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IDEAS+ Swarm Weekly Report 2015/29: 2015/07/13 - 2015/07/19

Abstract : This is the **Instrument Data quality Evaluation and Analysis Service Plus** (IDEAS+) Swarm Weekly report on Swarm products quality, covering the period from 13 July to 19 July 2015.

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TABLE OF CONTENTS

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AMENDMENT POLICY

This document shall be amended by releasing a new edition of the document in its entirety. The Amendment Record Sheet below records the history and issue status of this document.

AMENDMENT RECORD SHEET

ISSUE	DATE	REASON
1.0	30 Jul 2015	First issue

1. INTRODUCTION

This document refers to the activities carried out in the framework of the Sensor Performance, Products and Algorithms (SPPA) Office [RD.1], and as such it reports on work related to:

- Algorithms and Processors Development, Maintenance and Evolution: these include all algorithm and software evolution and maintenance aspects for the different components, for both the Operational processors (OP) and Prototypes processors (PP) of L1 and L2 chains.
- Performance Assessment: these include all Quality Control activities (on-line and offline, systematic or on-demand), for the applicable product levels.
- System Calibration: these include the activities related to calibration, from sensor to system level. They also include aspects like cross calibration and handling of external calibration sources.
- Product validation: these include definition and maintenance of product validation plans.
- End-to-end Sensor Dataset Performance: these include activities related to the organisation and coordination of Quality Working Groups and all aspects of the Experimental platform. It also covers the product baseline, coordination and handling of external communities, and all aspects of ADF handling (both for the operational processors and for the prototypes).

This weekly report constitutes a work in progress throughout the mission life time, and new parts and complements will be added while the consolidation of knowledge on Swarm data and instruments will progress.

Section 2.1 always gives an overview of the general quality status of the mission instruments and products, while the main observations of the week are summarized in Section 2.1.

The document also includes information on data quality for the three Swarm spacecraft, inferred from automated HTML quality reports which are produced on daily basis for each product. Please contact the IDEAS+ Swarm team if interested in accessing the reports via web or FTP (all details about interfaces and folder structure available on [RD.2]). Such quality reports represent the core of the Routine Quality Control (Chapter). A description of the implemented quality checks is given in [RD.3], and references therein.

Basing on specific findings of the routine quality control, or on-demand from other entities (i.e. Swarm PDGS, FOS, Mission Management, Post-Launch Support Office, Expert Support Laboratories, Quality Working Groups, user community), anomalies can be triggered and preliminary characterisations and investigations of such anomalies are given in Chapter 4.The anomalies documented in the Weekly Reports are tracked in the following way:

1. If triggered by ESA Eohelp or within the Service: IDEAS+ action and ticketing system (http://requests-sppa.serco.it/RT3/index.html).

2. If triggered by IDEAS+ Swarm team or other entities:

2a. If the observation/analysis leads to an anomaly to be addressed to the processor provider (GMV): SPR on EO ARTS (https://arts.eo.esa.int), **SWL1L2DB** project;

2.b. If the observation/analysis does not lead to an anomaly or the investigation shall be escalated to other entities (PLSO/industry, ESL, PDGS): Action tracked on EO ARTS, **SW-IDEAS** project, then addressed to the proper tracking system if needed (e.g. JIRA for ESLs, SW-CP-AR project on EO ARTS for PDGS).

Information on Level 1B Swarm products can be found in [RD.4].

1.1 Current Operational configuration of monitored data:

- Processors Version: L1BOP 3.16, L2-Cat2 1.12.p1
- L0 input products baseline: 02
- L1B baseline: 04 (for definitions and description of the data baseline concept see https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/swarm/data-access/product-baseline-definition)
- Level 2 – Cat 2 baseline: 01
- Input auxiliary files baseline: CCDB 0009, ADF 0101
- MPPF-CVQ v.2.14.00

1.2 Reference documents

The following is a list of documents with a direct bearing on the content of this report. Where referenced in the text, these are identified as RD.n, where 'n' is the number in the list below:

[RD.1] Sensor Performance, Products and Algorithms (SPPA), PGSI-GSOP-EOPG-TN-05-0025. Version 2.3.

[RD.2] Swarm PDGS External DMC Interface Control Document, SW-ID-DS-GS-0001, Issue 3.2.

[RD.3] Swarm MPPF-CVQ Monitoring Baseline Document, ST-ESA-SWARM-MBD-0001, Issue 1.7.

[RD.4] Swarm Level 1B Product Definition, SW-RS-DSC-SY-0007, Issue 5.13.

[RD.5] Swarm IDEAS Configuration Management Plan, IDEAS-SER-MGT-PLN-1081 v0.14.

[RD.6] Swarm Quality Control Project Plan, IDEAS-SER-MGT-PLN-1071

[RD.7] SW_L1BOP_status_20141124_MoM

[RD.8] Planned Updates for Level 1b, SW-PL-DTU-GS-008, Rev: 1dC.

[RD.9] IDEAS+ Swarm Weekly Report: 25/08/2014 – 31/08/2014, IDEAS+-SER-OQC-REP-2071_SPPA_SwarmWeeklyReport_20140825_20140831.pdf (ref. for SWL1L2DB-9)

[RD.10] IDEAS+ Swarm Weekly Report: 29/09/2014 – 05/10/2014, IDEAS+-SER-OQC-REP-2071_SPPA_SwarmWeeklyReport_20140929_20141005.pdf (ref. for SW-IDEAS-34)

[RD.11] IDEAS+ Swarm Weekly Report: 06/10/2014 – 12/10/2014, IDEAS+-SER-OQC-REP-2071_SPPA_SwarmWeeklyReport_20141006_20141012.pdf (ref. for SW-IDEAS-36)

[RD.12] IDEAS+ Swarm Weekly Report: 20/10/2014 – 26/10/2014, IDEAS+-SER-OQC-REP-2071_SPPA_SwarmWeeklyReport_20141020_20141026.pdf (ref. for SW-IDEAS-40, GPS sync loss)

[RD.13] IDEAS+ Swarm Weekly Report: 15/09/2014 – 21/09/2014, IDEAS+-SER-OQC-REP-2071_SPPA_SwarmWeeklyReport_20140915_20140921.pdf (ref. for SW-IDEAS-27)

[RD.14] Swarm L1B 03.15 Validation Report, OSMV-OPMT-SRCO-RP-15-3385, Issue 1.3.

[RD.15] IDEAS+ Swarm Weekly Report: 23/03/2015 – 29/03/2015, IDEAS+-SER-OQC-REP-2071_SPPA_SwarmWeeklyReport_201513_20150323_20150329.pdf.

[RD.16] SWARM Weekly Operations Report #76, SW-RP-ESC-FS-6172

[RD.17] Olsen, N., H. Luhr, C.C. Finlay, T.J. Sabaka, I. Michaelis, J. Rauberg and L. Tøffner-Clausen, The CHAOS-4 geomagnetic field model, Geophys. J. Int. 197, 815–827, 2014

[RD.18] IDEAS+-SER-IPF-PLN-2272, Swarm Level 1B Operational Processor Verification Plan, IDEAS+-SER-IPF-PLN-2272_L1BOP_316_v1.5_final.pdf

[RD.19] IDEAS+ Swarm Weekly Report: 15/06/2015 – 21/06/2015, IDEAS+-SER-OQC-REP-2071_SPPA_SwarmWeeklyReport_201525_20150615_20150621.pdf.

2. SUMMARY OF THE OBSERVATIONS

2.1 General status of Swarm instruments and Level 1B products quality

Nothing to report

2.2 Plan for operational processor updates

L1B: After the deployed in operation of the new processor (v03.16) a first assessment of the data quality has been performed by the IDEAS+ team. In the meanwhile, GMV has just delivered (29/07/2015) a new patch of the L1BOP 03.16 which will fix all the small issues found during the testing of this processor.

L2-Cat2: A new L2-Cat 2 processor (v01.15) is under testing.

