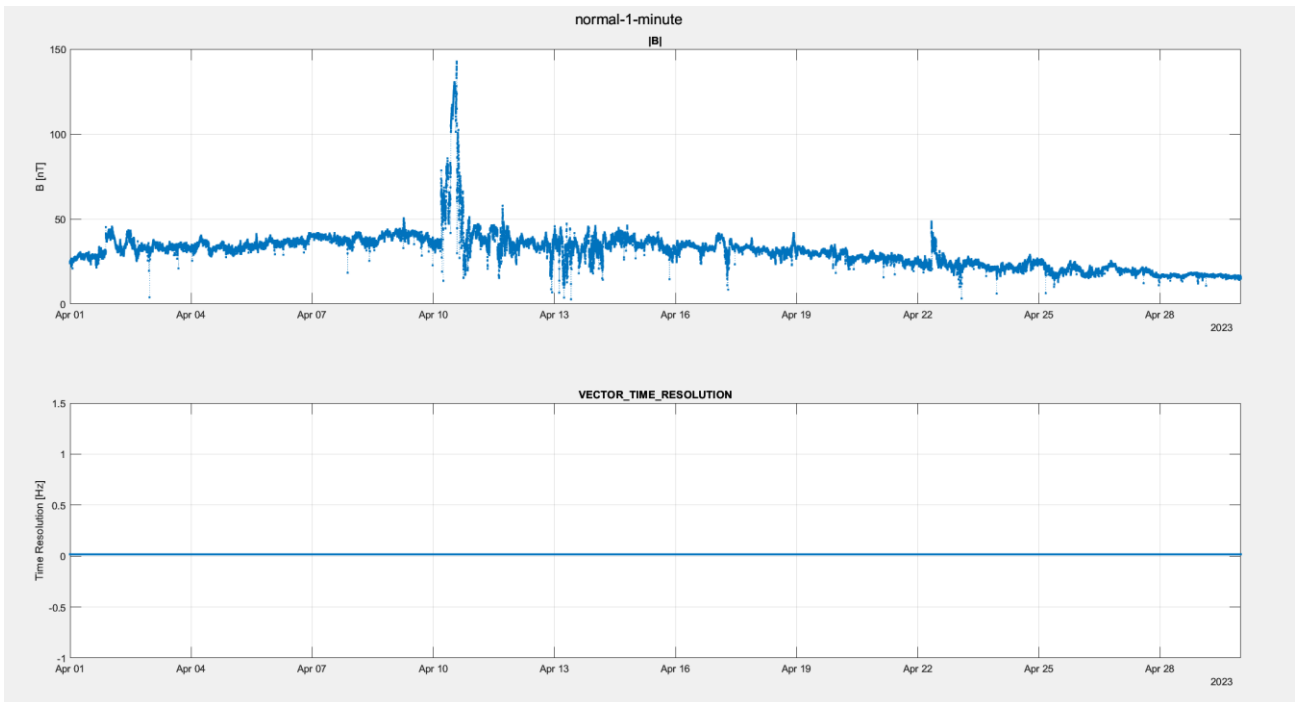
Operations	1 April – 30 April	Science phase throughout period, normal data produced.
Operational Events of Note	10/04/2023 - Perihelion 17/04/2023 – Small data gaps 3:00-5:00 due to downlink issues at CEB (Cebreros) on 2023-06-01.	

Normal mode data is produced from the burst mode stream when it is available, as is the case this month. This can produce small changes in the time sampling of the data over the transition; these are smaller than the cadence of 1/8 of a second.

