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| **Customer** | : | **ESRIN** | **Document Ref** | : | **IDEAS-VEG-OQC-REP-1246** |
| **Contract No** | : | **21525/08/I-OL** | **Issue Date** | : | **15 May 2013** |
| **WP No** | : | **14500** | **Issue** | : | **1** |

**Title** : **IDEAS – SMOS Public Monthly Report - April 2013**

**Abstract** : This document provides a summary of the status and performance of SMOS over the course of the reporting month.

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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 | DCI No | REASON |
|---|---|---|---|
| 1 | 15 May 2013 | N/A | First release |
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# 1. EXECUTIVE SUMMARY

This is the routine Soil Moisture and Ocean Salinity (**SMOS**) Monthly Public Report containing a summary of the instrument health, product quality status and, important updates to SMOS processing and AUX files during April 2013

The instrument health during April was found to be nominal. There were only one unavailability reported during the reporting period that translate into time intervals with data loss or degraded data. The list of unavailabilities is included in the section 3.2.

The data quality during April was found to be nominal except in the time intervals listed in the section 4.5. The degradation of the data has been induced either by instrument anomalies or by the unavailability of the dynamic auxiliary files.

# 2. INTRODUCTION

## 2.1 Structure of the Document

After this introduction, the document is divided into a number of major sections that are briefly described below:

1 Executive summary

The executive summary covers the main findings from the report.

2 Introduction

A list of referenced documents and definitions of terms are available.

3 Instrument status

This section covers the instrument health and unavailabilities from this reporting period.

4 Data Summary

This section covers reprocessing, updates to processors and aux files as well as a data coverage summary.

5 Long Term Analysis

Long-term analysis of the instrument calibration and data quality are provided in this section.

## 2.2 Definitions of Terms

The following terms have been used in this report with the meanings shown.

| Term | Definition |
|---|---|
| CMN | Control and Monitoring Node, responsible for commanding the receivers, reading their physical temperatures and telemetry and the generation of the synchronization signal (local oscillator tone) among receivers. |
| CCU | Correlator and Control unit, instrument computer on-board |
| DPGS | Data Processing Ground Segment |
| ESL | Expert Science Laboratory |
| IC4EC | Internal Calibration for External calibration. Calibration sequences for the instrument monitoring and calibration of science data acquired in external target pointing. |
| IDEAS | Instrument Data quality Evaluation and Analysis Service, reporting to the ESA Data Quality and Algorithms Management Office (EOP-GQ), responsible for quality of data provided to users including the data calibration and |

| | |
|---|---|
| | validation, the data processing algorithms, and the routine instrument and processing chain performances. |
| IPF | Instrument Processor Facility |
| L2SM | Level 2 Soil Moisture |
| MM | Mass Memory |
| OCM | Orbit Correction Manoeuvre |
| PMS | Power Measurement System |
| RFI | Radio Frequency Interference |
| N/A | Not applicable |

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# 3. INSTRUMENT STATUS

## 3.1 Instrument health

The current instrument status is that all the instrument subsystems are working correctly. The current configuration of the instrument is that the arm A and the arm B are working in nominal side and arm C is in the redundant side.

**Table 3-1 History of instrument problems and mode changes**

| Start | Stop | Description |
|---|---|---|
| 11 January 2010 12:07z<br><br>Orbit 1013 | N/A | Arm A changes from redundant to nominal side. That operation is to avoid the malfunction of one of the redundant CMNs of the arm. |
| 12 January 2011 09:15z<br><br>Orbit 6278 | N/A | Arm B changes from redundant to nominal side. That operation is to avoid the malfunction of one of the redundant CMNs of the arm. |

## 3.2 Instrument unavailabilities and anomalies

The unavailabilities and anomalies listed in Table 3-2 occurred during the reporting period. A full list of unavailabilities can be found in the Mission Status section on the SMOS Earthnet website (http://earth.esa.int/object/index.cfm?fobjectid=7060).

During these unavailabilities and anomalies the instrument may have either not collected data or may have collected corrupt data which may not have been processed to higher levels. Table 4-5, Table 4-6 and

Table 4-7 provide details of the data which has been affected by gaps and quality degradation respectively.

**Table 3-2 SMOS unavailability list**

| Start | Stop | Unavailability Report Reference | Planned | Description |
|---|---|---|---|---|
| 2013-04-14 06:20:41z<br><br>Orbit 18119 | 2013-04-14 06:20:41z<br><br>Orbit 18119 | FOS-0200 | No | MM Latchup (P6) |

# 4. DATA SUMMARY

## 4.1 Reprocessing activities

The information regarding to the recent reprocessing activities are:

1) The first SMOS mission reprocessing campaign has been completed and the data set is available to the SMOS user community.

   Particularly, the processors used are the Level 1 Processor v504, the Level 2 Ocean Salinity processor v550 and the Level 2 Soil Moisture processor v501. The reprocessed period covers from 2010-01-12 to 2011-12-22 for the L1 and L2 Sea Surface Salinity data and from 2010-01-12 to 2011-11-28 for the L2 Soil moisture data.

   The improvements and known caveats in the quality of the SMOS Level 1 and Level 2 data products are described in the data release notes available on the ESA web page:

   https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/news/-/asset_publisher/8pPI/content/re-processed-smos-data-now-available?p_r_p_564233524_assetIdentifier=re-processed-smos-data-now-available&redirect=%2Fc%2Fportal%2Flayout%3Fp_l_id%3D65665

   Data users are strongly encouraged to consult those notes before using SMOS data.

2) The Level 2 Ocean Salinity data covering the period 15-Dec-2011 00:25:04z to 24-Jan-2012 00:21:40z have been regenerated. The period covers from the L2 Ocean Salinity processor deployment until the introduction of the L2 configuration update. The L2 Ocean Salinity data have been regenerated using the L2 configuration introduced on 23-Jan-2012 (see section 4.2.5 in the January 2012 monthly report for the details of the L2 OS configuration used for the re-generation) and the Ocean Target Transformation (OTT) files for December and January. Those files were not available in the nominal processing due to an intrinsic delay in the OTT generation and their usage in this regeneration activity improved the L2 OS data quality with respect to the nominal processing. The files are OPER class and they can be identified through the file counter which is 2 or higher.

3) The Level 1C data covering the period of the first mission reprocessing has been regenerated using the Level 1C v505 processor. This activity has been conducted to fix the corrupted measurements above 72 deg latitude North and South that were present in the Level 1C products of the first mission reprocessing. The availability of the data has been communicated through the SMOS website (https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/news/-/asset_publisher/8pPI/content/correction-of-anomaly-for-level-1c-reprocessed-data-in-v5-05?p_r_p_564233524_assetIdentifier=correction-of-anomaly-for-level-1c-reprocessed-data-in-v5-05&redirect=%2Fc%2Fportal%2Flayout%3Fp_l_id%3D65665%26p_p_state%3Dnormal%26_101_INSTANCE_HdN9_struts_action%3D%252Fasset_publisher%252Fview_content%26p_p_lifecycle%3D0%26_101_INSTANCE_HdN9_type%3Dcontent%26p_p_id%3D101_INSTANCE_HdN9%26_101_INSTANCE_HdN9_urlTitle%3Dcorrection-of-anomaly-for-level-1c-reprocessed-data-in-v5-05%26p_p_mode%3Dview).

4) The Level 1 and Level 2 data covering the period of 28th September to 1st October 2012 has been regenerated applying the correct phase calibration. The data regeneration does not cover the regeneration of the AUX_DGGxxx files. Therefore, the Level 2 Soil Moisture products have been regenerated using the degraded

AUX_DGGxxx files. The files are OPER class and they can be identified through the file counter which is 2 or higher.

5) The Level 1 and Level 2 data covering the period from 2012-11-24 13:16z to 2012-11-25 00:10z has been regenerated applying the correct phase calibration. The data regeneration does not cover the regeneration of the AUX_DGGxxx files. Therefore, the Level 2 Soil Moisture products have been regenerated using the degraded AUX_DGGxxx files. The files are OPER class and they can be identified through the file counter which is 2 or higher.

Next reprocessing campaign is actually foreseen by end-2013.

## 4.2 Processing changes

### 4.2.1 Processor updates

5 No processor updates have been conducted during the reporting period.

### 5.2.1 Processor Status

At the end of the reporting period, the Processing Facility is using the following processors:

**Table 4-1 Instrument Processors status**

| Processor | Version |
|---|---|
| L1OP | 504 (L1a/L1b)<br>505 (L1c) |
| L2OS | 550 |
| L2SM | 551 |

**Table 4-2 Pre- and Post-processors status**

| Processor | Version |
|---|---|
| ECMWFP | 315 |
| VTECGN | 311 |
| LAI pre-processor | 307 |
| L2 Post-processors | 400 |

### 5.2.2 Schema updates

No schema changes have been conducted during the reporting period.

### 5.2.3 Schema status

At the end of the reporting period, the schema version of the datablock of the products generated and distributed through EOLI is:

**Table 4-3 Schema version status**

| Product type | Version |
|---|---|
| MIR_SC_F1B | 300 |
| MIR_SCSF1C | 300 |
| MIR_SCLF1C | 300 |
| MIR_BWSF1C | 300 |
| MIR_BWLF1C | 300 |
| MIR_SMUDP2 | 300 |
| MIR_OSUDP2 | 300 |
| AUX_ECMWF_ | 300 |

The schema packages are available from the SMOS Glo0bal Mapping Tool (GMT) webpage:

https://earth.esa.int/web/guest/software-tools/-/asset_publisher/P2xs/content/gmt-smos-global-mapping-tool

### 5.2.4 Aux file updates

The following quasi-static AUX files were disseminated to the processing stations this reporting period. The status of the quasi-static AUX files at the end of the reporting period is in the section 6.

**SM_OPER_AUX_BULL_B_20130202T000000_20130301T235959_120_001_3**

Start sensing time at L1 processor: N/A

Justification: Bulletin Update including values from February 2013 and the prediction for March 2013. Its usage is intended for reprocessing.

**SM_OPER_AUX_BULL_B_20130202T000000_20500101T000000_120_001_3**

Start sensing time at L1 processor: 2013-04-03 06:25:38z

Justification: Bulletin Update including values from February 2013 and the prediction for March 2013. Its usage is intended for the nominal production.

**SM_OPER_AUX_OTT1D__20130401T000000_20500101T000000_550_001_3**

Start sensing time at L2 processor: N/A

Justification: April update.

**SM_OPER_AUX_OTT1F__20130401T000000_20500101T000000_550_001_3**

Start sensing time at L2 processor: 2013-04-11 04:34:16z

Justification: April update.

**SM_OPER_AUX_OTT2D__20130401T000000_20500101T000000_550_001_3**

Start sensing time at L2 processor: N/A

Justification: April update.

**SM_OPER_AUX_OTT2F__20130401T000000_20500101T000000_550_001_3**

Start sensing time at L2 processor: 2013-04-11 04:34:16z

Justification: April update.

**SM_OPER_AUX_OTT3D__20130401T000000_20500101T000000_550_001_3**

Start sensing time at L2 processor: N/A

Justification: April update.

**SM_OPER_AUX_OTT3F__20130401T000000_20500101T000000_550_001_3**

Start sensing time at L1 processor: 2013-04-11 04:34:16z

Justification: April update.

**SM_OPER_AUX_CNFL1P_20110206T010100_20500101T000000_500_046_3**

Start sensing time at L1 processor: 2013-04-16 07:59:50z

Justification: Updated Max_Gap_Within_Sequence (previous: 15000; new: 150) of the Short Calibration to avoid the usage of IC4EC sequences in the nominal calibration.

## 4.2 Calibration Events Summary

The following table summarizes the major calibration activities conducted during the reporting period. The Local Oscillator calibration is not included in the table since occurs periodically every 10 minutes. The short calibrations are acquired since 2011-03-24 and they are currently used in the nominal processing chain.

**Table 4-4 Calibration summary**

| Start | Finish | Calibration | Comments |
|---|---|---|---|
| 2013-04-04 17:31:00z | 2013-04-04 17:32:44z | Short Calibration | Nominal |
| 2013-04-10 | 2013-04-10 | NIR calibration | Nominal |

| | | | |
|---|---|---|---|
| 16:41:14z | 18:03:27z | | Brightness temperature: 4.50 K<br>RMS: 1.93 K<br>Moon elevation: -3.93 deg<br>Sun Elevation: -0.31 deg<br>Right Ascension: 288.51 deg<br>Declination: 2.87 deg |
| 2013-04-11<br>14:35:00z | 2013-04-11<br>15:28:19z | Long Calibration | Nominal |
| 2013-04-11<br>16:15:00z | 2013-04-11<br>17:08:19z | Long Calibration | Nominal |
| 2013-04-18<br>16:45:00z | 2013-04-18<br>16:46:44z | Short Calibration | Nominal |
| 2013-04-24<br>15:43:53z | 2013-04-24<br>17:06:06z | NIR calibration | Nominal<br>Brightness temperature: 4.32 K<br>RMS: 1.43 K<br>Moon elevation: -11.74 deg<br>Sun Elevation: -2.71 deg<br>Right Ascension: 310.05 deg<br>Declination: -40.99 deg |
| 2013-04-25<br>15:32:38z | 2013-04-25<br>15:34:22z | Short Calibration | Nominal |

## 4.3 Data Coverage Summary

Where instrument unavailabilities or anomalies have occurred during this reporting period, gaps in data coverage may have occurred. A list of the gaps due to a permanent data loss is given in Table 4-5 by product level. On the other hand, a list of gaps due to operational problems is given in Table 4-6. The latter gaps may be recovered when the problem is fixed.

The science data gaps due to the execution of calibration activities are not listed in this section.

**Table 4-5 Data loss summary**

| Start | Finish | Data Level | Comments |
|---|---|---|---|
| N/A | N/A | N/A | N/A |

**Table 4-6 Operational gaps summary**

| Start | Finish | Data Level | Comments |
|---|---|---|---|
| 2013-04-09 08:39:54z<br><br>Orbit 18048 | 2013-04-09 09:11:38z<br><br>Orbit 18048 | All levels | Abnormal behavior of the Level 0 processor. |

## 4.4 Summary of degraded data

In April 2013, SMOS data was affected by the following instrument and processing anomalies which have had a detrimental effect on the data quality.

The CMN unlocks produced short intervals (10 min) of degraded data.

**Table 4-7 Summary of degraded data**

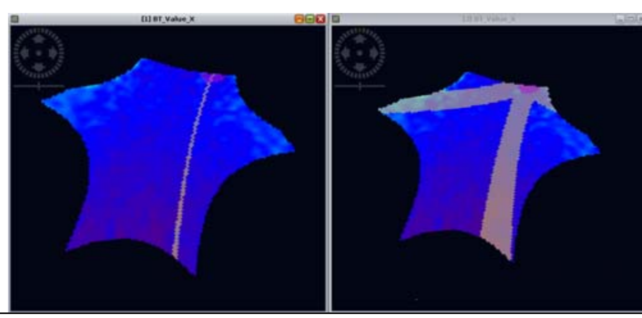
| Start | Finish | Affected products | Problem Description |
|---|---|---|---|
| 2013-04-24 00:15:24z<br><br>Orbit 18259 | 2013-04-24 16:34:16z<br><br>Orbit 18268 | Level 1C and above products | The auxiliary file with the prediction of the Ionespheric Electron Content has not been updated during this period. The IRI model has been used instead. The affected products are flagged with the ADF error flag. |

## 4.5 Product Quality Disclaimers

The following product disclaimers affects the data generated in the reporting period:

**Table 4-8 Summary of product quality disclaimers**

| Date | |
|---|---|
| 21 March 2012 | Due to a software anomaly in the L1OP V5.04 and V5.05 processor, the Sun Glint Flag available in the L1c Product is not correctly set. This flag aims to indicate |

| | |
|---|---|
| | measurements affected by Sun glint over ocean. The major impact of this anomaly is on the users who are using L1c data to retrieve Sea Surface Salinity. Those users need to discard the information provided by the Sun glint flag in their retrieval algorithms. This anomaly does not impact the ESA Level 2 Ocean salinity product because the Sun glint flag from L1c input data is not used by the retrieval algorithm. Information on Sun glint are directly computed by the L2 processor and used for the retrieval of the Sea Surface Salinity. Only the Dg_sun_glint_area counter in the Level 2 Ocean Salinity products is affected due to this anomaly. |
| 12 July 2012 | Due to a software anomaly in the Level 0 processor, the *Cycle* field in all the product headers is incorrectly set. This value is annotated in the headers of all the higher level products. |
| 15 August 2012 | Due to a software anomaly in the Level 1 processor, the sun tails flag is not correctly set in the L1C products. Therefore, not all the affected data by the Sun tails are flagged in the Level 1C products and the Level 2 processors will take those data as nominal. The following figure shows where the not flagged pixels are located in the snapshot in case of descending passes. The current flagging is provided in the left, whereas the correct flagging of the Sun tail is shown in the right. Notice that in the current data one of the Sun tail is missing and therefore the pixel in the upper part of the snapshot are not flagged. The figure on the right has been generated with an increase of the width of the Sun tail to make clear the area affected. The impact of the Sun tail in the measurements is under investigation by the ESL and a refinement of the width of the Sun Tail will be available in the next version of the L1 processor.  |
| 06 March 2013 | Due to a software anomaly in the Level 2 Ocean Salinity processor, Fg_ctrl_galactic_noise (part of Fg_ctrl_poor_geophysical) may be set sometimes when it should be clear. As a result, good quality data may be rejected when filtering retrievals using the Fg_ctrl_poor_geophysical flag. Users are recommended to |

| | |
|---|---|
| | filter data using either a threshold (eg < 150) on Dg_quality_SSS, or a combination of Fg_ctrl_poor_retrieval and applicable flags from Fg_ctrl_poor_geophysical (ie any of Fg_ctrl_many_outliers or Fg_ctrl_sunglint or Fg_ctrl_moonglint or Fg_ctrl_num_meas_low or Fg_sc_suspect_ice or Fg_sc_rain). In the OSDAP the Fm_gal_noise_error flag may also be set incorrectly. |
| 06 March 2013 | Due to a software anomaly in the Level 2 Ocean Salinity processor v550, the salinity retrieval error is slightly increased in high wind speed conditions. |

# 5. LONG-TERM ANALYSIS

## 5.1 Calibration Analysis

The calibration parameters are under monitoring. During the reporting period, there have been NIR calibrations events on 10th and 24th April. The NIR calibration events have been monitored and the noise injection levels of the NIR diodes are inside the range defined in the routine calibration plan.

The evolution of the noise temperature of the reference noise diodes *Tna* and *Tnr* show some drifting and seasonal variations since the beginning of the mission (Figure 1 to Figure 4). After the compensation of those variations by means of the calibration, a residual seasonal variations are still observed in the data (see Release notes: https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-5105.pdf). Recently, it has been discovered that the antenna losses are the elements which are varying and those variations are propagated to the reference noise temperatures *Tna* and *Tnr* through the calibration. Therefore, the variation in *Tna* and *Tnr* is not totally related to the diode stability which is the purpose to monitor these parameters.

Currently, the calibration algorithms compensates both variations, the antenna losses and the reference noise diodes, simultaneously since both factors are coupled in the current calibration strategy. The Level 1 Processor 600 will introduce a new calibration algorithm which decouples the variation of the antenna losses and the reference noise diodes drifts. That will allow the compensation of each drift separately improving the diode stability monitoring, further improving the calibration of the NIR and as such the final data quality in terms of Brightness temperature stability and accuracy.

The leakage and cross-coupling factors of the NIR channels remain small and no problems can be observed apart from a peak in the phase of the NIR-AB cross-coupling term on 11 April 2012. That peak corresponds to an anomaly in the NIR-AB that did not have impact on the data.

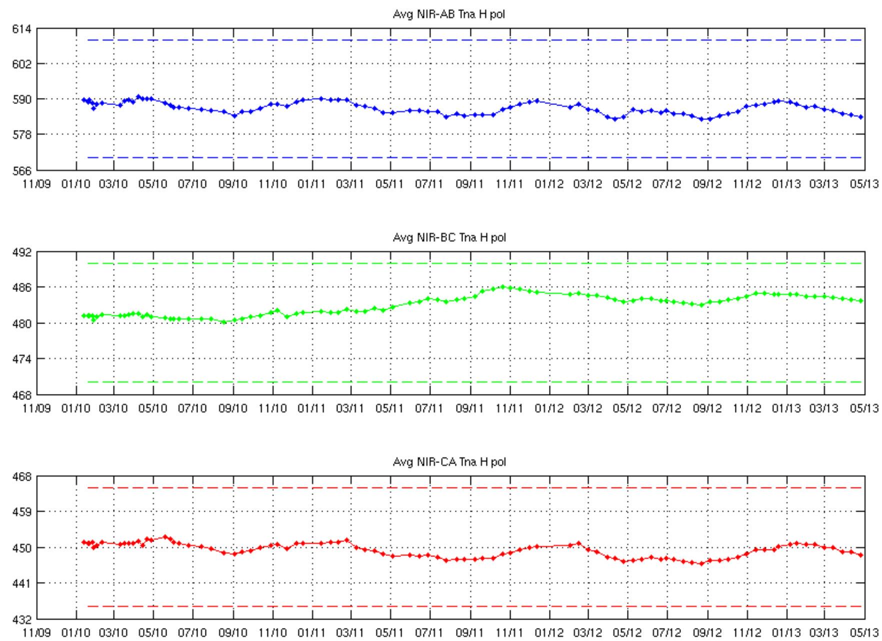



**Figure 1 Tna evolution of NIR AB (blue), NIR BC (green) and NIR CA (red) in the H-channel since the beginning of the mission. Thresholds in dashed lines**

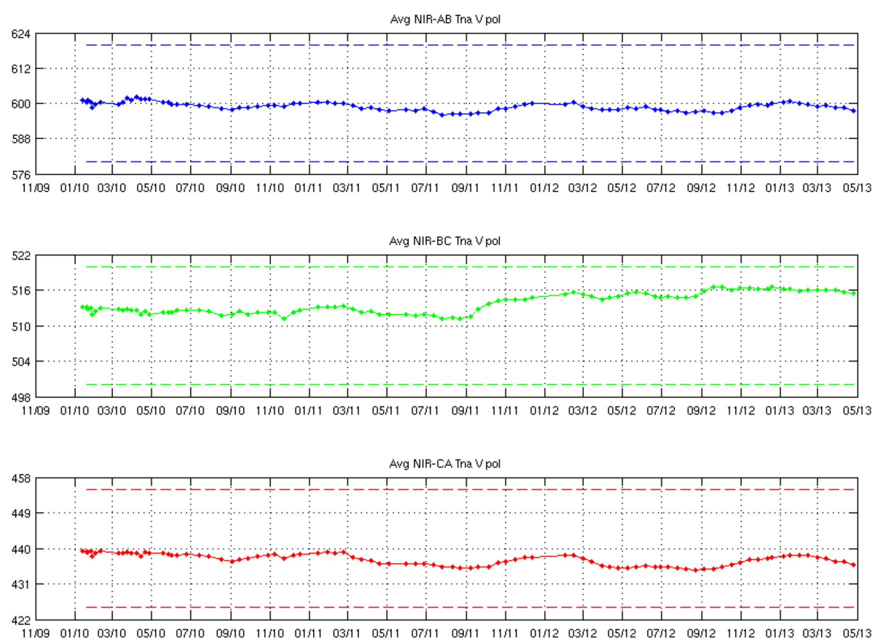



**Figure 2 Tna evolution of NIR AB (blue), NIR BC (green) and NIR CA (red) in the V-channel since the beginning of the mission. Thresholds in dashed lines**

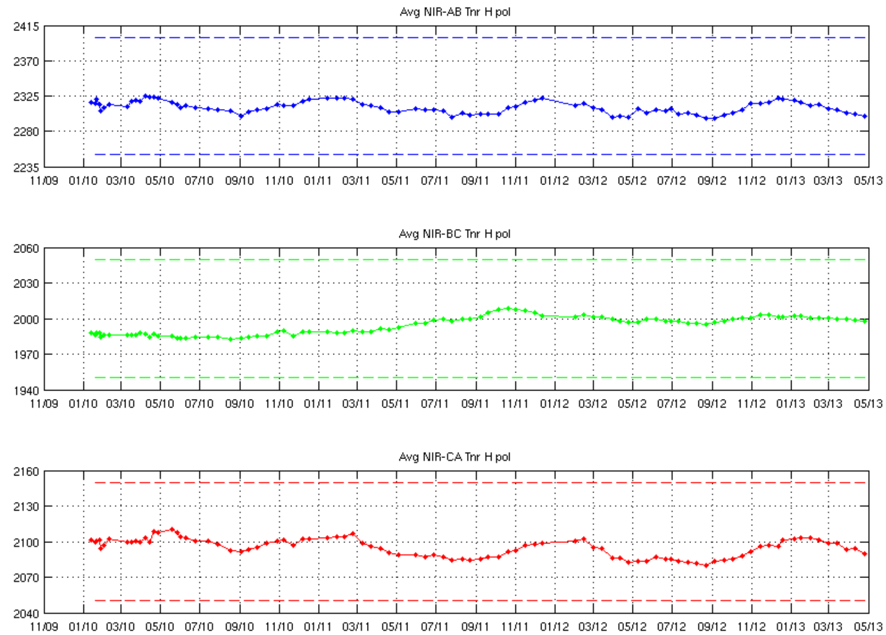



**Figure 3 Tnr evolution of NIR AB (blue), NIR BC (green) and NIR CA (red) in the H-channel since the beginning of the mission. Thresholds in dashed lines**