2.3 Quality Working Group and Cal/Val Coordination

Coordination is in place for organizing the 6th Swarm Data Quality Workshop in Paris (hosted by IPGP) in late September 2015.

Following the QWG recommendations in Potsdam and the scientists need in view of the IUGG conference in June, the preliminary plasma dataset has been released early February 2015.

DTU/ESL shared the final set of corrected data on early April. These corrected data also contain the dB_sun correction, providing the users the possibility to access to uncorrected data.

The Task Force meeting was held on 2-3 July in Airbus. During this meeting the following decisions have been taken:

1. A “S-N” dependency of the dBy component on S/C C has to be tested with B_{ASM}
2. A seasonal effect shall be studied by all parties
3. It shall be considered, if the similarities between the three satellites can be caused by processing rather than by the physical disturbance
4. The Lesur/Toffner model should be restricted to focus only on the Zenith / /Bottom disturbance
5. Brain storm on the root cause of the Zenith/Bottom disturbance – can only be carried out by the system design experts

2.4 Summary of observations for 2015, Week 29 (13/07 - 19/07)

During the monitored week the following events have been found and investigated:

- **Some features observed in the MOD-NAV difference:** we observe at times deviations from the average values lasting several minutes (SW-IDEAS-34).
- **Several few seconds gaps in MAGx_CA_1B products** throughout the week. Most of them associated to gaps in telemetry (L0 products are continuous, due to processing some are discarded and a gap in L1A occurs), (SW-IDEAS-63).

3. ROUTINE QUALITY CONTROL

3.1 Gaps analysis

1) MAGx_CA gaps
   a) SC A
      i) 13 July two gaps in bus telemetry and one gap in 4 nearest ASM samp.
      ii) 14 July two gaps in bus telemetry
      iii) 15 July one gap in bus telemetry.
   b) SC B
      i) 17 July due to gap in bus telemetry

Investigation on the origin of those gaps is ongoing.

3.2 Orbit and Attitude Products

In Table 1 are listed events that have to be reported.

Table 1: List of events related to attitude and orbit products to be reported in the monitoring for 2015, Week 29: 13/07 - 19/07.

Observation ID	Description	Affected parameter	Sect. of Obs. Description	Sect. of Obs. Analysis
SW-IDEAS-34	OBS_ROUTINE: spiky features observed in the NAV-MOD difference	Orbits (position and velocity)	3.2.1.1, 3.2.1.2, 3.2.1.3	[RD.10]
SW-IDEAS-63	OBS_ROUTINE: MAGx_CA_1B gaps.	MAGx_CA_1B	3.1	3.1

The relevant parameters that have been monitored are:

- Position difference between calculated Medium Accuracy orbits (**MODx_SC_1B**) and on-board solution (**GPSxNAV_0**). Threshold values for such differences have not been assessed yet: we have just monitored the average values and maximum variations around the week, and reported in tables in the sections below, along with some example from the HTML daily reports. For the time being we evaluated an anomaly should be raised if one (or more) of the following conditions occurs:

  o The **average difference** on a given day exceeds the position accuracy requirement for the mission (1.5 m),

  o The variability around the average is quite high: **standard deviation** threshold has been arbitrarily chosen to be twice the position accuracy requirement for the mission (2-sigma = 3 m).

  o At least 4-5 spikes are observed on a given day, exceeding +/- 50 m.

- Visual inspection of Star Tracker characterisation flags (**STRxATT_1B**)
- Deviation of the quaternion norm from unity (deviation threshold = +/- 10^{-9})
- Visual inspection of Euler Angles derived from quaternions.

3.2.1 Position Statistics

In Table 2, one can see the statistics of the differences between MOD and on-board solution positions for S/C A, B and C respectively. In the third column the maximum differences (maximum negative and maximum positive) are reported. The maximum standard deviation is in the fourth column. Maxima, minima and standard deviations usually refer to the Z component which is often the most disturbed; in case another component is most affected, it will be specified in parentheses.

Table 2: Swarm A, B and C, difference between MOD and on-board solution positions. If not specified maximum difference and maximum standard deviation refers to the Z axis.

Swarm A, 13/07 - 19/07, Position difference					
Day	**Average difference (m)**	**Maximum difference (m)**		**Maximum standard deviation (m)**	**Notes**
13/07	0.09	-9.4	6.3	1.49	
14/07	0.12	-6.3	8.6	1.29	
15/07	0.05	-7.2	10 (X)	1.29	Spike in X component
16/07	0.21	-4.9	6.9	1.04	
17/07	0.04	-8	7.4	1.31	SW-IDEAS-34 [RD.10]
18/07	0.24	-5.5	6.4	1.23	
19/07	0.09	-8.7	6.8	1.41	

Swarm B, 13/07 - 19/07, Position difference					
Day	**Average difference (m)**	**Maximum difference (m)**		**Maximum standard deviation (m)**	**Notes**
13/07	0.1	-6.9	11.9 (Y)	1.4	Spike in Y component
14/07	0.13	-8.4	11	1.39	Spike in Z component
15/07	0.1	-6.3	7.9	1.3	
16/07	0.1	-6	6.5 (Y)	1.15	
17/07	0.16	-5.9	9.3	1.23	
18/07	0.19	-6.3	8.6	1.22	SW-IDEAS-34 [RD.10]
19/07	0.11	-12.6	6.9	1.34	Spike in Z component

Swarm C, 13/07 - 19/07, Position difference					
Day	**Average difference (m)**	**Maximum difference (m)**		**Maximum standard deviation (m)**	**Notes**
13/07	0.1	-7.9	6.5	1.38	
14/07	0.12	-6.8	6.7	1.23	
15/07	0.07	-7.2	8.8	1.31	
16/07	0.24	-5.9	6.4	1.03	
17/07	0.09	-5.5 (Y)	6.8	1.18	SW-IDEAS-34 [RD.10]
18/07	0.26	-4.4	9.4 (X)	1.16	Spike in X component
19/07	0.04	-7.4	7	1.38	

3.2.1.1 Swarm A

Below some plot example follows of MOD-NAV differences, S/C A, taken at the beginning of the week (13/07, Figure 1) in the middle (16/07, Figure 2) and at the end (19/07, Figure 3). From top to bottom the plots show of MOD-NAV differences in ITFR reference frame: on X, Y and Z axis respectively. The difference between both solutions is given in [m].

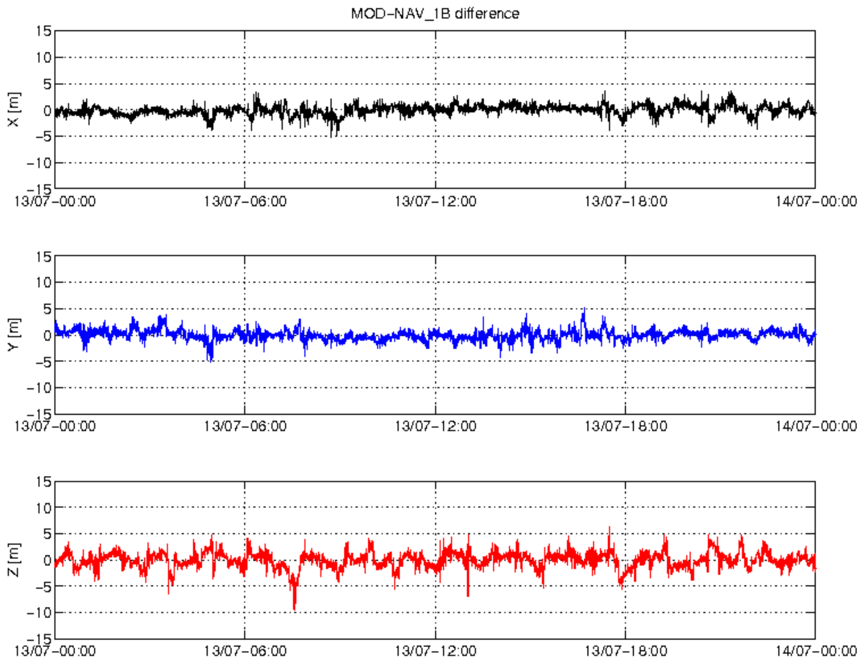


Figure 1: Difference MOD-GPSNAV, S/C A, 13/07. From top to bottom: X, Y and Z axis

