Imperial College London

# MAG Data Release Report 2111

18 Jan 2022 (report covers data release for 1-30 Nov 2021)

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|---|---|---|---|
| Report Version | 1 | L2 ground processing software version: | V2.13 |
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## Data Summary

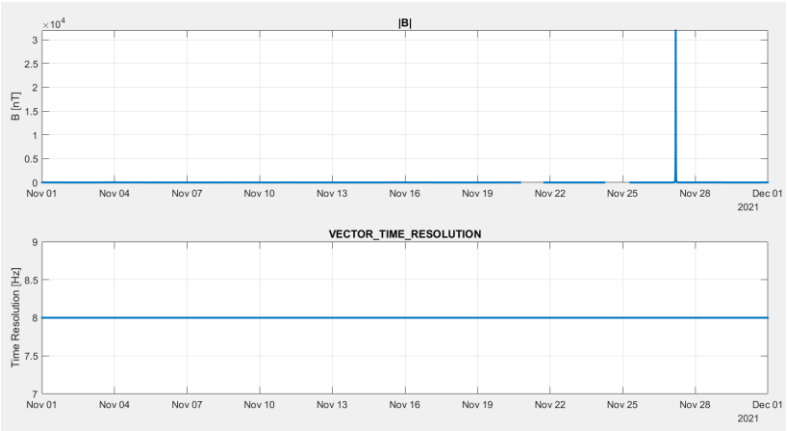
MAG was on for the period 1-30 November 2021.

On the 27th of November, Solar Orbiter had a Earth gravity assist (EGAM) to correct its trajectory. During part of the flyby the sensors were in range 0 and 1, when no high frequency data is available due to the high level of quantization. Please, contact the MAG team if this data is of your interest.

**Spacecraft noise** was observed particularly in IBS data for several periods (there was significant noise for a total of 49 hour in the period 1-30 Nov). 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 spacecraft started the month at 0.83AU and ended it at 1AU.

## Normal Mode




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

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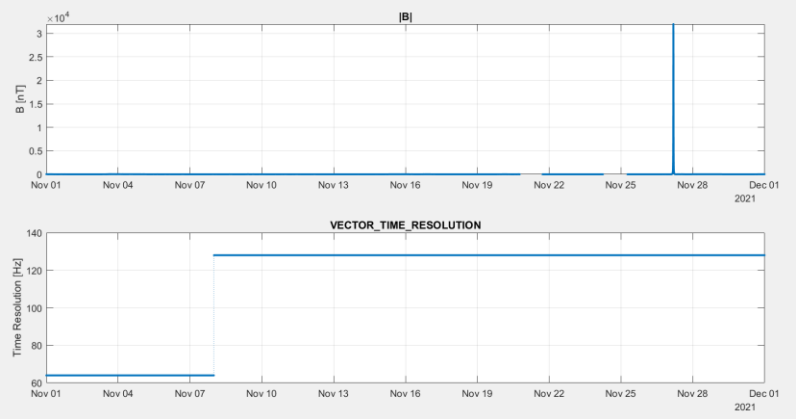
|---|---|---|
| Operations | 1-30 November | Cruise phase throughout period, normal data returned |
| Operational Events of Note | 27 November: Earth Gravity Assist, closest approach at 04:30:31, ~460km above the Earth's surface. | |

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

## Burst Mode




Coverage continuous. Data at 64 Hz cadence.

| Coverage | From | To | Coverage |
|---|---|---|---|
| | 1/11 | 7/11 | 24 hours 64 Hz per day |
| | 8/11 | 30/11 | 24 hours 128 Hz per day |

