



17 April 2024 (report covers data release for 1-31 Dec 2021)

Report Version	2	L2 ground processing software version:	V2.26.1
MAG PI	Tim Horbury t.horbury@imperial.ac.uk		
MAG IM	Helen O'Brien h.obrien@imperial.ac.uk		
Report prepared by	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.

December 2021 is the first full month in the science phase of the mission, following the earth flyby on the 27th of November. There were two TCMs during the month, on the 3rd and 13-14th which have been NaNed due their impact on the offsets and quality of the data. There is some evidence of heater signature around these periods, due to the changing thermal environment of the boom. Please refer to the mag heater status in the quality bitmask for periodic signals of ~15mins.

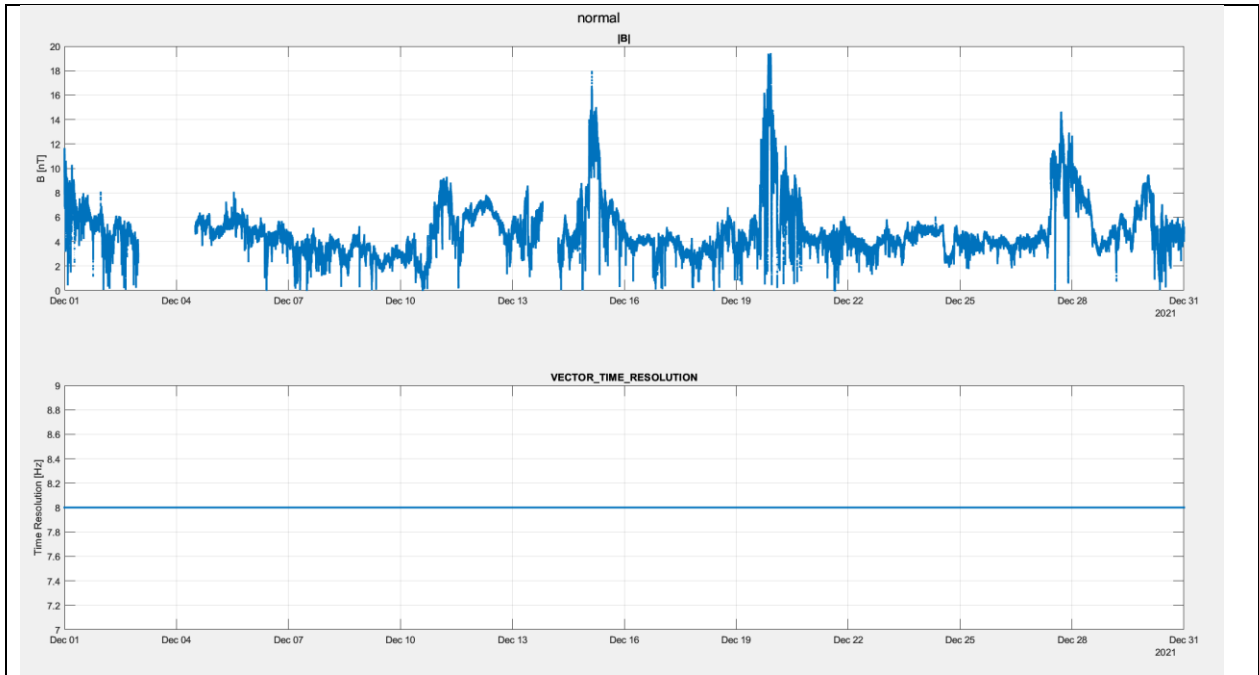
MAG was on for the period 1-31 December 2021.

Spacecraft noise was observed particularly in IBS data for several periods (there was significant noise for a total of 227 hour in the period 1-31 Dec). 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.

3-6-7-8-9-12-13 of December cannot be released because the data have been all converted to NaNs.

The spacecraft started the month at 1.00AU and ended it at 1.00AU.

Normal Mode



MAG was on with 8Hz cadence normal mode data returned, for exceptions see below.

