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Title : **IDEAS – SMOS Public Monthly Report - October 2014**

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	12 November 2014	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 updates to SMOS processing and AUX files during October 2014.

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

The data quality during October was found to be nominal till sensing time 15 October 18:22 UTC when a warm-NIR calibration has been executed. After that sensing time the brightness temperature calibrated with the warm-NIR had increased of about 1K and it remained stable until the end of the reporting period. Sea surface salinity data has been impacted by the brightness temperature bias with an overall decrease of the retrieved ocean salinity. Furthers degradation in the data are listed in the section 4.5. The degradation of the data reported in section 4.5 has been induced either by instrument anomalies or by the unavailability of the dynamic auxiliary files.

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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

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	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 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 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
Time	Orbit	Time	Orbit			
07/10/2014 17:18z	25909	07/10/2014 17:18z	25909	FOS-0283	No	MM Latch up P6

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08/10/2014 18:00z	25924	08/10/2014 18:00z	25924	FOS-0284	Yes	MM Latch up P6 Recovery
11/10/2014 00:48z	25957	11/10/2014 00:58z	25957	FOS-0285	No	CMN Unlock B3
17/10/2014 21:31z	26056	17/10/2014 21:41z	26056	FOS-0286	No	CMN Unlock H3
19/10/2014 09:15z	26077	19/10/2014 09:15z	26077	FOS-0287	No	MM Latch up P1
20/10/2014 16:00z	26096	20/10/2014 16:00z	26096	FOS-0288	Yes	MM Latch up P1 Recovery
29/10/2014 22:48z	26229	29/10/2014 23:08z	26229	FOS-0289	Yes	OCM

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4. DATA SUMMARY

4.1 Reprocessing activities

The information regarding to data reprocessing activities (REPR data type) during the reporting period are:

1) Preparation has continued for the L2 data reprocessing. The distribution of the complete reprocessed data set (L1 and L2) is planned for the first quarter of 2015.

The information regarding to the data regeneration activities (OPER data type) during the reporting period are:

1) None

The information regarding to past data reprocessing activities (REPR data type) are:

1) The second SMOS mission reprocessing for L1 data started on 2014-07-10, and finished on 2014-09-04.

2) 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 v505, 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:

   a) L1 read-me-first note available on:

https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-5105.pdf

   b) L2 soil moisture read-me-first note available on:

https://earth.esa.int/documents/10174/118493/L2SMv551_release_note_2013-08-09.pdf

   c) L2 sea surface salinity read-me-first note available on:

https://earth.esa.int/c/document_library/get_file?folderId=118493&name=DLFE-6605.pdf

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

3) The first SMOS L2 sea surface salinity "catch-up" reprocessing campaign has been completed and the data set covering the period from 22 December 2011 to 31 December 2012 has been released to the SMOS user community. The SMOS L2 sea surface salinity "catch-up" data set has been generated by the L2OS processor version V5.50 using as input the level 1C data from the nominal operational chain (i.e. L1C V505 OPER data type) and an improved Ocean Target Transformation (OTT) correction for the sea surface salinity retrieval. The catch-up reprocessing aimed at aligning the operationally available data set to the reprocessed data set and

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will be repeated until the operational processing chain will use the same approach (foreseen for end of 2014). With the release of this data set the SMOS users now have a consistent dataset of sea surface salinity measurements from the beginning of the SMOS mission till December 2012 (REPR data type). Data users are strongly encouraged to consult the Level 2OS read-me-first note (https://earth.esa.int/c/document_library/get_file?folderId=118493&name=DLFE-6605.pdf) to understand the improvements and known caveats in the data set before using the SMOS data.

4) The first SMOS level 2 soil moisture "catch-up" reprocessing campaign has been completed and the dataset covering the period from 12 January 2010 to 27 April 2012 has been released to the SMOS user community. The SMOS level 2 soil moisture "catch-up" dataset has been generated by the current version V5.51 of the level 2 soil moisture processor using as input the level 1C data from the level 1 reprocessing campaign (i.e. L1C V5.05 REPR data type) with sensing time till 22 December 2011 and the level 1 from the nominal operational chain (i.e. L1C V5.05 OPER data type) thereafter. The “catch-up” soil moisture reprocessing intends to align the entire soil moisture data archive to the currently used level 2 soil moisture processor baseline V5.51.

   With the "catch-up" campaign now completed, the users have a consistent and homogenous long term soil moisture level 2 soil moisture V5.51 dataset that can be exploited for their research activities from the beginning of the SMOS mission up to the present. Data users are strongly encouraged to consult the Level 2SM read-me-first note (https://earth.esa.int/documents/10174/118493/L2SMv551_release_note_2013-08-09.pdf) to understand the known caveats in the dataset before using the SMOS data.

5) The Second SMOS L2 sea surface salinity "catch-up" reprocessing campaign has been completed and the data set covering the period from 01 January 2013 to 31 December 2013 has been released to the SMOS user community.

   The SMOS L2 sea surface salinity "catch-up" data set has been generated by the L2OS processor version V5.50 using as input the level 1C data from the nominal operational chain (i.e. L1C V505 OPER data type) and an improved Ocean Target Transformation (OTT) correction for the sea surface salinity retrieval. The catch-up reprocessing aimed at aligning the operationally available data set to the reprocessed data set and will be repeated until the operational processing chain will use the same approach (foreseen for end of 2014). With the release of this data set the SMOS users now have a consistent dataset of sea surface salinity measurements from the beginning of the SMOS mission till December 2013 (REPR data type). Data users are strongly encouraged to consult the Level 2OS read-me-first note (https://earth.esa.int/documents/10174/127856/SMOS_Level-2_Ocean_Salinity_RN)to understand the improvements and known caveats in the data set before using the SMOS data.

The information regarding to the past data regeneration activities (OPER data type) are:

1) 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.

2) 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.

3) 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.

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4.2 Processing changes

4.2.1 Processor updates

No processor updates have been conducted during the reporting period.

4.2.2 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) 505 (L1c)
L2OS	550
L2SM	551

Table 4-2 Pre- and Post-processors status

Processor	Version
ECMWFP	318
VTECGN	311
LAI pre-processor	307
L2 Post-processors	400

4.2.3 Schema updates

No schema changes have been conducted during the reporting period.

4.2.4 Schema status

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

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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 Global Mapping Tool (GMT) webpage:

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

4.2.5 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 7.

SM_OPER_AUX_BULL_B_20140802T000000_20140901T235959_120_001_3

Start sensing time at L1 processor: N/A

Justification: Bulletin Update including values from August 2014 and the prediction for September 2014. Its usage is intended for reprocessing.

SM_OPER_AUX_BULL_B_20140802T000000_20500101T000000_120_001_3

Start sensing time at L1 processor: 2014-10-09 03:40:58z

Justification: Bulletin Update including values from August 2014 and the prediction for September 2014. Its usage is intended for the nominal production.

SM_OPER_AUX_OTT1D__20141001T000000_20500101T000000_550_001_3

Start sensing time at L2 processor: N/A

Justification: October update.

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SM_OPER_AUX_OTT1F__20141001T000000_20500101T000000_550_001_3

Start sensing time at L2 processor: 2014-10-09 T 02:00:52z

Justification: October update.

SM_OPER_AUX_OTT2D__20141001T000000_20500101T000000_550_001_3

Start sensing time at L2 processor: N/A

Justification: October update.

SM_OPER_AUX_OTT2F__20141001T000000_20500101T000000_550_001_3

Start sensing time at L2 processor: 2014-10-09 T 02:00:52z

Justification: October update.

SM_OPER_AUX_OTT3D__20141001T000000_20500101T000000_550_001_3

Start sensing time at L2 processor: N/A

Justification: October update.

SM_OPER_AUX_OTT3F__20141001T000000_20500101T000000_550_001_3

Start sensing time at L1 processor: 2014-10-09 T 02:00:52z

Justification: October update.

4.3 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

Date	Start Time	Stop Time	Calibration	Comments
01/10/14	04:17:37.400	05:39:50.600	NIR	Nominal Brightness temperature:4.2465 K RMS: 1.095999 K Moon Elevation: 5.322583 deg Sun Elevation: -9.401407 deg Right Ascension: 286.730473 deg

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				Declination: 39.457066 deg
02/10/14	16:35:00.000	16:36:44.400	Short	Nominal
09/10/14	17:03:00.000	17:04:44.400	Short	Nominal
15/10/14	17:47:53.400	19:10:06.600	warm-NIR	Nominal Brightness temperature: 3.987190 K RMS: 0.812546 K Moon Elevation: -15.148207 deg Sun Elevation: 9.968127 deg Right Ascension: 108.099693 deg Declination: -49.192546 deg
16/10/14	15:51:22.000	18:24:45.200	Long	Nominal
23/10/14	16:18:54.000	16:20:38.400	Short	Nominal
29/10/14	18:44:51.400	20:07:04.600	warm-NIR	Nominal Brightness temperature: 3.837081 K RMS: 0.644248 K Moon Elevation: - Sun Elevation: 9.864599 deg Right Ascension: 130.301228 deg Declination: -16.031443 deg
30/10/14	16:18:54.000	16:20:38.400	Short	Nominal

4.4 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.

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Table 4-5 Data loss summary

Start	Finish	Data Level	Comments
29/10/2014 22:48z Orbit 26229	29/10/2014 22:48z Orbit 26229	All Products	OCM (FOS-0289)[1]

1: Data acquired during the manoeuvre is flagged as external pointing and not available as nominal data.

Table 4-6 Operational gaps summary

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

4.5 Summary of degraded data

In October 2014, SMOS data was affected by the following instrument and processing anomalies which have had a detrimental effect on the data quality.