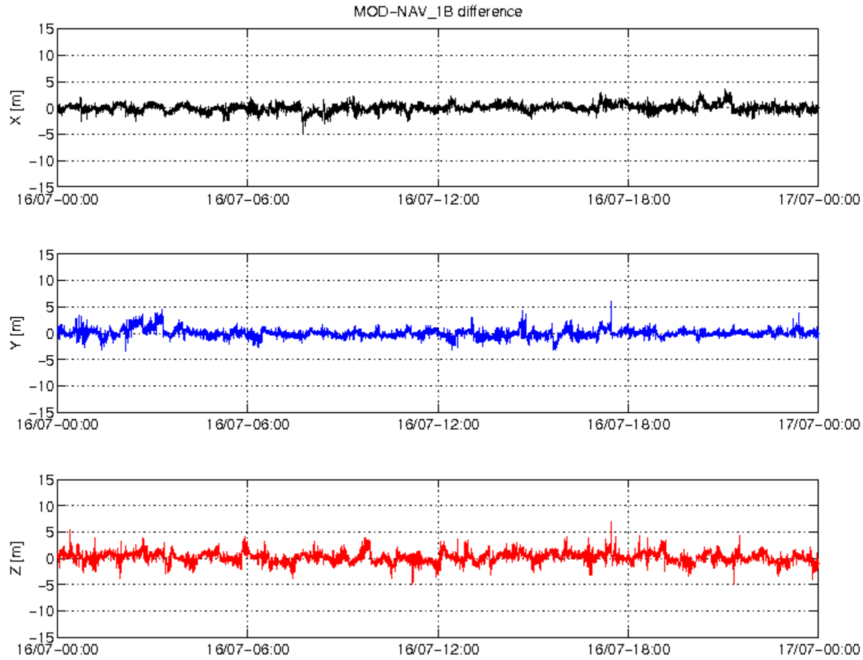


Figure 2: Difference MOD-GPSNAV, S/C A, 16/07. From top to bottom: X, Y and Z axis

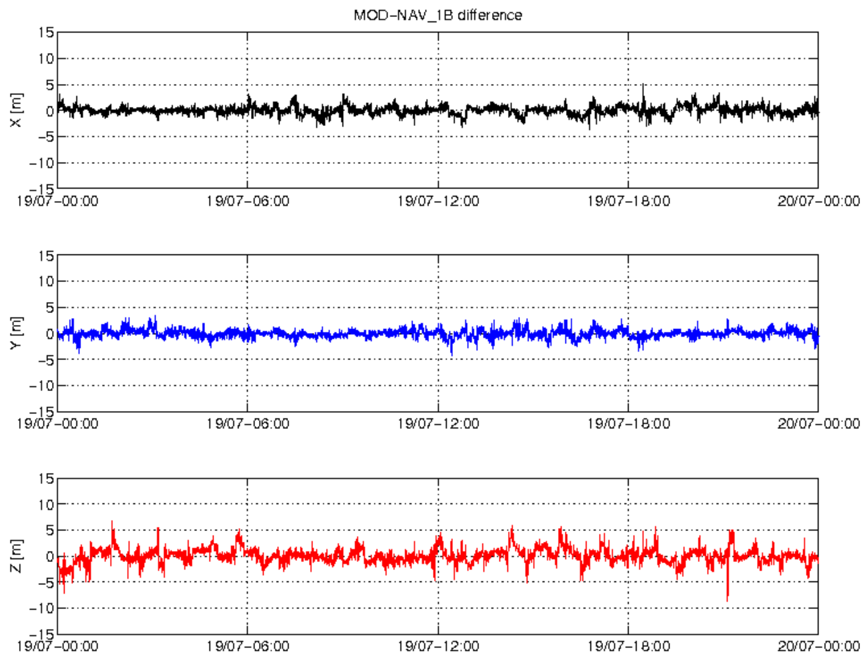


Figure 3: Difference MOD-GPSNAV, S/C A, 19/07. From top to bottom: X, Y and Z axis

3.2.1.2 Swarm B

Below some plot example follows of MOD-NAV differences, S/C B, taken at the beginning of the week (13/07, Figure 4), in the middle (16/07, Figure 5), and at end of the week (19/07, Figure 6). From top to bottom the plots show of MOD-NAV differences in ITFR reference frame: on X, Y and Z axis respectively. The difference between both solutions is given in [m].

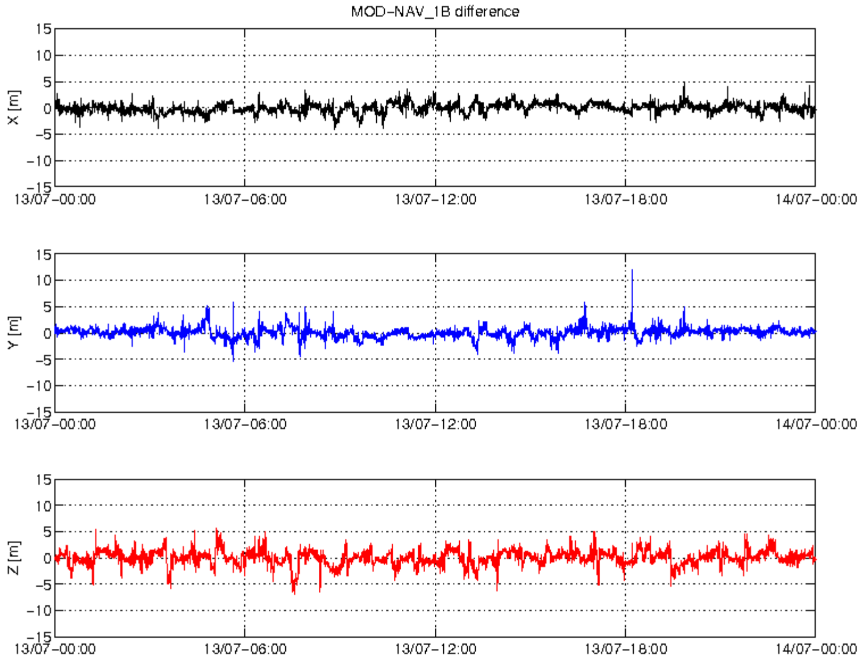


Figure 4: Difference MOD-GPSNAV, S/C B, 13/07. From top to bottom: X, Y and Z axis

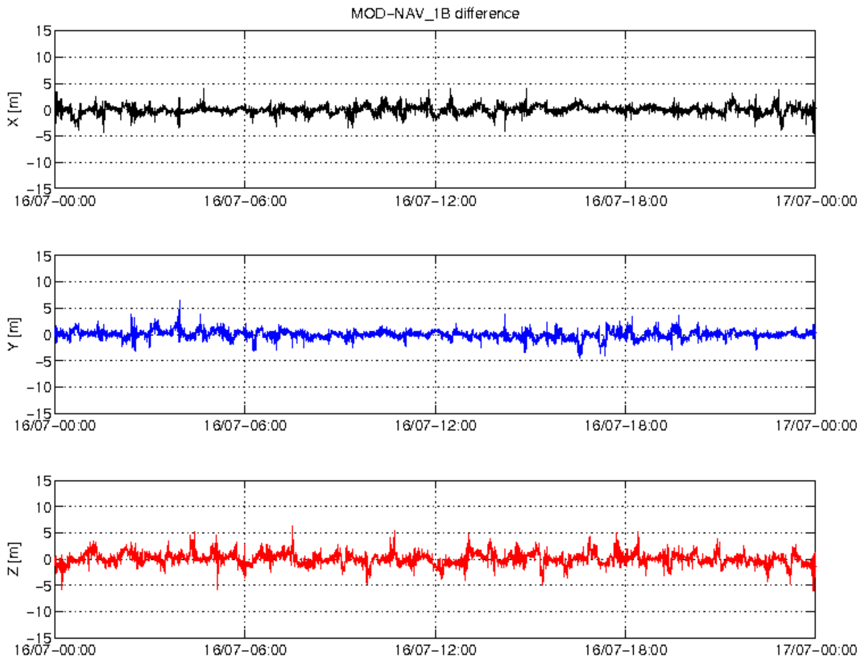


Figure 5: Difference MOD-GPSNAV, S/C B, 16/07. From top to bottom: X, Y and Z axis