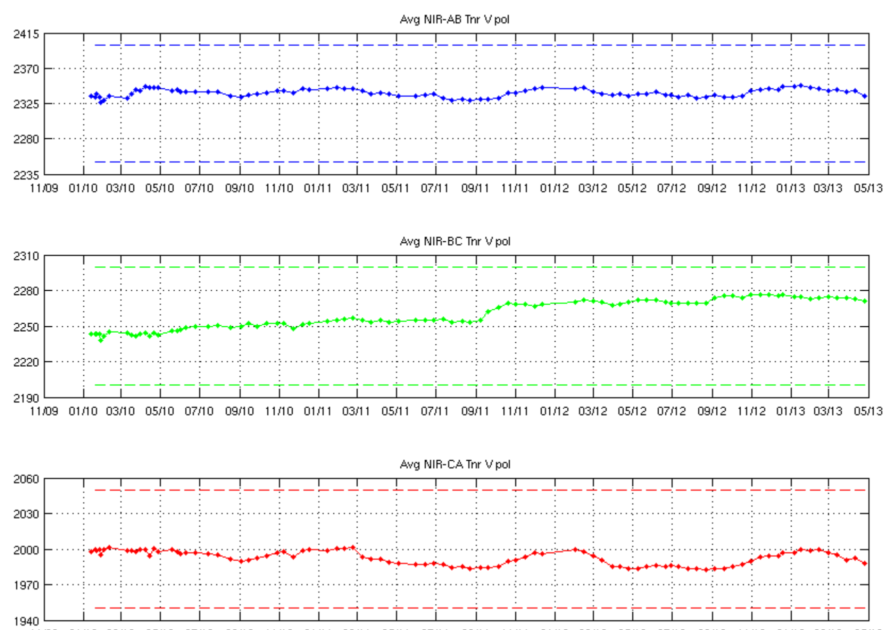



**Figure 4 Tnr evolution of NIR AB (blue), NIR BC (green) and NIR CA (red) in the V-channel since the beginning of the mission. Thresholds in dashed lines**

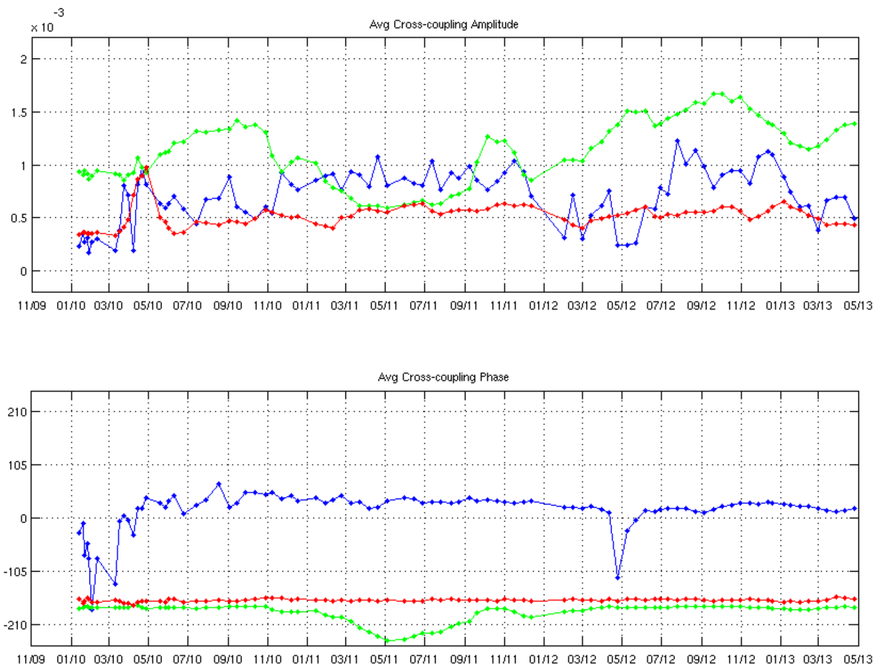



**Figure 5 Cross-coupling evolution in amplitude and phase of NIR AB (blue), NIR BC (green) and NIR CA (red) since the beginning of the mission**

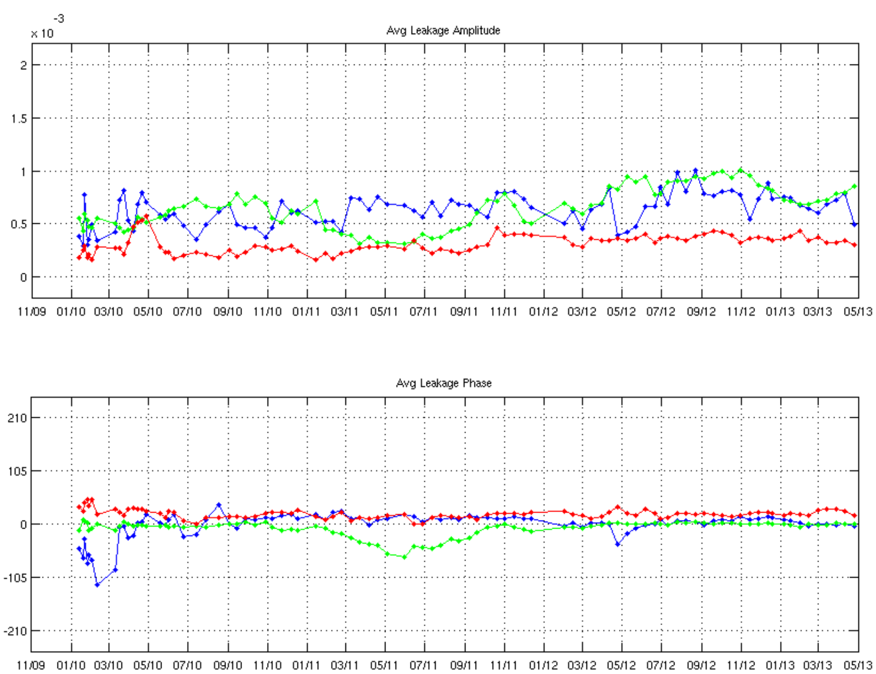



**Figure 6 Leakage factor evolution in amplitude and phase of NIR AB (blue), NIR BC (green) and NIR CA (red) since the beginning of the mission**

The LICEF calibration status is updated by long (every 8 weeks) and short (weekly) on-board calibration activities. A long calibration event has been conducted on 11th April 2013.

LICEF PMS gain is derived during the long calibration activity and the Figure 7 to Figure 18 show the evolution of the deviations of the PMS gain wrt its average over time. Figure 19 to Figure 30 show the evolution of the PMS offsets derived during the short calibration activity. The PMS gain and offset values are inside the range defined in the routine calibration plan although small drift can be observed. That drift can be explained due to the current limitations of the NIR calibration algorithm to track the antenna losses and the reference noise diodes. The drifts in the antenna losses that the NIR calibration algorithm cannot compensate are directly propagated to the PMS gain and offset calibration. It is expected that the introduction of the future L1OP v600 will remove these apparent drifts allowing to improve the PMS stability and as such the final data quality in terms of Brightness temperature stability and accuracy.

Figure 31 shows the evolution of the average over all the baselines of the Fringe Washing Function (FWF) amplitude in the origin derived during the long calibration. The amplitude of the FWF at the origin does not show any drift and their values are inside the ranges defined in the routine calibration plan.

During the reporting period updates has been applied for the NIR, Long and Short calibration as reported in Table 4-4