Table 4-7 Summary of degraded data

Start	Finish	Affected products	Problem Description
11/10/2014 00:48z	11/10/2014 00:58z	L1a and above products.	CMN Unlock B3 (FOS-0285)
17/10/2014 21:31z	17/10/2014 21:41z	L1a and above products.	CMN Unlock H3 (FOS-0286)

4.6 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

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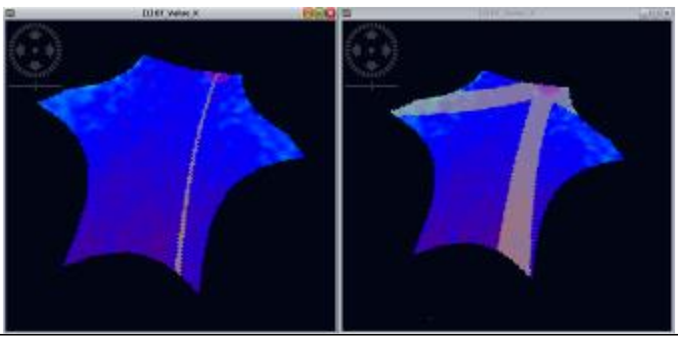
	Sun glint over ocean. The major impact of this anomaly is on the users who are using L1c data to retrieve Sea Surface Salinity. Those users need to discard the information provided by the Sun glint flag in their retrieval algorithms. This anomaly does not impact the ESA Level 2 Ocean salinity product 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 V550, 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.
15 October 2014	From 15 October 18:22 UTC onwards the brightness temperature is about 1K warmer. This bias impacts the sea surface salinity

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	retrieval.

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 01th,15th and 29th of October. 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, with warm-NIR values closer to the limit range.

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, 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 620 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.

The Warm NIR calibrations performed on 7th of July, 15th and 29th of September were commanded with the Sun slightly above the antenna plane. These were experimental NIR calibrations and have not been used in the operational chain, but there are included in the analysis for completeness. The result of these calibrations can be easily seen in the plots as an outlier value. After these three experimental calibrations it was agreed that the execution of NIR calibrations with the Sun slightly above the antenna plane and elevations between 5 and 10 degrees removes the anomalous behaviour of LICEF-BC-03, while maintaining a better thermal stability and reducing the thermal stress of the instrument. Therefore, Warm NIR calibrations with a Sun elevation of 10 degrees are now implemented operationally in the flight and ground segment since 15 October 2014.

The operational warm-NR calibrations performed on 15th and 29th of October (and ingested in the nominal chain) have been used to calibrate the data in the operational chain and caused an increase of ~1K in brightness temperature in L1c products. This effect is mainly due to the calibration methodology used in the operational processor which is based on the usage of antenna temperature to compute the antenna losses. As explained above, with the new processor version V620 this coupling effect between antenna losses and antenna temperature will be much more reduced and no jump in the brightness temperature is expected. The biases in the brightness temperature is not compensated for by the October OTT (which was computed by analysing data acquired before the implementation of the warm-NIR calibration) and therefore sea surface salinity data was impacted by a reduction in the retrieved salinity of about 1psu.

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In order to keep stability in the long term operational data set, plans are being made to recovery the current data degradation.

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

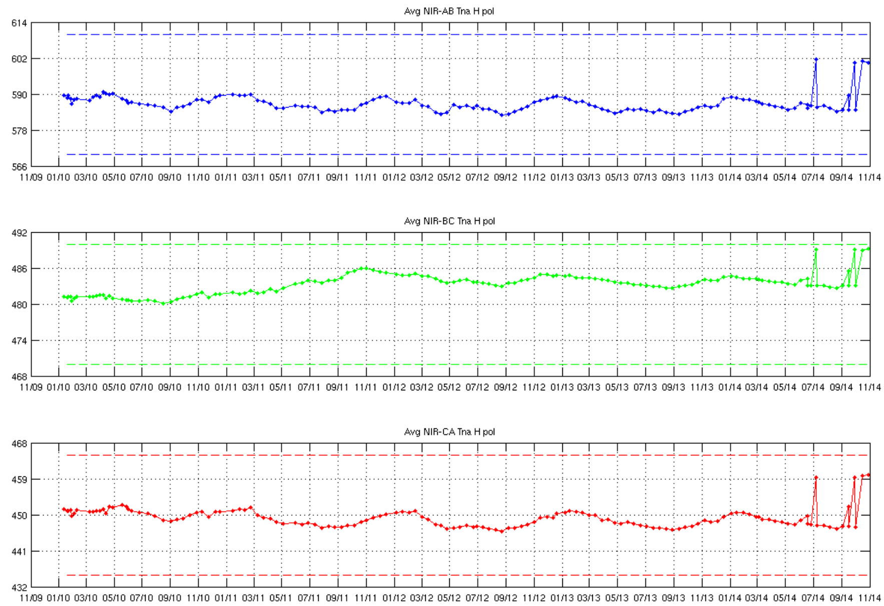

Figure 2 Tna evolution of NIR AB (blue), NIR BC (green) and NIR CA (red) in the V-channel since the beginning of the mission. Thresholds in dashed lines

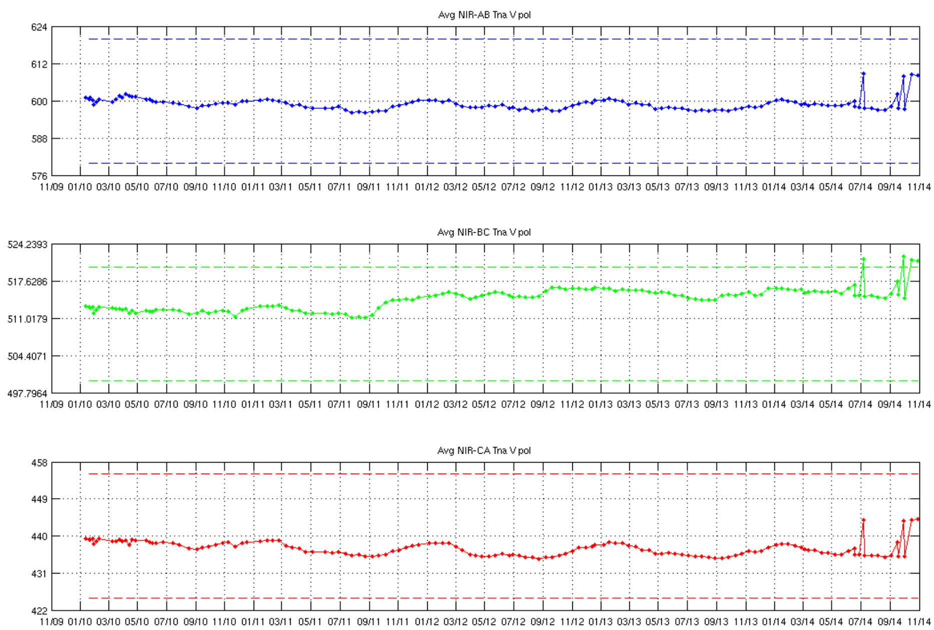

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Figure 3 Tnr evolution of NIR AB (blue), NIR BC (green) and NIR CA (red) in the H-channel since the beginning of the mission. Thresholds in dashed lines

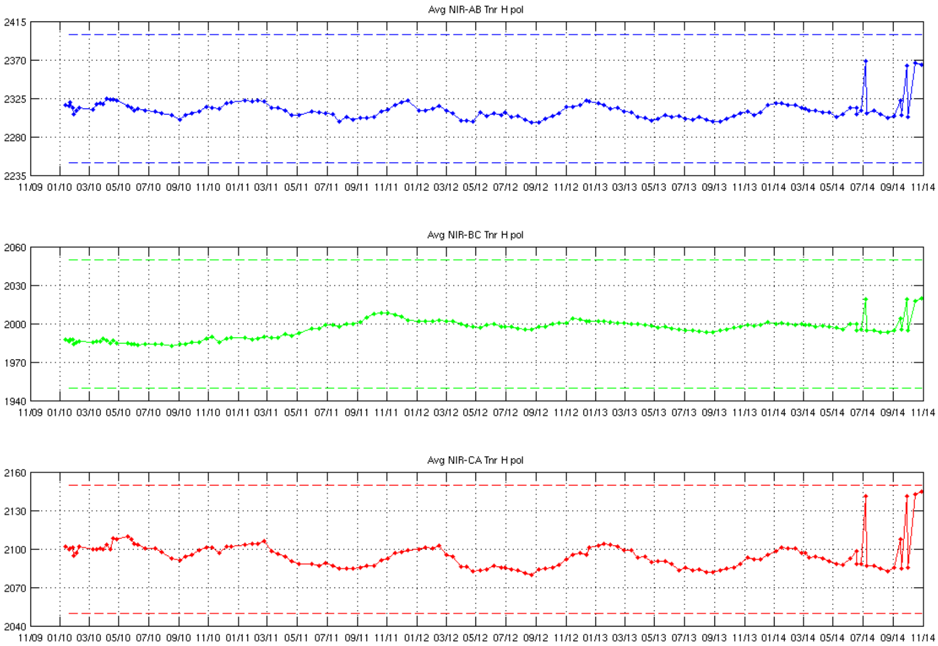

Figure 4 Tnr evolution of NIR AB (blue), NIR BC (green) and NIR CA (red) in the V-channel since the beginning of the mission. Thresholds in dashed lines