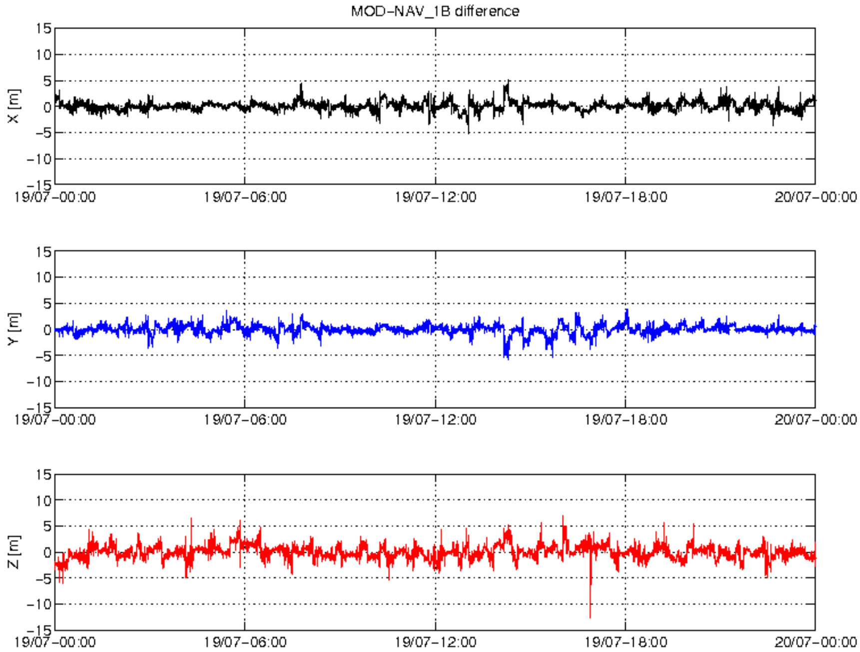


Figure 6: Difference MOD-GPSNAV, S/C B, 19/07. From top to bottom: X, Y and Z axis

3.2.1.3 Swarm C

Below some plot example of MOD-NAV differences, S/C C, follows, taken at the beginning of the week (13/07, Figure 7), in the middle (16/07, Figure 8) and at the end (19/07, Figure 9). From top to bottom the plots show of MOD-NAV differences in ITFR reference frame: on X, Y and Z axis respectively. The difference between both solutions is given in [m].

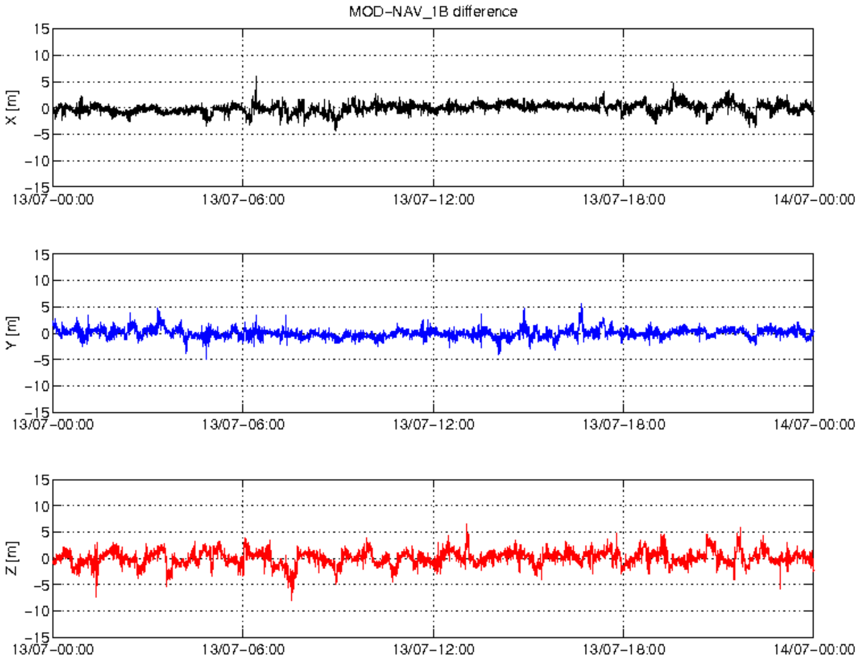


Figure 7: Difference MOD-GPSNAV, S/C C, 13/07. From top to bottom: X, Y and Z axis

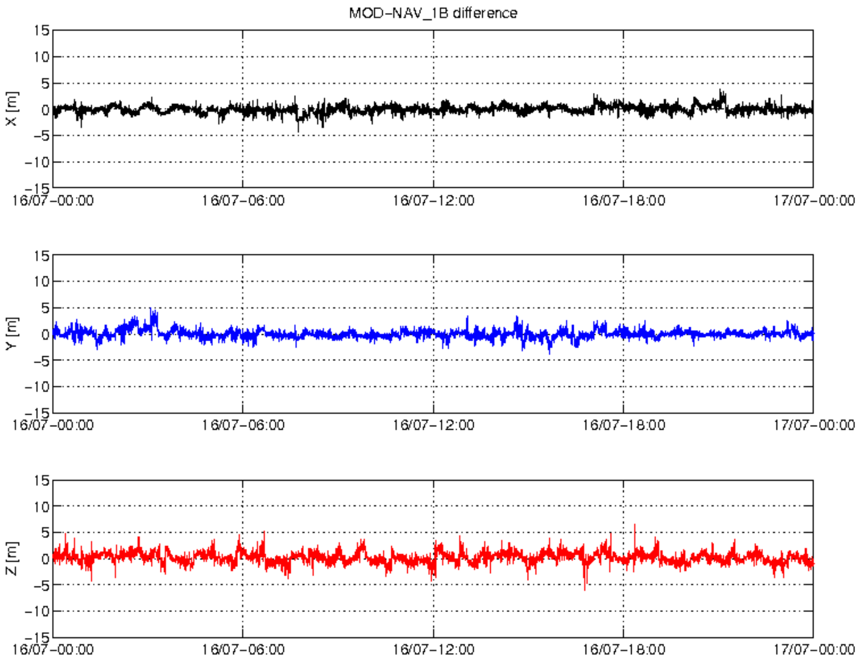


Figure 8: Difference MOD-GPSNAV, S/C C, 16/07. From top to bottom: X, Y and Z axis