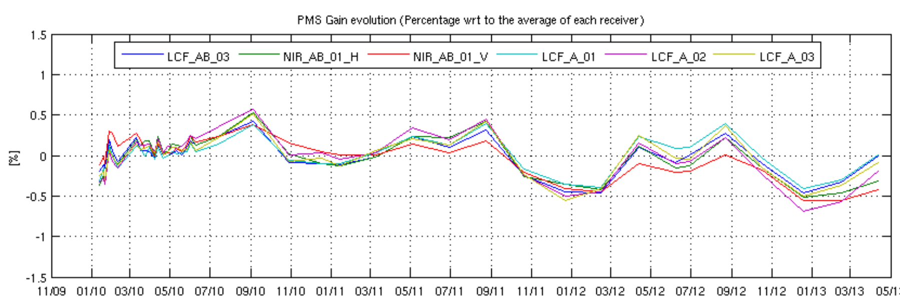



**Figure 7 Evolution of the Δ PMS Gain of the LICEFS in CMN H1**

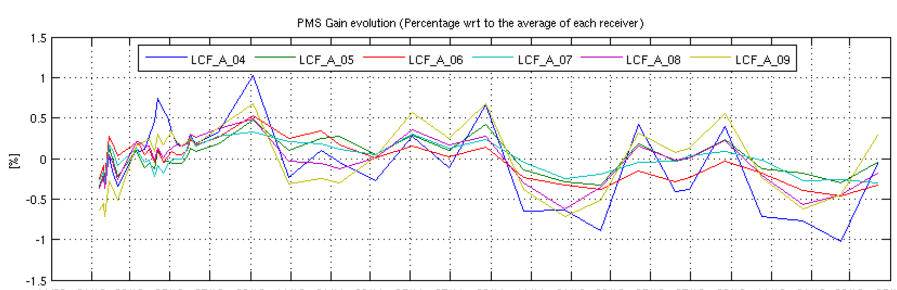



**Figure 8 Evolution of the Δ PMS Gain of the LICEFS in CMN A1**

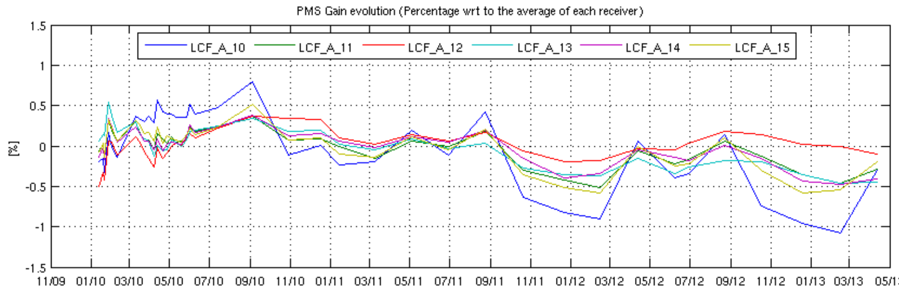



**Figure 9 Evolution of the Δ PMS Gain of the LICEFS in CMN A2**

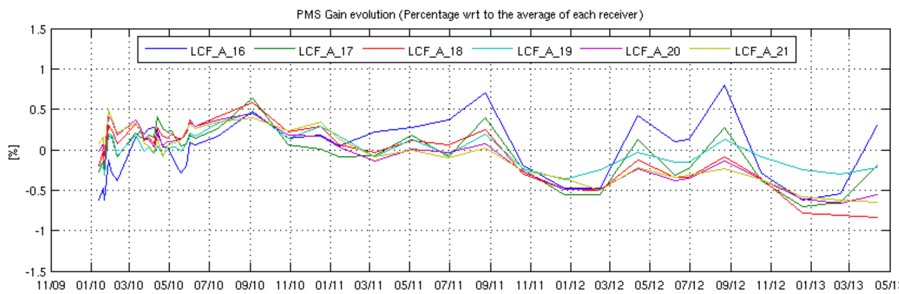



**Figure 10 Evolution of the Δ PMS Gain of the LICEFS in CMN A3**

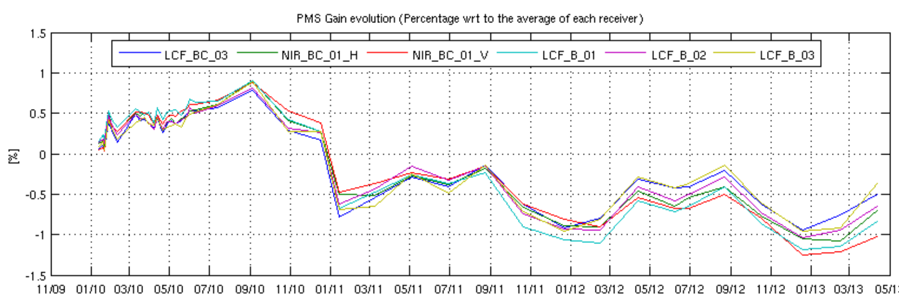



**Figure 11 Evolution of the Δ PMS Gain of the LICEFS in CMN H2**

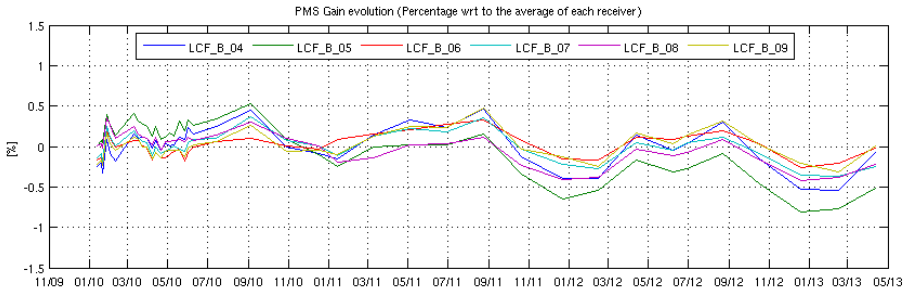



**Figure 12 Evolution of the Δ PMS Gain of the LICEFS in CMN B1**

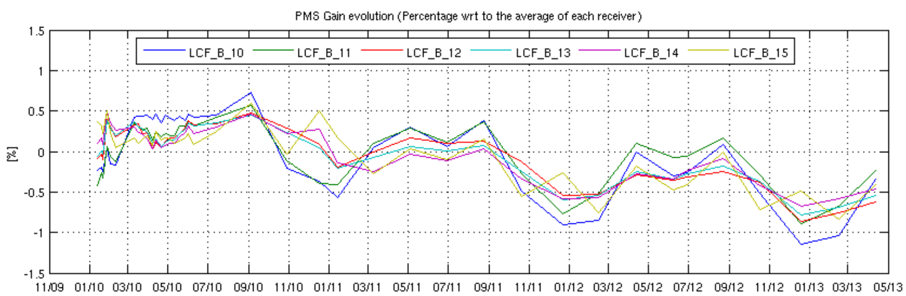



**Figure 13 Evolution of the Δ PMS Gain of the LICEFS in CMN B2**

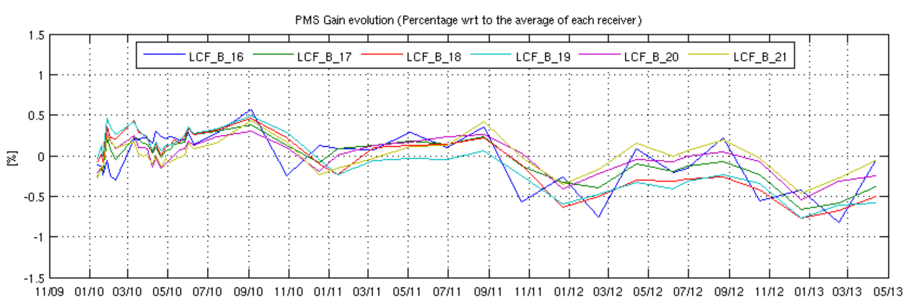



**Figure 14 Evolution of the Δ PMS Gain of the LICEFS in CMN B3**

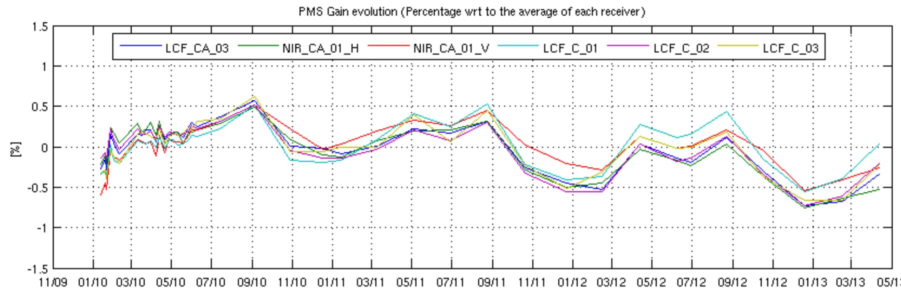



**Figure 15 Evolution of the Δ PMS Gain of the LICEFS in CMN H3**

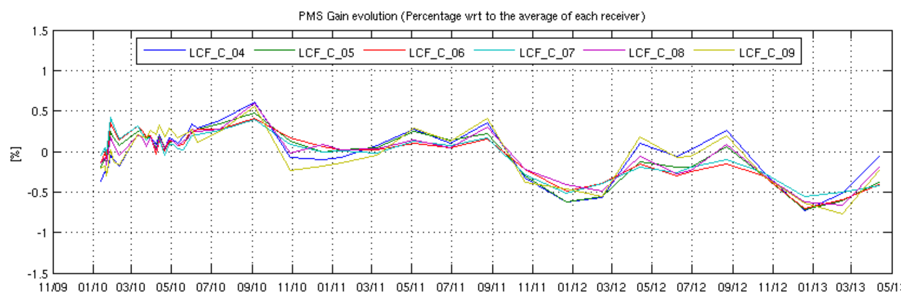



**Figure 16 Evolution of the Δ PMS Gain of the LICEFS in CMN C1**

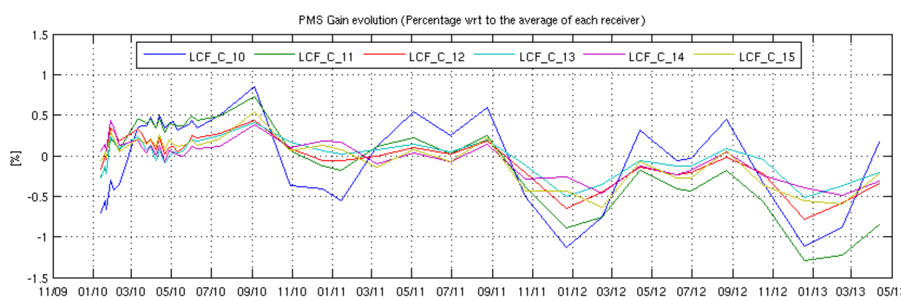



**Figure 17 Evolution of the Δ PMS Gain of the LICEFS in CMN C2**

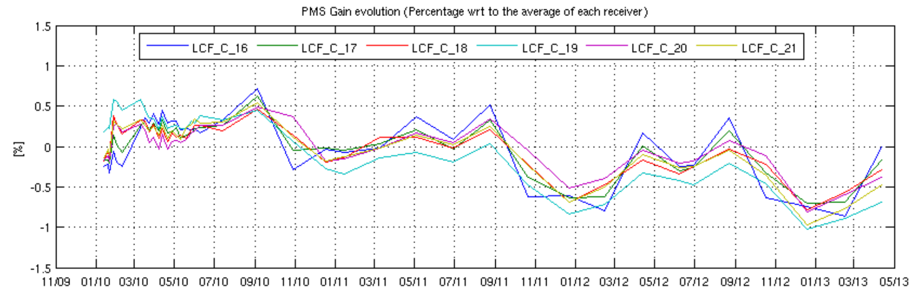



**Figure 18 Evolution of the Δ PMS Gain of the LICEFS in CMN C3**

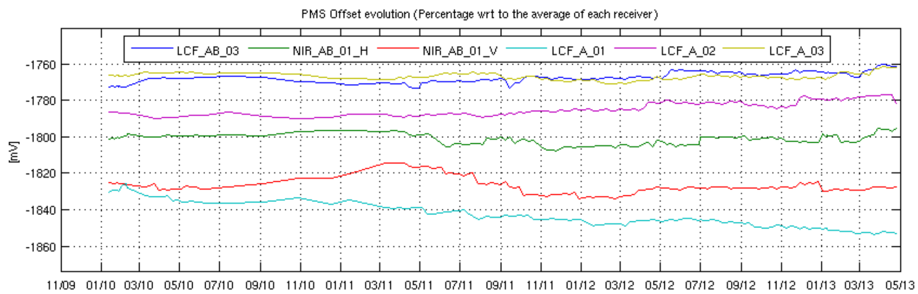



**Figure 19 Evolution of the Δ PMS Offset of the LICEFS in CMN H1**

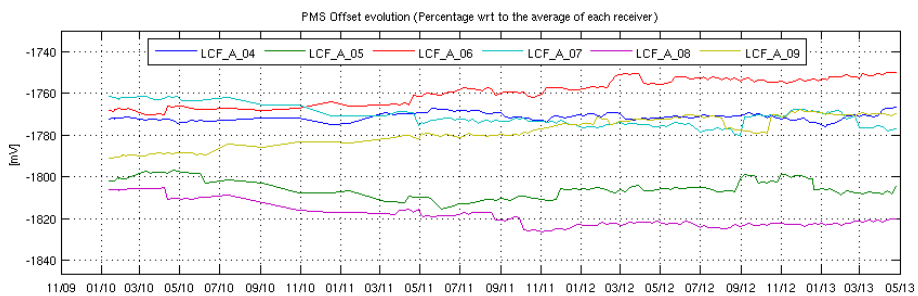



**Figure 20 Evolution of the Δ PMS Offset of the LICEFS in CMN A1**

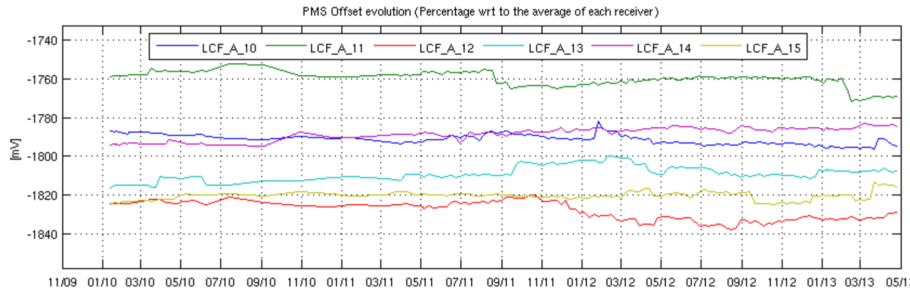



**Figure 21 Evolution of the Δ PMS Offset of the LICEFS in CMN A2**

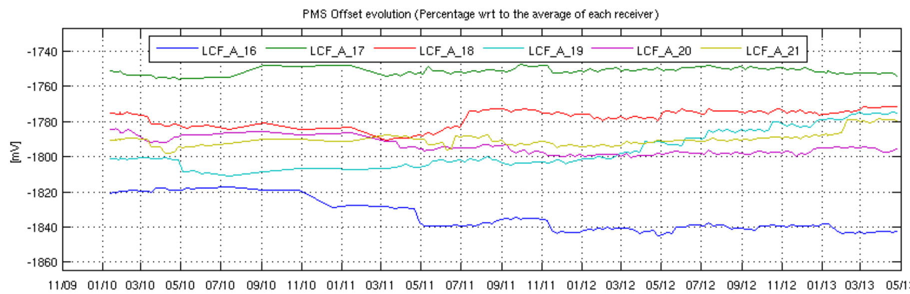



**Figure 22 Evolution of the Δ PMS Offset of the LICEFS in CMN A3**

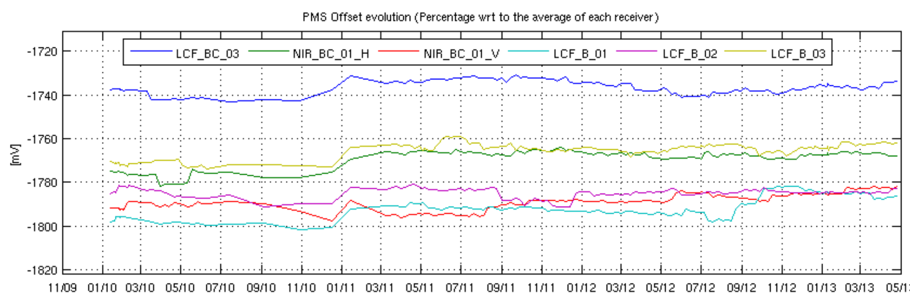



**Figure 23 Evolution of the Δ PMS Offset of the LICEFS in CMN H2**

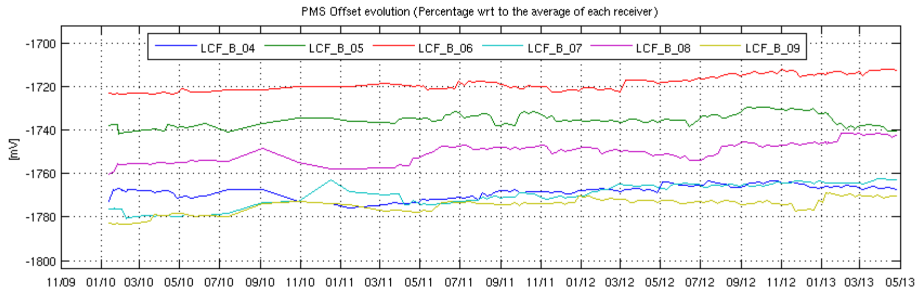



**Figure 24 Evolution of the Δ PMS Offset of the LICEFS in CMN B1**

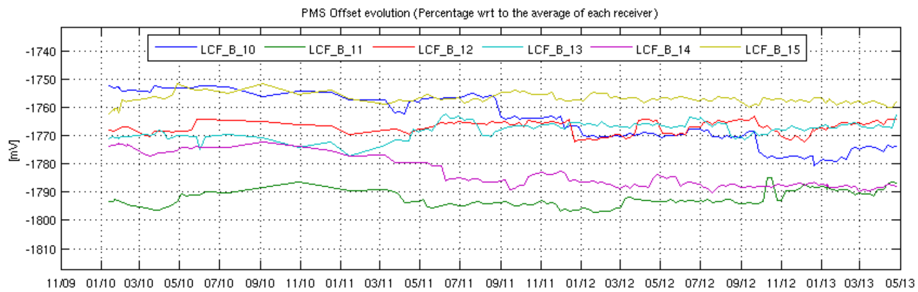



**Figure 25 Evolution of the Δ PMS Offset of the LICEFS in CMN B2**

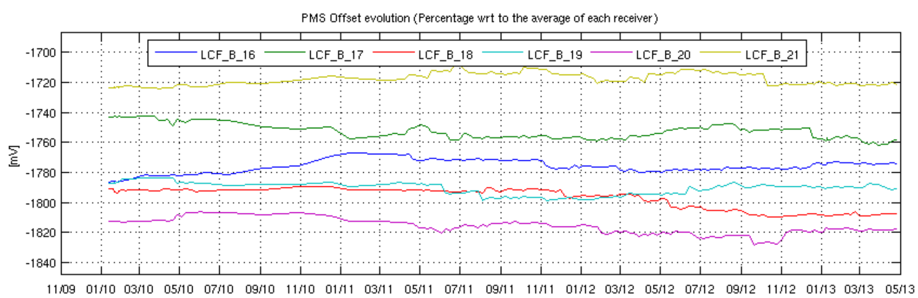



**Figure 26 Evolution of the Δ PMS Offset of the LICEFS in CMN B3**

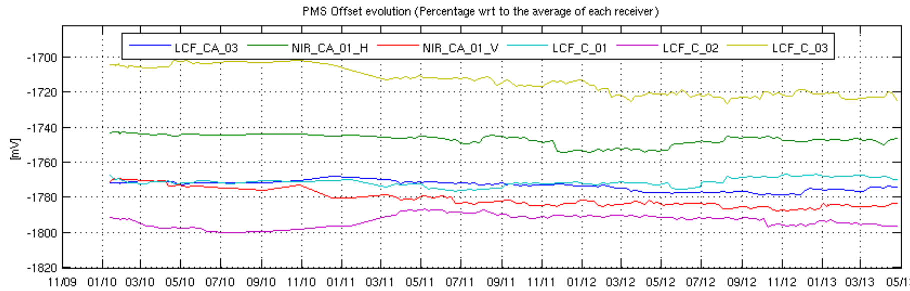



**Figure 27 Evolution of the Δ PMS Offset of the LICEFS in CMN H3**

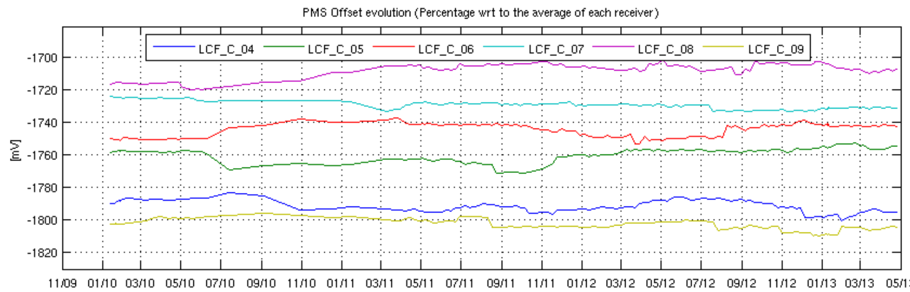



**Figure 28 Evolution of the Δ PMS Offset of the LICEFS in CMN C1**

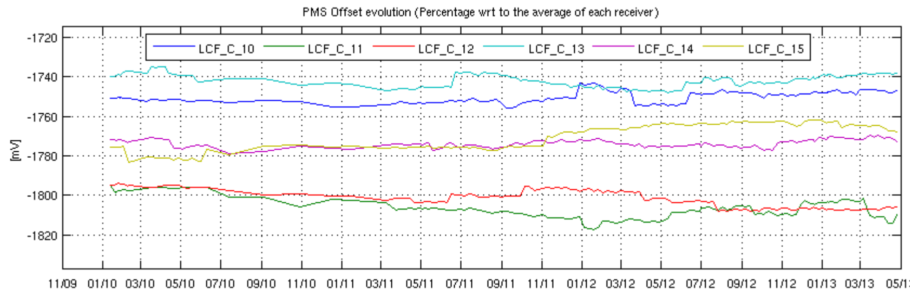



**Figure 29 Evolution of the Δ PMS Offset of the LICEFS in CMN C2**

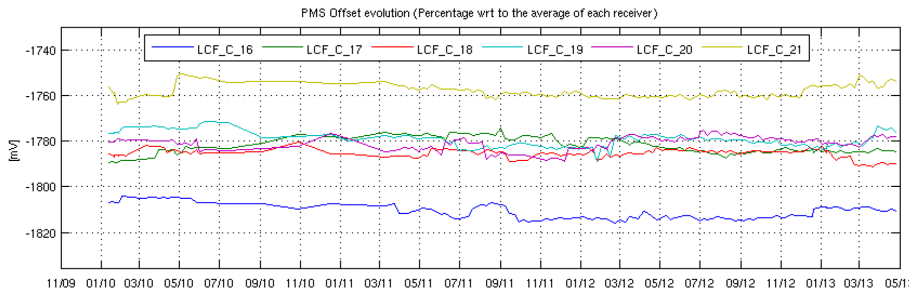



**Figure 30 Evolution of the Δ PMS Offset of the LICEFS in CMN C3**

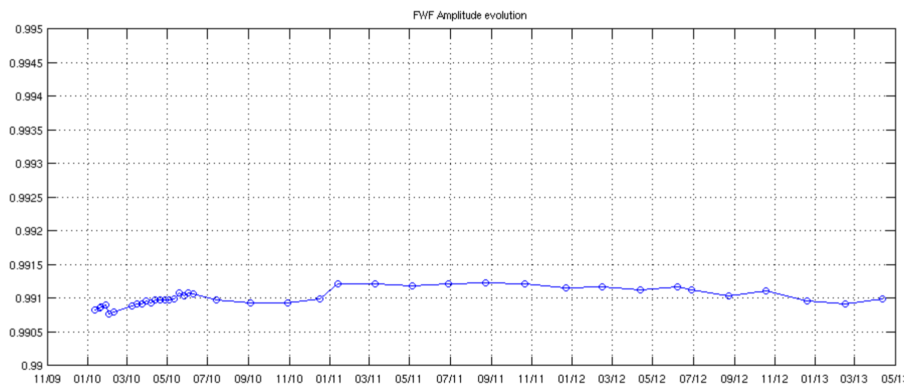



**Figure 31 Evolution of the average of the FWF Amplitude at the origin**

The evolution of the average of the correlator offsets do not show any significant drift. Also, the correlation offsets between receivers that do not share local oscillator remains much smaller than the correlation offsets between receivers sharing local oscillator. This result is expected since any residual correlated signal arriving to a pair of receivers arrives through the local oscillator signal. On the other hand, the measurement of the correlator offsets acquired between 29th February to 7th June 2012 are noisier because they have been derived using only 122 samples from the NIR calibration events whereas the long calibrations provide 846 samples. The average and maximum difference in brightness temperature between using the nominal calibration and the values obtained from the NIR calibration events are 0.03 K and 0.4 K, respectively.

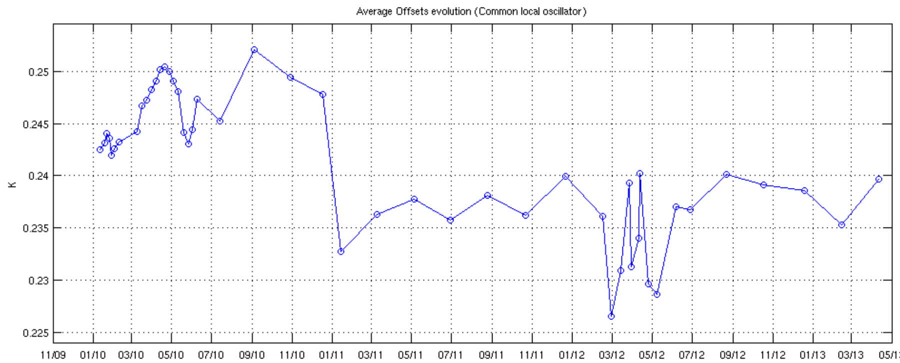



**Figure 32 Evolution of the average of the Correlator offsets for the baselines which share local oscillator**

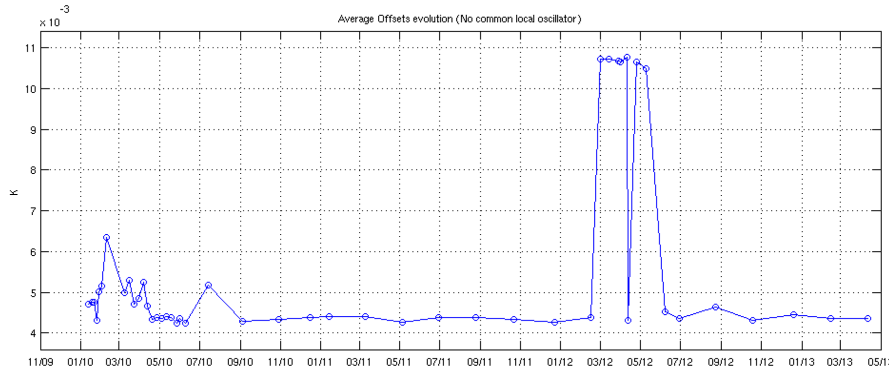



**Figure 33 Evolution of the average of the Correlator offsets for the baselines which do not share local oscillator**

## 5.2 Product Quality Analysis

The data quality during April was found to be nominal except in the time intervals listed in the section 4.5.

The L1 production is nominal as no artefacts are observed in the Stokes maps in Figure 34 to Figure 63. The figures plot the Stokes parameter computed at 42.5 deg from the L1C Browse products. All the artificial patterns in the images can be explained by the presence of RFIs. The impact of the RFI in the brightness temperature measurements over land can be observed mainly in Europe and Asia. In the reporting period, there were 2 strong RIFs. One strong RFI was observed in the West coast of North America on 2013-04-18 at 04:45z (See Figure 36). Another strong RFI was observed over the Atlantic ocean on 2013-04-29 at 22:42z approximately that was visible for a few minutes (see Figure 53).

The third Stokes parameter (Real part of XY) shows a clear pattern between ascending and descending pass due to the different values of the Total Electron Content in the atmosphere for morning / evening orbits. Strong values of the third Stokes parameter are related to RFI. The fourth Stokes parameter (Imaginary part of XY) shows as expected a mean value around zero. Strong values of the fourth Stokes parameter are related to RFI.

The L2 Soil Moisture and Ocean Salinity production is nominal in the reporting period. Figure 69 shows the evolution of the soil moisture retrievals. Those values present significant differences with the Volumetric Soil Water at L1 (see Figure 70) provided by ECMWF, mainly for the ascending passes. The Level 2 ESL has pointed out that the possible cause is that the predicted precipitation event might not actually occur. An important lack of soil moisture retrievals in the selected area that are polluted by the presence of RFI and frozen soil that do not allow soil moisture retrieval. For more detail on Soil Moisture retrieval algorithm see the L2 Soil Moisture Algorithm Theoretical Baseline Document:

(https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1633.pdf).

