IMPERIAL MAG Data Release Report 2207

29 Aug 2024 (report covers data release for 1-31 July 2022)

Report Version	2	L2 ground processing software version:	V2.27
MAG PI	Tim Horbury t.horbury@imperial.ac.uk		
MAG IM	Helen O'Brien h.obrien@imperial.ac.uk		
MAG Data Scientist	Jean Morris j.morris23@imperial.ac.uk		

Data Summary

V2 updates 2024:
After an investigation by ESA, Airbus and Imperial, the unexplained spacecraft interference has been confirmed not to impact the science quality of the OBS data. Cleaning of data around thruster firings requires use of the contaminated IBS data so users should beware of data during these periods, which can be identified by the thruster flag. These now re-released periods have also been quality flagged to level 2, due to the effect on the IBS data, as IBS-OBS is also an important tool in offset determination. This SC interference had historically resulted in the data not being released for these periods. The MAG team is now working to re-release these previously retracted periods, please see the Appendix for the periods now released.

V1:

MAG was on for the period 1-31 July 2022. Burst mode data was only available in the period 10-14 July 2022.

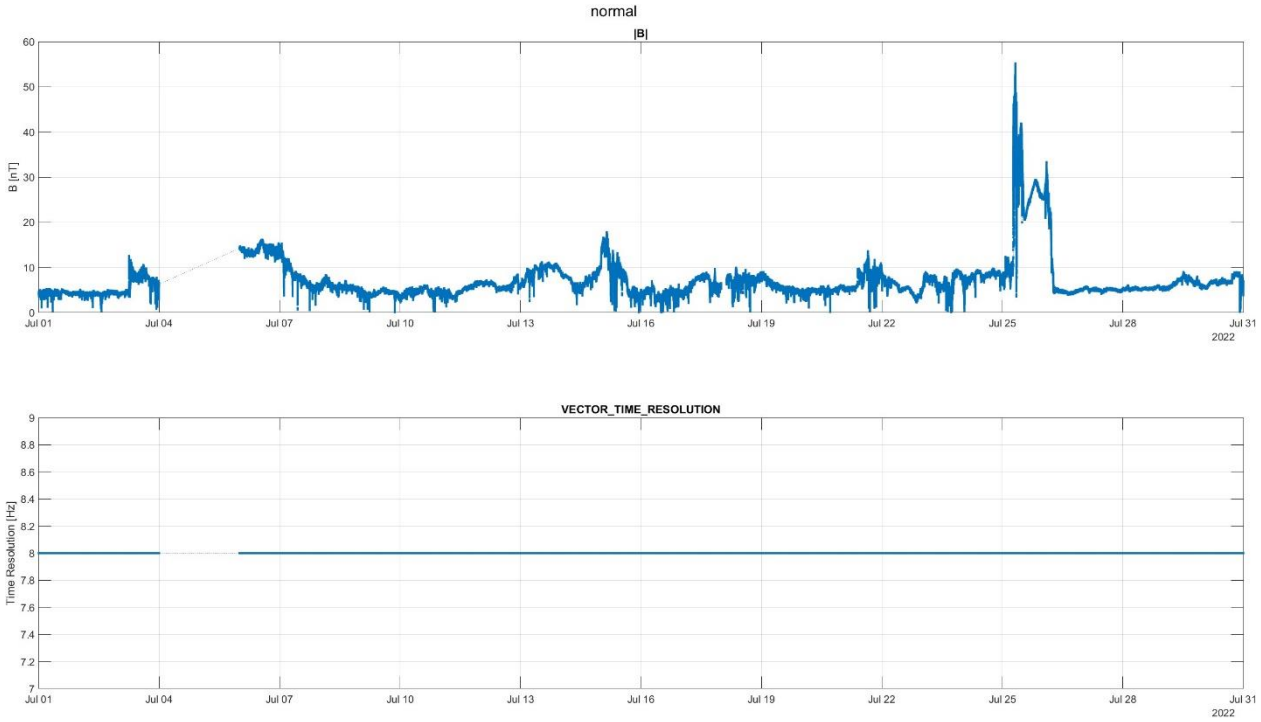
On 04/07 and until 05/07 the temperature of both IBS and OBS changed in order to be prepared for the TCM (Trajectory Correction Manoeuvre) , influencing the offsets of both sensors. The data covering the TCM has not been released as it is highly disturbed due to heater cycles instability.