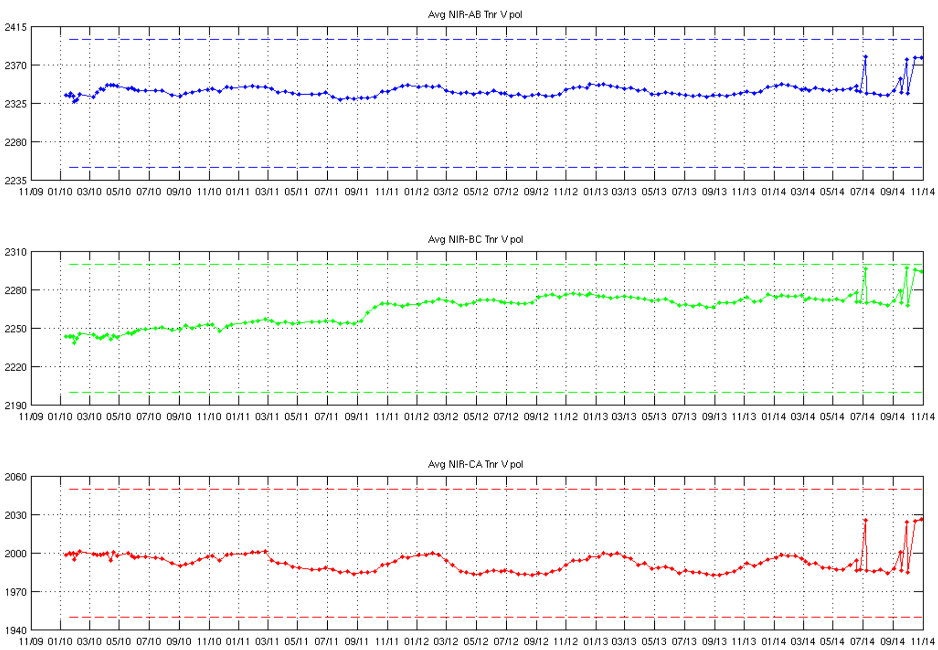

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Figure 5 Cross-coupling evolution in amplitude and phase of NIR AB (blue), NIR BC (green) and NIR CA (red) since the beginning of the mission

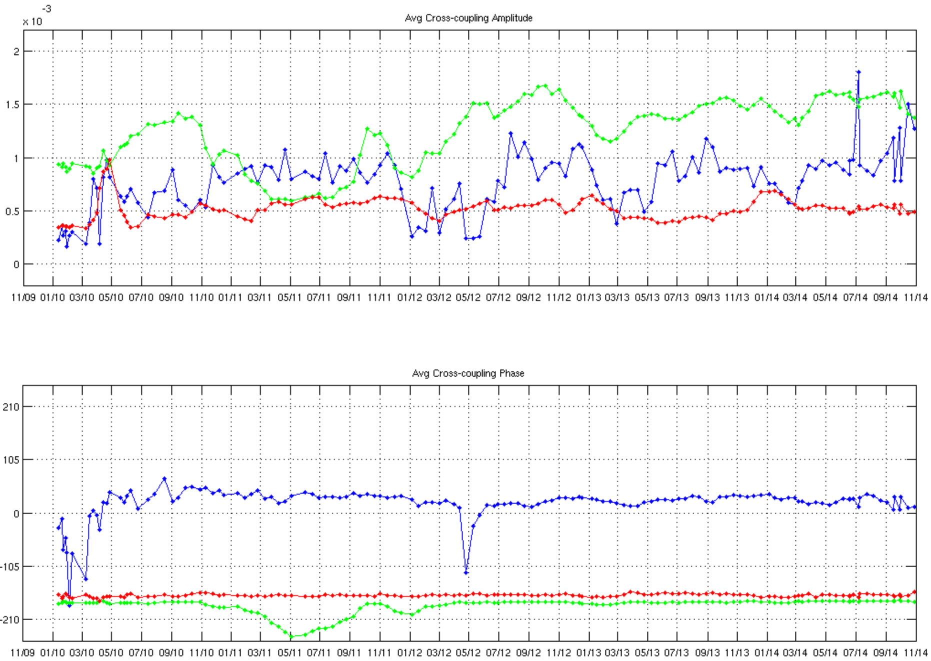
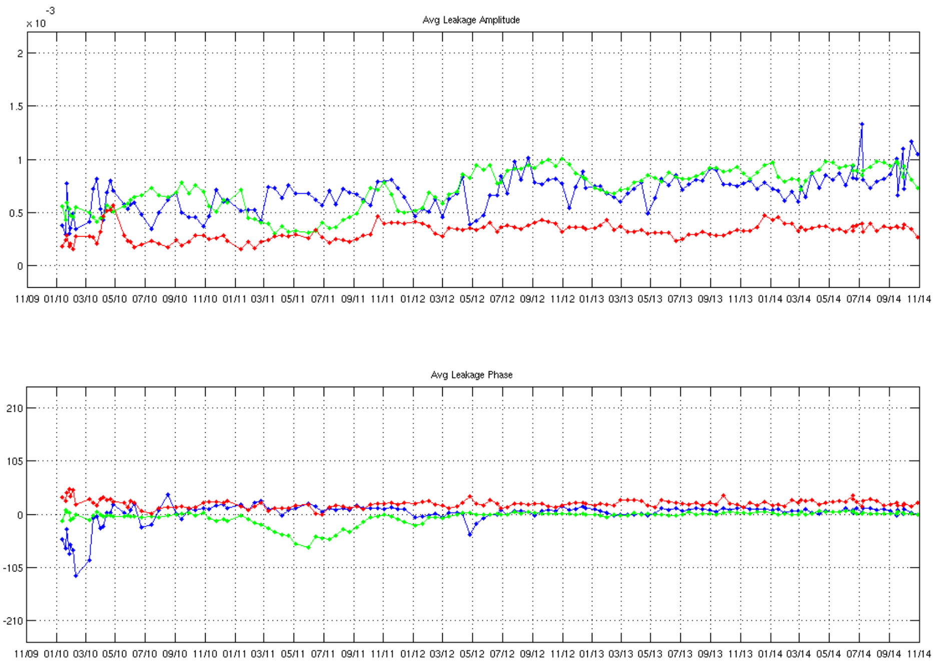


Figure 6 Leakage factor evolution in amplitude and phase of NIR AB (blue), NIR BC (green) and NIR CA (red) since the beginning of the mission



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The LICEF calibration status is updated by long (every 8 weeks) and short (weekly) on-board calibration activities. A long calibration has been executed during the reporting period on 16th October.

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 (not computed using the warm-NIR calibrations) 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.

The PMS gain computed using the warm-NIR calibration from 15 October 2014 onwards, shows an evolution of about 2% This is caused by higher *Tna* and *Tnr* temperatures due to warm-NIR calibrations.

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 and Short calibration as reported in Table 4-4

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

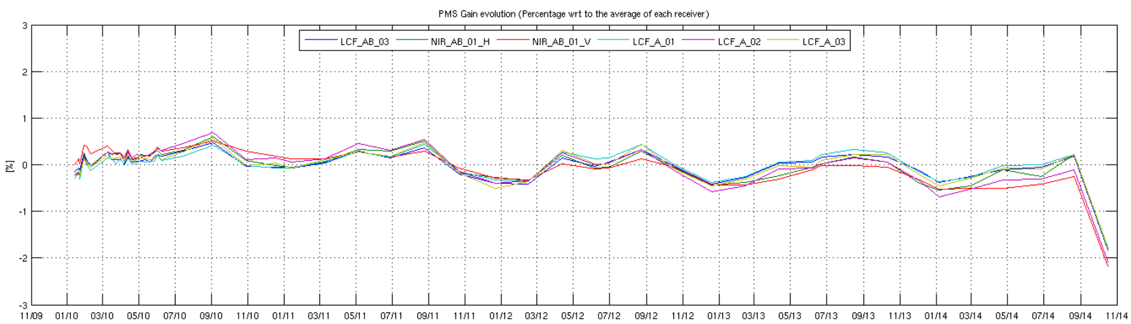

Figure 8 Evolution of the Δ PMS Gain of the LICEFS in CMN A1

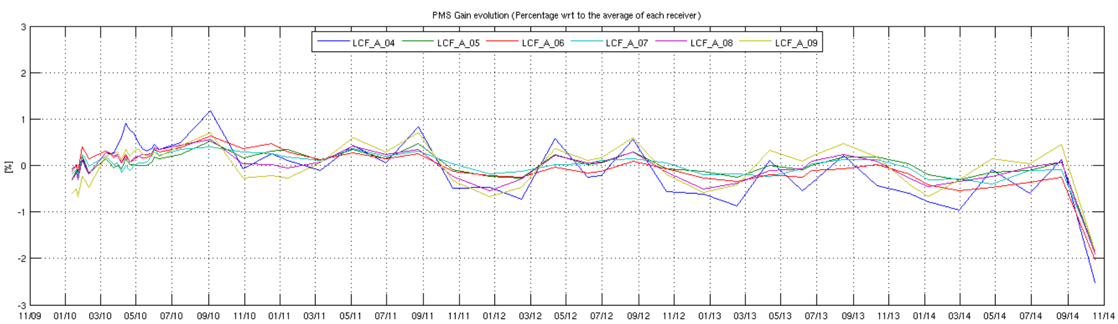

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Figure 9 Evolution of the Δ PMS Gain of the LICEFS in CMN A2