**Figure 34 1st Stokes evolution over land during the reporting period (week 14)**

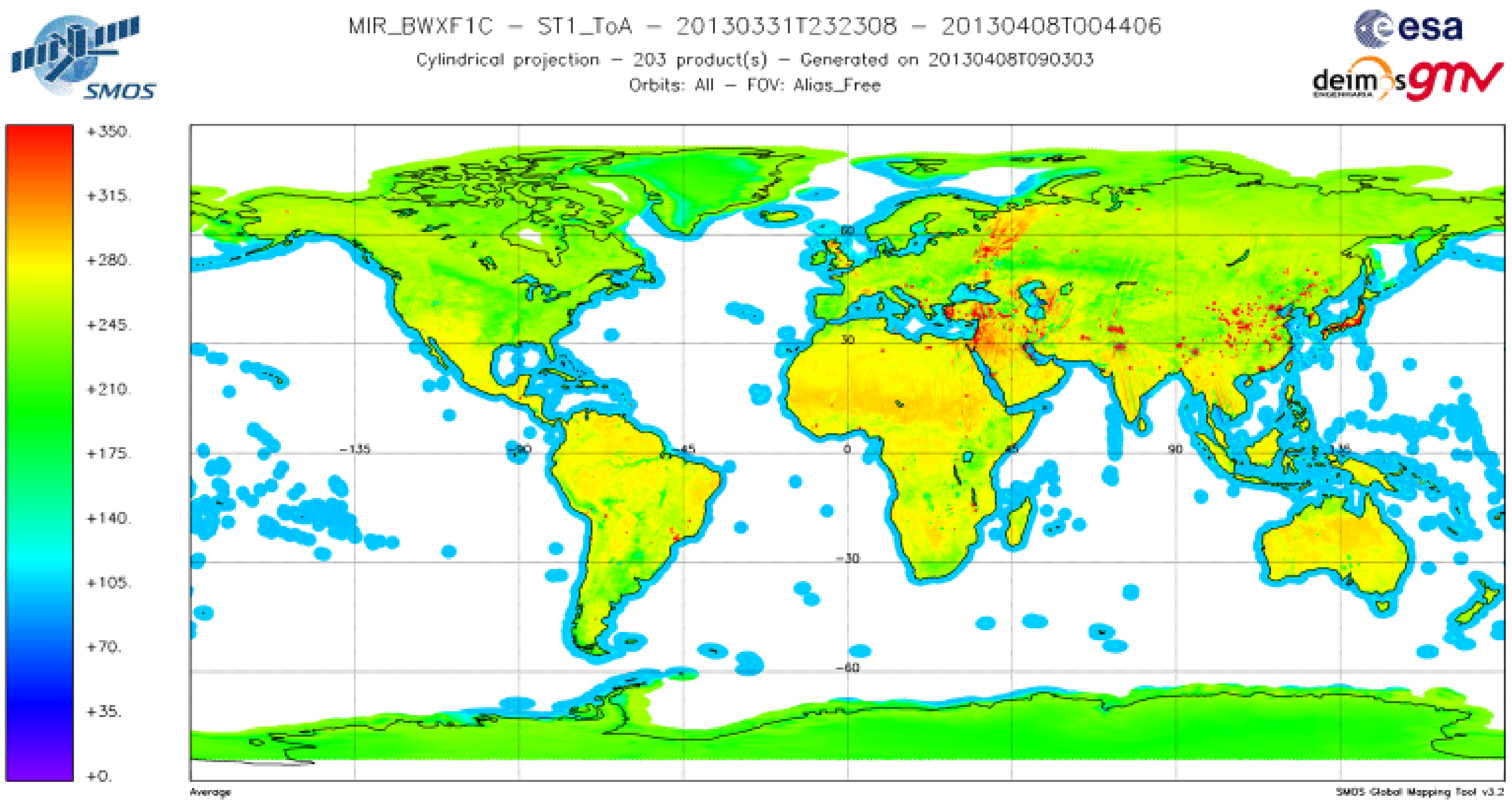


**Figure 35 1st Stokes evolution over land during the reporting period (week 15)**

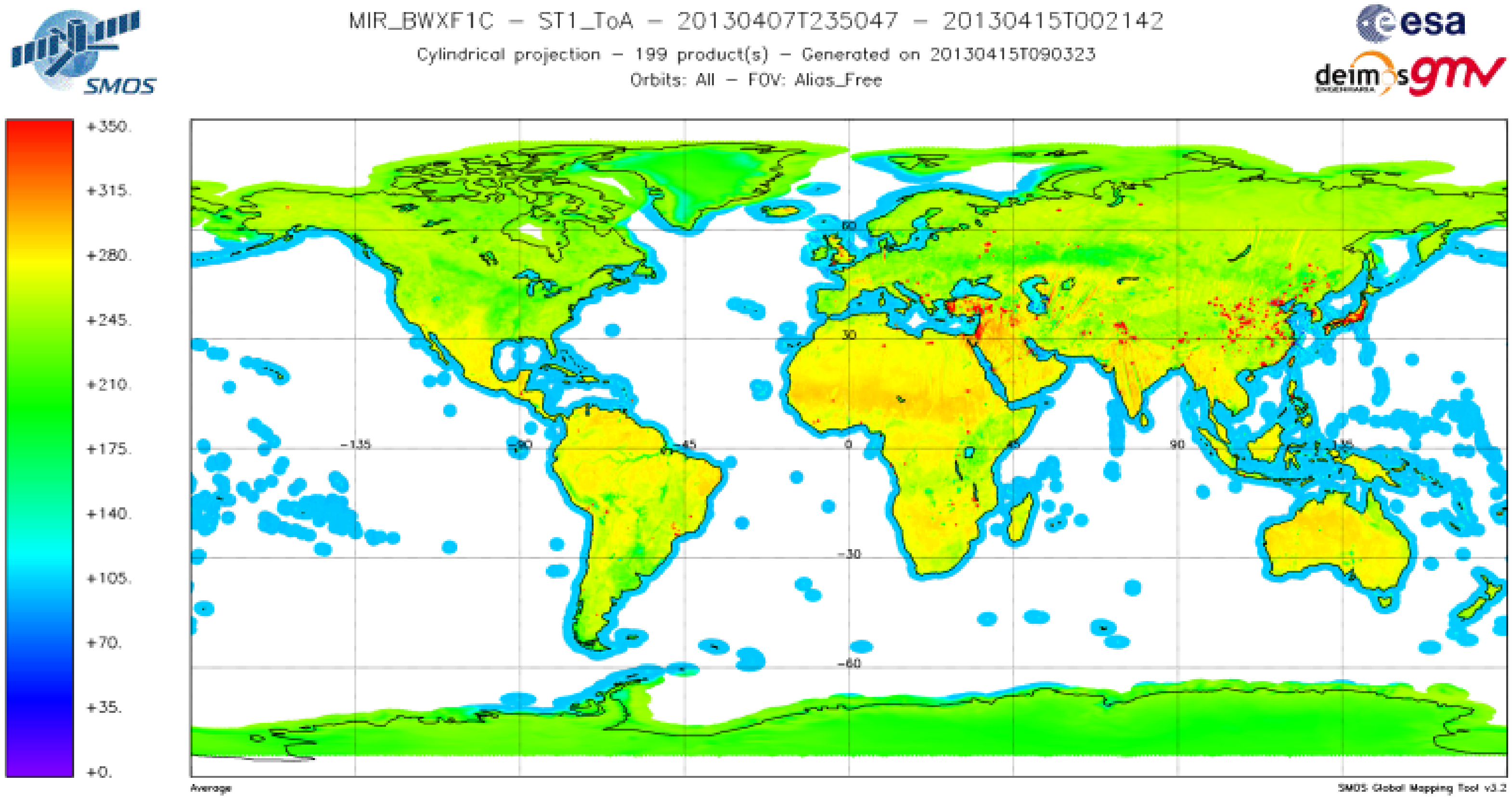


**Figure 36 1st Stokes evolution over land during the reporting period (week 16)**

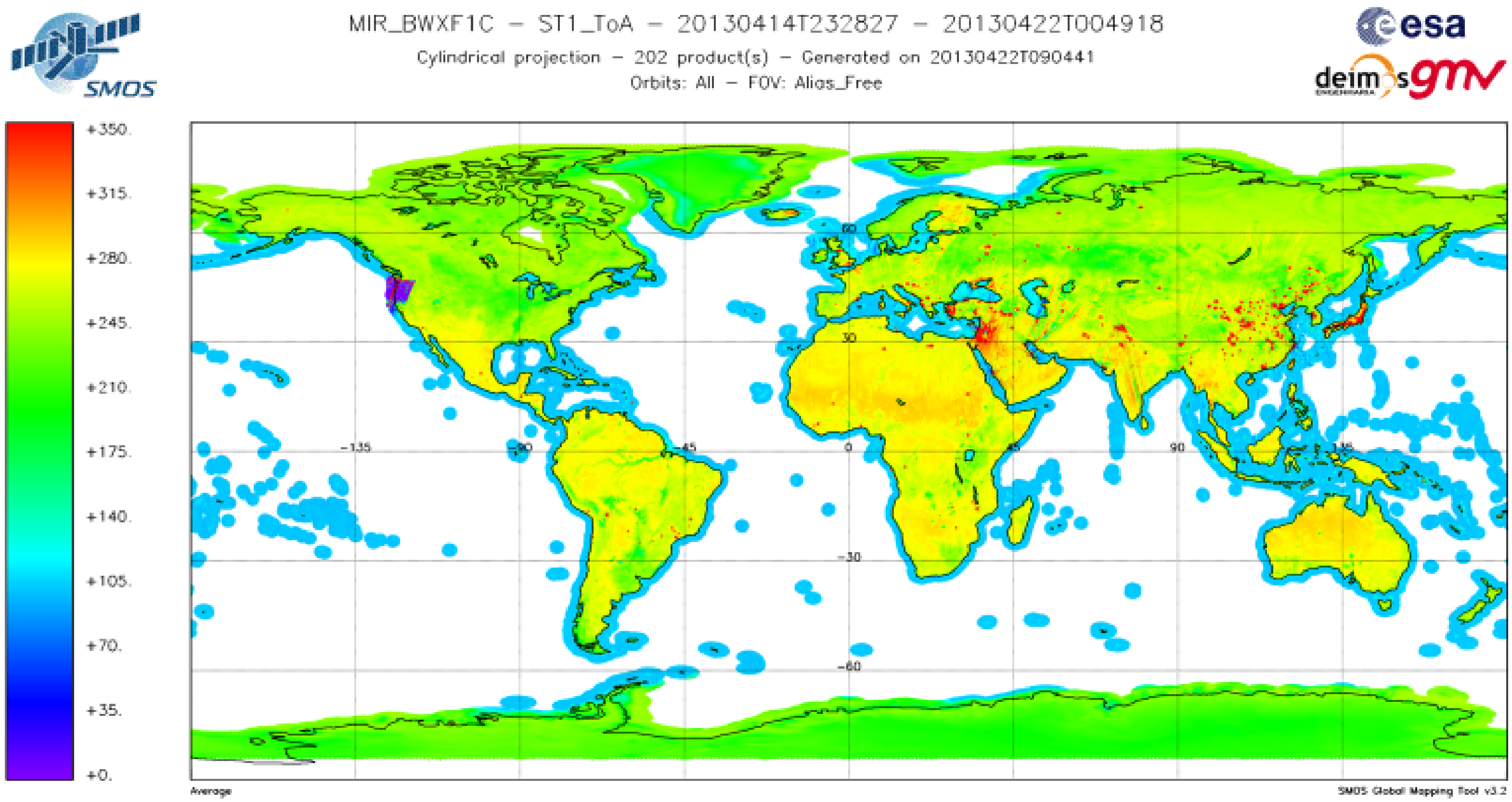


**Figure 37 1st Stokes evolution over land during the reporting period (week 17)**

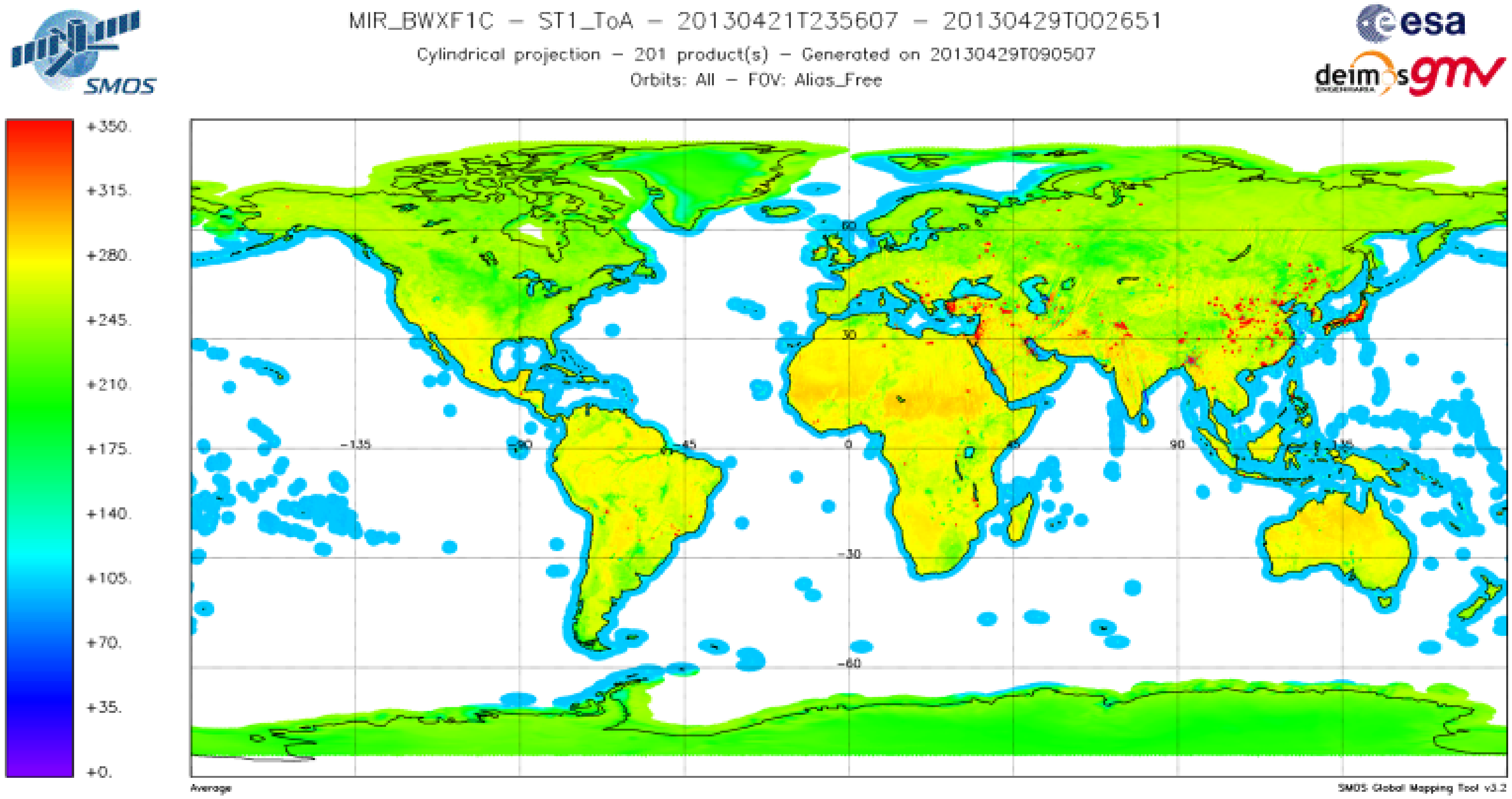


**Figure 38 1st Stokes evolution over land during the reporting period (week 18)**

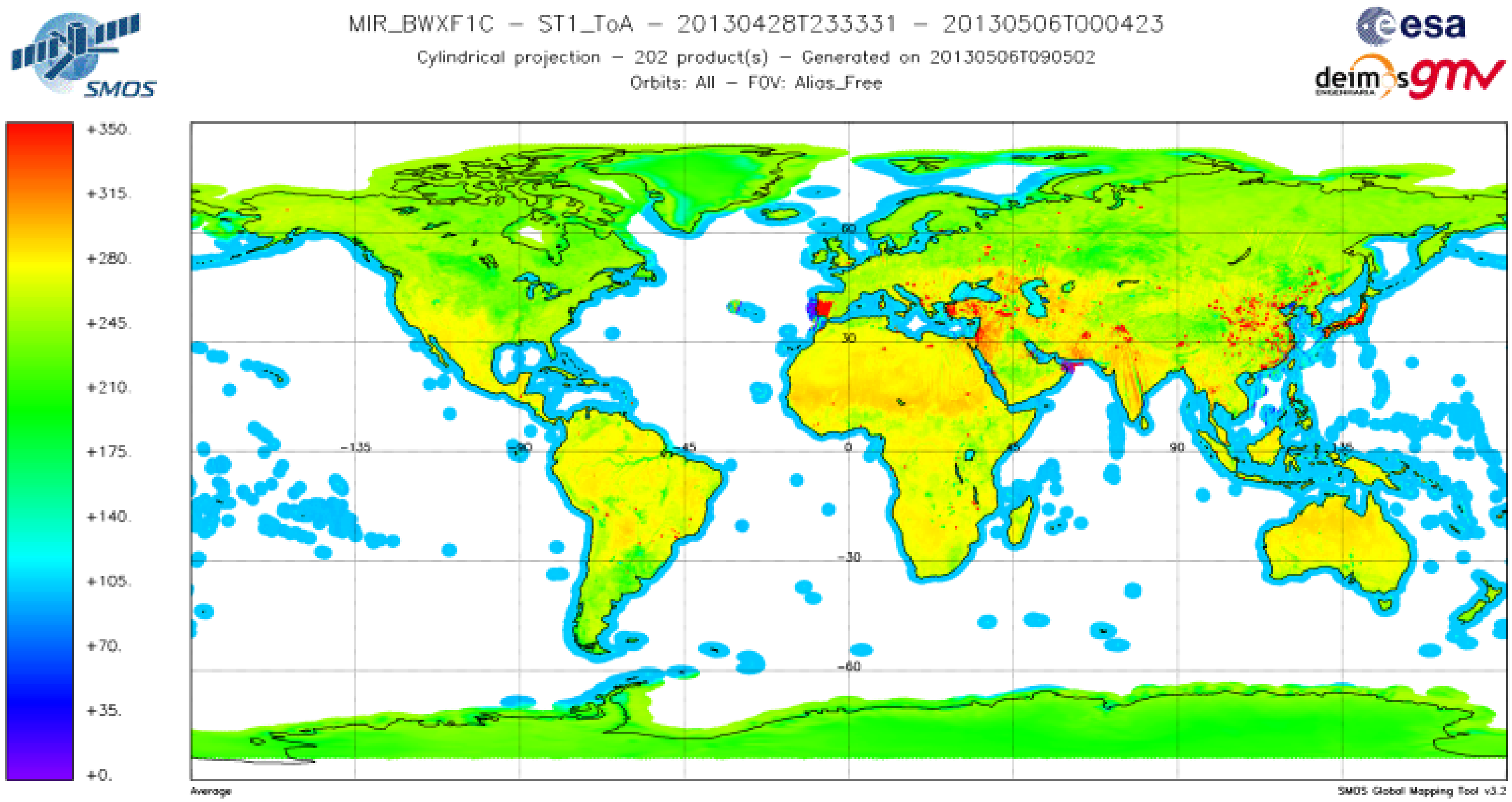


**Figure 39 Real Part of the XY Brightness temperature evolution over land during the reporting period (week 14)**

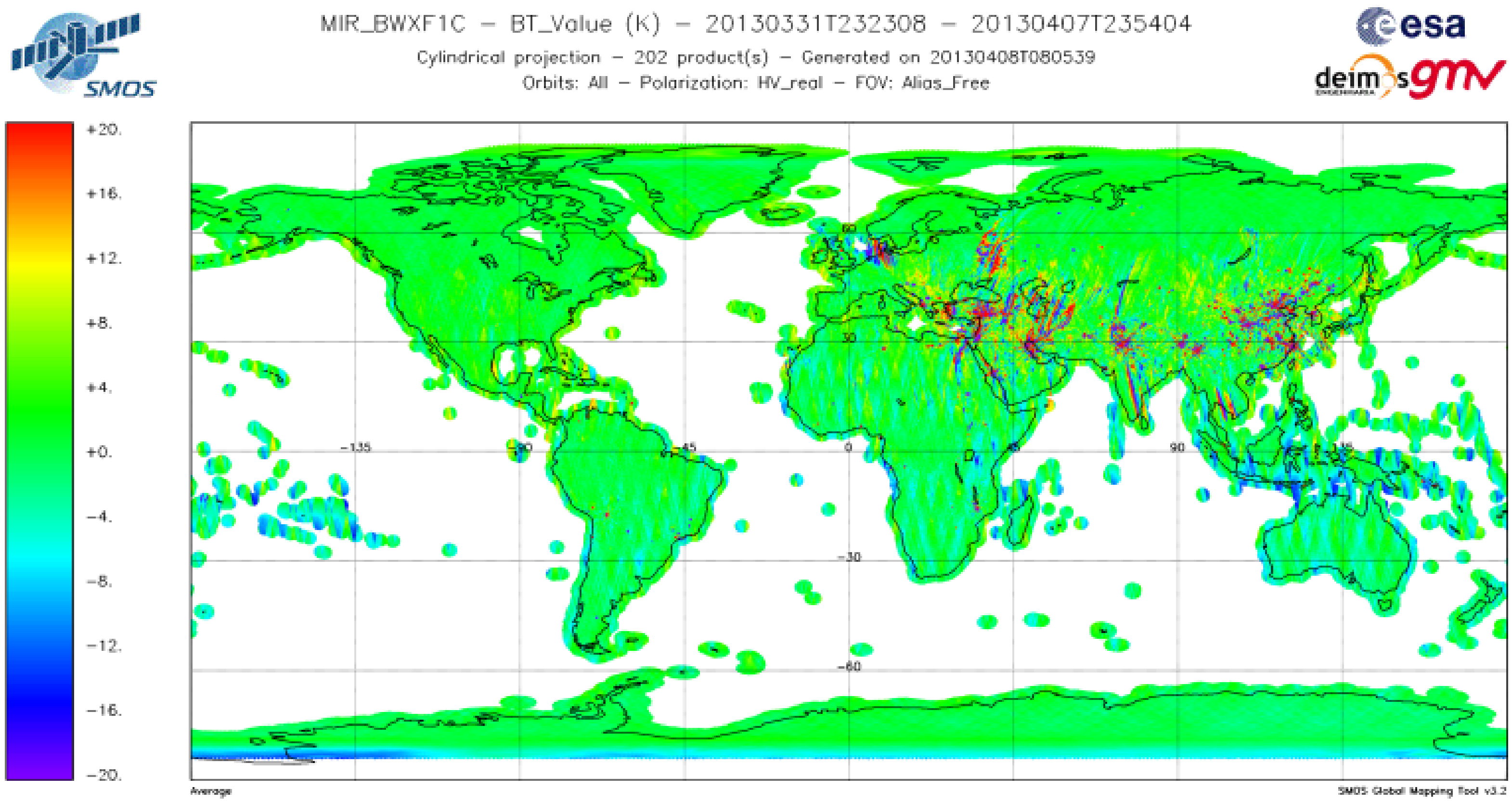


**Figure 40 Real Part of the XY Brightness temperature evolution over land during the reporting period (week 15)**

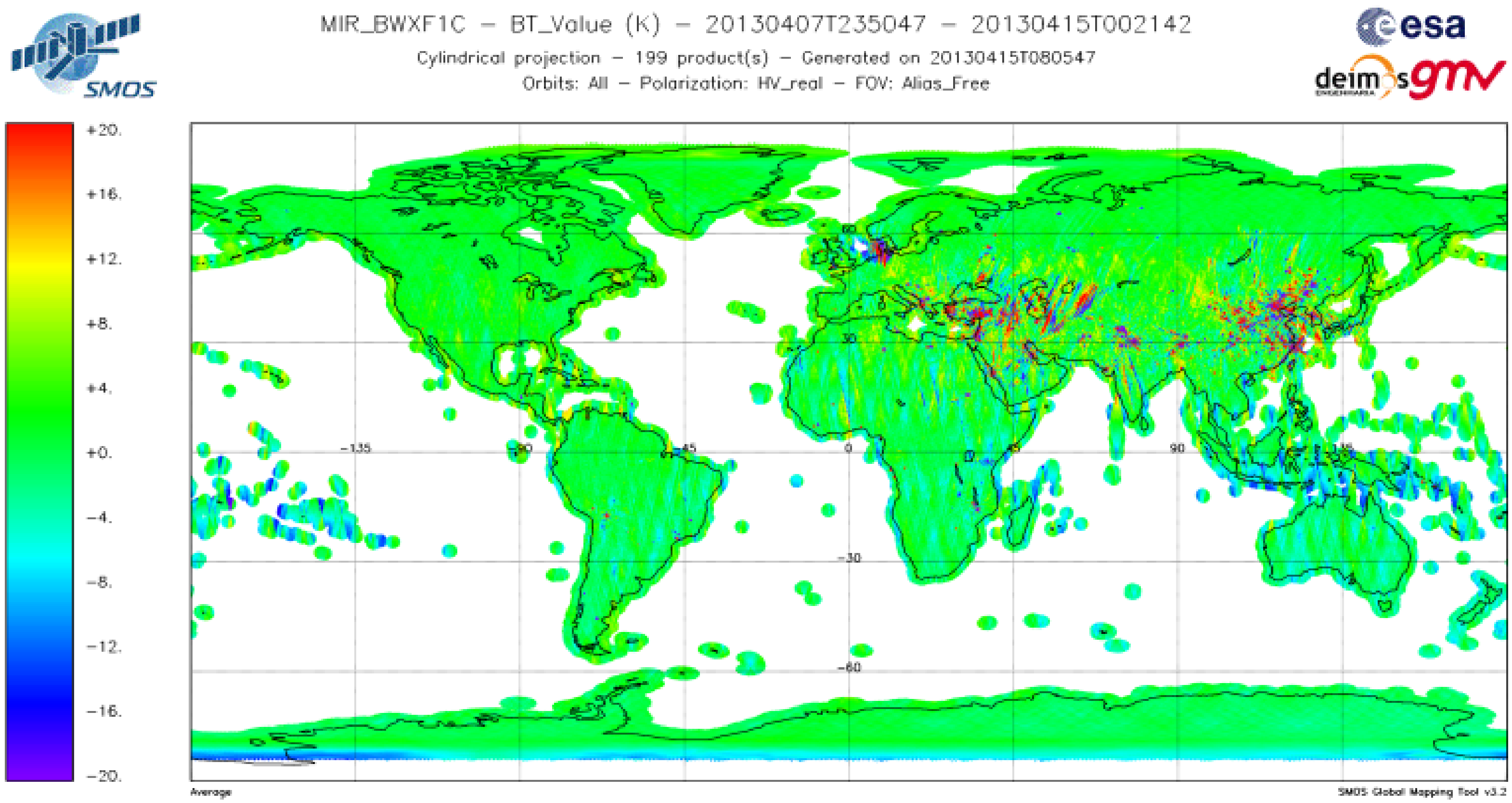


**Figure 41 Real Part of the XY Brightness temperature evolution over land during the reporting period (week 16)**

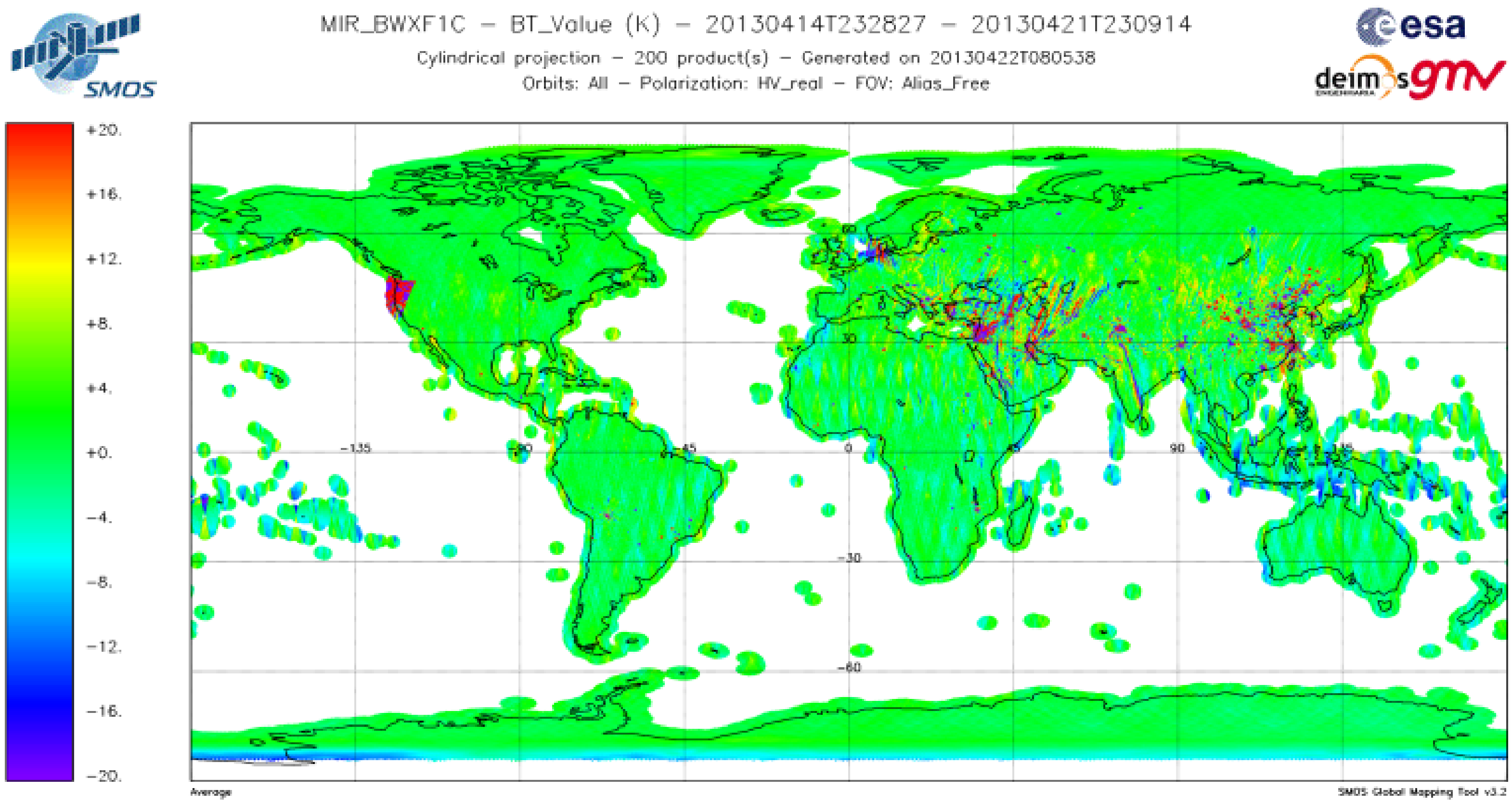


**Figure 42 Real Part of the XY Brightness temperature evolution over land during the reporting period (week 17)**

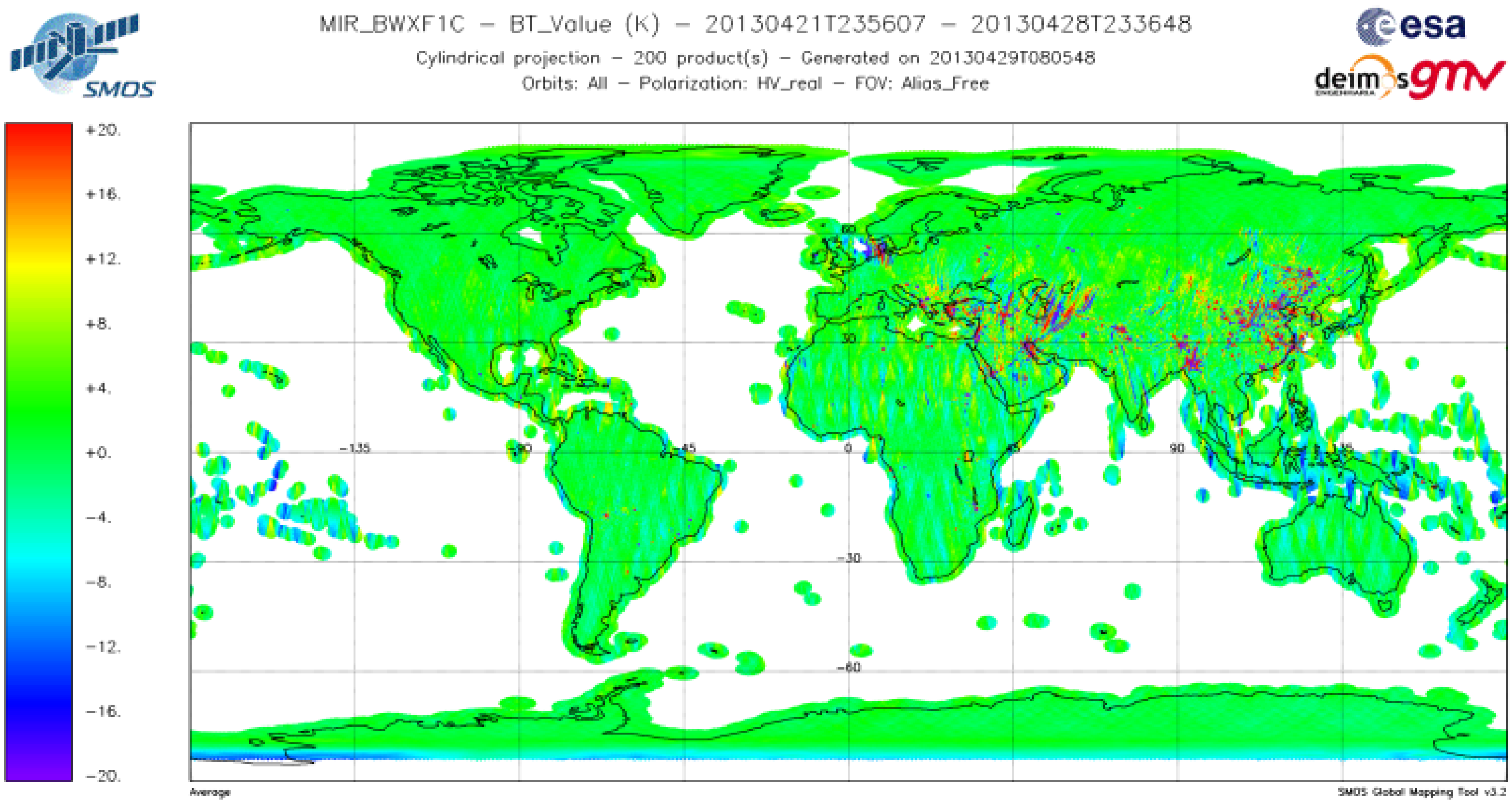


**Figure 43 Real Part of the XY Brightness temperature evolution over land during the reporting period (week 18)**

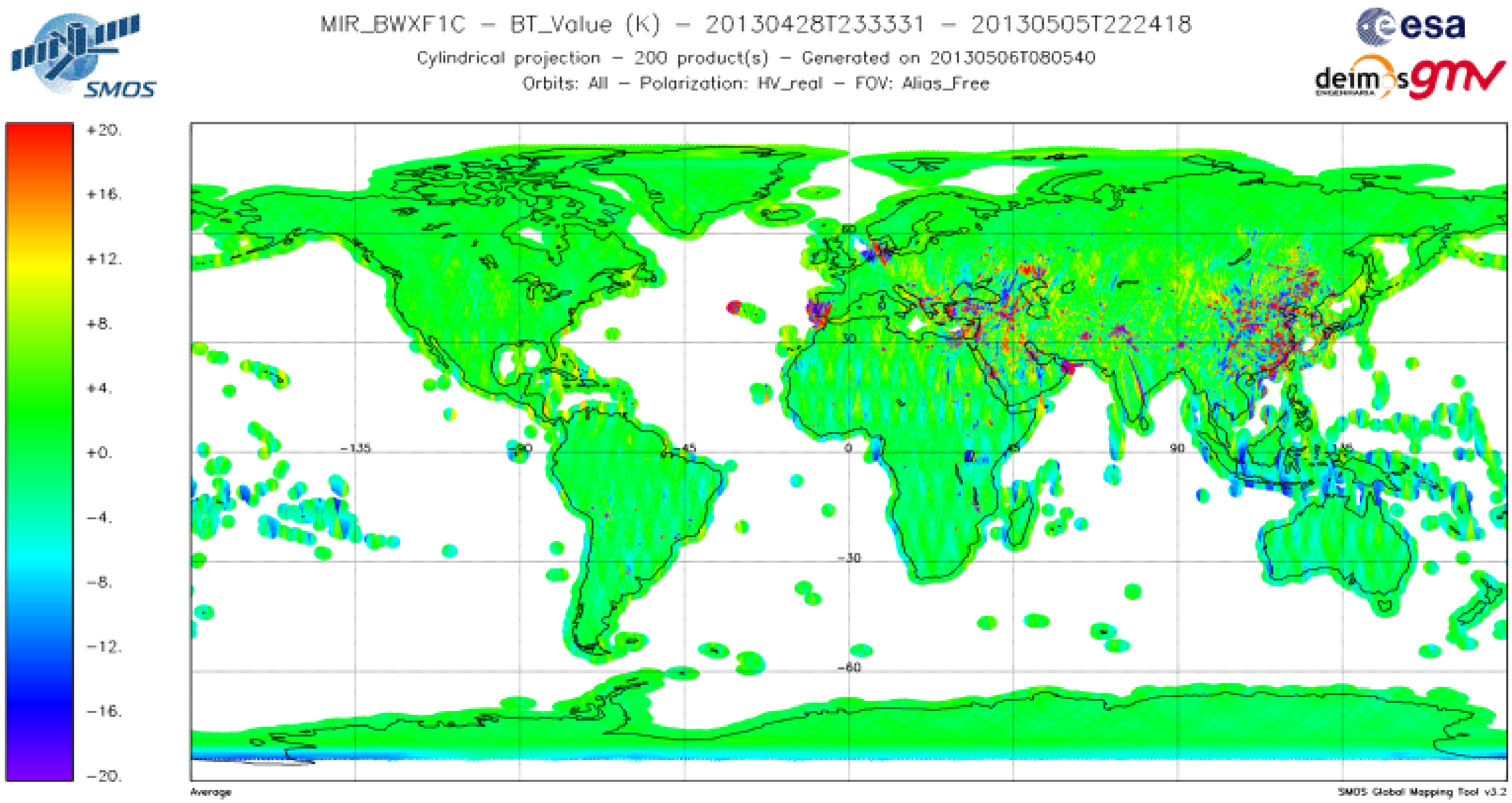


**Figure 44 Imaginary Part of the XY Brightness temperature evolution over land during the reporting period (week 14)**

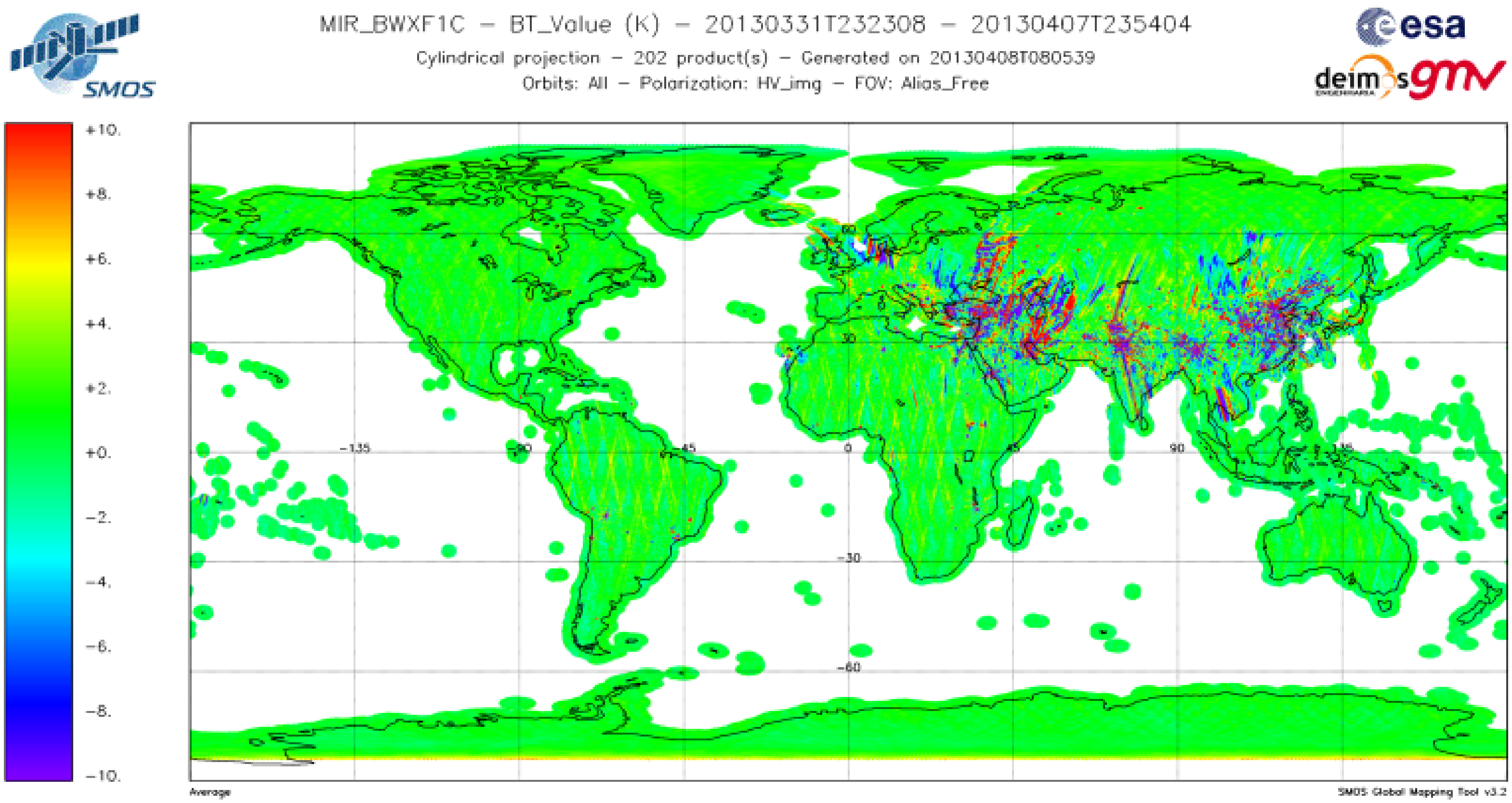


**Figure 45 Imaginary Part of the XY Brightness temperature evolution over land during the reporting period (week 15)**

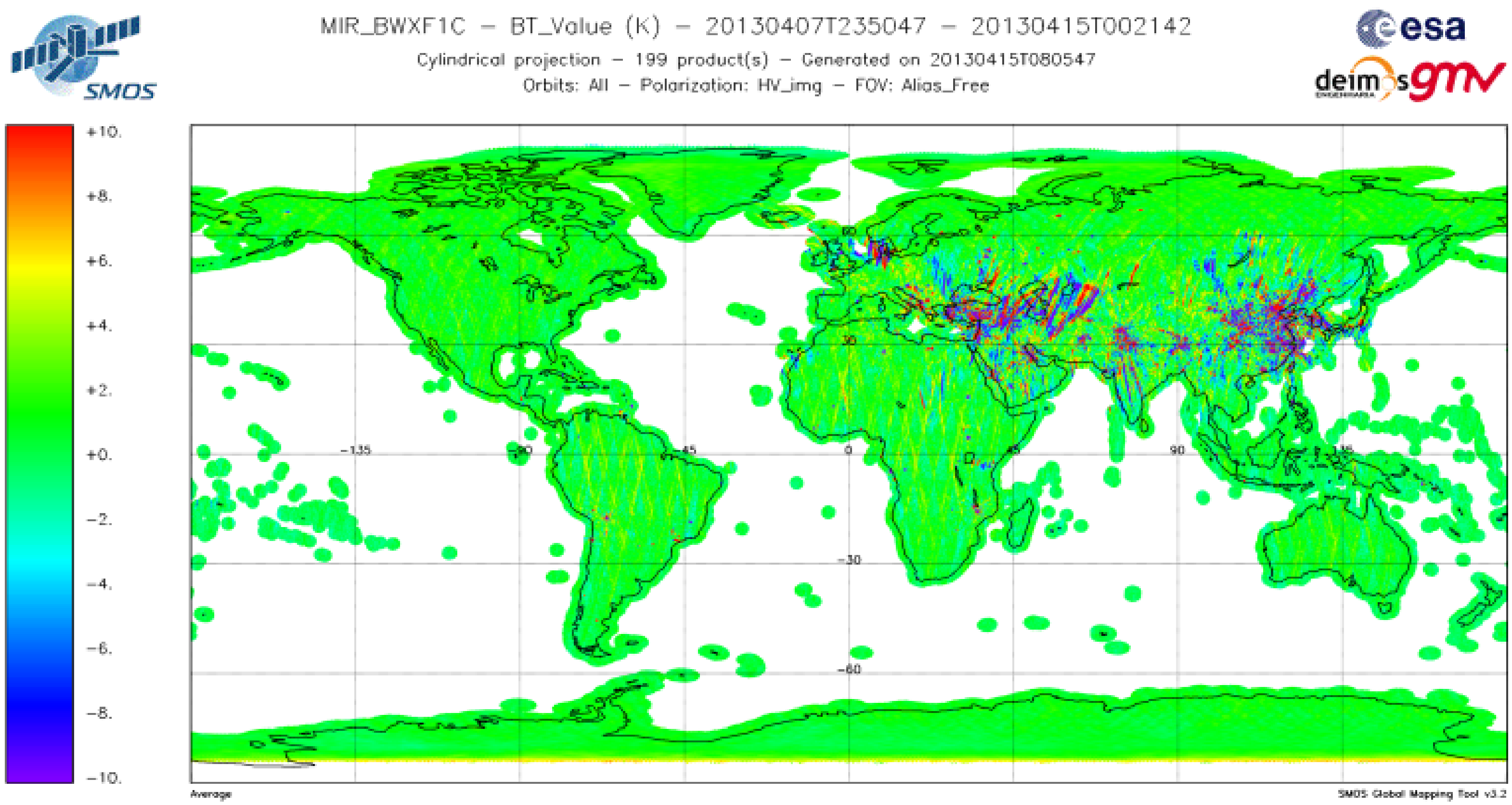


**Figure 46 Imaginary Part of the XY Brightness temperature evolution over land during the reporting period (week 16)**

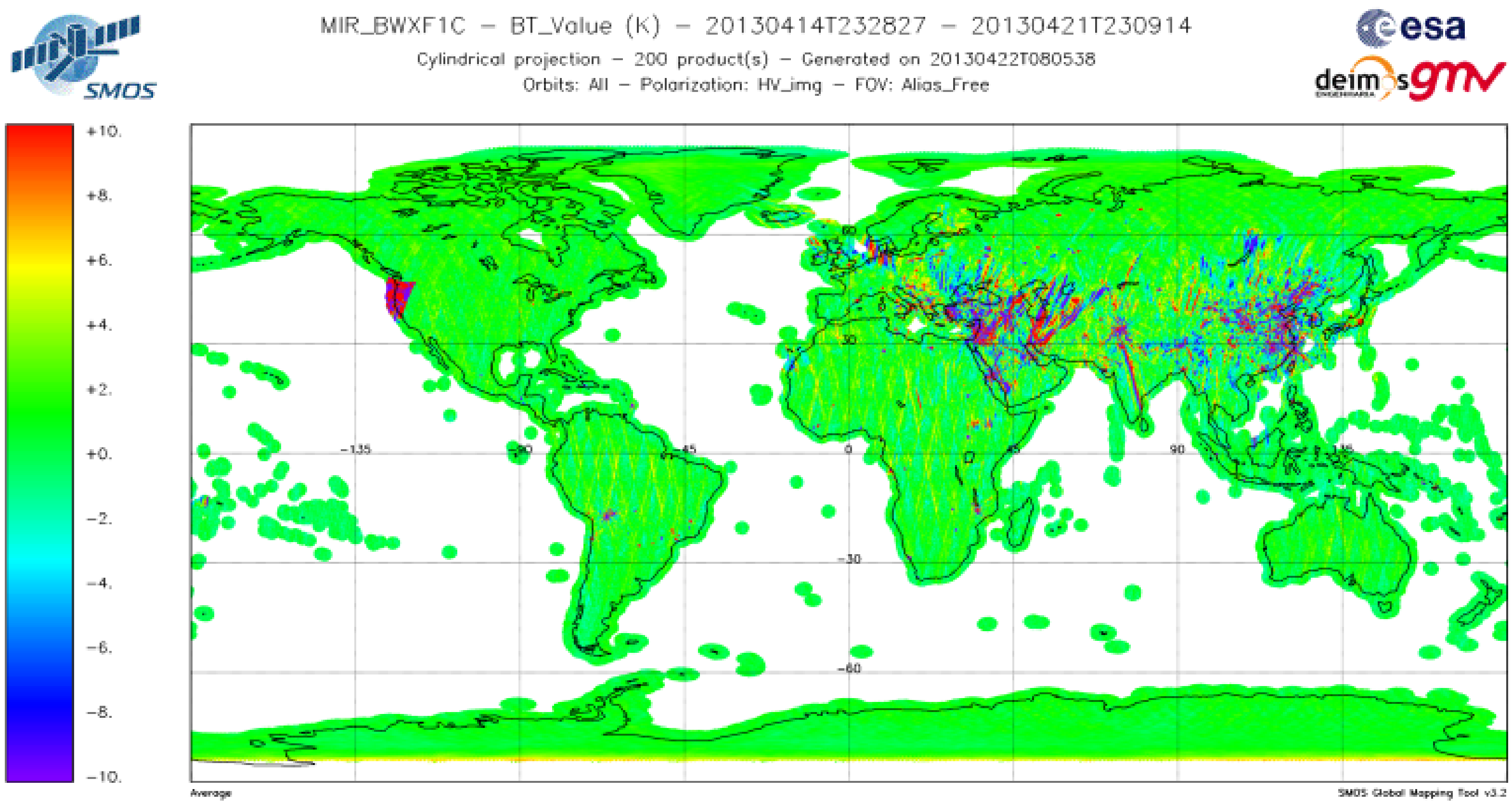


**Figure 47 Imaginary Part of the XY Brightness temperature evolution over land during the reporting period (week 17)**

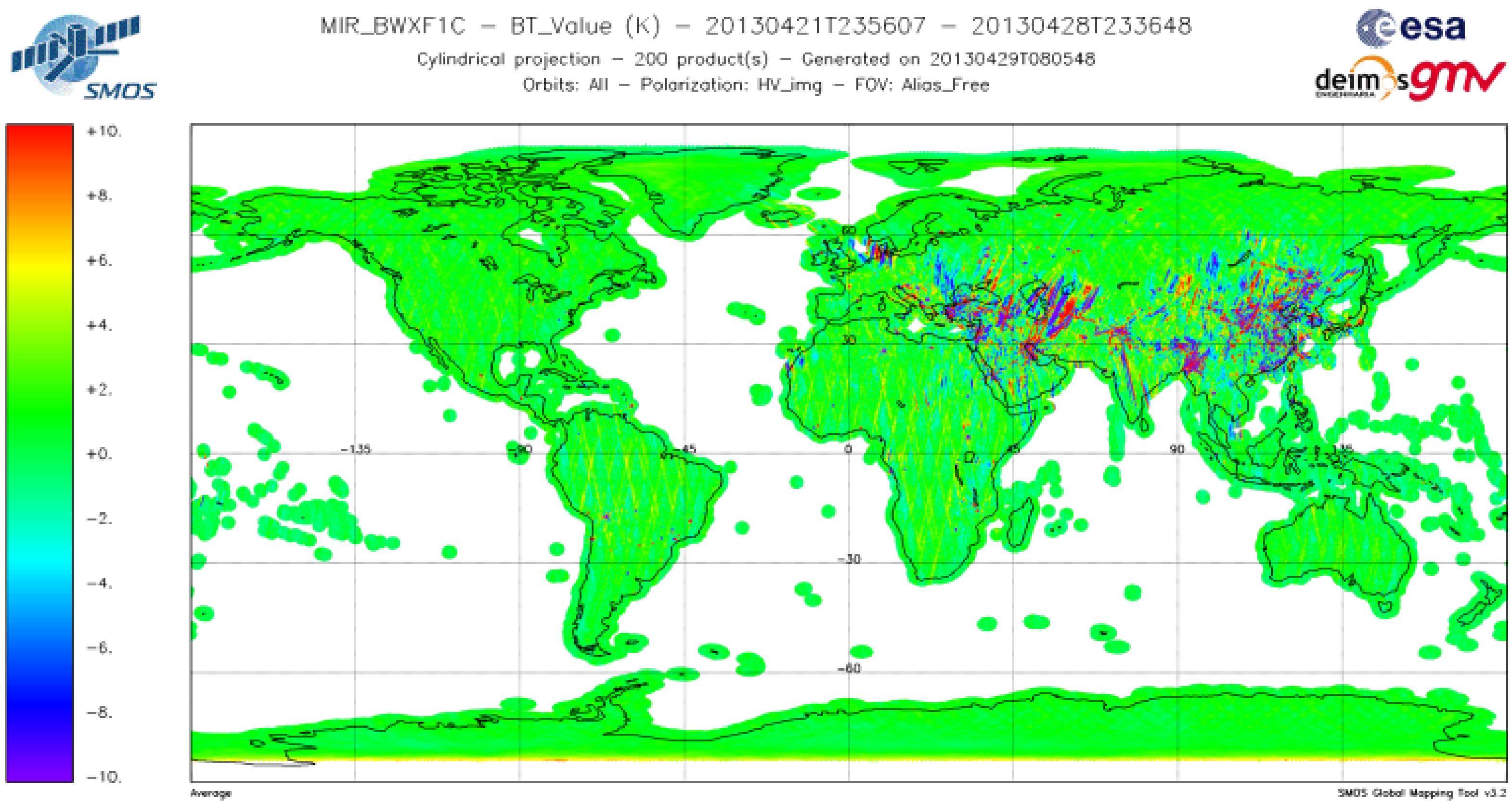


**Figure 48 Imaginary Part of the XY Brightness temperature evolution over land during the reporting period (week 18)**

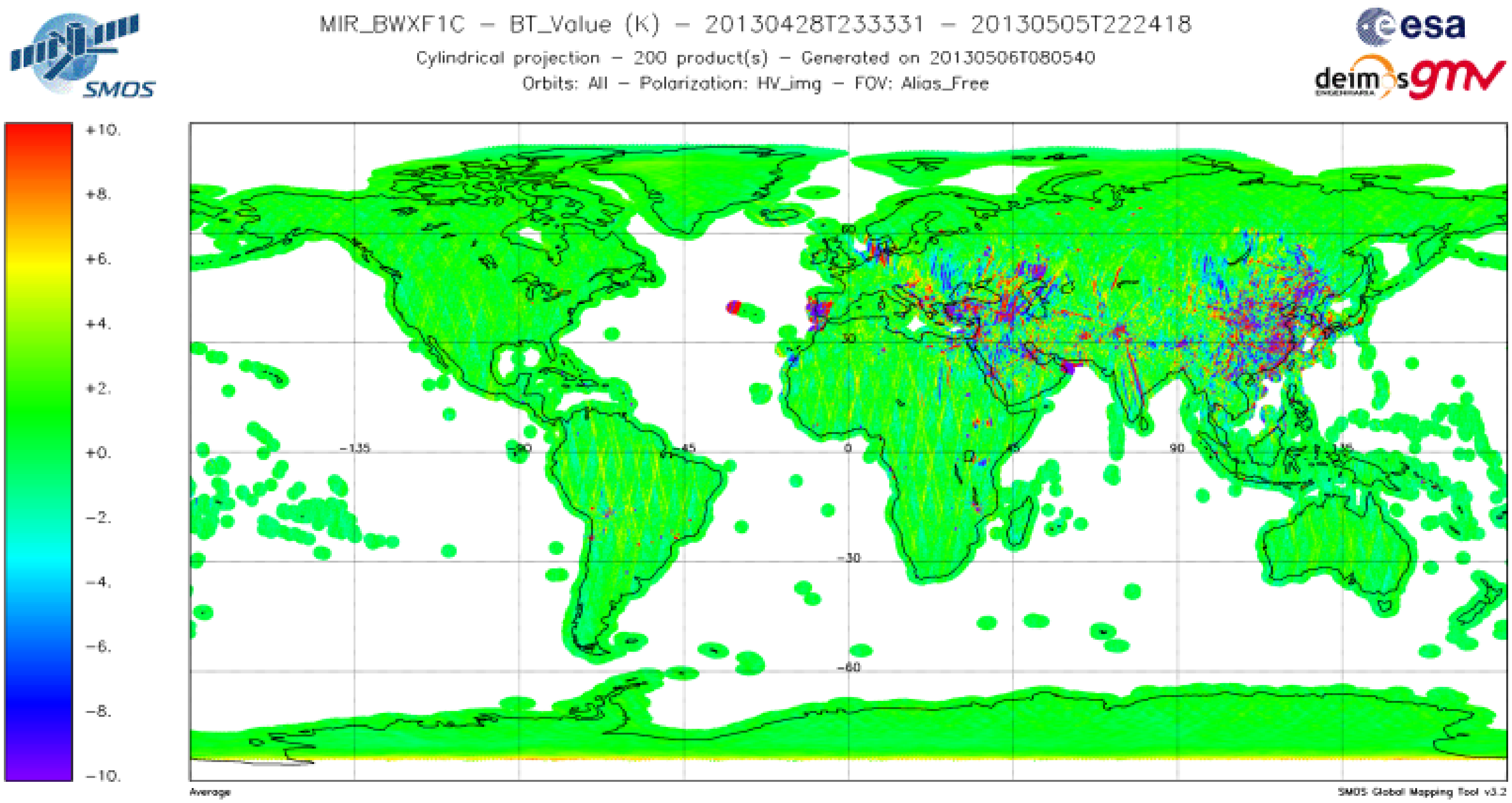