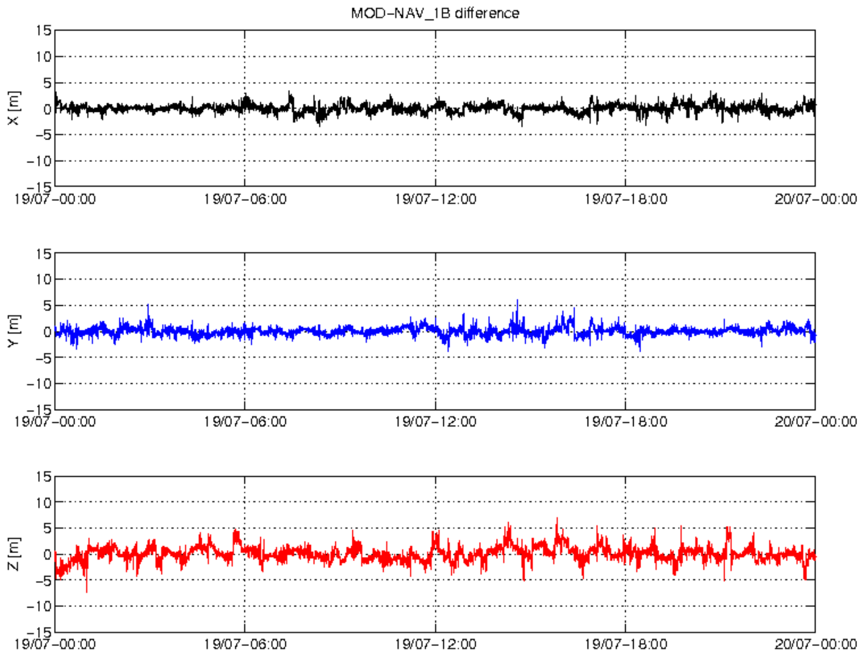


Figure 9: Difference MOD-GPSNAV, S/C C, 19/07. From top to bottom: X, Y and Z axis

3.2.2 Attitude observations

3.2.2.1 Swarm A

Nothing to report.

3.2.2.2 Swarm B

Nothing to report.

3.2.2.3 Swarm C

Nothing to report.

3.3 Magnetic Products

For the magnetic products the weekly monitoring consists in:

- TCF.VFM parameters monitoring (VFM calibration parameters): series of biases, scales, non-orthogonality factors and RMS. **This check is performed on monthly basis.**

- ASM instrument monitoring: quartz frequency and ASM temperature

- VFM instrument monitoring: temperatures

- Visual inspection of daily time series of magnetic field intensity F, $\mathbf{B_{NEC}}$ and $\mathbf{B_{VFM}}$. Looking for gaps (or zero values in case of **MAGx_LR_1B** products), out-of-threshold values (i.e. exceeding +/- 60000 nT), and other strange features.

- Monitoring of the **VFM-ASM known anomaly**: visual inspection of $|B_{NEC}|$ - F and recording of daily maximum variations. If +/- 5 nT are exceed on a given day, an alert is raised.

- Comparison of magnetic data (BNEC) with a model (Chaos4plus).

3.3.1 ASM-VFM difference statistics

In Table 3, one can see the statistics of the differences between magnetic field absolute value measured by ASM and by VFM. In the second and third column are reported the maximum differences, maximum negative and maximum positive respectively. The maximum standard deviation is in the fourth column. Please note, that for the last two days a new processor was already in place. The standard deviation for the new processor is 4 times lower. The ASM-VFM difference from the new processor stays within (-1;1) nT.

Table 3 Swarm A and B, difference between magnetic field absolute value measured by ASM and by VFM.

Swarm A, 13/07 - 19/07, ASM-VFM difference				
Day	**Max (nT)**	**Min (nT)**	**Standard deviation (m)**	**Notes**
13/07	2.8E+00	-2.1E+00	7.5E-01	L1B 3_15
14/07	2.1E+00	-1.2E+00	7.7E-01	L1B 3_15
15/07	2.2E+00	-1.8E+00	7.7E-01	L1B 3_15
16/07	2.3E+00	-1.2E+00	7.9E-01	L1B 3_15
17/07	2.4E+00	-1.2E+00	8.4E-01	L1B 3_15
18/07	-6.9E-01	6.7E-01	2.8E-01	L1B 3_16
19/07	-7.2E-01	1.2E+00	2.7E-01	L1B 3_16
Swarm B, 13/07 - 19/07, ASM-VFM difference				
Day	**Max (nT)**	**Min (nT)**	**Standard deviation (m)**	**Notes**
13/07	3.1E+00	-3.1E+00	7.9E-01	L1B 3_15
14/07	1.8E+00	-2.1E+00	8.1E-01	L1B 3_15
15/07	1.6E+00	-2.0E+00	7.9E-01	L1B 3_15
16/07	1.6E+00	-1.6E+00	8.1E-01	L1B 3_15
17/07	1.6E+00	-2.5E+00	8.3E-01	L1B 3_15
18/07	-7.8E-01	6.4E-01	2.5E-01	L1B 3_16
19/07	-7.1E-01	5.3E-01	2.3E-01	L1B 3_16

3.3.2 ASM Instrument parameters: quartz frequency and ASM temperature (ASMAVEC_0)

For S/C Alpha and Bravo the temperature and quartz frequency behaved as expected.

3.3.3 VFM Instrument parameters: VFM temperatures (MAG_CA)

The VFM instrument parameters important for monitoring the instrument health are the VFM sensor temperatures: T_CDC, T_CSC and T_EU.

For S/C Alpha and Bravo for reported period the temperatures behaved as expected.

3.3.4 Magnetic time series visual inspection

3.3.4.1 Swarm A

An example of representative magnetic field time series for S/C A (19/07) can be seen in Figure 10 below.

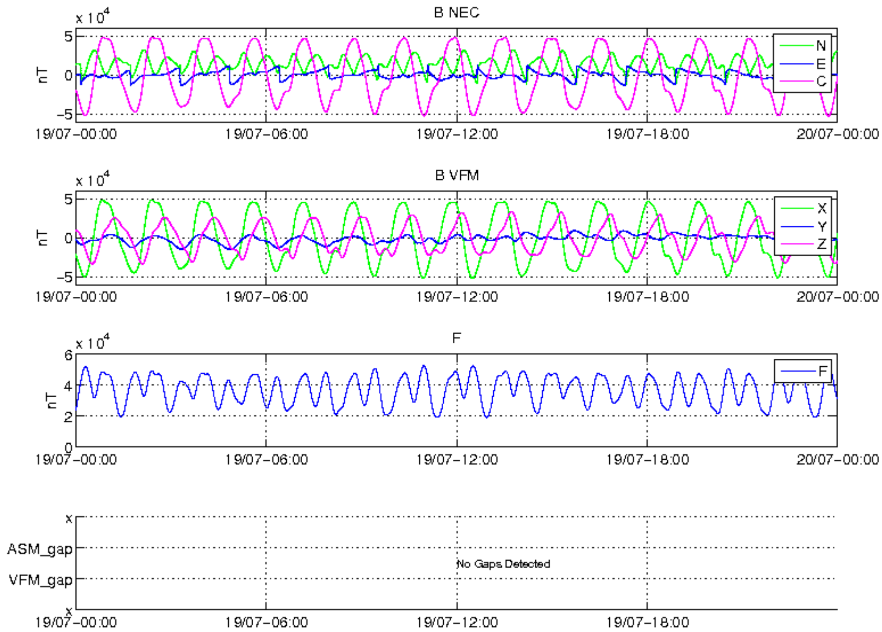
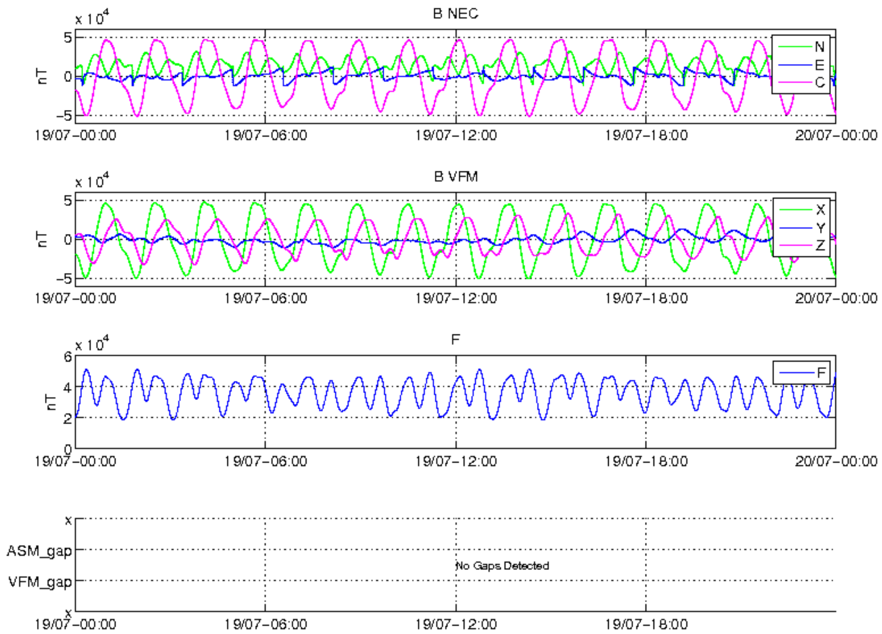


Figure 10: Time series of the geomagnetic field, for 19/07, S/C A. From top to bottom: magnetic field components in NEC reference frame, magnetic field components in the VFM reference frame, magnetic field intensity (F) from ASM, and location of gaps (if any).