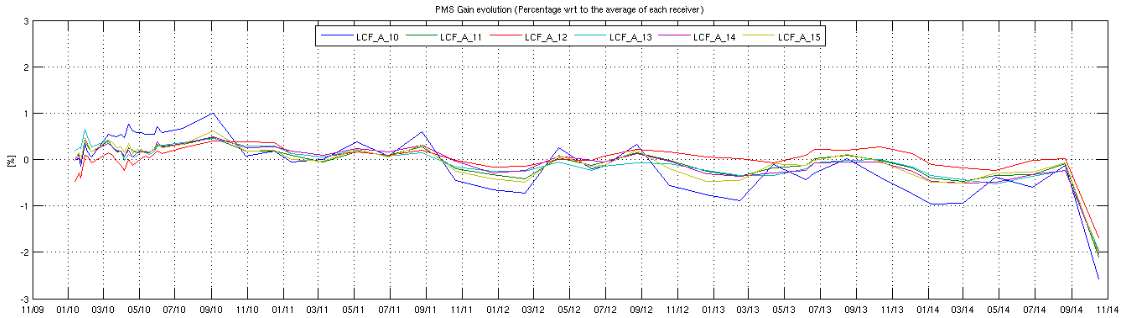

Figure 10 Evolution of the Δ PMS Gain of the LICEFS in CMN A3

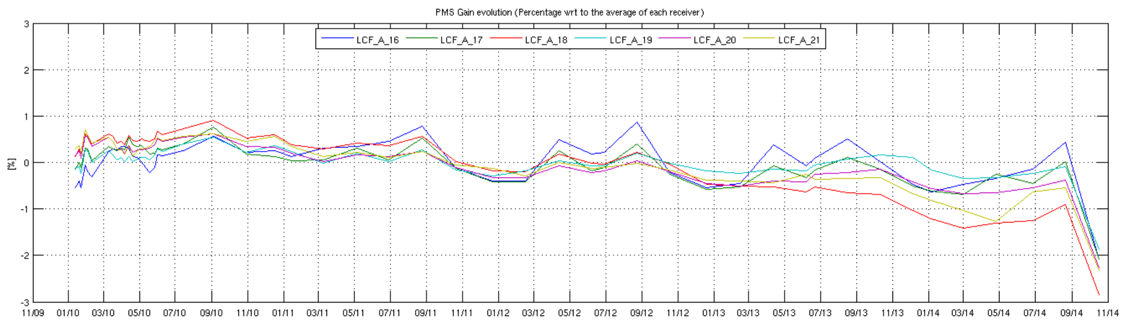

Figure 11 Evolution of the Δ PMS Gain of the LICEFS in CMN H2

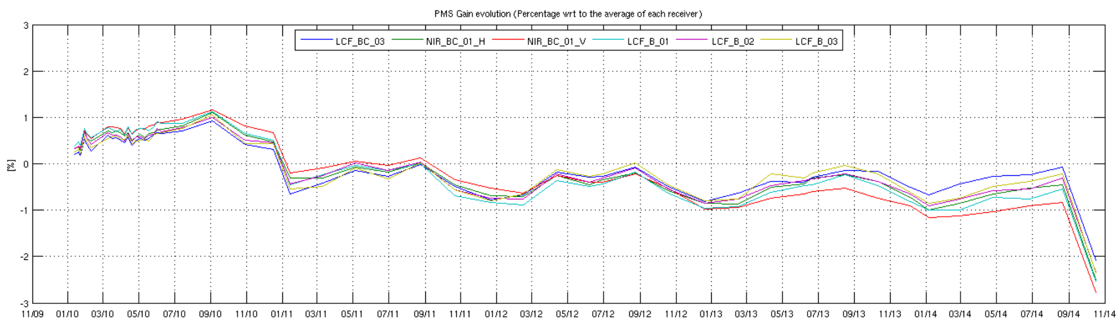

Figure 12 Evolution of the Δ PMS Gain of the LICEFS in CMN B1

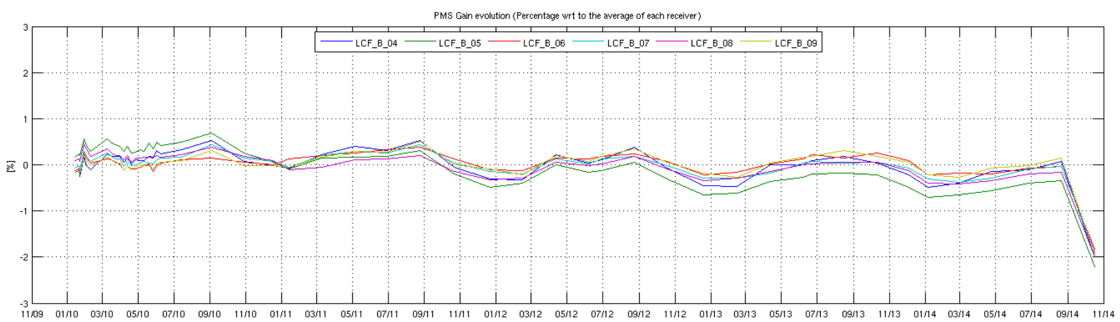

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Figure 13 Evolution of the Δ PMS Gain of the LICEFS in CMN B2

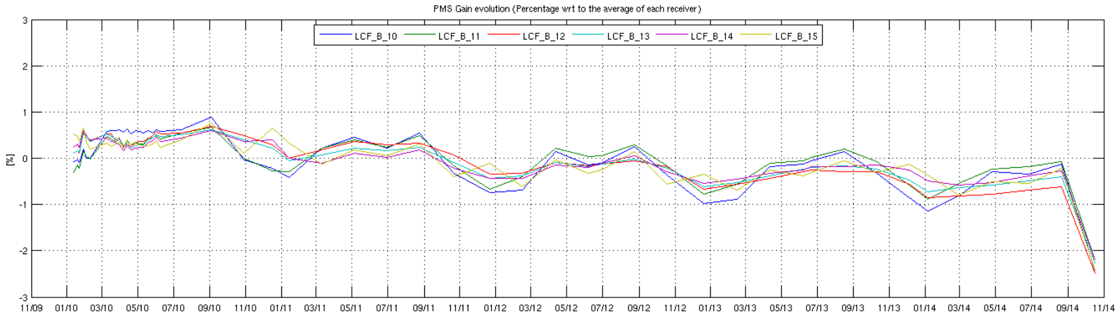

Figure 14 Evolution of the Δ PMS Gain of the LICEFS in CMN B3

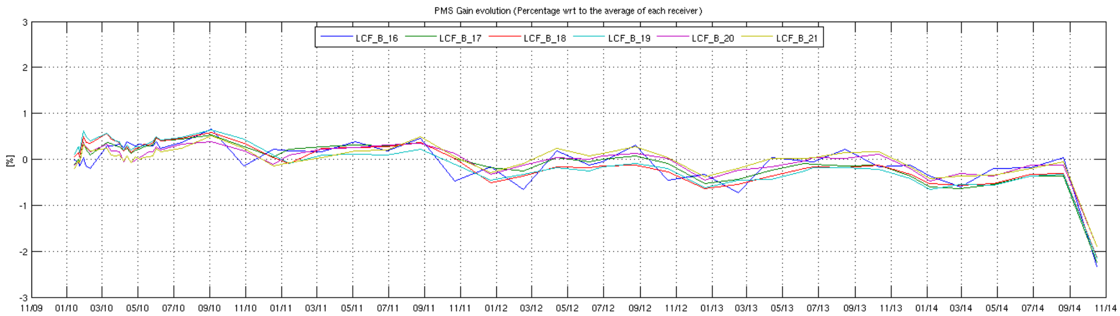

Figure 15 Evolution of the Δ PMS Gain of the LICEFS in CMN H3

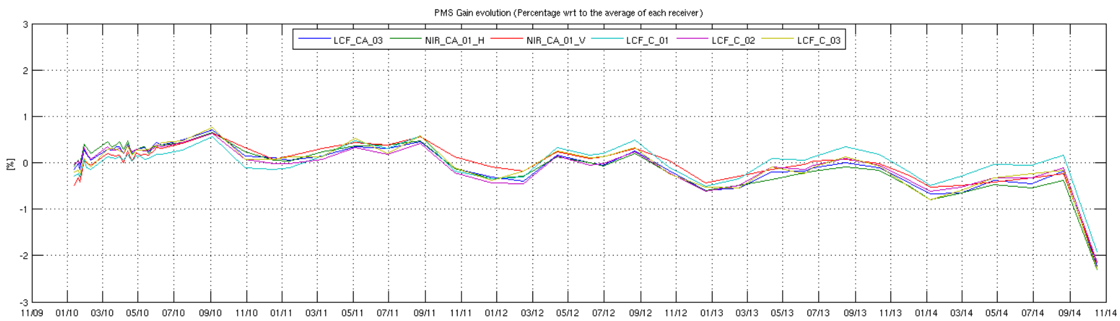

Figure 16 Evolution of the Δ PMS Gain of the LICEFS in CMN C1

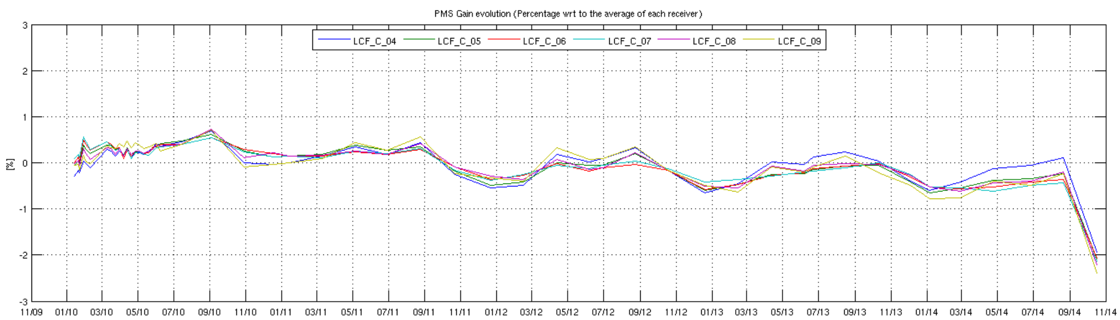

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Figure 17 Evolution of the Δ PMS Gain of the LICEFS in CMN C2