**Figure 49 1st Stokes evolution over sea during the reporting period (week 14)**

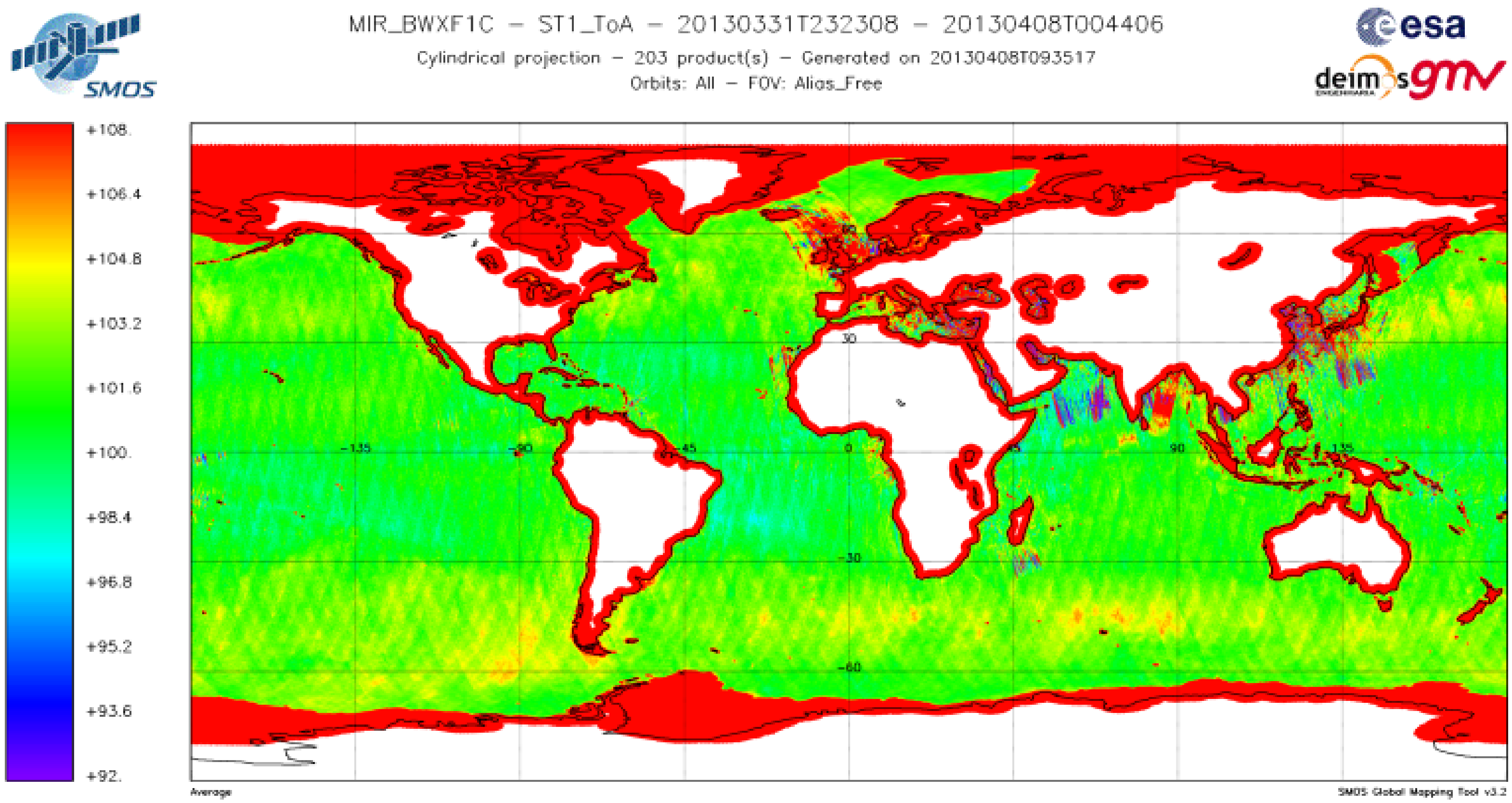


**Figure 50 1st Stokes evolution over sea during the reporting period (week 15)**

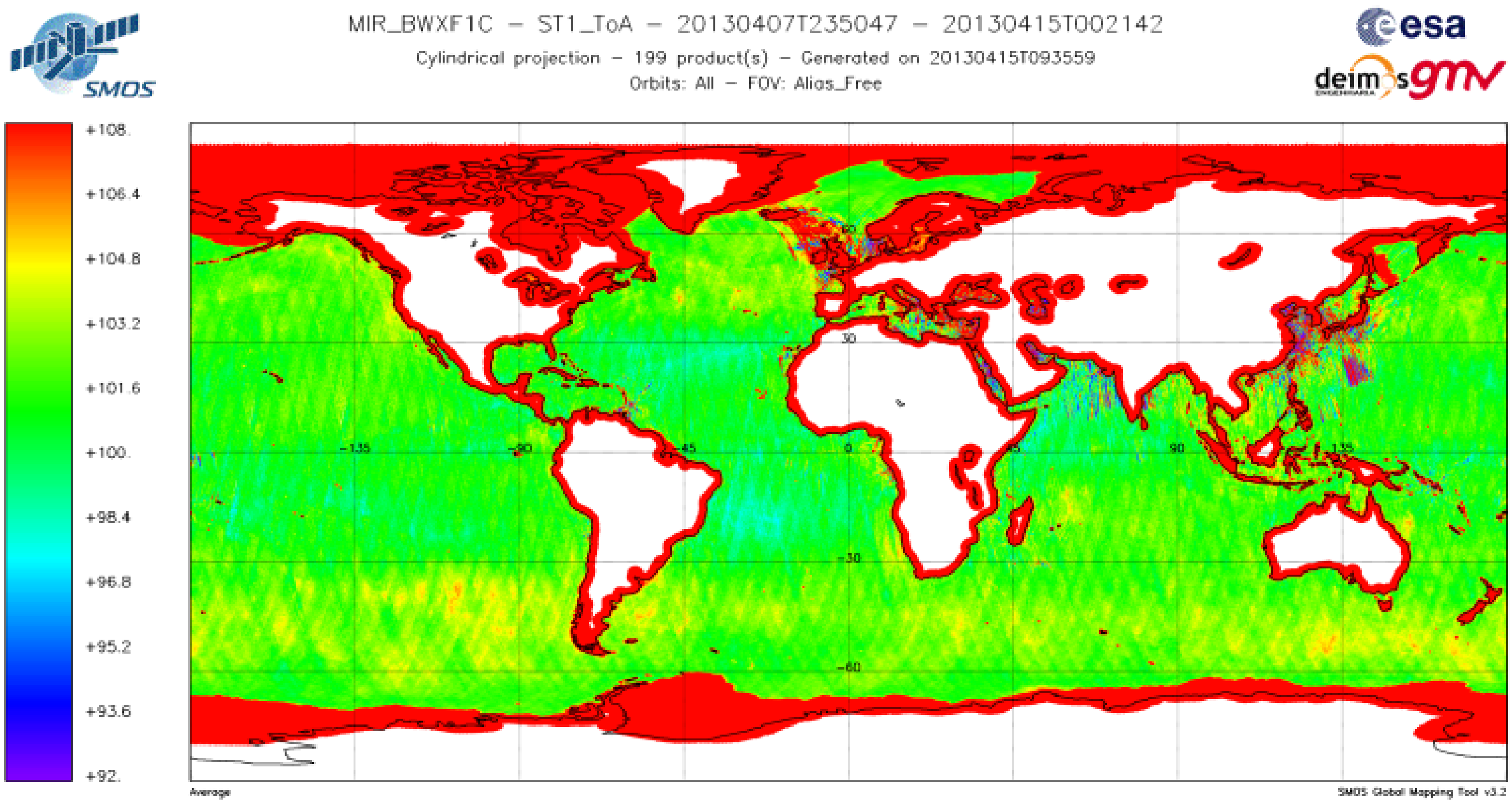


**Figure 51 1st Stokes evolution over sea during the reporting period (week 16)**

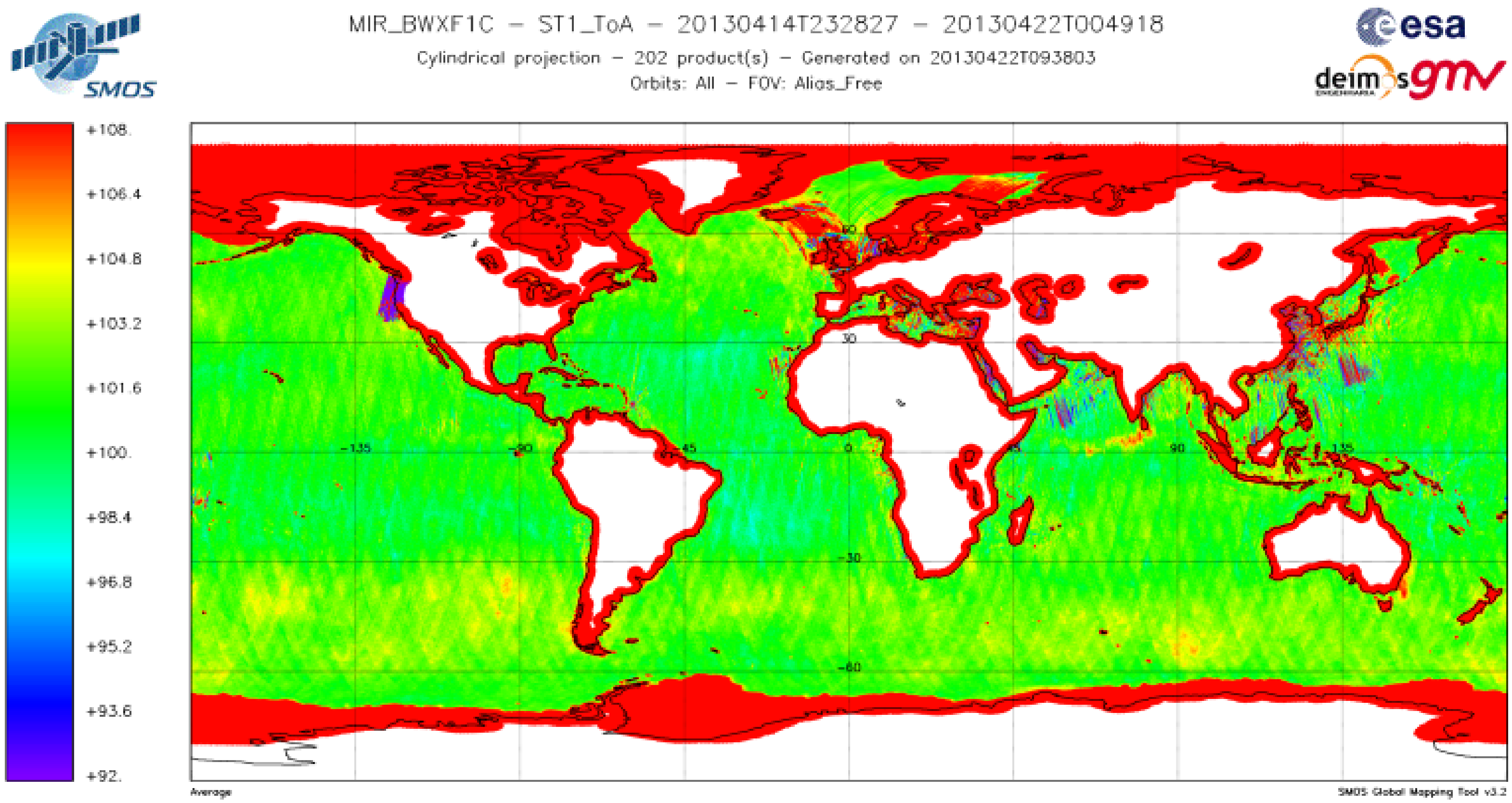


**Figure 52 1st Stokes evolution over sea during the reporting period (week 17)**

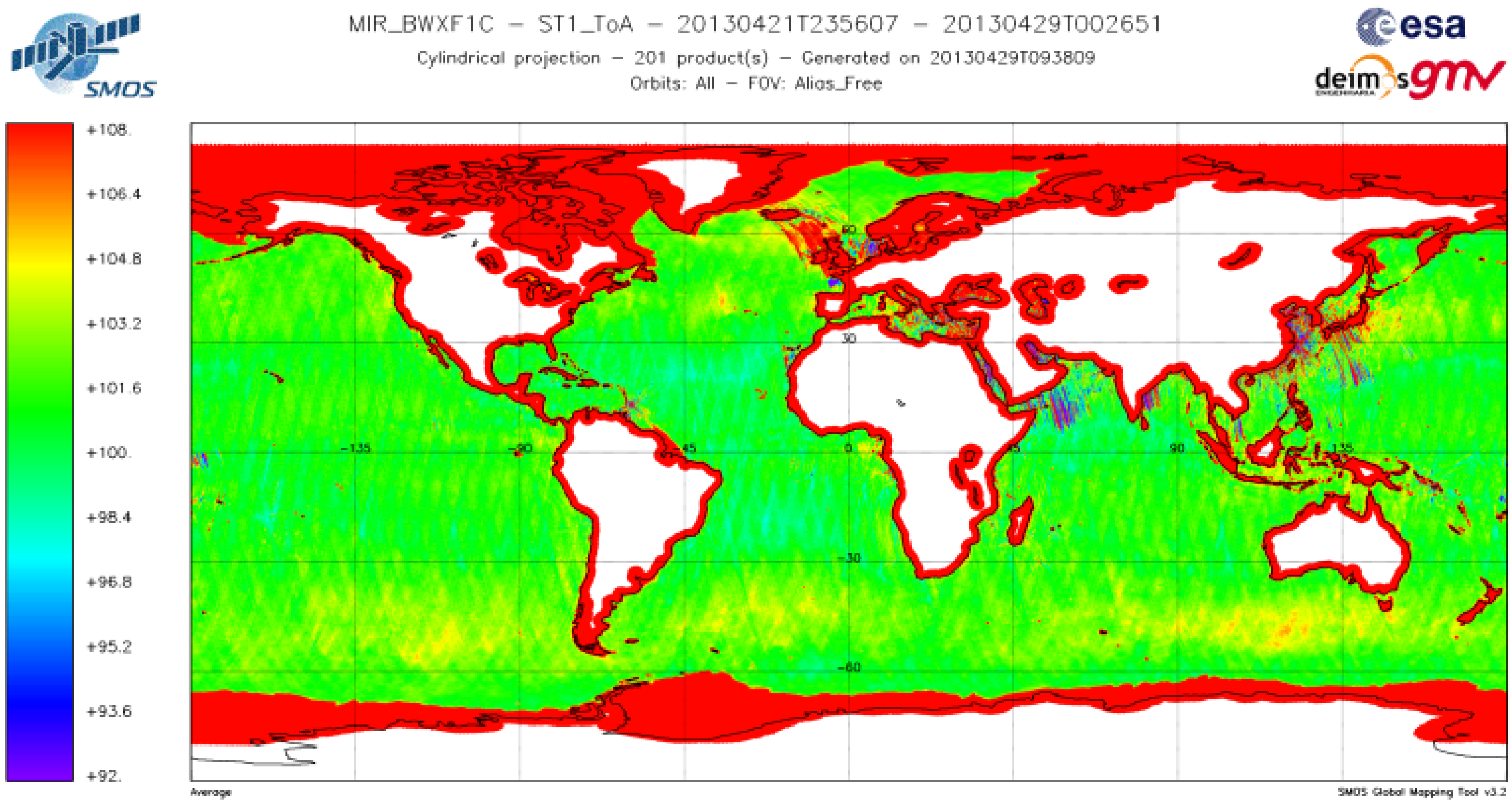


**Figure 53 1st Stokes evolution over sea during the reporting period (week 18)**

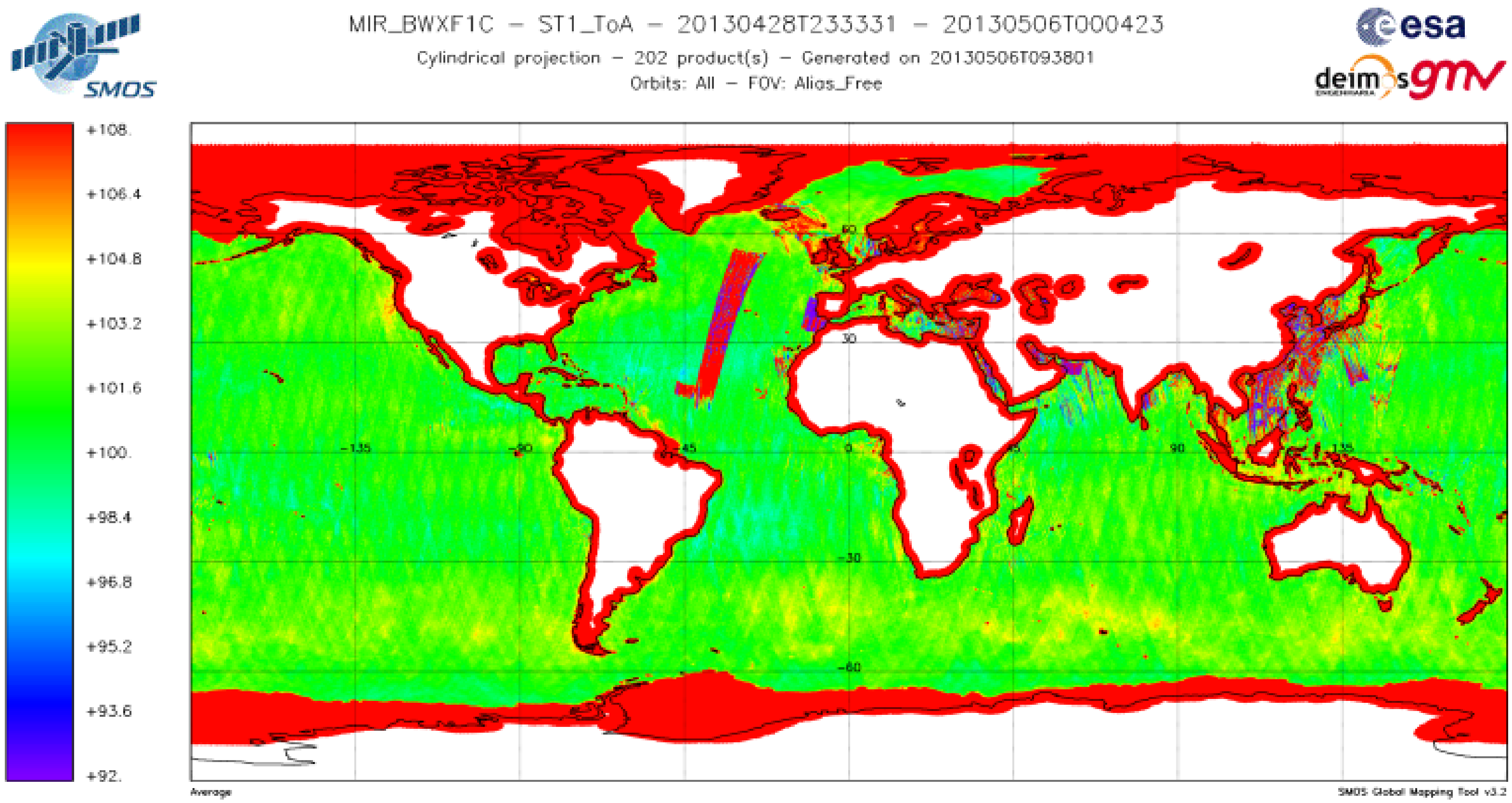


**Figure 54 Real Part of the XY Brightness temperature evolution over sea during the reporting period (week 14)**

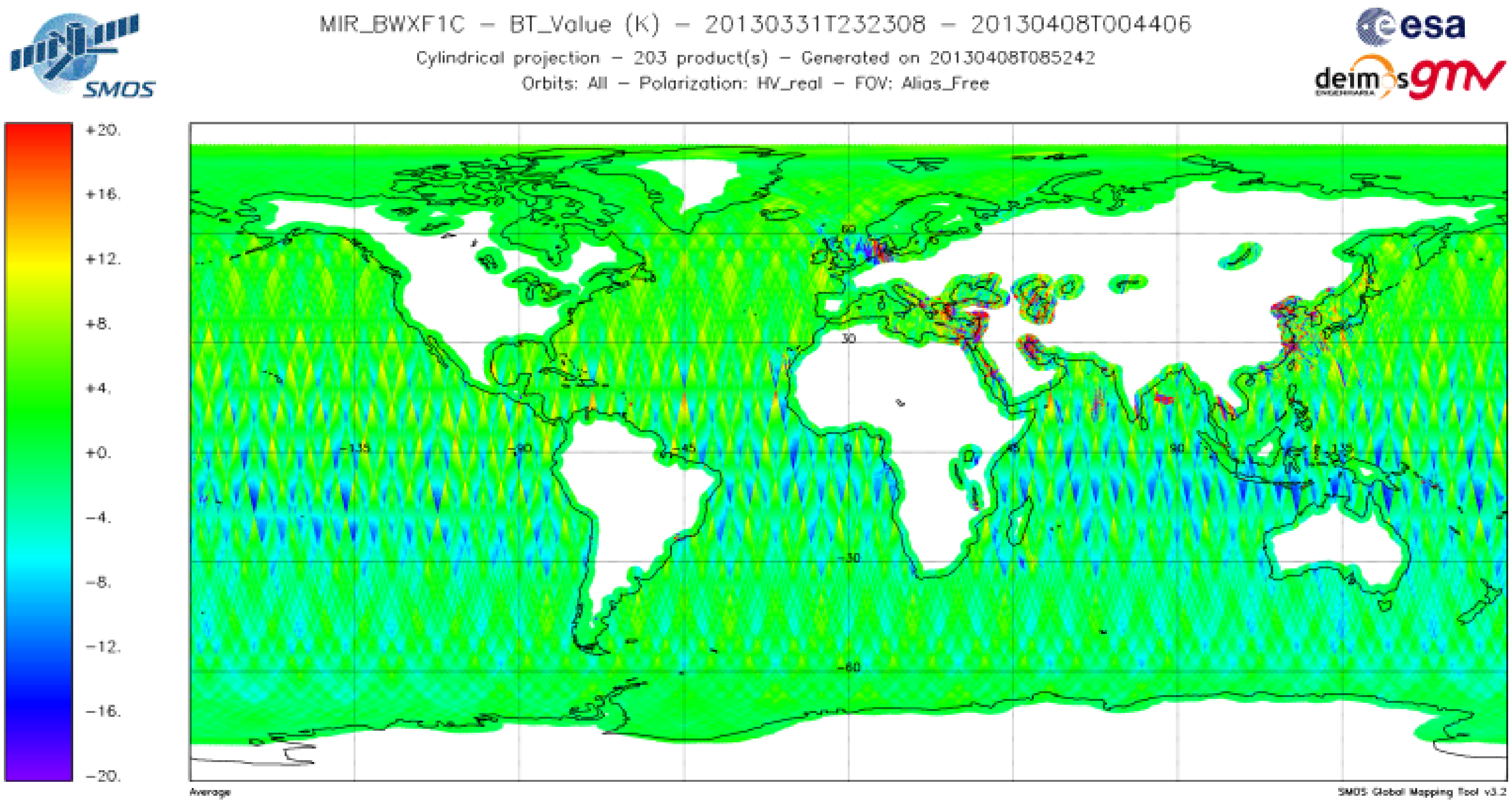


**Figure 55 Real Part of the XY Brightness temperature evolution over sea during the reporting period (week 15)**

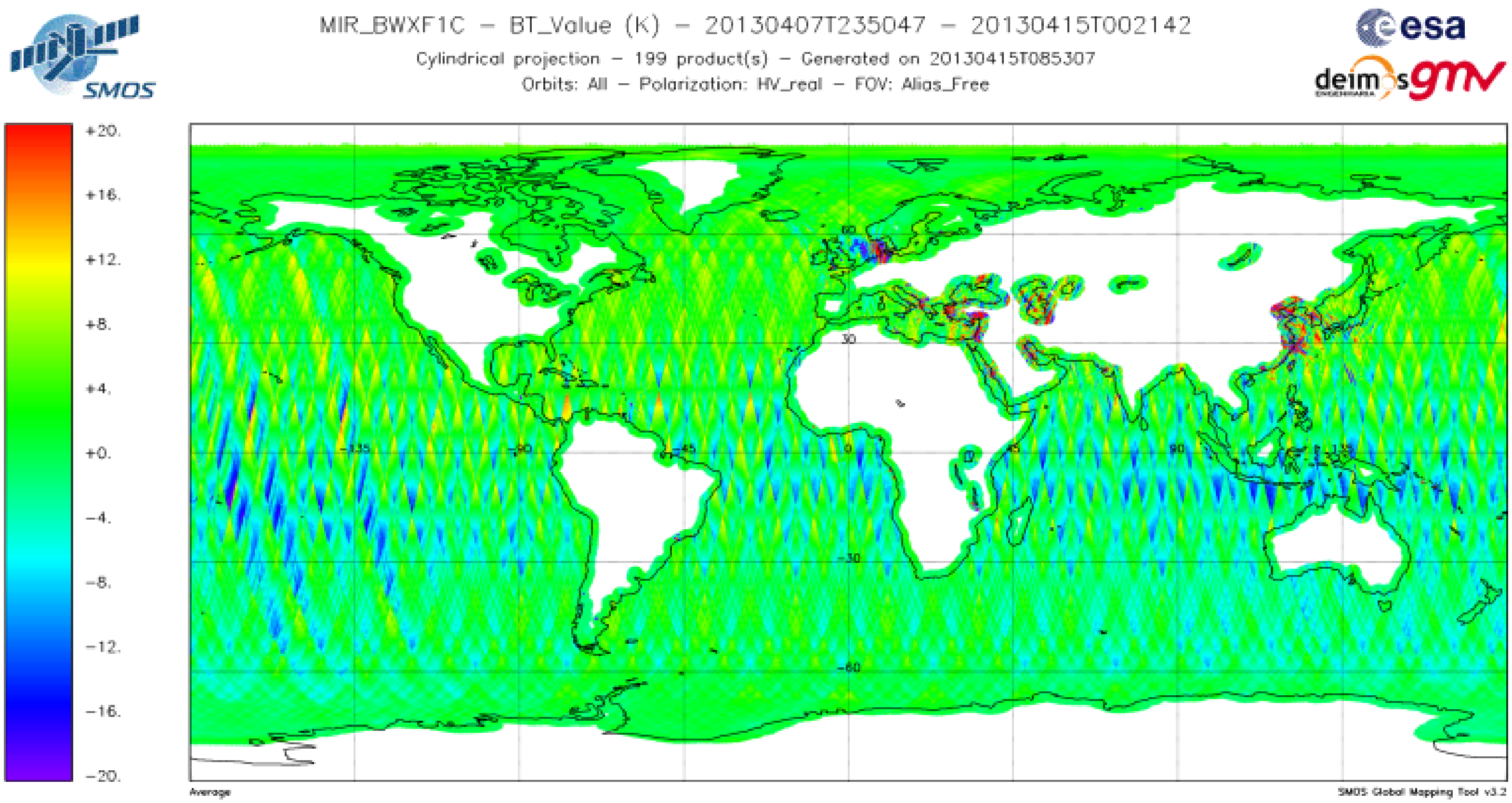


**Figure 56 Real Part of the XY Brightness temperature evolution over sea during the reporting period (week 16)**

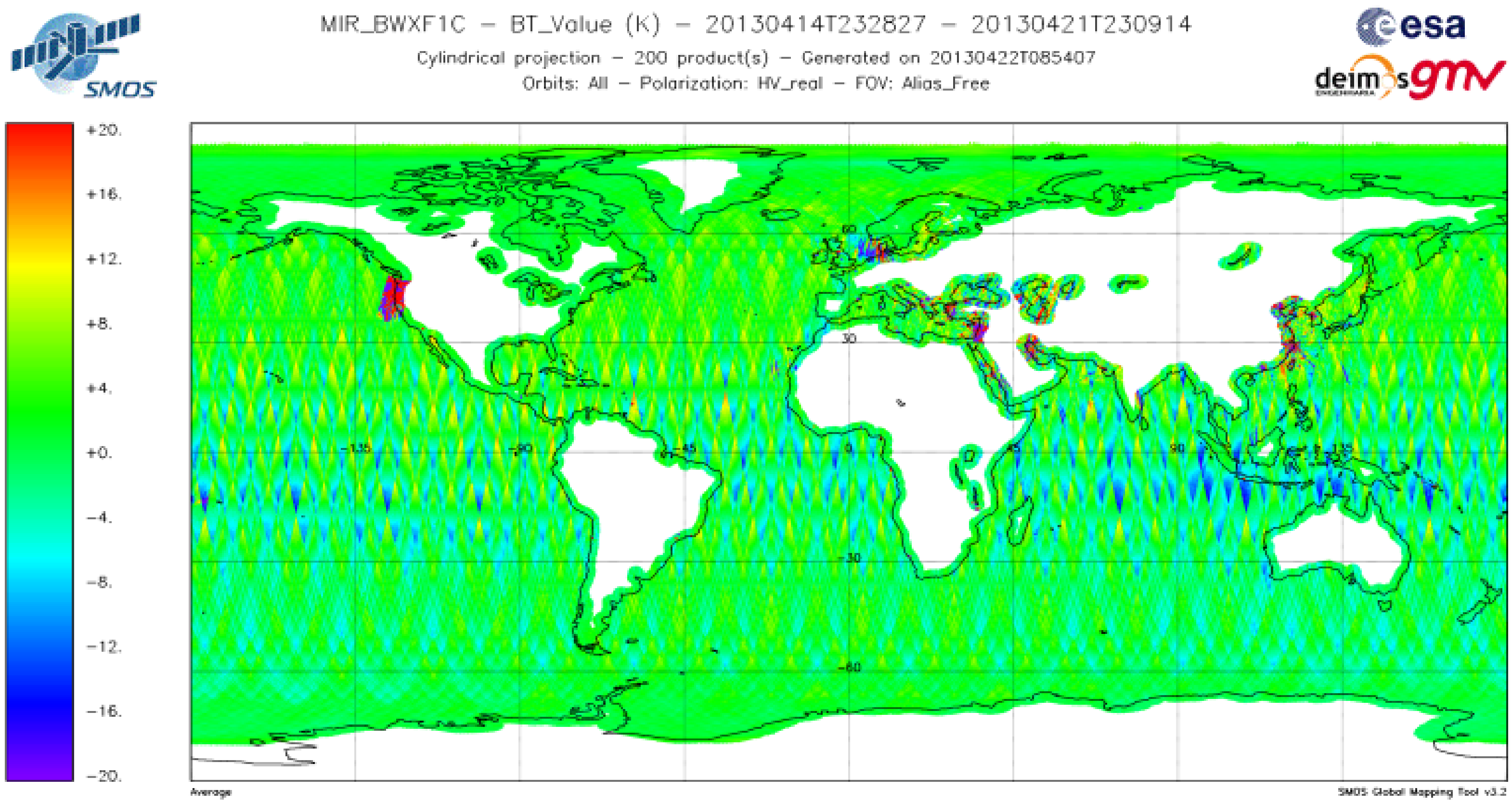


**Figure 57 Real Part of the XY Brightness temperature evolution over sea during the reporting period (week 17)**

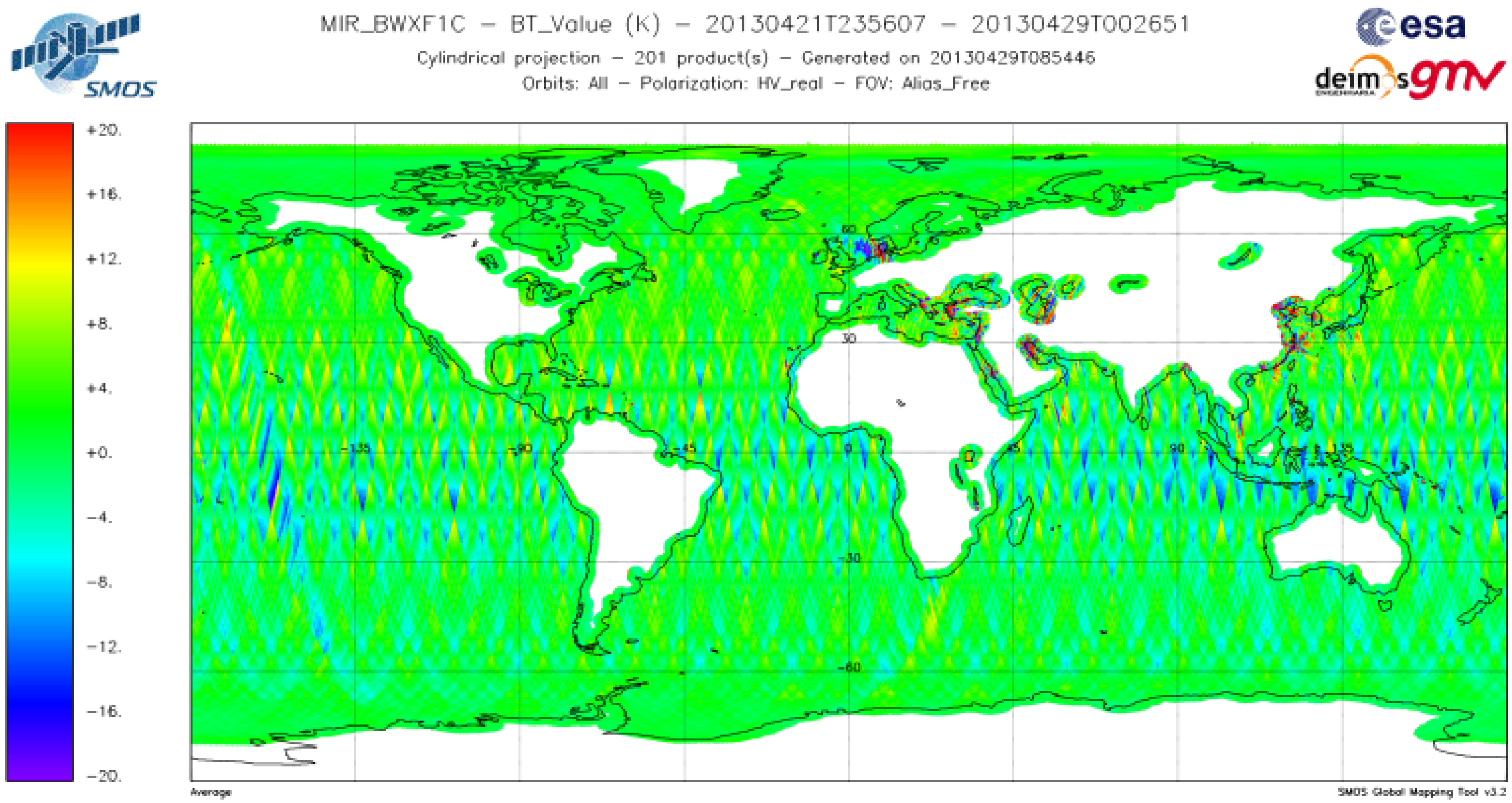


**Figure 58 Real Part of the XY Brightness temperature evolution over sea during the reporting period (week 18)**

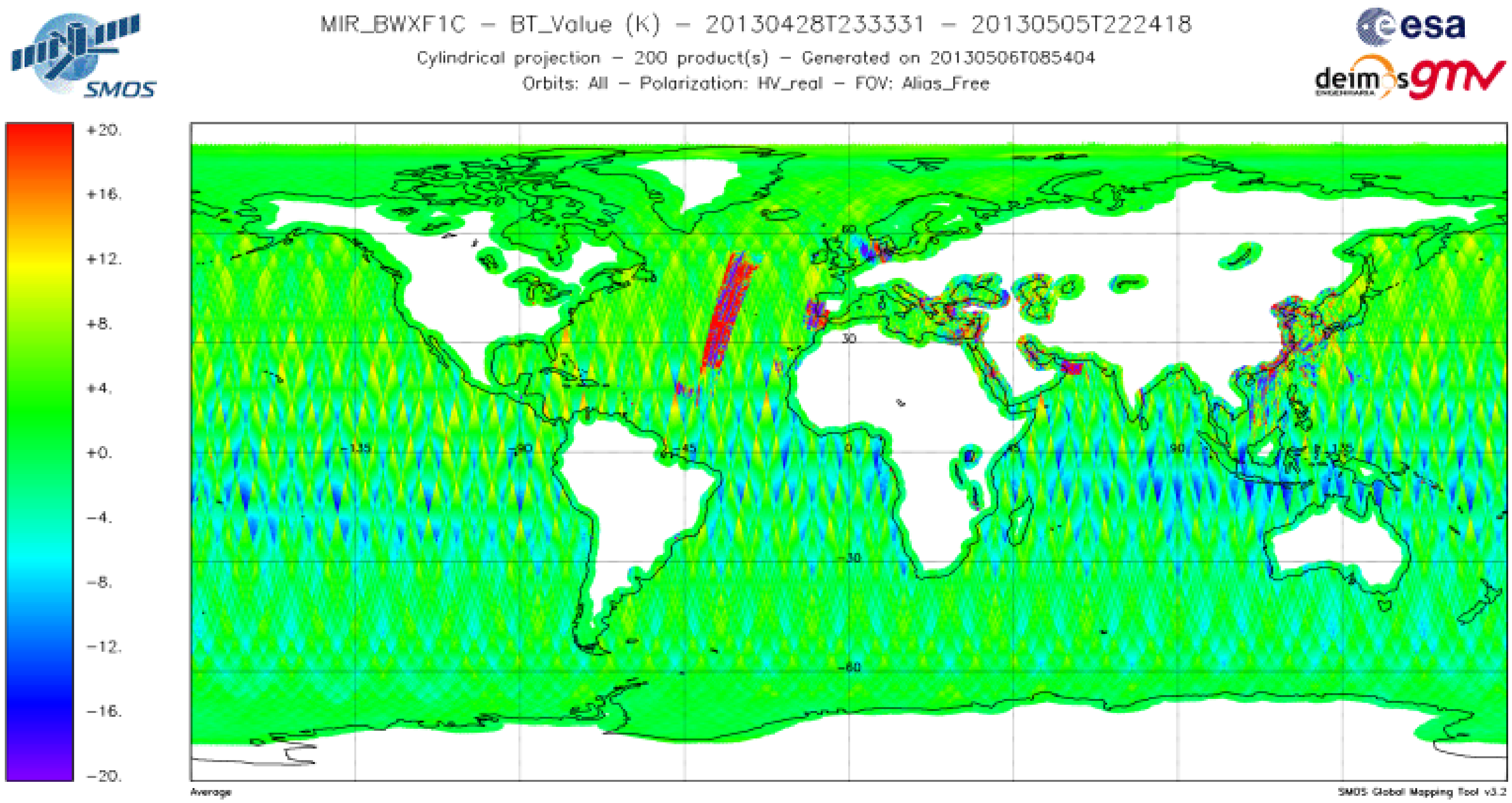


**Figure 59 Imaginary Part of the XY Brightness temperature evolution over sea during the reporting period (week 14)**

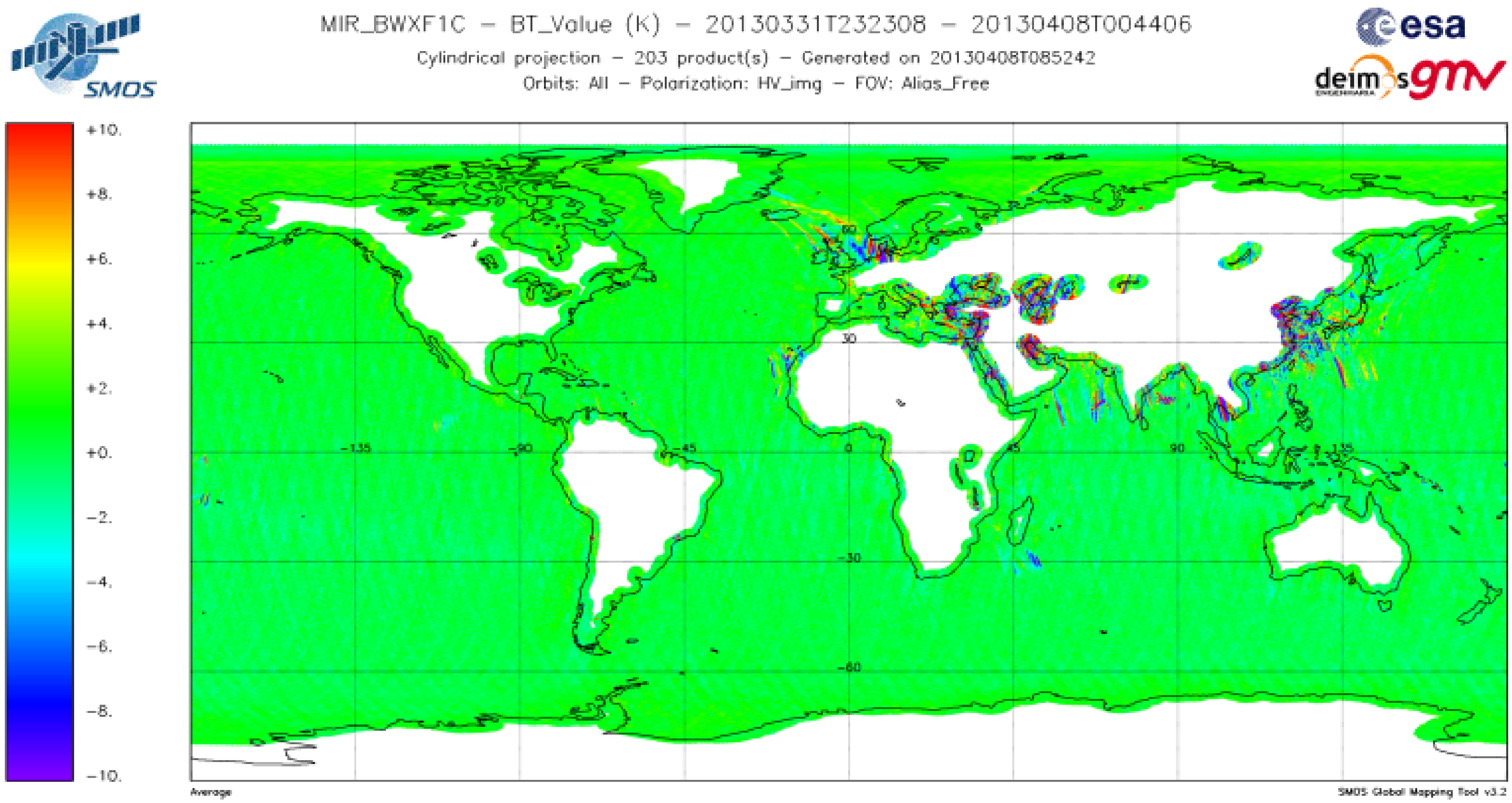


**Figure 60 Imaginary Part of the XY Brightness temperature evolution over sea during the reporting period (week 15)**

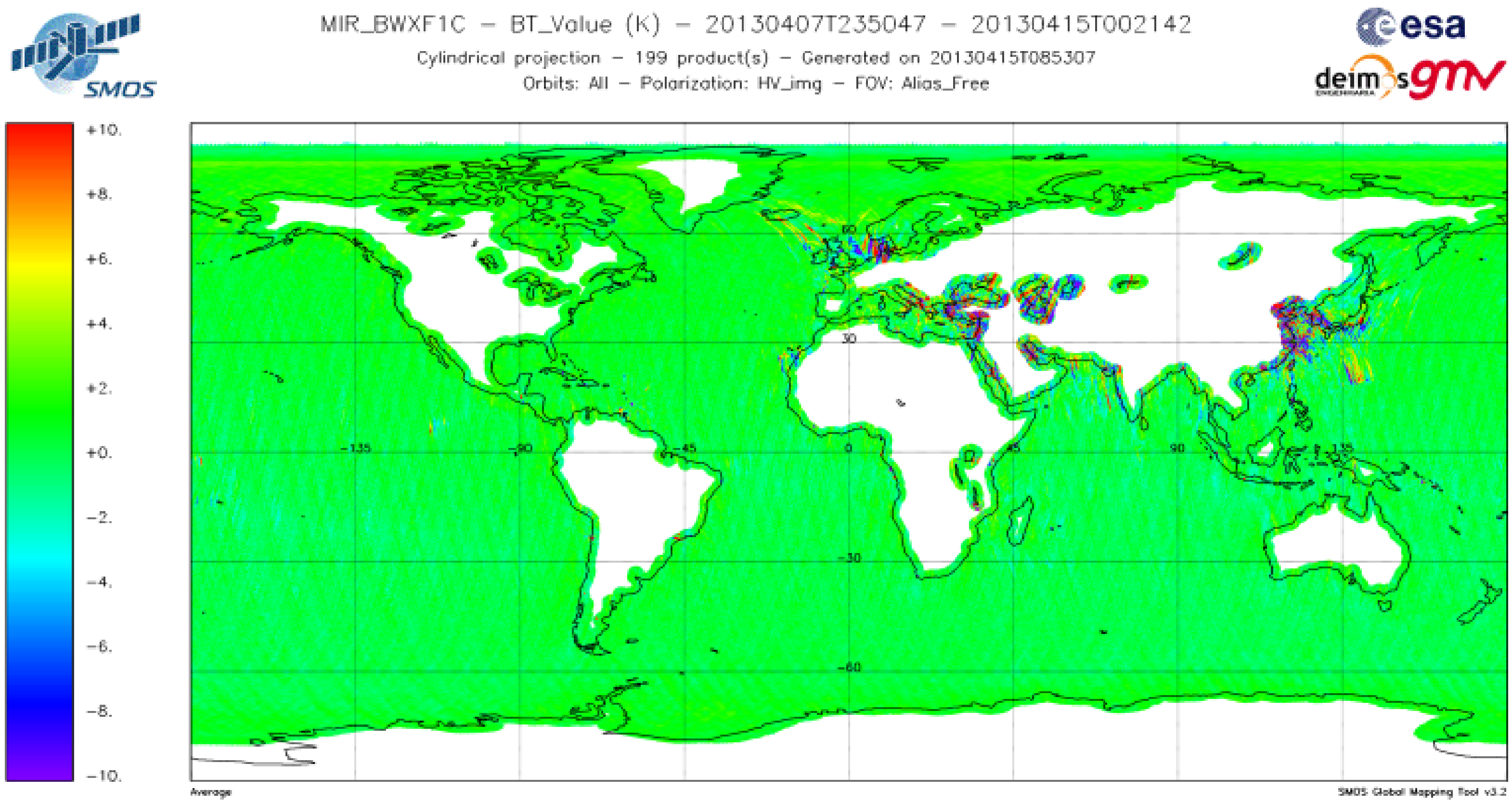


**Figure 61 Imaginary Part of the XY Brightness temperature evolution over sea during the reporting period (week 16)**

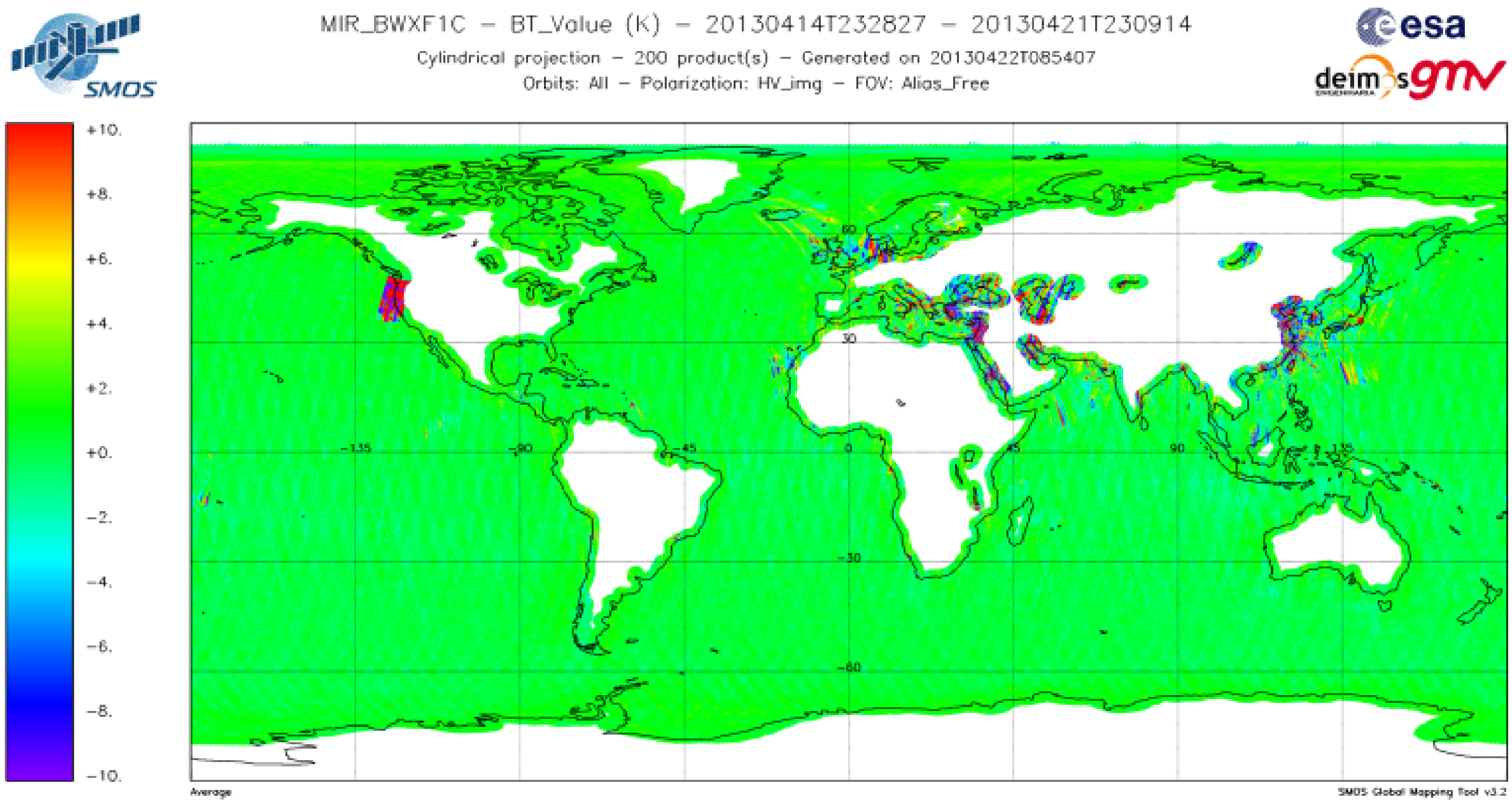


**Figure 62 Imaginary Part of the XY Brightness temperature evolution over sea during the reporting period (week 17)**

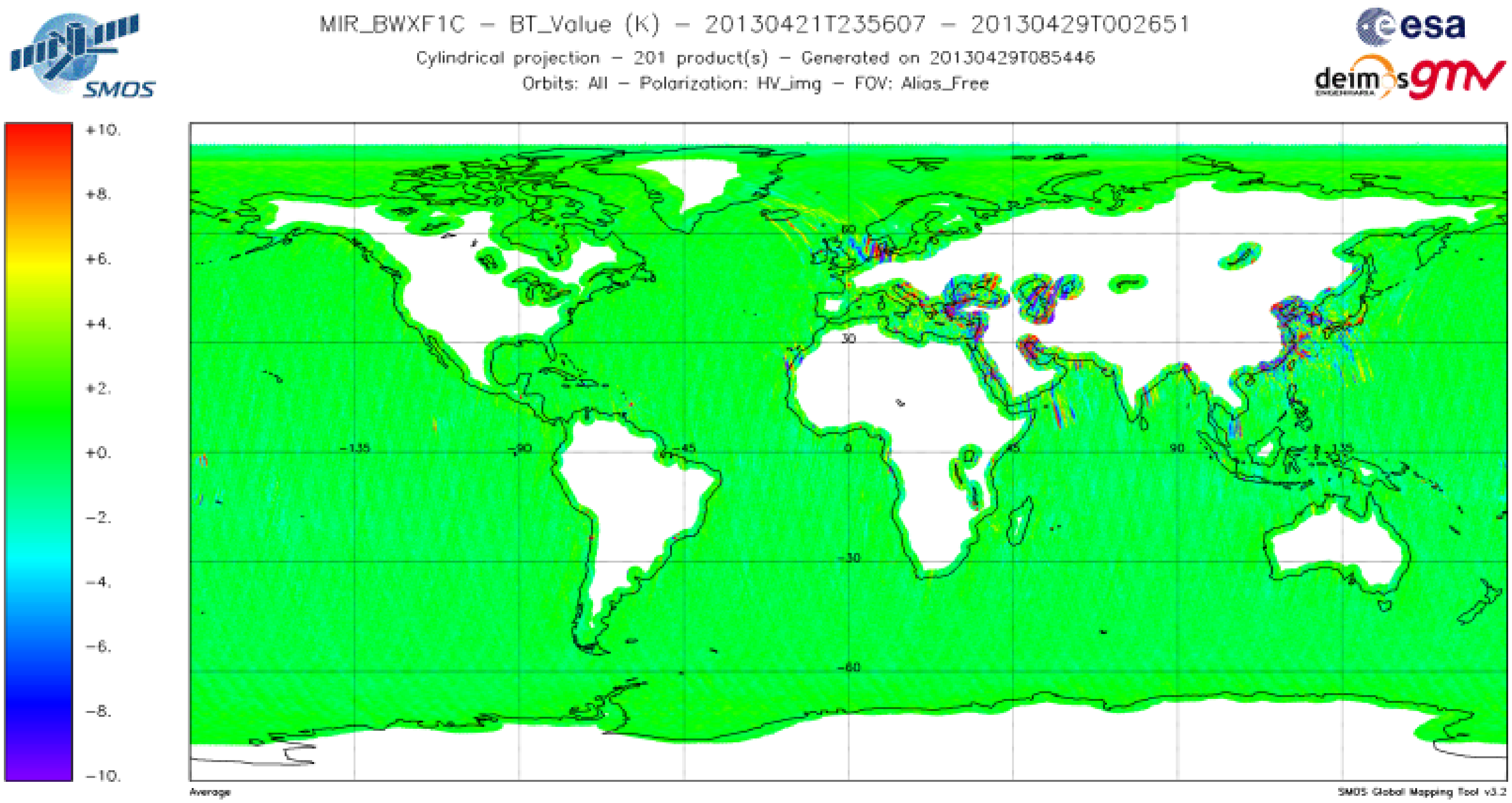


**Figure 63 Imaginary Part of the XY Brightness temperature evolution over sea during the reporting period (week 18)**

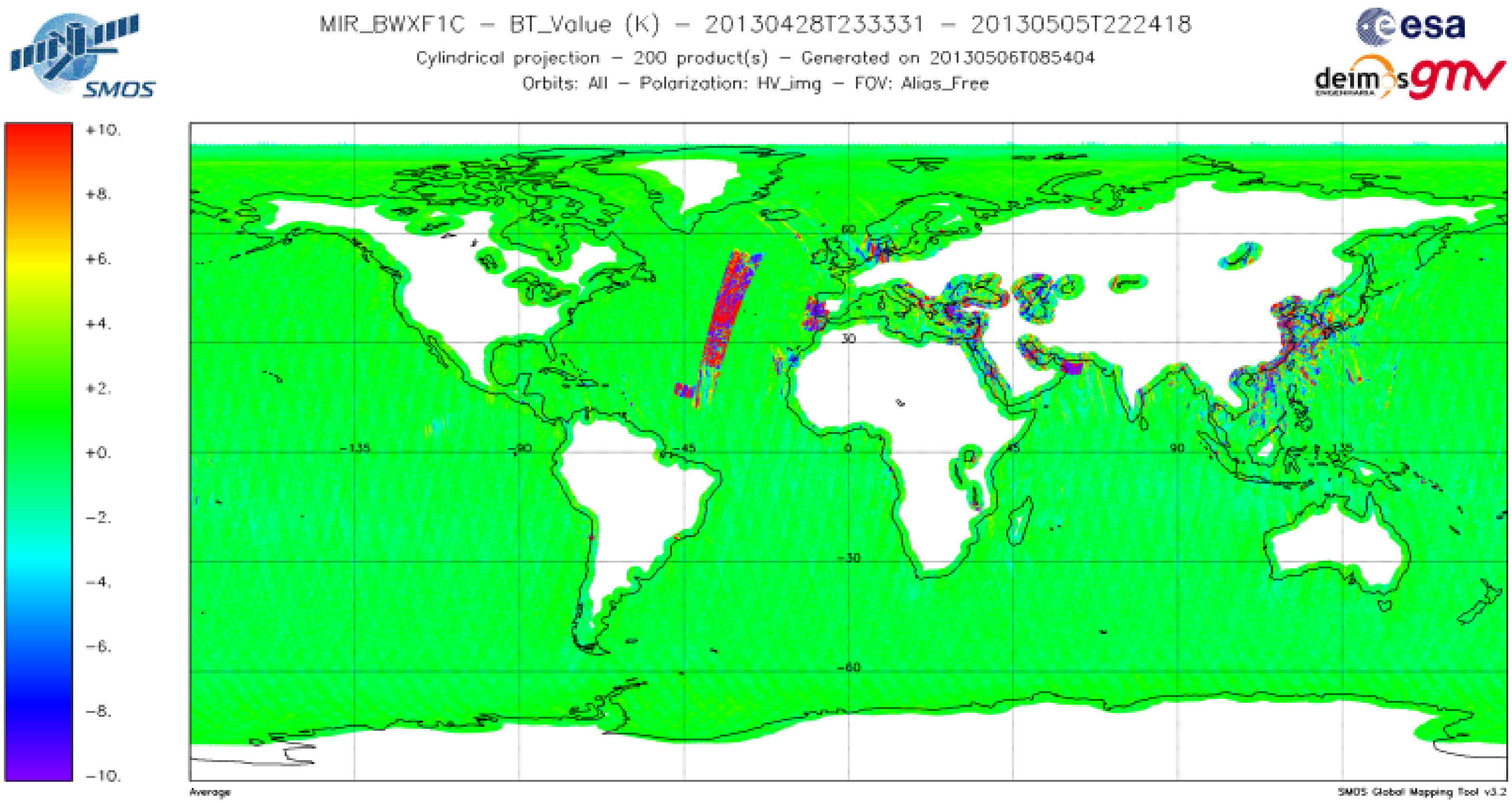


**Figure 64 Soil moisture evolution during the reporting period (week 14)**

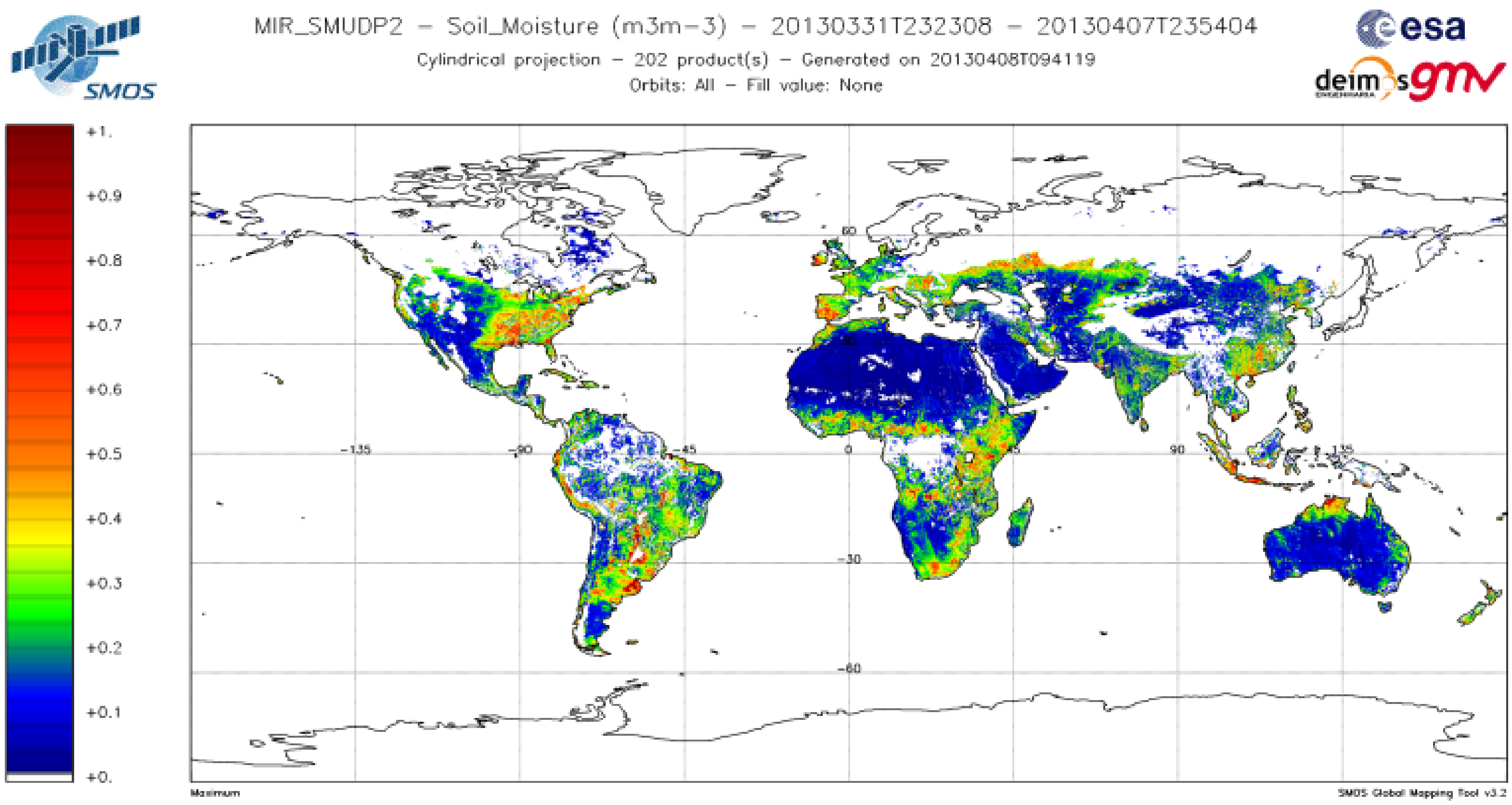