3.3.4.2 Swarm B

An example of representative magnetic field time series for S/C B (19/07) can be seen in Figure 11 below.



*

Figure 11: Time series of the geomagnetic field for 19/07, S/C B. From top to bottom: magnetic field components in NEC reference frame, magnetic field components in the VFM reference frame, magnetic field intensity (F) from ASM, and location of gaps (if any).

3.3.4.3 Swarm C

An example of magnetic field time series for S/C C (19/07) can be seen in Figure 12.

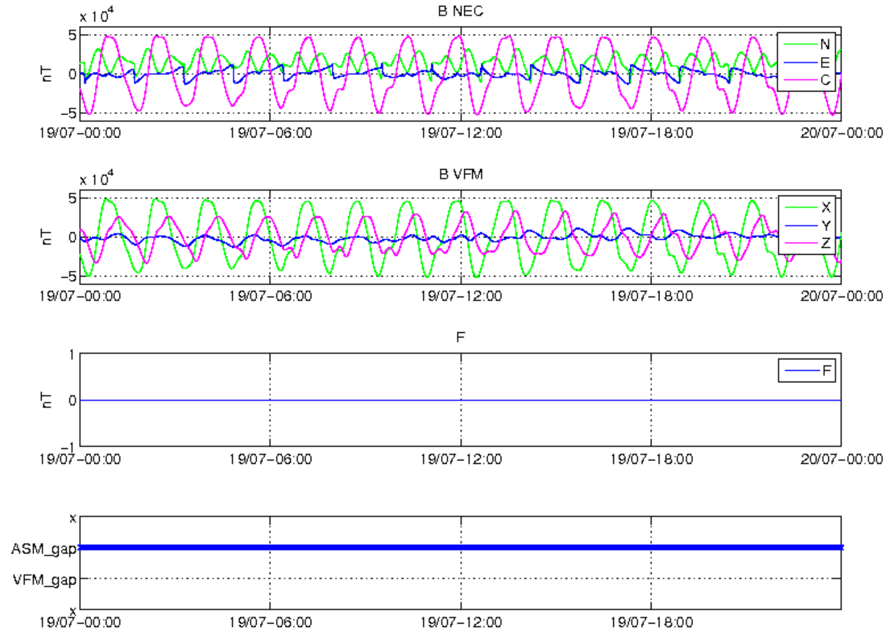


Figure 12: Time series of the geomagnetic field for 19/07, S/C C. From top to bottom: magnetic field components in NEC reference frame, magnetic field components in the VFM reference frame, magnetic field intensity (F) from ASM (no data here because ASM it is off) and location of gaps.

3.3.5 VFM-ASM anomaly

General observation: beginning from 18/07 the L1B data are processed with the new operational process (V03.16). The ASM-VFM residuals for S/C A show a significant decreasing trend. This anomaly is under investigation.

3.3.5.1 Swarm A

The daily peak-to-peak difference around the week stays within [-1;2] nT with a few spikes not exceeding 2nT, and within [-0.7; 0.7] nT for the last two days produced with new processor. Below two example plots follows of such differences: 13/07 (Figure 13), and 19/07 (Figure 14).

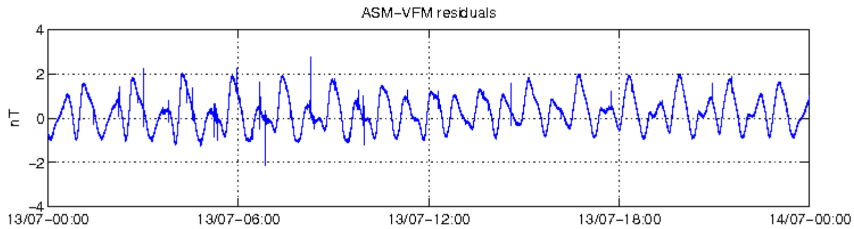


Figure 13: ASM-VFM residuals for S/C A, 13/07.

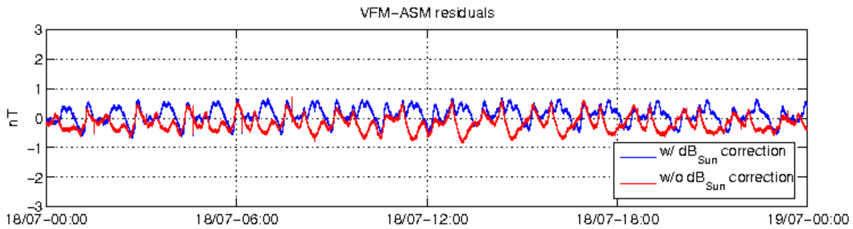


Figure 14: ASM-VFM residuals before (red) and after (blue) the correction for S/C A, 19/07.

3.3.5.2 Swarm B

The daily peak-to-peak difference around the week is, on average: [-2; 2] nT, with a few spikes not exceeding 3 and within [-0.7; 0.7] nT for the last two days produced with new processor. Below two example plots follows of such differences: 13/07 (Figure 15), and 19/07 (Figure 16).

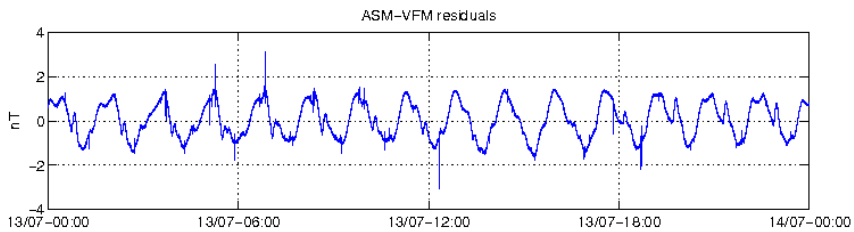


Figure 15: ASM-**VFM** residuals for S/C B, 13/07.

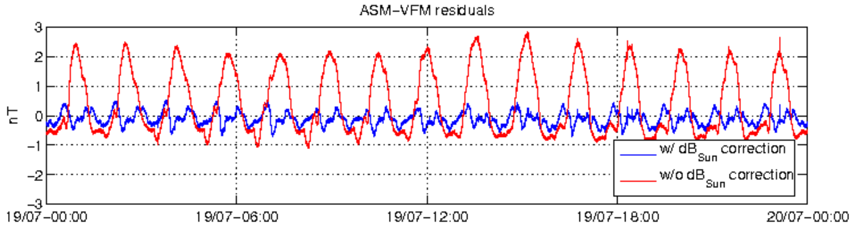


Figure 16: ASM-VFM residuals before (red) and after (blue) the correction for S/C B, 19/07.

3.3.5.3 Swarm C

No data because ASM is switched off.

3.3.6 B_{NEC} vs Chaos4plus model residuals

Figure 17, Figure 19 and Figure 21 show field residuals $dB=B_{NEC} - B_{Chaos}$ (all versus co-latitude in degrees), from top to bottom: 1) Br, 2) Bθ and 3) Bφ.