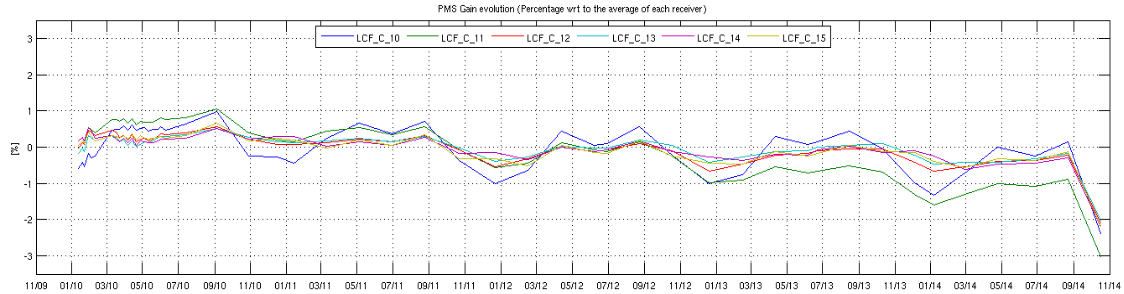

Figure 18 Evolution of the Δ PMS Gain of the LICEFS in CMN C3

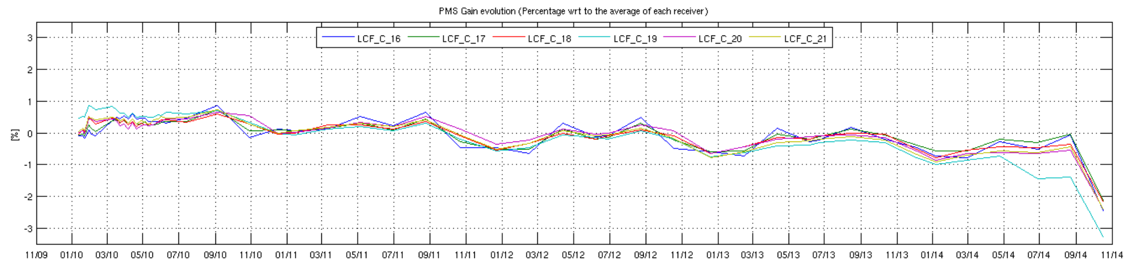

Figure 19 Evolution of the Δ PMS Offset of the LICEFS in CMN H1

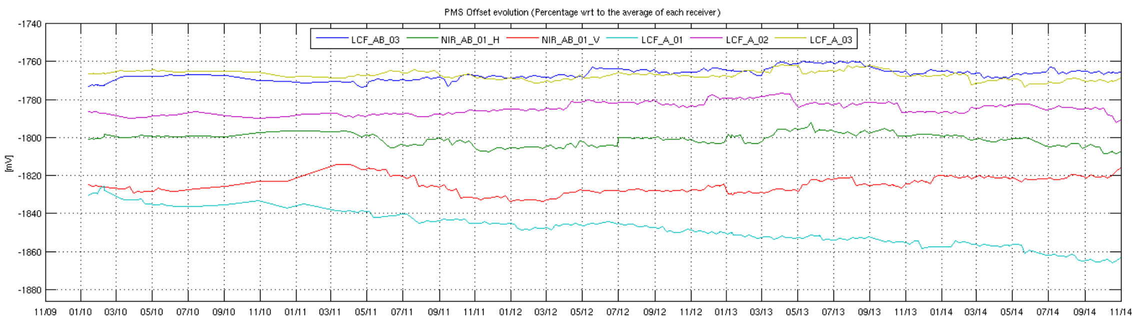

Figure 20 Evolution of the Δ PMS Offset of the LICEFS in CMN A1

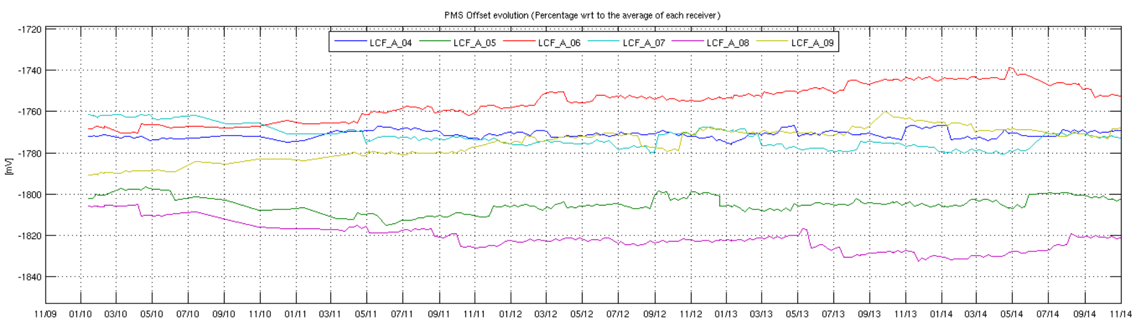

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Figure 21 Evolution of the Δ PMS Offset of the LICEFS in CMN A2

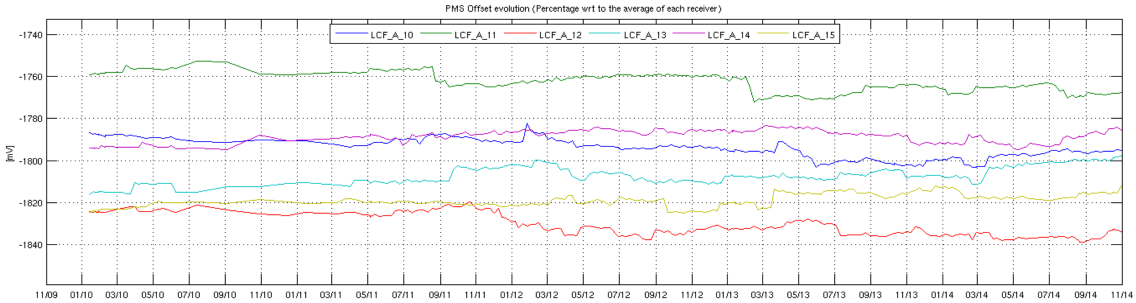

Figure 22 Evolution of the Δ PMS Offset of the LICEFS in CMN A3

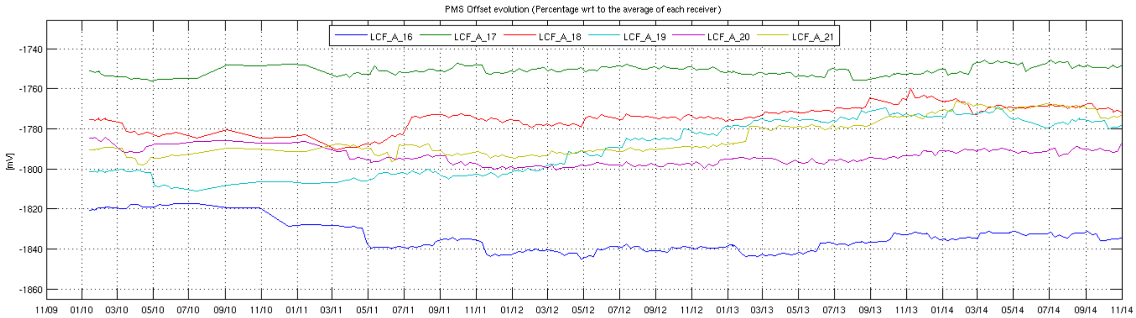

Figure 23 Evolution of the Δ PMS Offset of the LICEFS in CMN H2

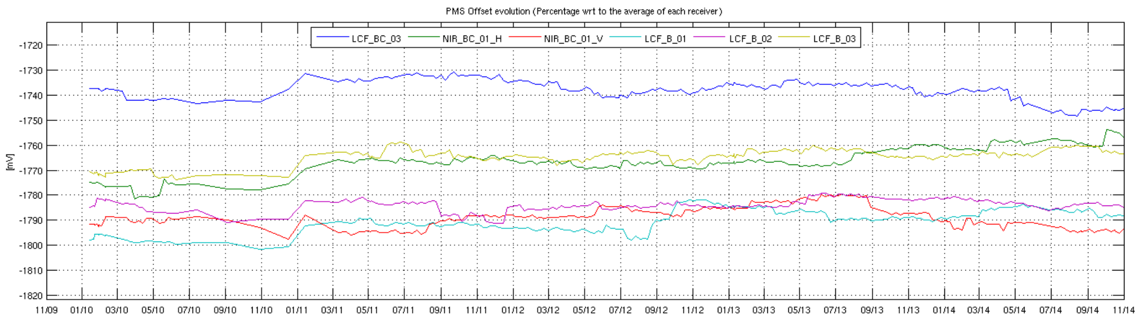

Figure 24 Evolution of the Δ PMS Offset of the LICEFS in CMN B1

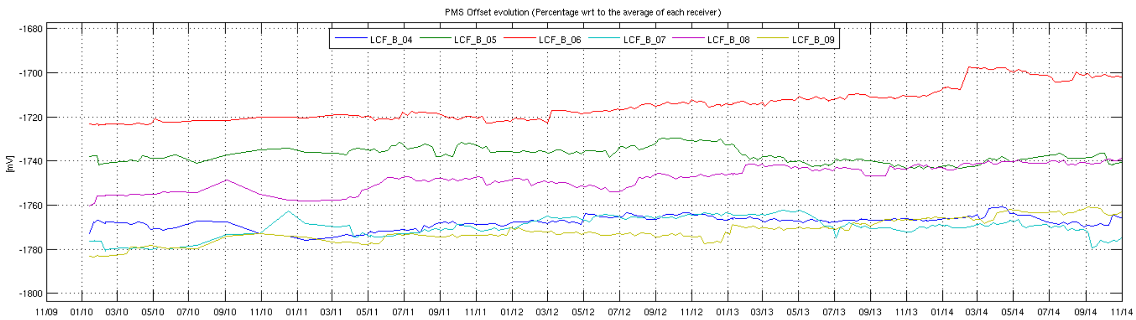

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Figure 25 Evolution of the Δ PMS Offset of the LICEFS in CMN B2