**Figure 65 Soil moisture evolution during the reporting period (week 15)**

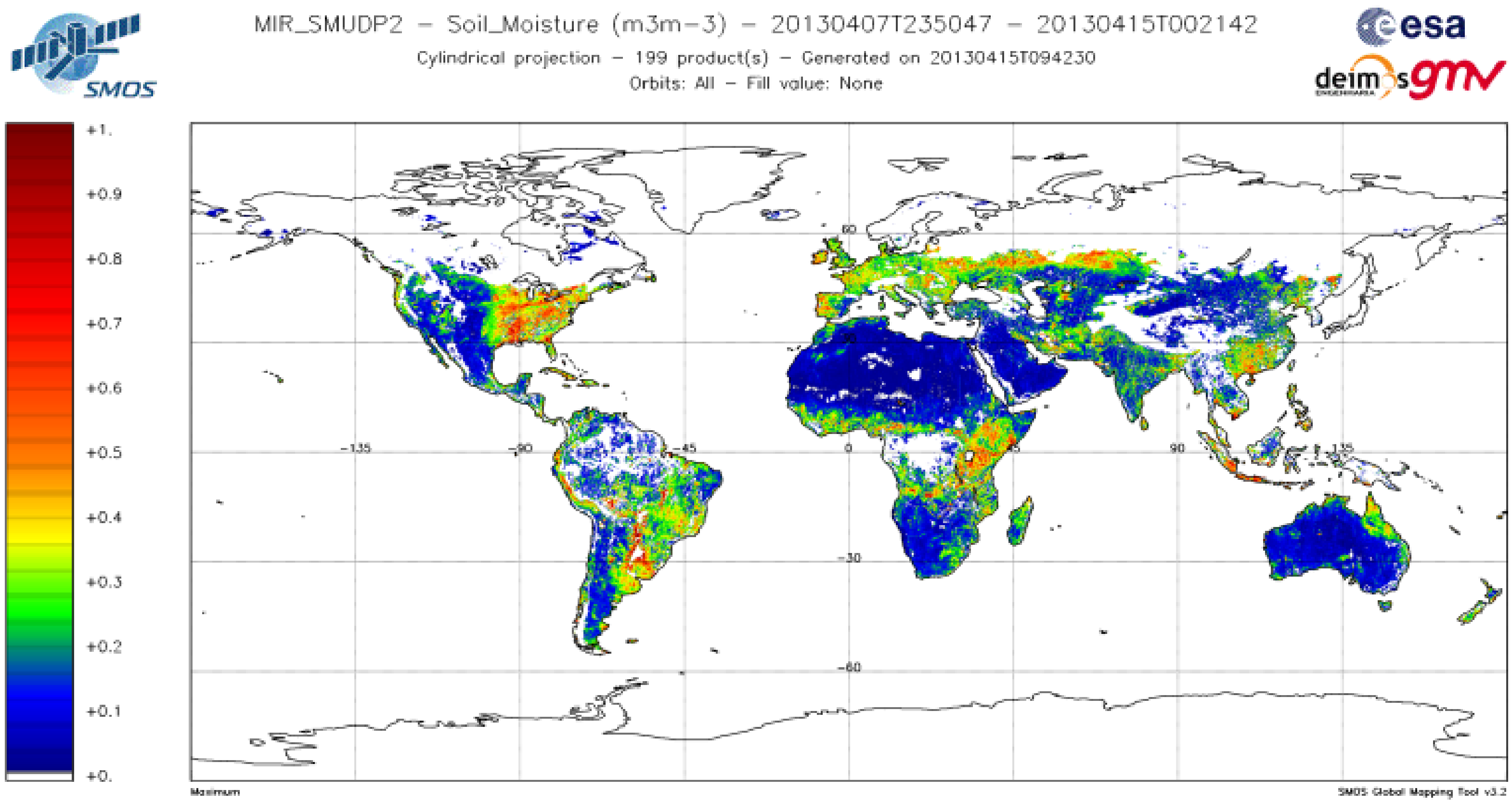


**Figure 66 Soil moisture evolution during the reporting period (week 16)**

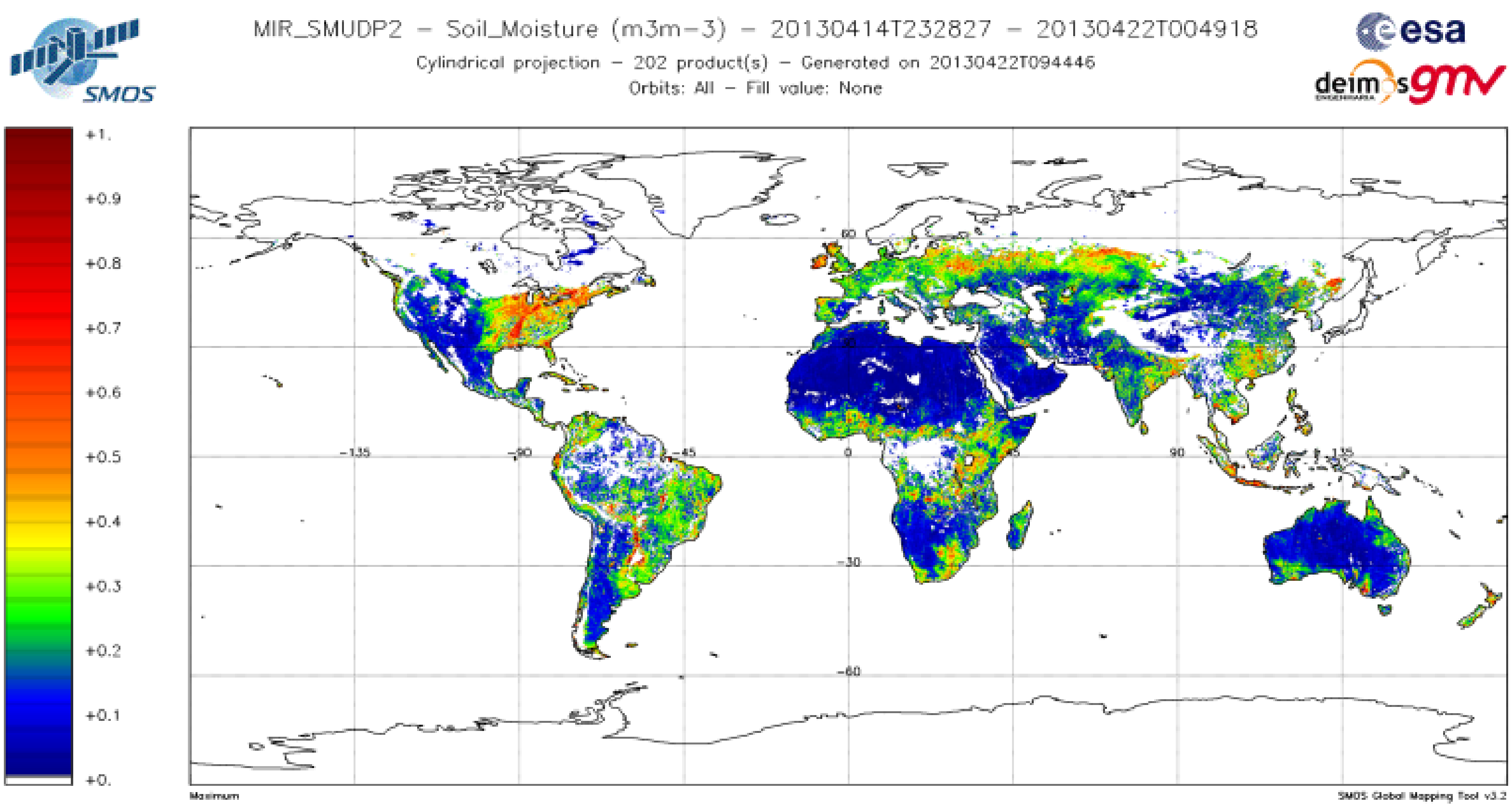


**Figure 67 Soil moisture evolution during the reporting period (week 17)**

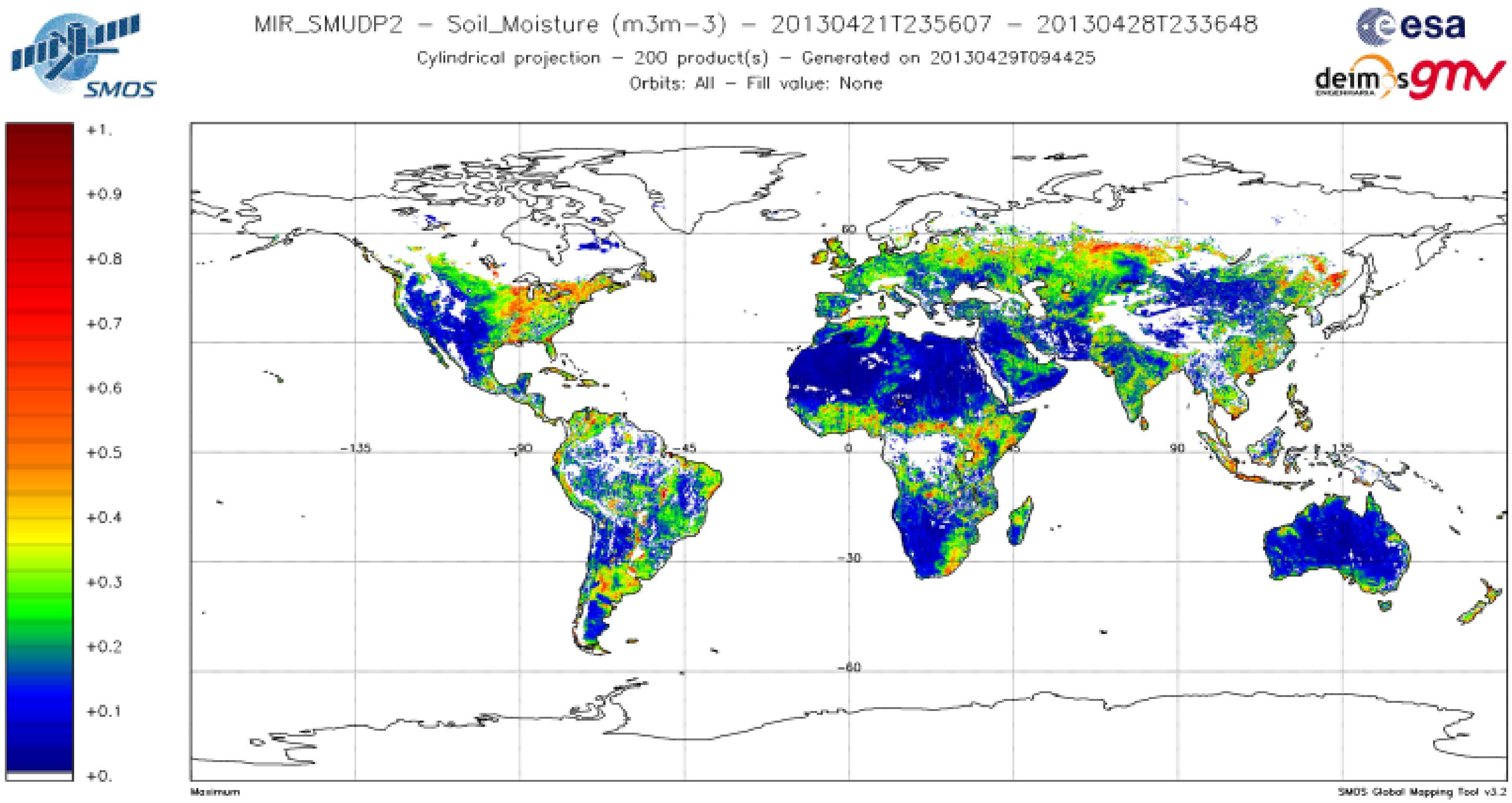


**Figure 68 Soil moisture evolution during the reporting period (week 18)**

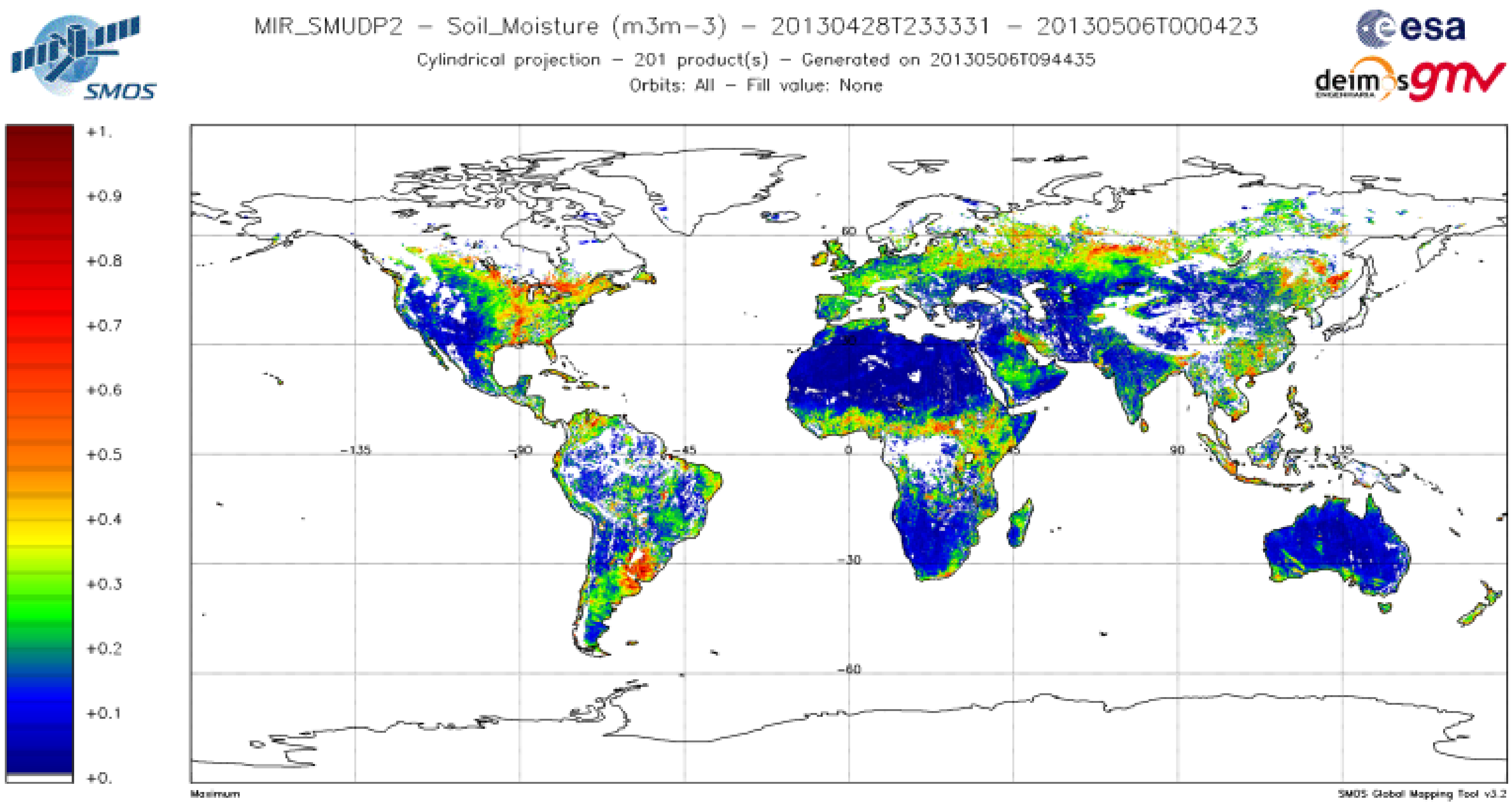
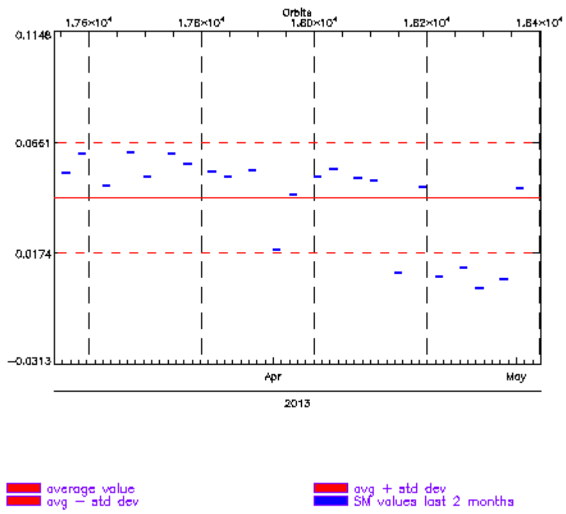


**Figure 69 Soil moisture on Taklamakan desert during the reporting period: SM in ascending passes (left) and SM in descending passes (right)**



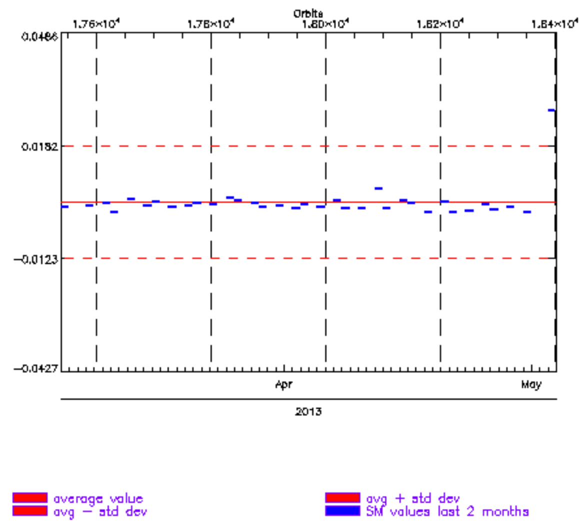
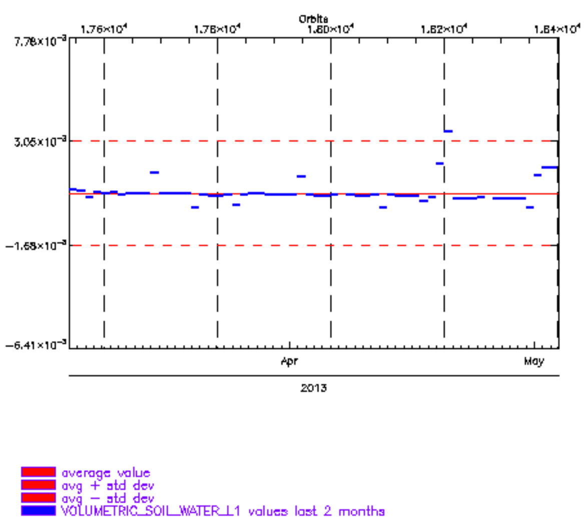
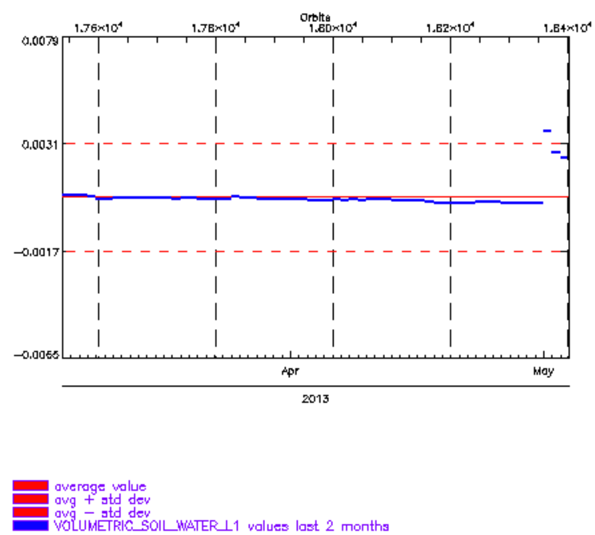




**Figure 70 Volumetric Soil Water L1 provided by ECMWF on Taklamakan desert during the reporting period: ascending passes (left) and descending passes (right)**



# 6. ADF CONFIGURATION AT THE END OF THE REPORTING PERIOD

| ADF File Type | Operational ADF Version (DPGS Baseline) | Updated |
|---|---|---|
| AUX_APDL__ | SM_OPER_AUX_APDL___20050101T000000_20500101T000000_300_002_3.EEF | No |
| AUX_APDNRT | SM_OPER_AUX_APDNRT_20050101T000000_20500101T000000_207_001_6.EEF | No |
| AUX_APDS__ | SM_OPER_AUX_APDS___20050101T000000_20500101T000000_300_002_3.EEF | No |
| AUX_ATMOS_ | SM_OPER_AUX_ATMOS__20050101T000000_20500101T000000_001_010_8.EEF | No |
| AUX_BFP___ | SM_OPER_AUX_BFP____20050101T000000_20500101T000000_340_003_3.EEF | No |
| AUX_BNDLST | SM_OPER_AUX_BNDLST_20050101T000000_20500101T000000_300_001_3 | No |
| AUX_BSCAT_ | SM_OPER_AUX_BSCAT__20050101T000000_20500101T000000_300_003_3 | No |
| AUX_BWGHT_ | SM_OPER_AUX_BWGHT__20050101T000000_20500101T000000_340_005_3.EEF | No |
| AUX_CNFFAR | SM_OPER_AUX_CNFFAR_20050101T000000_20500101T000000_100_002_3.EEF | No |
| AUX_CNFL0P | SM_OPER_AUX_CNFL0P_20050101T000000_20500101T000000_001_005_3.EEF | No |
| AUX_CNFL1P | SM_OPER_AUX_CNFL1P_20110206T010100_20500101T000000_500_046_3.EEF | Yes |
| AUX_CNFNRT | SM_OPER_AUX_CNFNRT_20050101T000000_20500101T000000_505_009_3.EEF | No |
| AUX_CNFOSD | SM_OPER_AUX_CNFOSD_20050101T000000_20500101T000000_001_021_3.EEF | No |
| AUX_CNFOSF | SM_OPER_AUX_CNFOSF_20050101T000000_20500101T000000_001_021_3.EEF | No |