Spacecraft noise was observed particularly in IBS data for several periods (there was significant noise for a total of 137 hours in the period 1-31 July 2022). This noise is very clear in IBS, the source has not been identified. We can see evidence for it being there in OBS as well, and have not got algorithms to clean this from the data. The magnetic field data have been converted to NaNs when the noise in the data was particularly high. The full period of missing data is listed in the appendix of this report. If you have particular need for any data during these periods, please contact the MAG team and we see if the data maybe suitable for release for certain applications.

The 4th and 5th of July 2022 cannot be released: SC noise was high for the whole day.

The spacecraft started the month at 1.01AU and at the end it was at 0.96AU from the Sun.

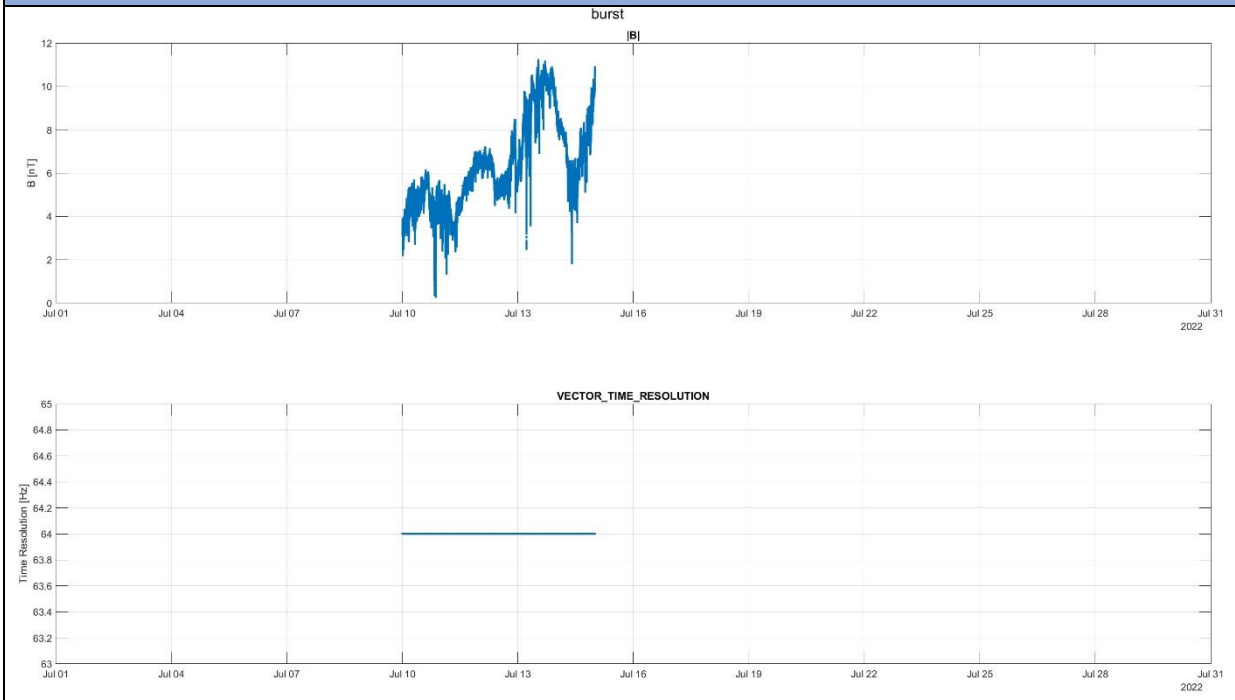
Normal Mode



MAG was on with 8Hz cadence normal mode data returned, for exceptions see below.		
Operations	1-31 July	Science phase throughout period, normal data returned
Operational Events of Note	TCM on 4-5 July and relative change in sensor temperatures	