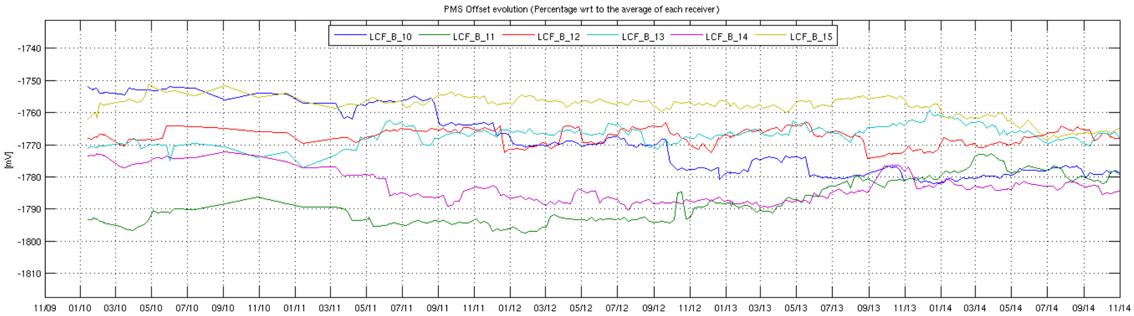

Figure 26 Evolution of the Δ PMS Offset of the LICEFS in CMN B3

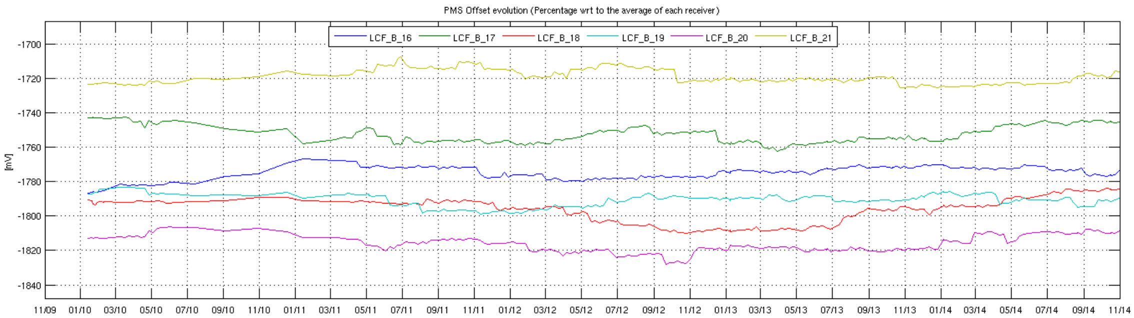

Figure 27 Evolution of the Δ PMS Offset of the LICEFS in CMN H3

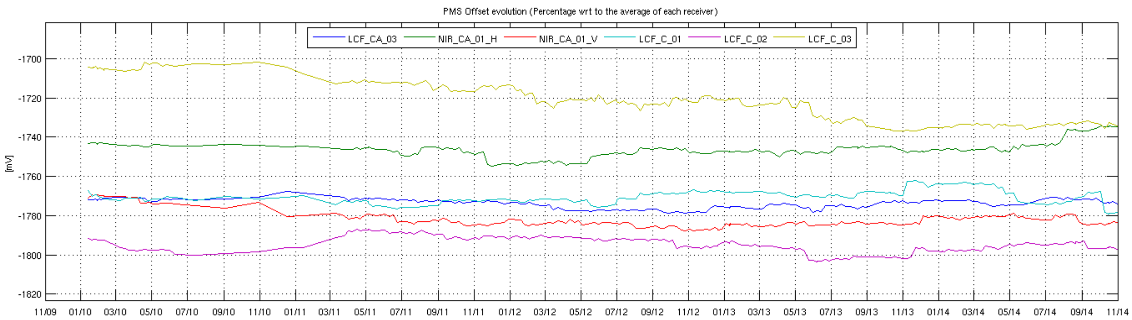

Figure 28 Evolution of the Δ PMS Offset of the LICEFS in CMN C1

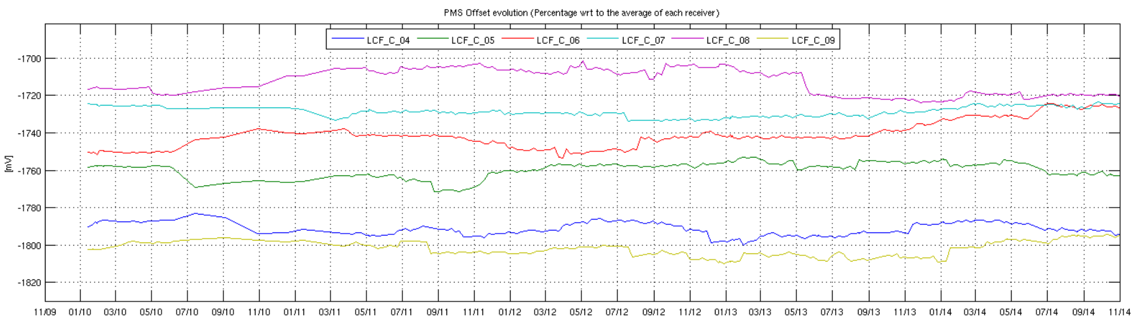

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Figure 29 Evolution of the Δ PMS Offset of the LICEFS in CMN C2

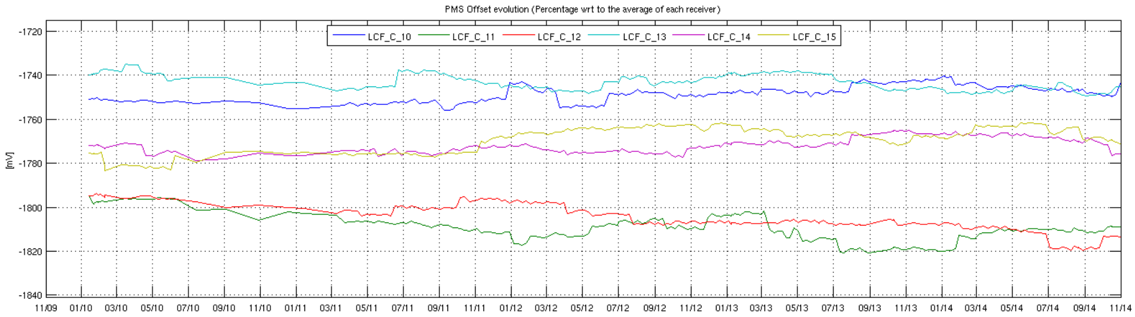


Figure 30 Evolution of the Δ PMS Offset of the LICEFS in CMN C3

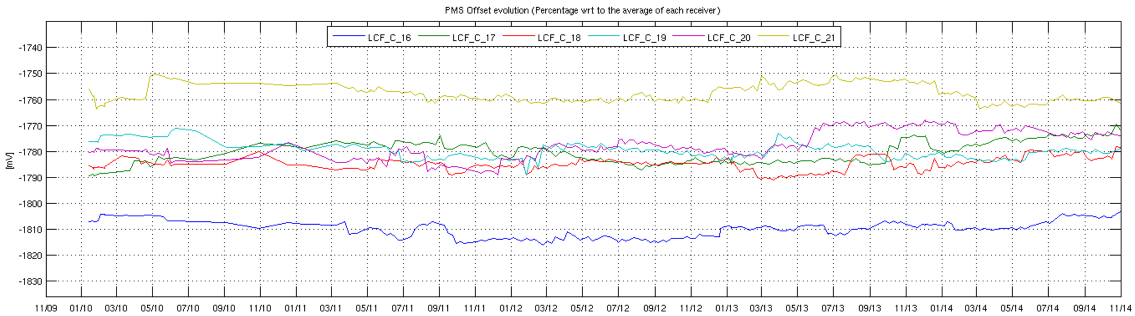
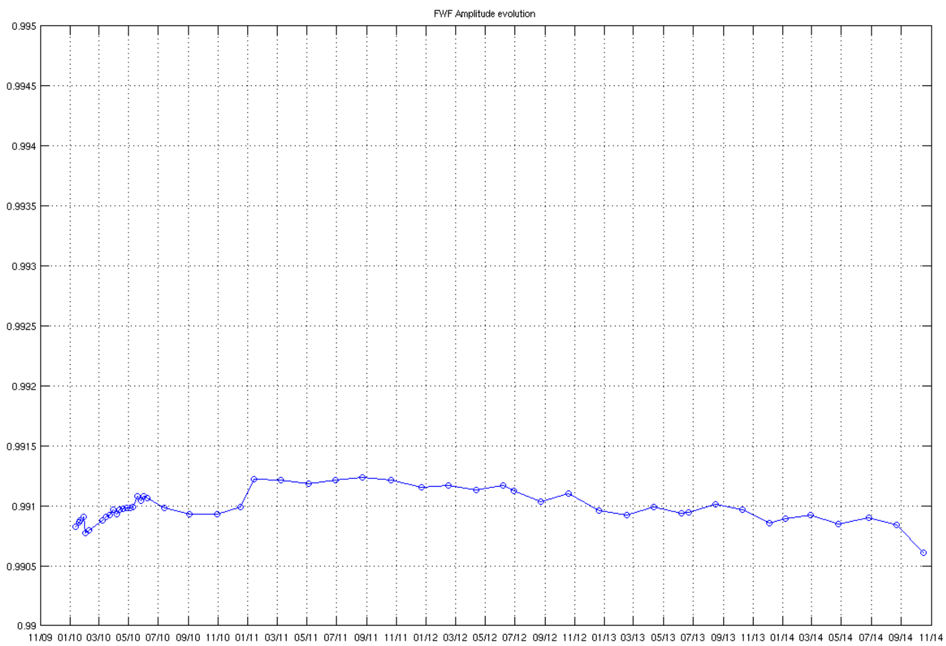


Figure 31 Evolution of the average of the FWF Amplitude at the origin



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The evolution of the average of the correlator offsets does 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.