## Quality bitmask


Quality bit mask events

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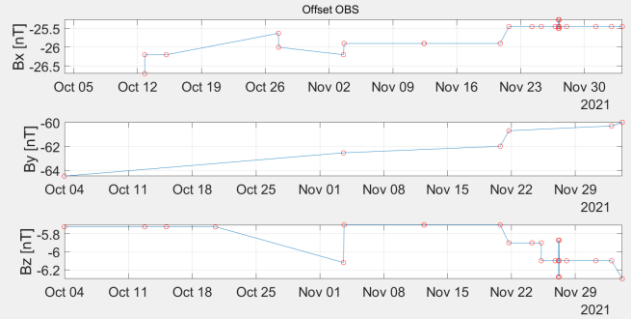
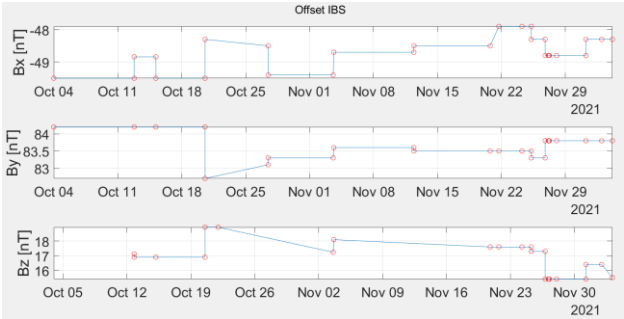
|---|---|
| SC events which disturb the field | 1. Thruster firings<br>2. Solar array lubrications (solar array is moved 15 degrees, then returned to original position)<br>3. Solar array movements (solar array angle is changed, and then remains at new angle due to sun-SC distance thermal constraints)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

| Time | Reason |
|---|---|
| 08/11/2021 00:04 | Battery top up event |
| 12/11/2021 09:55 | SA movement from 30 to 0 deg |
| 20/11/2021 18:27 to 21/11/2021 17:21 | TCM 1 |
| 24/11/2021 06:00 to 25/11/2021 06:30 | TCM 2 |

## Offset




**1-30 November:**
OBS Bx and By continued recovering after the reboot on the 20th of September 2021, moving closer to zero. OBS, as well as IBS, was affected by the TCM on the 20th and 24th of November. IBS was affected by the SA movement on the 12th of November too. OBS offset Bx and Bz has been corrected when its range changed from 3 to 2 and from 2 to 1, and vice versa.

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

| Offset | Date | OBSX | OBSY | OBSZ | IBSX | IBSY | IBSZ | Comment |
|---|---|---|---|---|---|---|---|---|
| 191 | 04/10/2021 00:00 | | -64.5 | -5.72 | -49.5 | 84.2 | | Change of linear trend in OBS |
| 192 | 12/10/2021 19:09 | -26.7 | | -5.72 | -49.5 | 84.2 | 17.13 | Pre SA movement |
| 193 | 12/10/2021 19:10 | -26.2 | | -5.72 | -48.84 | 84.2 | 16.9 | Post SA movement |
| 194 | 15/10/2021 04:10 | -26.2 | | -5.72 | -48.84 | 84.2 | 16.9 | Pre IBS range change |
| 195 | 15/10/2021 04:13 | -26.2 | | -5.72 | -49.5 | 84.2 | 16.9 | Post IBS range change |
| 196 | 20/10/2021 13:22 | | | -5.72 | -49.5 | 84.2 | 16.9 | Pre SA movement |
| 197 | 20/10/2021 13:27 | | | | -48.3 | 82.7 | 18.95 | Post SA movement |
| 198 | 22/10/2021 00:00 | | | | | | 18.95 | End influence after SA movement |
| 199 | 27/10/2021 11:05 | -25.63 | | | -48.5 | 83.1 | | Pre EUI step |
| 200 | 27/10/2021 11:23 | -26 | | | -49.4 | 83.3 | | Post EUI step |
| 201 | 03/11/2021 14:05 | -26.2 | -62.55 | -6.12 | -49.4 | 83.3 | 17.24 | IBS range change |
| 202 | 03/11/2021 15:44 | -25.9 | | -5.7 | -48.7 | 83.6 | 18.1 | IBS range change |
| 203 | 12/11/2021 09:55 | -25.9 | | -5.7 | -48.7 | 83.6 | | Pre SA movement from 30 to 0 deg |
| 204 | 12/11/2021 10:18 | -25.9 | | -5.7 | -48.5 | 83.5 | | Post SA movement from 30 to 0 deg |
| 205 | 20/11/2021 18:27 | -25.9 | -62 | -5.7 | -48.5 | 83.5 | 17.6 | TCM start |
| 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 |
| 219 | 27/11/2021 03:42:01.940 | -25.45 | | -6.1 | -48.8 | 83.8 | 15.4 | OBS Range 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 220 | 27/11/2021 03:42:02.000 | -25.27 | | -5.87 | -48.8 | 83.8 | 15.4 | OBS Range 2 |
| 221 | 27/11/2021 04:00:41.050 | -25.5 | | -6.28 | -48.8 | 83.8 | 15.4 | OBS Range 1 |
| 222 | 27/11/2021 05:07:29.000 | -25.5 | | -6.28 | -48.8 | 83.8 | 15.4 | OBS Range 1 |
| 223 | 27/11/2021 05:33:01.730 | -25.27 | | -5.87 | -48.8 | 83.8 | 15.4 | OBS Range 2 |
| 224 | 27/11/2021 05:33:02.000 | -25.45 | | -6.1 | -48.8 | 83.8 | 15.4 | OBS Range 3 |
| 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 |
| 216 | 04/02/2022 00:00 | -25.45 | -60 | -6.3 | -48.3 | 83.8 | 15.5 | Final offset |