As a general feature one can see the field residuals to be steady and usually below 50 nT at low and middle latitudes, up to |55| - |60| degrees; then the residual increases at high latitudes because the Chaos model does not take into account the contribution from the external field ([RD.17]).

Figure 18, Figure 20 and Figure 22 shows, from top to bottom, the time series on 13/07 of: (1-2-3) residuals of B_{NEC}-B_{CHAOS} by components, related to Swarm Alpha, Bravo and Charlie respectively,

The component most affected by residual spikes and variations is Bθ_NEC, i.e. the component which shows the variations of the field wrt to co-latitude. At high latitudes, the order of magnitude of the variability is about +/- 200 nT.

For 13th of July we again can observe the influence of high magnetic activity. In the section ON-DEMAND analysis, are shown the trend of the Dst magnetic index for the period together with the trends of the daily standard deviation of the time series of the difference between Swarm and Chaos4_B_NEC components.

3.3.6.1 Swarm A

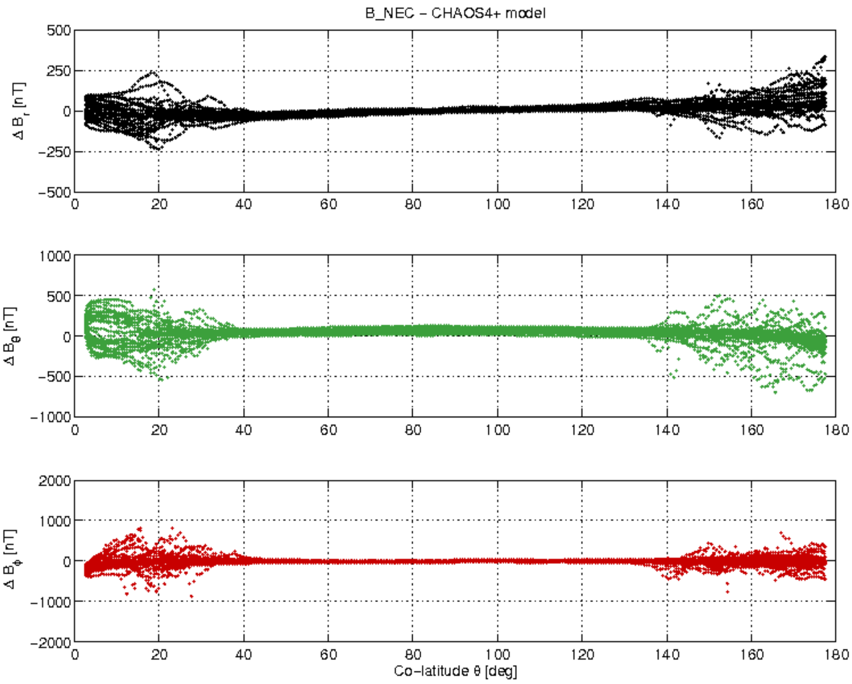


Figure 17: Swarm A day 13/07 B_NEC - B_Chaos vs colatitude.

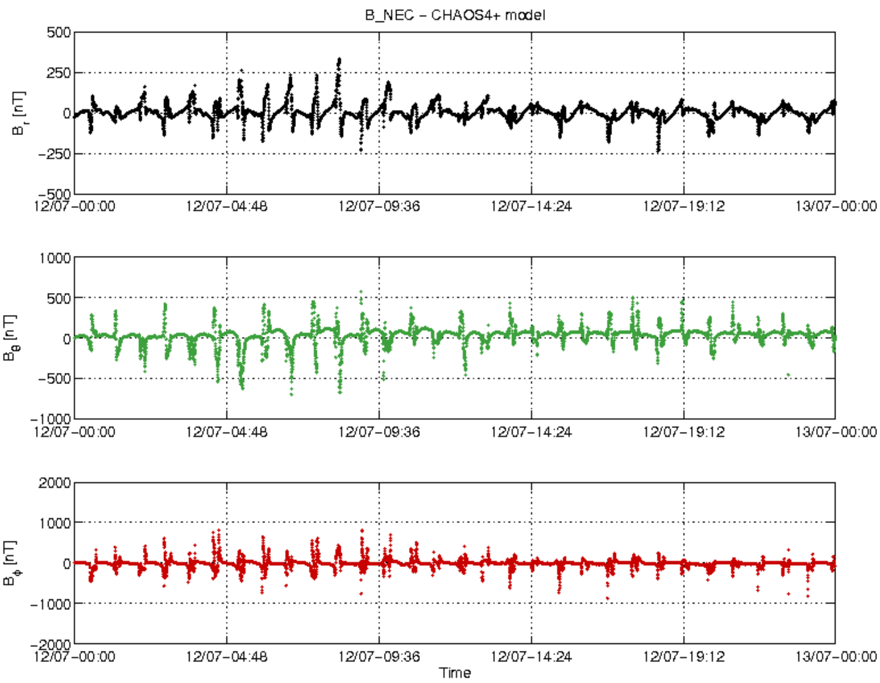


Figure 18: Swarm A day 13/07: time series of B_NEC – B_Chaos residuals.

3.3.6.2 Swarm B

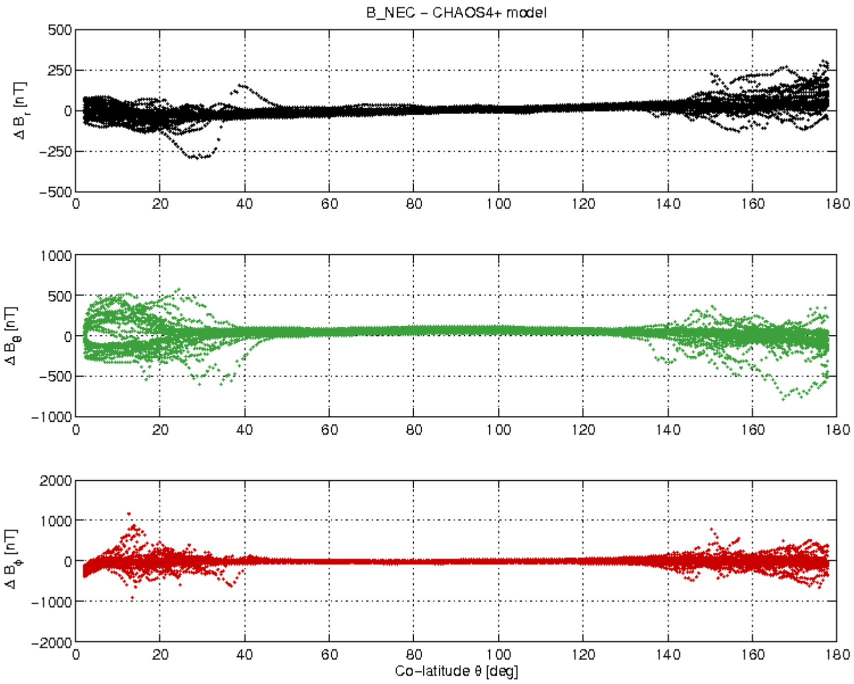


Figure 19 Swarm B day 13/07 B_NEC - B_Chaos difference vs colatitude.