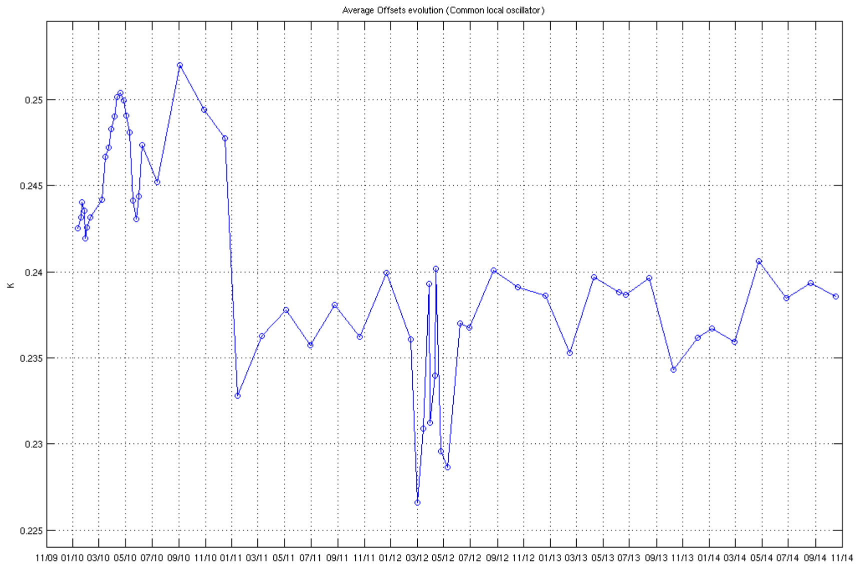

Figure 32 Evolution of the average of the Correlator offsets for the baselines which share local oscillator

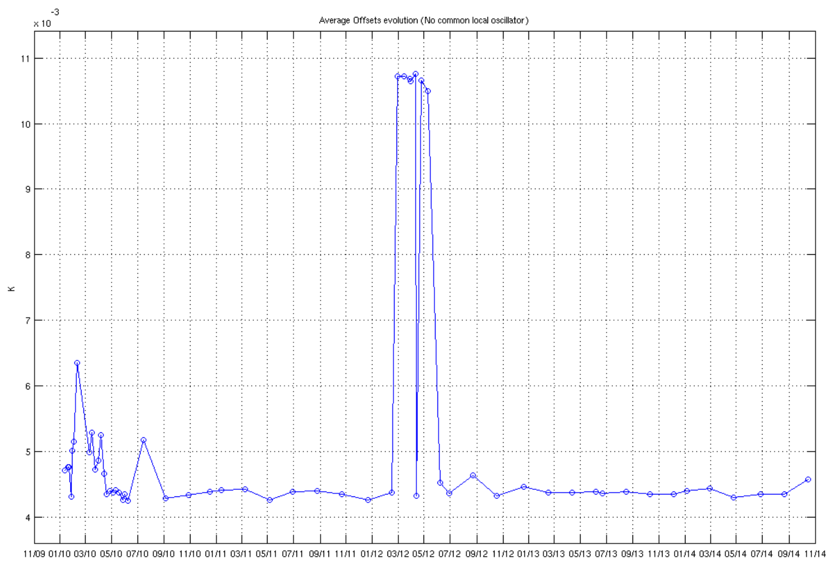

Figure 33 Evolution of the average of the Correlator offsets for the baselines which do not share local oscillator

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6. PRODUCT QUALITY ANALYSIS

The data quality until 15 October has found to be nominal except in the time intervals listed in the section 4.5. After 15 October 2014 a bias of about 1K is present in the brightness temperature which impacts the retrieval of the sea surface salinity by about 1 psu.

The L1 production is nominal as no artefacts are observed in the Stokes maps in Figure 34 to Figure 61. 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.

Two RFIs has been detected in this reporting period over the North Atlantic Ocean and Oceania.

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 except for the products affected by the 15th October Warm-NIR calibration, they present a jump in salinity of about 1psu .

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 does 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).

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

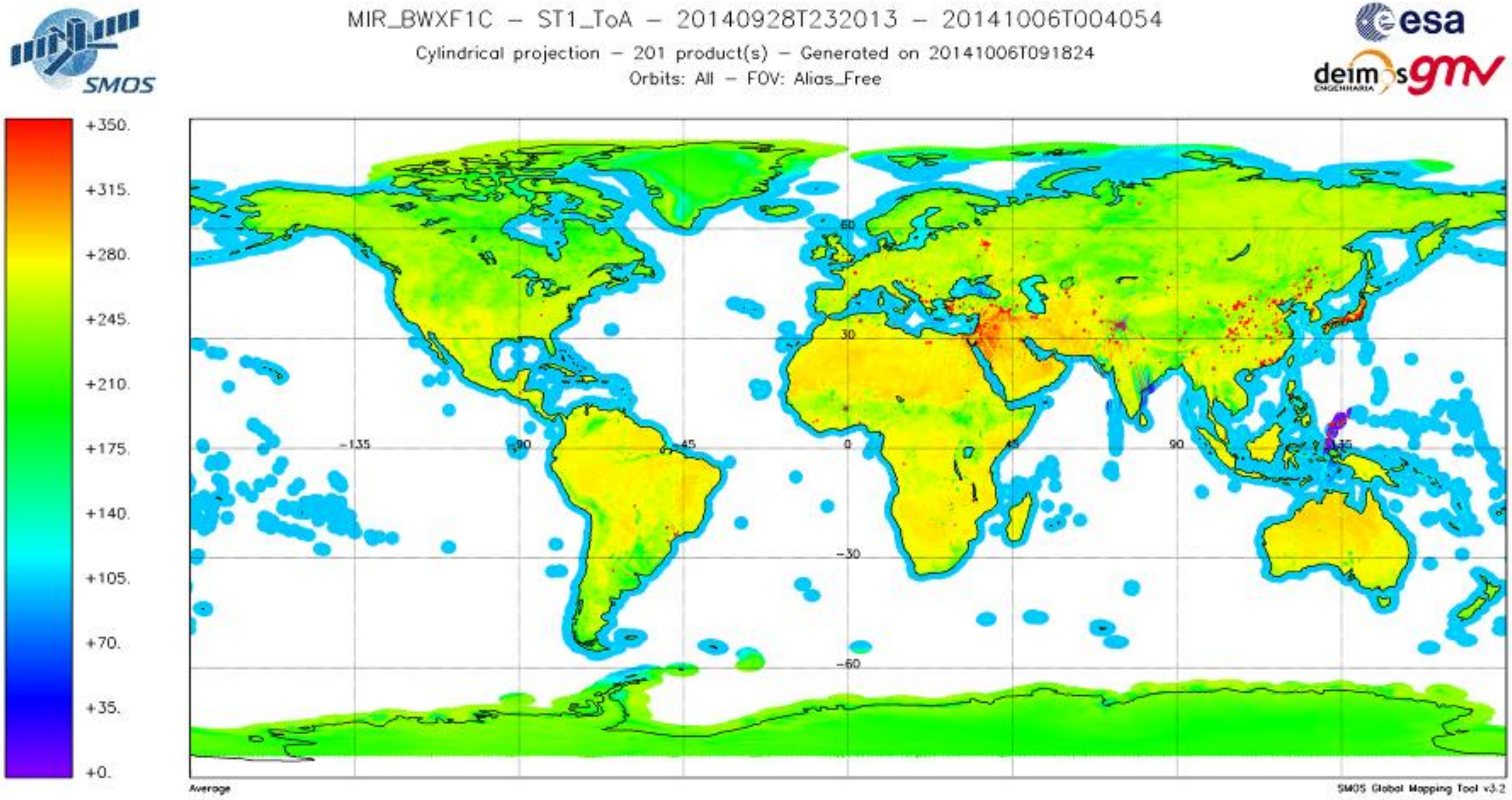

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Figure 35 1st Stokes evolution over land during the reporting period (week 2)