| AUX_CNFSMD | SM_OPER_AUX_CNFSMD_20050101T000000_20500101T000000_001_010_3.EEF | No |
| AUX_CNFSMF | SM_OPER_AUX_CNFSMF_20050101T000000_20500101T000000_001_010_3.EEF | No |
| AUX_DFFFRA | SM_OPER_AUX_DFFFRA_20050101T000000_20500101T000000_001_004_3 | No |
| AUX_DFFLMX | SM_OPER_AUX_DFFLMX_20050101T000000_20500101T000000_001_005_3 | No |
| AUX_DFFXYZ | SM_OPER_AUX_DFFXYZ_20050101T000000_20500101T000000_001_003_3 | No |
| AUX_DGG___ | SM_OPER_AUX_DGG____20050101T000000_20500101T000000_300_002_4 | No |
| AUX_DGGXYZ | SM_OPER_AUX_DGGXYZ_20050101T000000_20500101T000000_001_004_3 | No |
| AUX_DISTAN | SM_OPER_AUX_DISTAN_20050101T000000_20500101T000000_001_011_3 | No |
| AUX_ECOLAI | SM_OPER_AUX_ECOLAI_20050101T000000_20500101T000000_305_006_3 | No |
| AUX_ECMCDF | SM_OPER_AUX_ECMCDF_20101109T000000_20500101T000000_001_001_3.EEF | No |
| AUX_FAIL__ | SM_OPER_AUX_FAIL___20050101T000000_20500101T000000_300_003_3.EEF | No |
| AUX_FLTSEA | SM_OPER_AUX_FLTSEA_20050101T000000_20500101T000000_001_010_8.EEF | No |
| AUX_FOAM__ | SM_OPER_AUX_FOAM___20050101T000000_20500101T000000_001_011_3 | No |
| AUX_GAL_OS | SM_OPER_AUX_GAL_OS_20050101T000000_20500101T000000_001_010_8 | No |
| AUX_GAL_SM | SM_OPER_AUX_GAL_SM_20050101T000000_20500101T000000_001_002_3 | No |
| AUX_GAL2OS | SM_OPER_AUX_GAL2OS_20050101T000000_20500101T000000_001_014_3 | No |
| AUX_GALAXY | SM_OPER_AUX_GALAXY_20050101T000000_20500101T000000_300_003_3 | No |
| AUX_GALNIR | SM_OPER_AUX_GALNIR_20050101T000000_20500101T000000_300_002_3 | No |
| AUX_LANDCL | SM_OPER_AUX_LANDCL_20050101T000000_20500101T000000_001_003_3.EEF | No |
| AUX_LCF___ | SM_OPER_AUX_LCF____20050101T000000_20500101T000000_500_013_3 | No |
| AUX_LSMASK | SM_OPER_AUX_LSMASK_20050101T000000_20500101T000000_300_003_3 | No |
| AUX_MASK__ | SM_OPER_AUX_MASK___20050101T000000_20500101T000000_300_002_3 | No |
| AUX_MISP__ | SM_OPER_AUX_MISP___20050101T000000_20500101T000000_300_003_3.EEF | No |
| AUX_MN_WEF | SM_OPER_AUX_MN_WEF_20050101T000000_20500101T000000_001_002_3 | No |
| AUX_MOONT_ | SM_OPER_AUX_MOONT__20050101T000000_20500101T000000_300_002_3 | No |
| AUX_N256__ | SM_OPER_AUX_N256___20050101T000000_20500101T000000_504_001_3 | No |
| AUX_NIR___ | SM_OPER_AUX_NIR____20050101T000000_20500101T000000_500_007_3 | No |