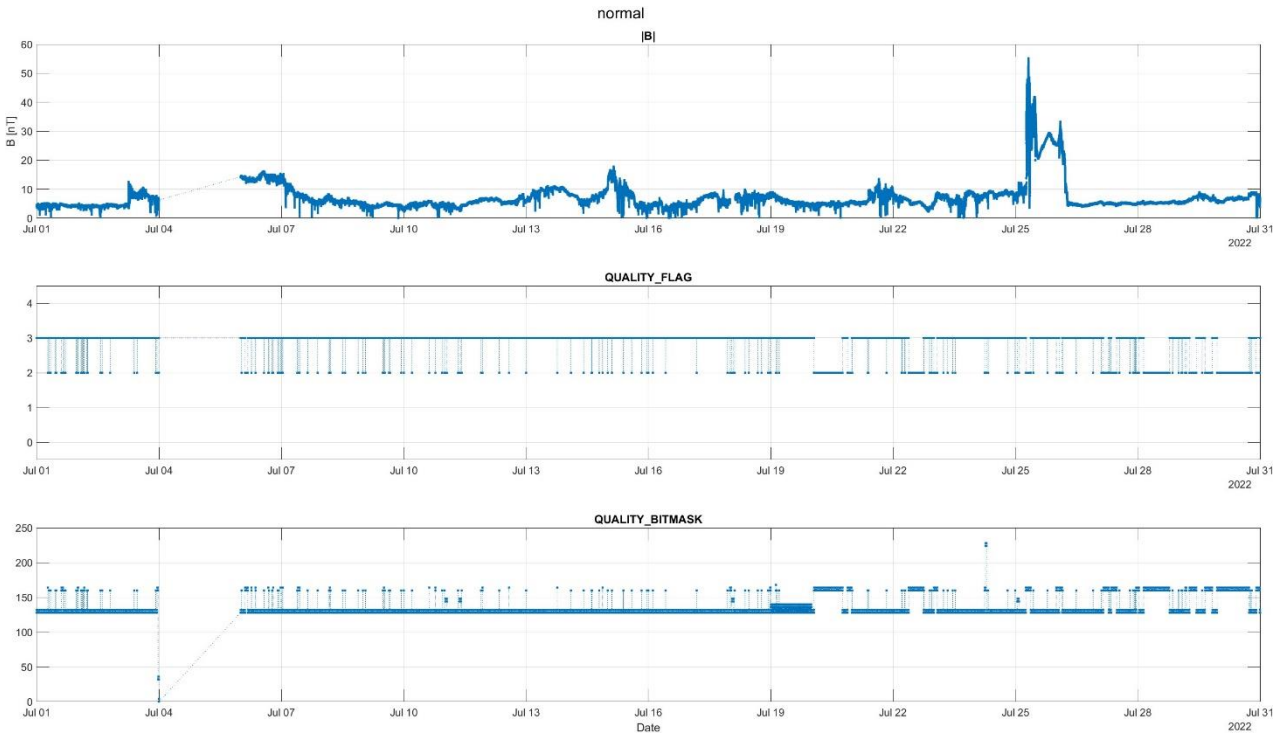
Data Gaps greater than one minute:
NaNs have been introduced during the noisiest periods because the data was highly disturbed. See Appendix for details.

Burst Mode



Coverage	From	To	Coverage
	10/07	14/07	24h per day 64Hz

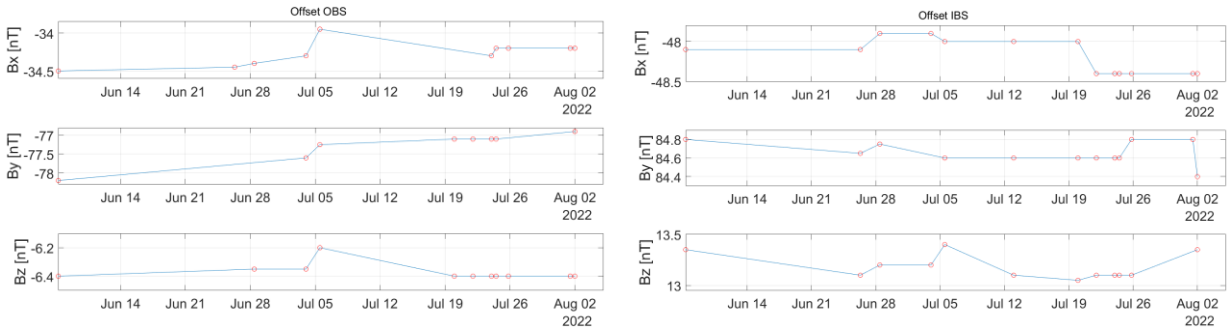
Quality bitmask



Quality bit mask events	
SC events which disturb the field	1. Thruster firings 2. Solar array lubrications (solar array is moved 15 degrees, then returned to original position) 3. Solar array movements (solar array angle is changed, and then remains at new angle due to sun-SC distance thermal constraints) 4. High gain antenna movements
SC related issues	

Time	Reason
04/07//2022-05/07/2022	TCM
18/07/20 00:48	Battery top up event
24/07/2022 06:23	SA lubrication

Offset



1-31 Jun:
Both sensor offsets changed after the TCM on 04-05/07. After that, OBS and IBS offsets linearly changed and adjustments to the trends have been made accordingly.