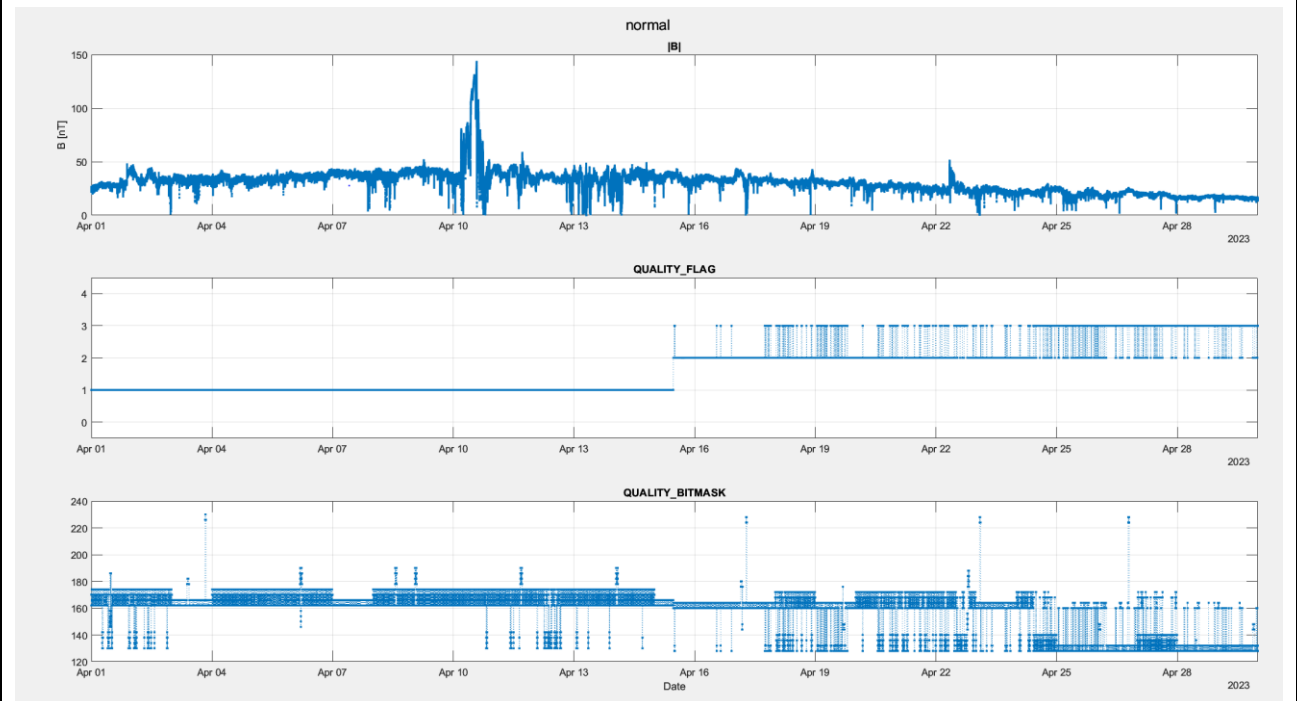


Coverage	From	To	Coverage
	01/04	30/04	24h of 64 vectors/s

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	N/A

Offsets



1 Apr – 30 Apr:

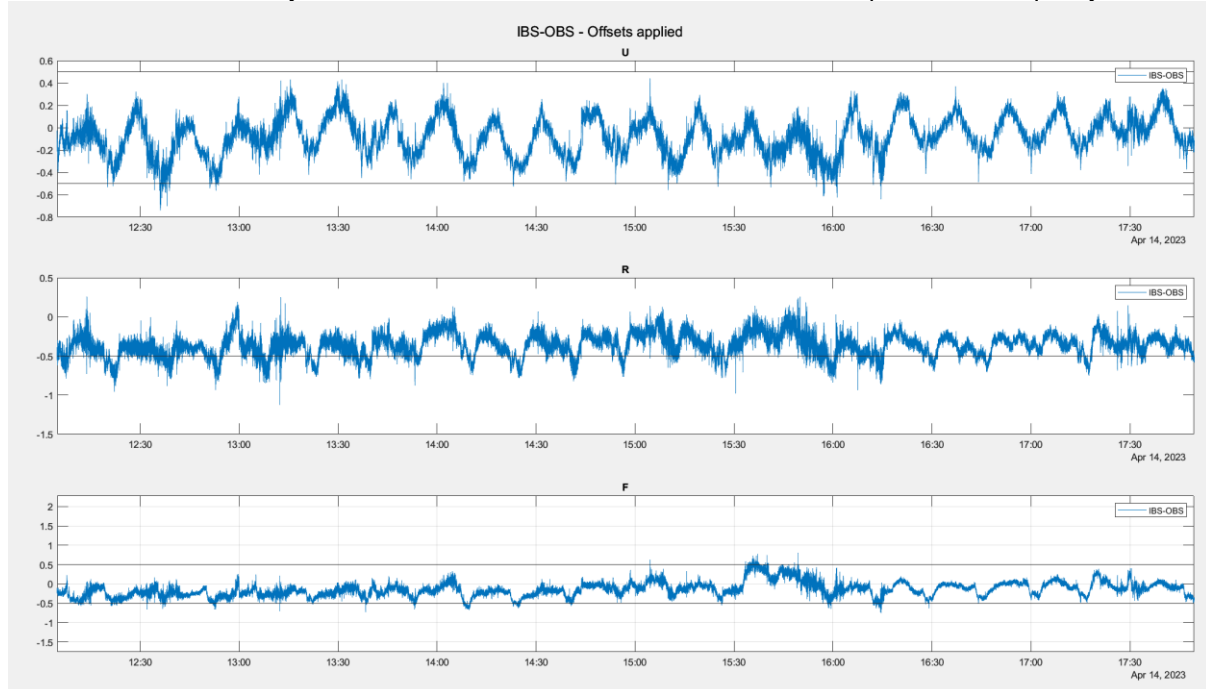
The OBS offsets initially recovered from the MAG reboot in March and followed a linear trend throughout perihelion on the 10th. The IBS sensor temperature had a parabolic shape during perihelion, as the temperature set point is based on the OBS sensor, and this has been captured in the IBS X offsets around the 10th. IBS X & Z changed on the 26th due to a solar array event. Between these events, the OBS & IBS offset linearly changed, and the trend has been chosen accordingly.

OffsetNumber	Date	OBSX	OBSY	OBSZ	IBSX	IBSY	IBSZ	Comment
220992	30/03/2023 12:00	-42.8	-106.61	-5.91	-50	84.92	15.66	Recovery from Mag OFF
220993	01/04/2023 12:00				-50			
220994	02/04/2023 12:00	-42.45	-106.15	-5.52		84.99		Recovery from Mag OFF
220995	05/04/2023 12:00				-49.97		16.06	IBS X,Z trend