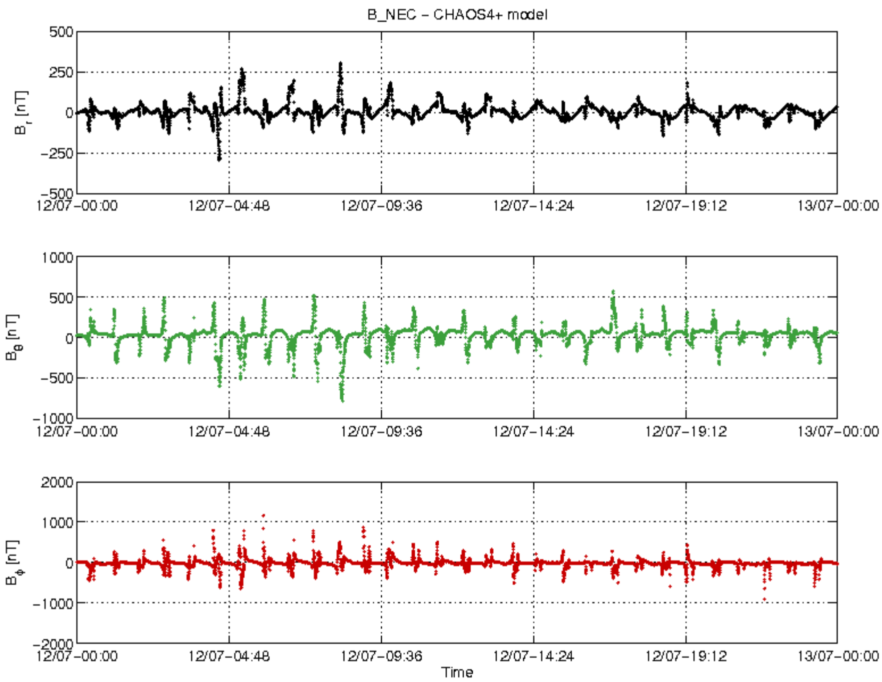


Figure 20 Swarm B day 13/07 time series of B_NEC – B_Chaos residuals.

3.3.6.3 Swarm C

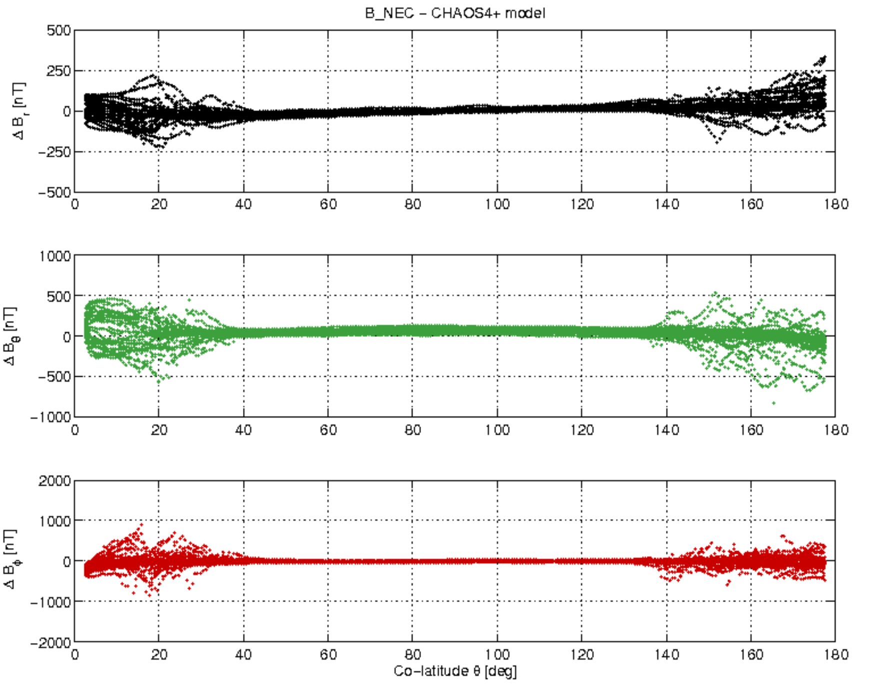


Figure 21 Swarm C day 13/07 B_NEC - B_Chaos difference vs colatitude.

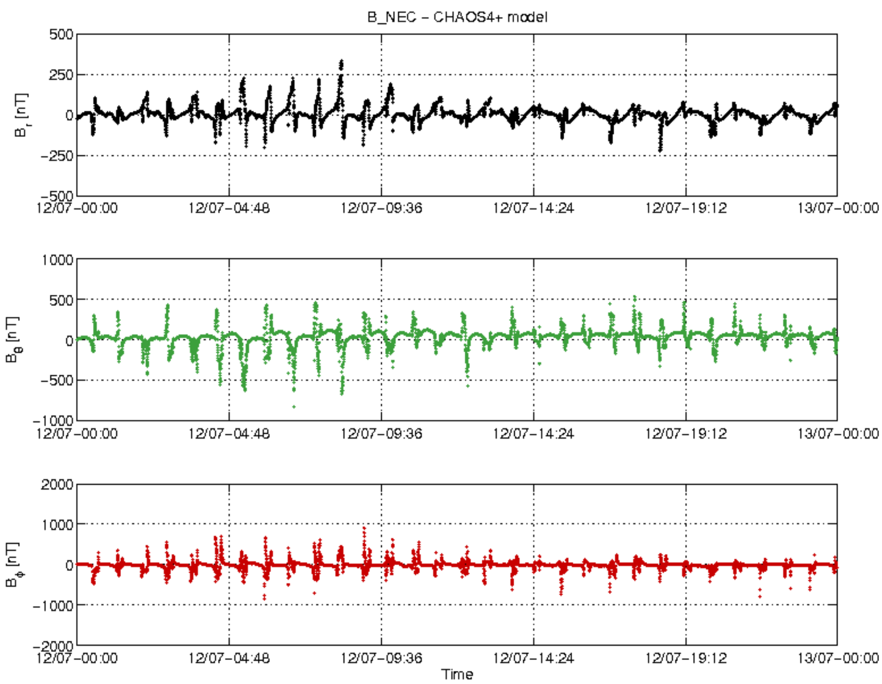


Figure 22 Swarm C day 13/07 time series of B_NEC – B_Chaos residuals.

4. ON-DEMAND ANALYSIS

Continuing with the analysis introduced in [RD.19], we have calculated the daily standard deviation (STD) of the differences between the Swarm and Chaos4 B_NEC components considering only the mid and low latitude (co-latitude in the range: 40≤θ≤150°).
The trend of the Dst index together with the trend of the STD between Swarm (S/C A, S/C B and S/C C) and Chaos4 X, Y and Z components are shown in Figure 23. To notice that we have observed again values of STD particularly high for the day 13/07 that correspond to a day moderately disturbed.

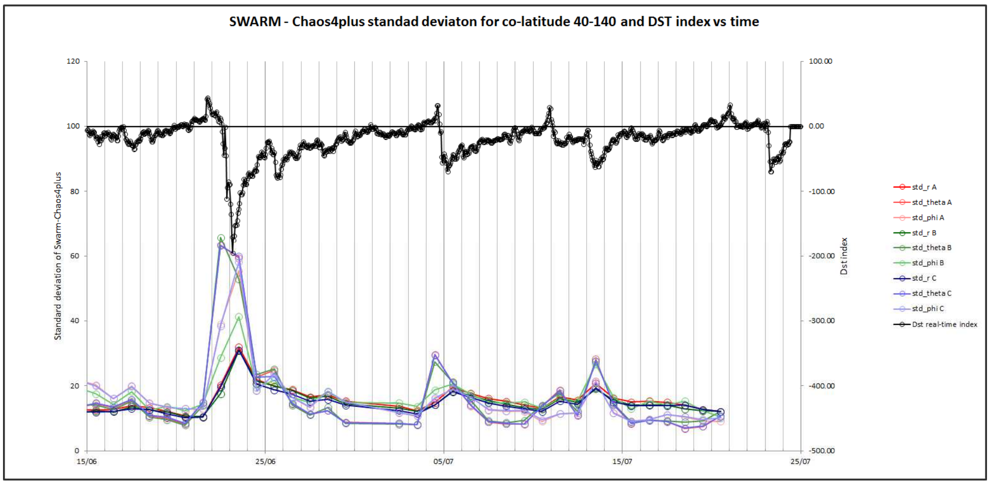


Figure 23: Trend of the Dst index (http://wdc.kugi.kyotou.ac.jp/dst_realtime/201506/index.html) together with the trend of the SD between Swarm (S/C A, S/C B and S/C C) and Chaos4 X, Y and Z components.

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