| AUX_NRTMSK | SM_OPER_AUX_NRTMSK_20050101T000000_20500101T000000_207_001_6 | No |
| AUX_OTT1D_ | SM_OPER_AUX_OTT1D__20130401T000000_20500101T000000_550_001_3 | Yes |
| AUX_OTT1F_ | SM_OPER_AUX_OTT1F__20130401T000000_20500101T000000_550_001_3 | Yes |

| | | |
|---|---|---|
| AUX_OTT2D_ | SM_OPER_AUX_OTT2D__20130401T000000_20500101T000000_550_001_3 | Yes |
| AUX_OTT2F_ | SM_OPER_AUX_OTT2F__20130401T000000_20500101T000000_550_001_3 | Yes |
| AUX_OTT3D_ | SM_OPER_AUX_OTT3D__20130401T000000_20500101T000000_550_001_3 | Yes |
| AUX_OTT3F_ | SM_OPER_AUX_OTT3F__20130401T000000_20500101T000000_550_001_3 | Yes |
| AUX_PATT__ | SM_OPER_AUX_PATT___20050101T000000_20500101T000000_320_003_3 | No |
| AUX_PLM___ | SM_OPER_AUX_PLM____20050101T000000_20500101T000000_300_007_3.EEF | No |
| AUX_PMS___ | SM_OPER_AUX_PMS____20050101T000000_20500101T000000_340_010_3.EEF | No |
| AUX_RFI___ | SM_OPER_AUX_RFI____20050101T000000_20500101T000000_300_003_3 | No |
| AUX_RFILST | SM_OPER_AUX_RFILST_20050101T000000_20500101T000000_001_004_3.EEF | No |
| AUX_RGHNS1 | SM_OPER_AUX_RGHNS1_20050101T000000_20500101T000000_001_015_3 | No |
| AUX_RGHNS2 | SM_OPER_AUX_RGHNS2_20050101T000000_20500101T000000_001_013_3 | No |
| AUX_RGHNS3 | SM_OPER_AUX_RGHNS3_20050101T000000_20500101T000000_001_013_3 | No |
| AUX_SGLINT | SM_OPER_AUX_SGLINT_20050101T000000_20500101T000000_001_011_3 | No |
| AUX_SOIL_P | SM_OPER_AUX_SOIL_P_20050101T000000_20500101T000000_001_002_3 | No |
| AUX_SPAR__ | SM_OPER_AUX_SPAR___20110112T091500_20500101T000000_340_006_3.EEF | No |
| AUX_SSS___ | SM_OPER_AUX_SSS____20050101T000000_20500101T000000_001_013_3 | No |
| AUX_SUNT__ | SM_OPER_AUX_SUNT___20050101T000000_20500101T000000_300_002_3 | No |
| AUX_WEF___ | SM_OPER_AUX_WEF____20050101T000000_20500101T000000_001_003_3 | No |
| MPL_ORBSCT | SM_OPER_MPL_ORBSCT_20091102T031142_20500101T000000_360_001_1 | No |

# APPENDIX A. CONFIGURATION DOCUMENT LIST

The list of internal documents used for the generation of this report is:

- Unavailability_08_04_13.xls
- Details_Calibrations_29_04_13.xls
- SO-MN-IDR-GS-0427_CCB-147_03-Apr-13_v10.doc
- SO-MN-IDR-GS-0428_CCB-148_09-Apr-13_v10.doc
- SO-MN-IDR-GS-0429_CCB-149_16-Apr-13_v10.doc
- SO-MN-IDR-GS-0430_CCB-150_23-Apr-13_v10.doc
- SO-MN-IDR-GS-0431_CCB-151_30-Apr-13_v10.doc

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