220996	06/04/2023 12:00				-49.8			IBS X trend
220997	07/04/2023 12:00			-5.52				OBS Z linear trend
220998	08/04/2023 12:00				-49.55			IBS X trend
220999	09/04/2023 12:00		-105.73				15.97	Perihelion trend
221000	11/04/2023 12:00						15	Perihelion trend
221001	12/04/2023 12:00					84.55		IBS Y trend
221002	13/04/2023 12:00						15.28	IBS Z trend
221003	15/04/2023 12:00		-105.73	-6.1	-49.91			OBS Y,Z, IBS X trend
221004	17/04/2023 00:00					84.8		IBS Y trend
221005	18/04/2023 12:00	-43					14	OBS X, IBS Z trend
221006	20/04/2023 12:00				-49.93			IBS X trend
221007	21/04/2023 12:00						14.09	IBS Z trend
221008	22/04/2023 12:00		-105.1					OBS Y trend
221009	24/04/2023 12:00				-49.4		14.6	IBS X,Z trend
221010	25/04/2023 12:00					85.4		IBS Y trend
221011	26/04/2023 12:00			-5.51				OBS Z linear trend

221012	26/04/2023 18:45	-42.6			-49.4		14.7	SA event
221013	26/04/2023 18:47				-49.75		14.3	SA event
221014	30/04/2023 12:00	-42.8	-105.12	-5.52	-49.75	85.2	14.3	