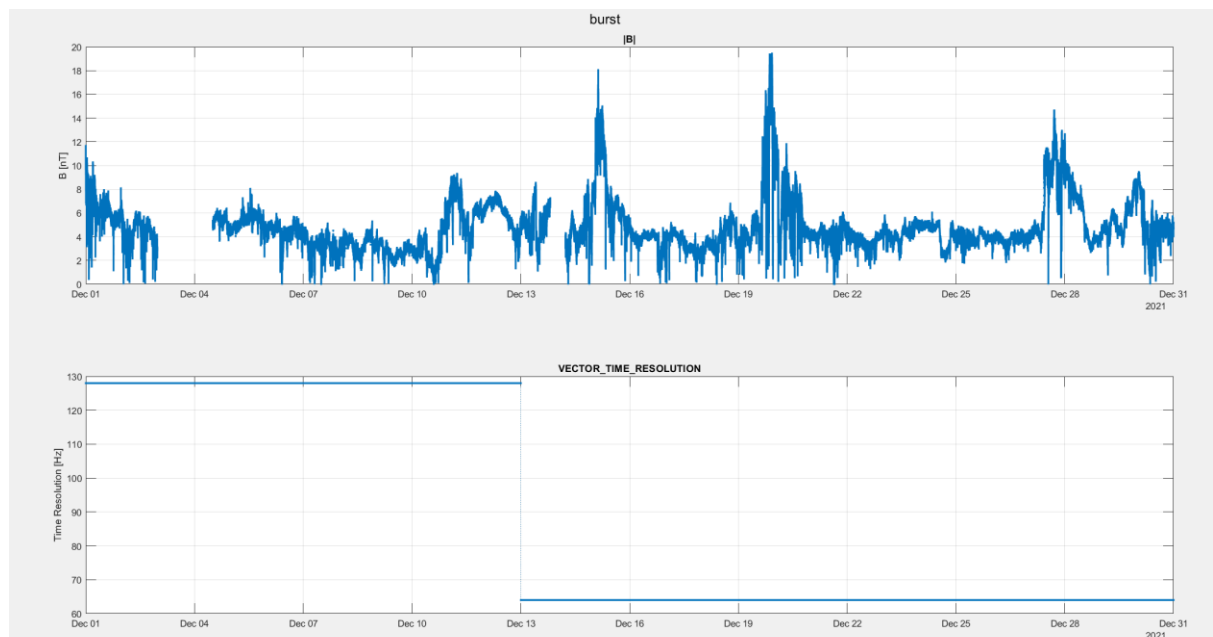
Operations	1-31 December	Cruise phase throughout period, normal data returned
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Operational Events of Note	None
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Data Gaps greater than one minute:

NaNs have been introduced during the noisiest periods because the data was highly disturbed. See Appendix for details.

Burst Mode



Coverage continuous. Data at 64 Hz or 128Hz cadence

Coverage	From	To	Coverage
	1/12	12/12	24 hours per day 128 Hz
	13/12	31/12	24 hours per day 64 Hz