Offset	Date	OBSX	OBSY	OBSZ	IBSX	IBSY	IBSZ	Comment
20220712	07/06/2022 07:00	-34.50	-78.2	-6.4	-48.1	84.8	13.35	Post battery top up event
20220713	26/06/2022 07:30	-34.45			-48.1	84.65	13.1	Change linear trend both
20220714	28/06/2022 10:15	-34.40		-6.35	-47.9	84.75	13.2	Change linear trend both
20220715	04/07/2022 00:00	-34.30	-77.6	-6.35	-47.9		13.2	Pre TCM
20220716	05/07/2022 12:00	-33.95	-77.25	-6.2	-48	84.6	13.4	Post TCM
20220717	13/07/2022 00:00				-48	84.6	13.1	Change linear trend IBS
20220718	20/07/2022 00:00		-77.1	-6.4	-48	84.6	13.05	Start linear trend IBS
20220719	22/07/2022 00:00		-77.1	-6.4	-48.4	84.6	13.1	End linear trend IBS
20220720	24/07/2022 00:00	-34.30	-77.1	-6.4	-48.4	84.6	13.1	End linear trend OBS
20220721	24/07/2022 12:00	-34.20	-77.1	-6.4	-48.4	84.6	13.1	Start linear trend both
20220722	25/07/2022 20:00	-34.20		-6.4	-48.4	84.8	13.1	End linear trend IBS
20220723	01/08/2022 12:00	-34.20		-6.4	-48.4	84.8		Start linear trend IBS
20220724	02/08/2022 00:00	-34.20	-76.9	-6.4	-48.4	84.4	13.35	End linear trend OBS and IBS

Appendix

SC Interference Re-Release

After an investigation by ESA, Airbus and Imperial, the unexplained spacecraft interference (SC interference) has been confirmed not to impact the science quality of the OBS data, so this is no longer being removed from these periods. Cleaning of data around thruster firings requires use of the contaminated IBS data so users should beware of data during these periods, which can be identified by the thruster flag. These now re-released periods have also been quality flagged to level 2, due to the effect on the IBS data, as IBS-OBS is also an important tool in offset determination.

Appendix – Periods now released.

StartTime	EndTime	Comment
01/07/2022 15:00	01/07/2022 15:00	SC interference
03/07/2022 23:17	03/07/2022 23:27	SC interference
04/07/2022 00:00	06/07/2022 00:00	TCM
06/07/2022 02:40	06/07/2022 03:50	SC interference
18/07/2022 00:00	18/07/2022 03:00	Battery top up event
20/07/2022 01:50	20/07/2022 18:00	SC interference
20/07/2022 21:45	20/07/2022 23:30	SC interference
22/07/2022 11:30	22/07/2022 18:00	SC interference
23/07/2022 00:00	23/07/2022 02:00	SC interference
24/07/2022 06:23	24/07/2022 06:33	SA relubrication
27/07/2022 04:00	27/07/2022 06:30	SC interference
27/07/2022 04:08	27/07/2022 06:30	SC interference
27/07/2022 08:42	27/07/2022 11:07	SC interference
27/07/2022 23:31	27/07/2022 23:57	SC interference
28/07/2022 00:09	28/07/2022 00:11	SC interference
28/07/2022 03:30	28/07/2022 18:15	SC interference
29/07/2022 06:54	29/07/2022 10:00	SC interference
29/07/2022 16:00	29/07/2022 19:20	SC interference
29/07/2022 23:09	30/07/2022 17:30	SC interference
30/07/2022 22:05	30/07/2022 22:15	SC interference
30/07/2022 23:00	30/07/2022 23:35	SC interference
31/07/2022 04:30	31/07/2022 15:00	SC interference