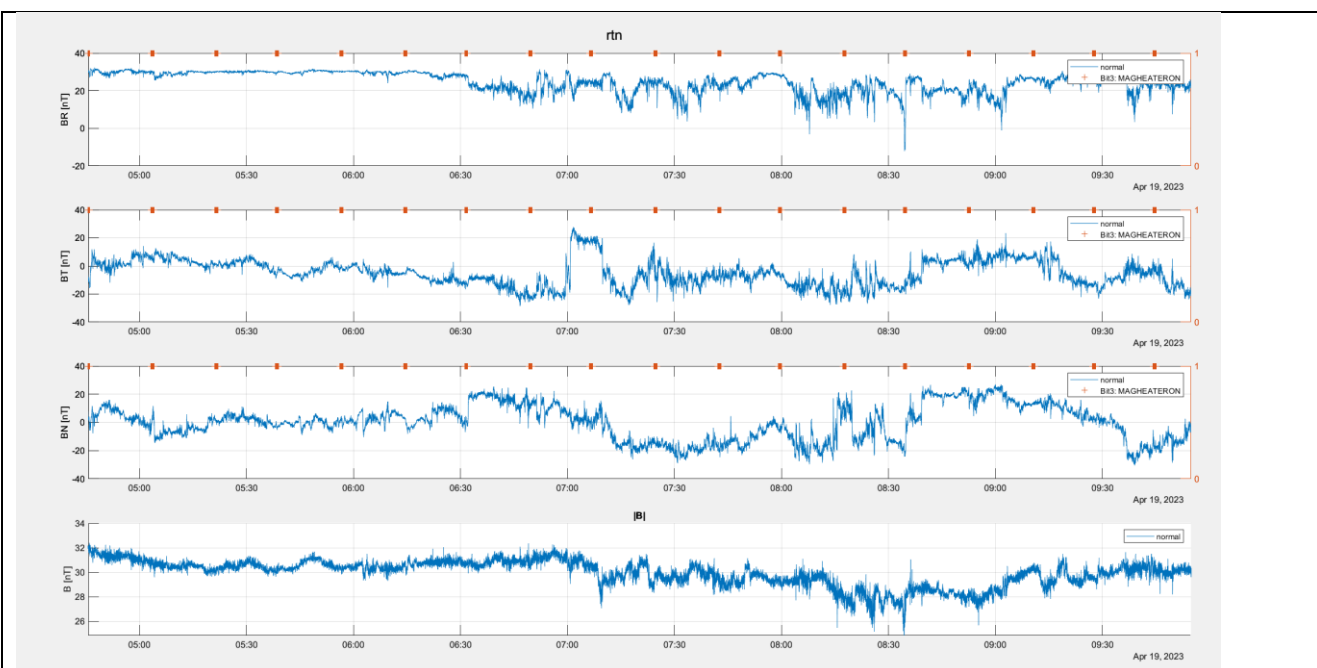
Residual MAG heater signal in data

Interference from the MAG heater is routinely characterised (using a superimposed epoch analysis) and removed from the data. Typically, a 3-day average characterisation is used, however during perihelion these heater profiles can vary substantially. Therefore, a longer average profile has been used for this period (1-20 April), which averaged profiles from 1-23 March. This removal is not perfect, and there is evidence in the MAGIBS-MAGOBS data (shown below) that some residual level of signal could still be present in the archive data. The magnitude of this error in the released archive data will be less than the error presented below in IBS-OBS. The heater cycle is ~15 minutes, and heater on/off status is reported in the quality bitmask.



Example of heater generated interference as seen in the MAGIBS-MAGOBS time series for April 2023. Y axis is in nT.

Analysis was undertaken to look at the magnitude of the natural signal against the heater interference signature, and typically the natural signal is much higher than the error profile from the heater. This is especially during times close to perihelion, and there is no substantial evidence that the heater signal is remaining in the data:



Therefore, the data has been released.

Appendix

Appendix A: Files within this release

Filename
solo_L2_mag-rtn-burst_20230401_V01.cdf
solo_L2_mag-rtn-burst_20230402_V01.cdf
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