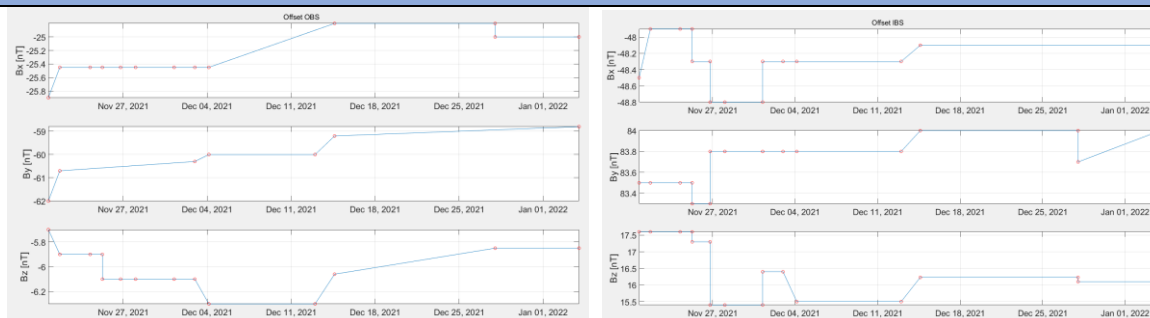
Quality bitmask



Quality bit mask events

SC events which disturb the field	<ol style="list-style-type: none"> 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
	03/12/2021	TCM
	03/12/2021 05:21-09:40	SA movement from 0 to -95 deg and vice versa
	03/12/2021 04:08-13:43	HGA Azimuth from 117 to 0 and vice versa
	03/12/21 21:35-21:42	SA lubrication
	04/12/2021 13:28	HGA elevation from -100 to -81 deg
	13/12/2021 19:30-14/12/2021 5:30	TCM
	20/12/2021 00:00	Battery top up event
	28/12/2021 00:10-00:17	SA lubrication

Offset



1-31 December:

OBS By continued recovering after the reboot on the 20th of September 2021, linearly moving closer to zero. OBS, as well as IBS, was affected by the TCM on the 2nd and the 13th of December and the SA lubrication on the 28th of December. IBS was affected by the SA current spike event on the 1st of December too.

These offsets have been quantified and removed from the L2 data.

Offset	Date	OBSX	OBSY	OBSZ	IBSX	IBSY	IBSZ	Comment
206	21/11/2021 17:21	-25.45	-60.7	-5.9	-47.9	83.5	17.6	TCM end
207	24/11/2021 06:00	-25.45		-5.9	-47.9	83.5	17.6	TCM start
208	25/11/2021 06:30	-25.45		-5.9	-47.9	83.5	17.6	TCM end
209	25/11/2021 06:30	-25.45		-6.1	-48.3	83.3	17.3	TCM end
210	26/11/2021 19:00	-25.45		-6.1	-48.3	83.3	17.3	Pre EGAM
211	26/11/2021 19:00	-25.45		-6.1	-48.8	83.8	15.4	Pre EGAM
212	28/11/2021 00:57	-25.45		-6.1	-48.8	83.8	15.4	Post EGAM
213	01/12/2021 06:00	-25.45		-6.1	-48.8	83.8	15.4	SA current spike
214	01/12/2021 06:01	-25.45		-6.1	-48.3	83.8	16.4	SA current spike
215	02/12/2021 23:26	-25.45	-60.3	-6.1	-48.3	83.8	16.4	TCM start
216	04/12/2021 03:30	-25.45	-60	-6.3	-48.3	83.8	15.5	TCM end
217	13/12/2021 00:00		-60	-6.3	-48.3	83.8	15.5	TCM start
226	14/12/2021 15:00	-24.8	-59.2	-6.06	-48.1	84	16.23	TCM end
227	28/12/2021 00:12	-24.8				84	16.23	Start SA lubrication
221	28/12/2021 00:17	-25		-5.85		83.7	16.1	End SA lubrication
222	04/01/2022 00:00	-25	-58.8	-5.85	-48.1	84	16.1	End of linear trend in OBS

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

Appendix – Periods now released.

StartTime	EndTime	Comment
02/12/2021 23:26	04/12/2021 12:01	TCM
05/12/2021 09:00	10/12/2021 08:00	SC interference
11/12/2021 22:00	14/12/2021 15:00	SC interference
18/12/2021 10:00	18/12/2021 10:30	SC interference
19/12/2021 11:00	19/12/2021 12:30	SC interference
20/12/2021 11:00	20/12/2021 12:30	SC interference
20/12/2021 17:00	20/12/2021 19:30	SC interference

Appendix B: Files within this release

Filename
solo_L2_mag-rtn-burst_20211201_V02.cdf
solo_L2_mag-rtn-burst_20211202_V02.cdf
solo_L2_mag-rtn-burst_20211204_V02.cdf
solo_L2_mag-rtn-burst_20211205_V02.cdf
solo_L2_mag-rtn-burst_20211206_V01.cdf
solo_L2_mag-rtn-burst_20211207_V01.cdf
solo_L2_mag-rtn-burst_20211208_V01.cdf
solo_L2_mag-rtn-burst_20211209_V01.cdf
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