# Appendix

## Appendix A: NANs periods of the month

This table shows the NaN periods which have been introduced in the data due to SC interference. The disturbance observed in the IBS-OBS data set is large that we cannot quantify the impact on OBS, therefore we have set this data to NaN. If you have a need to see this data, please get in contact with the MAG team and we can discuss this with you.

| StartTime | EndTime | Comment |
|---|---|---|
| 20/11/2021 18:27 | 21/11/2021 18:00 | TCM |
| 24/11/2021 06:00 | 25/11/2021 07:30 | TCM |

## Appendix B: Files within this release

| Filename |
|---|
| solo_L2_mag-rtn-burst_20211101_V01.cdf |
| solo_L2_mag-rtn-burst_20211102_V01.cdf |
| solo_L2_mag-rtn-burst_20211103_V01.cdf |
| solo_L2_mag-rtn-burst_20211104_V01.cdf |
| solo_L2_mag-rtn-burst_20211105_V01.cdf |
| solo_L2_mag-rtn-burst_20211106_V01.cdf |
| solo_L2_mag-rtn-burst_20211107_V01.cdf |
| solo_L2_mag-rtn-burst_20211108_V01.cdf |
| solo_L2_mag-rtn-burst_20211109_V01.cdf |
| solo_L2_mag-rtn-burst_20211110_V01.cdf |
| solo_L2_mag-rtn-burst_20211111_V01.cdf |
| solo_L2_mag-rtn-burst_20211112_V01.cdf |
| solo_L2_mag-rtn-burst_20211113_V01.cdf |
| solo_L2_mag-rtn-burst_20211114_V01.cdf |

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| solo_L2_mag-rtn-burst_20211115_V01.cdf |
| solo_L2_mag-rtn-burst_20211116_V01.cdf |
| solo_L2_mag-rtn-burst_20211117_V01.cdf |
| solo_L2_mag-rtn-burst_20211118_V01.cdf |
| solo_L2_mag-rtn-burst_20211119_V01.cdf |
| solo_L2_mag-rtn-burst_20211120_V01.cdf |
| solo_L2_mag-rtn-burst_20211121_V01.cdf |
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| solo_L2_mag-srf-normal_20211107_V01.cdf |
| solo_L2_mag-srf-normal_20211108_V01.cdf |
| solo_L2_mag-srf-normal_20211109_V01.cdf |
| solo_L2_mag-srf-normal_20211110_V01.cdf |
| solo_L2_mag-srf-normal_20211111_V01.cdf |
| solo_L2_mag-srf-normal_20211112_V01.cdf |
| solo_L2_mag-srf-normal_20211113_V01.cdf |
| solo_L2_mag-srf-normal_20211114_V01.cdf |
| solo_L2_mag-srf-normal_20211115_V01.cdf |
| solo_L2_mag-srf-normal_20211116_V01.cdf |
| solo_L2_mag-srf-normal_20211117_V01.cdf |
| solo_L2_mag-srf-normal_20211118_V01.cdf |

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| solo_L2_mag-srf-normal_20211119_V01.cdf |
| solo_L2_mag-srf-normal_20211120_V01.cdf |
| solo_L2_mag-srf-normal_20211121_V01.cdf |
| solo_L2_mag-srf-normal_20211122_V01.cdf |
| solo_L2_mag-srf-normal_20211123_V01.cdf |
| solo_L2_mag-srf-normal_20211124_V01.cdf |
| solo_L2_mag-srf-normal_20211125_V01.cdf |
| solo_L2_mag-srf-normal_20211126_V01.cdf |
| solo_L2_mag-srf-normal_20211127_V01.cdf |
| solo_L2_mag-srf-normal_20211128_V01.cdf |
| solo_L2_mag-srf-normal_20211129_V01.cdf |
| solo_L2_mag-srf-normal_20211130_V01.cdf |