Appendix B: Files within this release

Filename
solo_L2_mag-rtn-burst_20220710_V01.cdf
solo_L2_mag-rtn-burst_20220711_V01.cdf
solo_L2_mag-rtn-burst_20220712_V01.cdf
solo_L2_mag-rtn-burst_20220713_V01.cdf
solo_L2_mag-rtn-burst_20220714_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220701_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220702_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220703_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220706_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220707_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220708_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220709_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220710_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220711_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220712_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220713_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220714_V01.cdf

solo_L2_mag-rtn-normal-1-minute_20220715_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220716_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220717_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220718_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220719_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220720_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220721_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220722_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220723_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220724_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220725_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220726_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220727_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220728_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220729_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220730_V01.cdf
solo_L2_mag-rtn-normal-1-minute_20220731_V01.cdf
solo_L2_mag-rtn-normal_20220701_V01.cdf
solo_L2_mag-rtn-normal_20220702_V01.cdf
solo_L2_mag-rtn-normal_20220703_V01.cdf
solo_L2_mag-rtn-normal_20220706_V01.cdf
solo_L2_mag-rtn-normal_20220707_V01.cdf
solo_L2_mag-rtn-normal_20220708_V01.cdf
solo_L2_mag-rtn-normal_20220709_V01.cdf
solo_L2_mag-rtn-normal_20220710_V01.cdf
solo_L2_mag-rtn-normal_20220711_V01.cdf
solo_L2_mag-rtn-normal_20220712_V01.cdf
solo_L2_mag-rtn-normal_20220713_V01.cdf
solo_L2_mag-rtn-normal_20220714_V01.cdf
solo_L2_mag-rtn-normal_20220715_V01.cdf
solo_L2_mag-rtn-normal_20220716_V01.cdf
solo_L2_mag-rtn-normal_20220717_V01.cdf
solo_L2_mag-rtn-normal_20220718_V01.cdf
solo_L2_mag-rtn-normal_20220719_V01.cdf
solo_L2_mag-rtn-normal_20220720_V01.cdf
solo_L2_mag-rtn-normal_20220721_V01.cdf
solo_L2_mag-rtn-normal_20220722_V01.cdf
solo_L2_mag-rtn-normal_20220723_V01.cdf
solo_L2_mag-rtn-normal_20220724_V01.cdf
solo_L2_mag-rtn-normal_20220725_V01.cdf
solo_L2_mag-rtn-normal_20220726_V01.cdf
solo_L2_mag-rtn-normal_20220727_V01.cdf
solo_L2_mag-rtn-normal_20220728_V01.cdf
solo_L2_mag-rtn-normal_20220729_V01.cdf
solo_L2_mag-rtn-normal_20220730_V01.cdf
solo_L2_mag-rtn-normal_20220731_V01.cdf

solo_L2_mag-srf-burst_20220710_V01.cdf
solo_L2_mag-srf-burst_20220711_V01.cdf
solo_L2_mag-srf-burst_20220712_V01.cdf
solo_L2_mag-srf-burst_20220713_V01.cdf
solo_L2_mag-srf-burst_20220714_V01.cdf
solo_L2_mag-srf-normal_20220701_V01.cdf
solo_L2_mag-srf-normal_20220702_V01.cdf
solo_L2_mag-srf-normal_20220703_V01.cdf
solo_L2_mag-srf-normal_20220706_V01.cdf
solo_L2_mag-srf-normal_20220707_V01.cdf
solo_L2_mag-srf-normal_20220708_V01.cdf
solo_L2_mag-srf-normal_20220709_V01.cdf
solo_L2_mag-srf-normal_20220710_V01.cdf
solo_L2_mag-srf-normal_20220711_V01.cdf
solo_L2_mag-srf-normal_20220712_V01.cdf
solo_L2_mag-srf-normal_20220713_V01.cdf
solo_L2_mag-srf-normal_20220714_V01.cdf
solo_L2_mag-srf-normal_20220715_V01.cdf
solo_L2_mag-srf-normal_20220716_V01.cdf
solo_L2_mag-srf-normal_20220717_V01.cdf
solo_L2_mag-srf-normal_20220718_V01.cdf
solo_L2_mag-srf-normal_20220719_V01.cdf
solo_L2_mag-srf-normal_20220720_V01.cdf
solo_L2_mag-srf-normal_20220721_V01.cdf
solo_L2_mag-srf-normal_20220722_V01.cdf
solo_L2_mag-srf-normal_20220723_V01.cdf
solo_L2_mag-srf-normal_20220724_V01.cdf
solo_L2_mag-srf-normal_20220725_V01.cdf
solo_L2_mag-srf-normal_20220726_V01.cdf
solo_L2_mag-srf-normal_20220727_V01.cdf
solo_L2_mag-srf-normal_20220728_V01.cdf
solo_L2_mag-srf-normal_20220729_V01.cdf
solo_L2_mag-srf-normal_20220730_V01.cdf
solo_L2_mag-srf-normal_20220731_V01.cdf