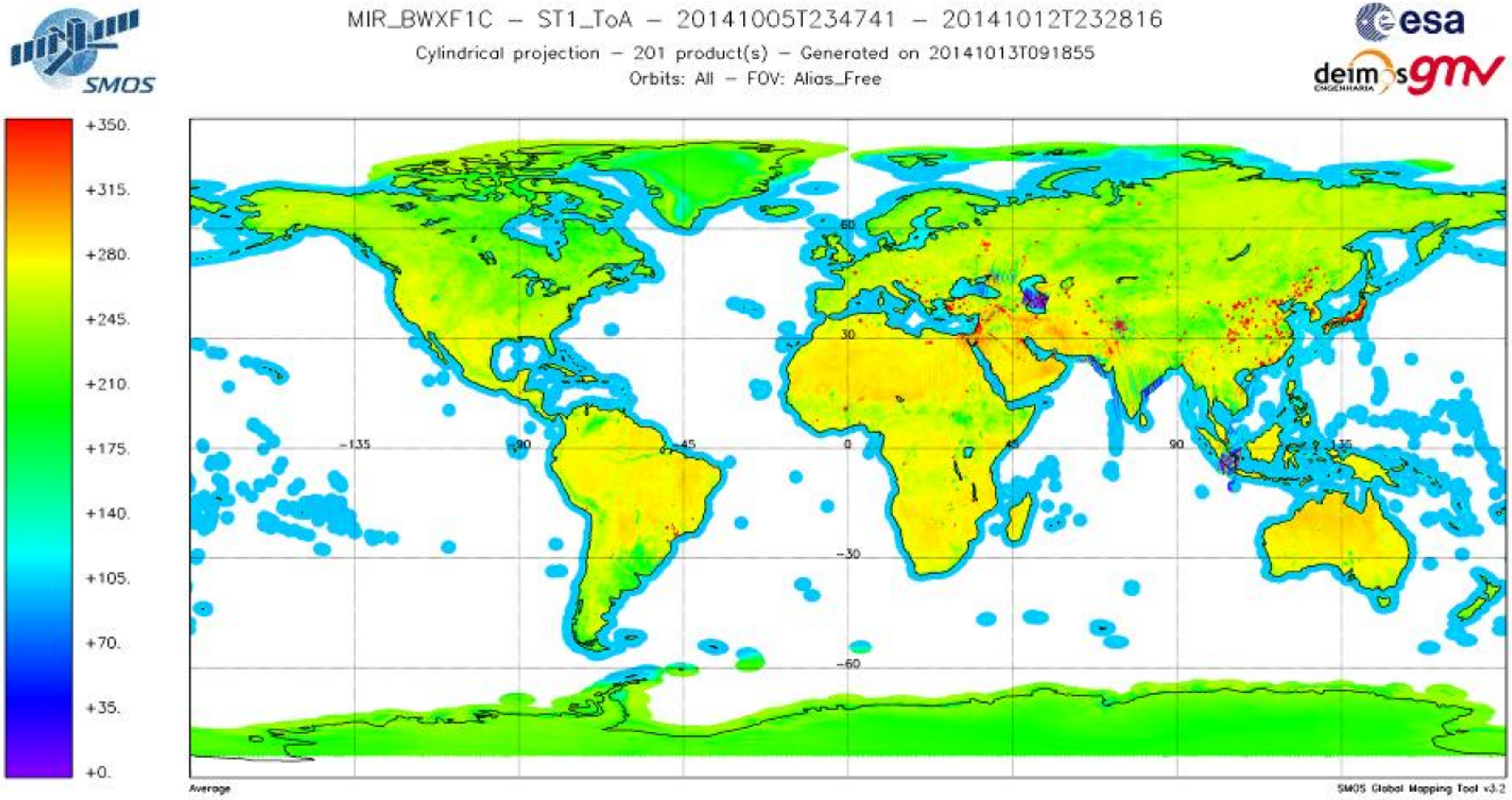

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Figure 36 1st Stokes evolution over land during the reporting period (week 3)

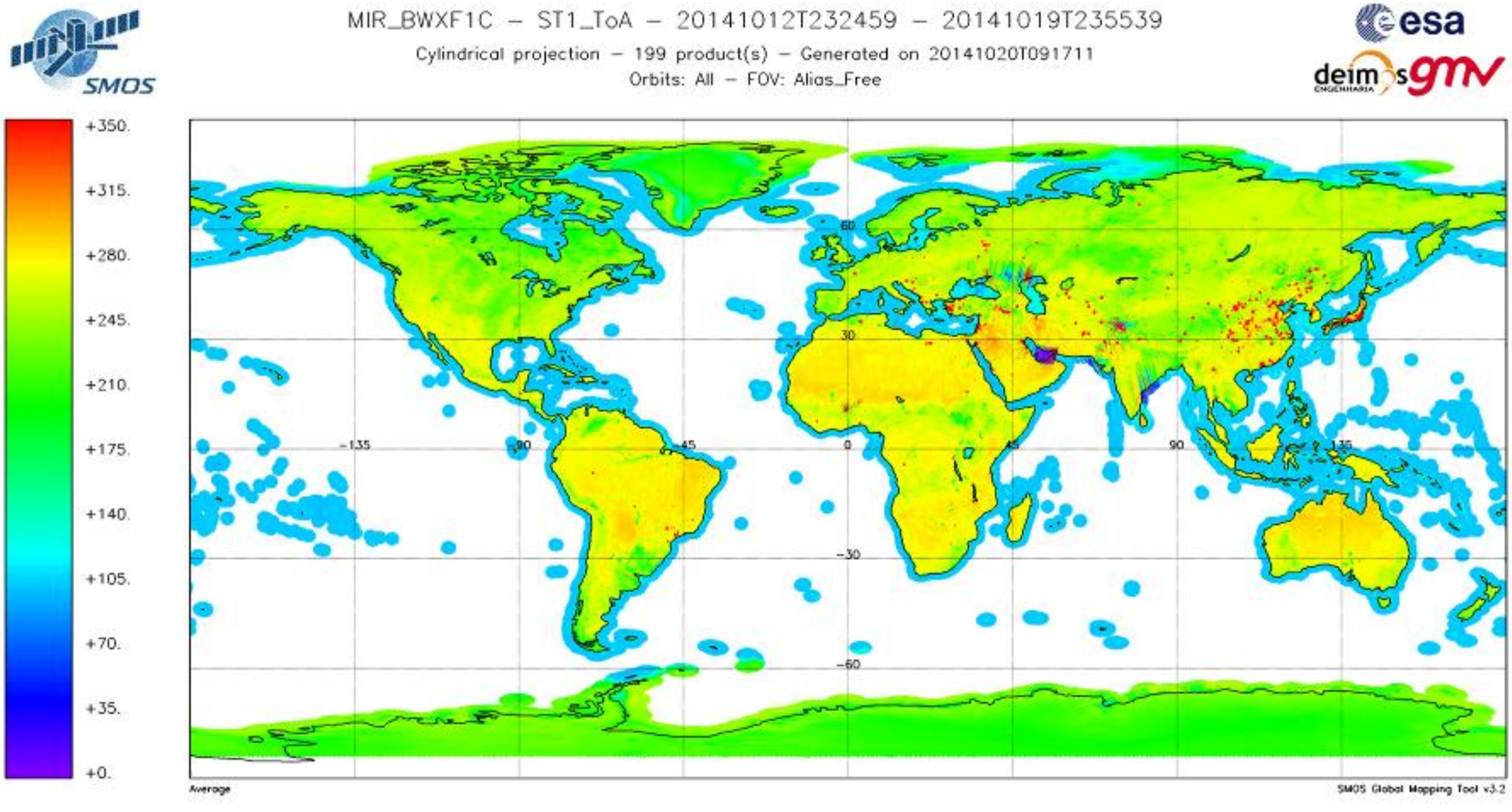

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Figure 37 1st Stokes evolution over land during the reporting period (week 4)

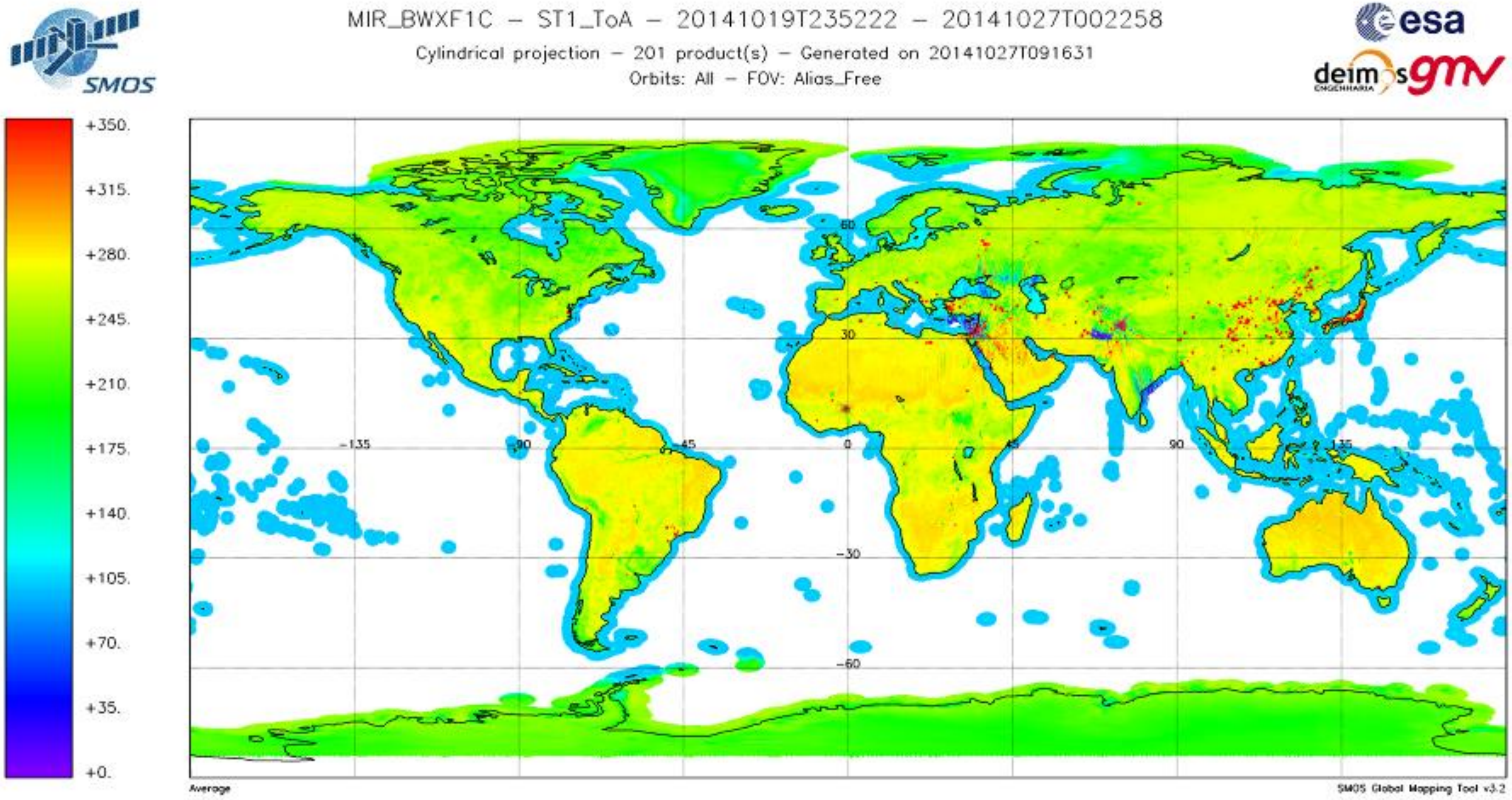

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Figure 38 1st Stokes evolution over land during the reporting period (week 5)

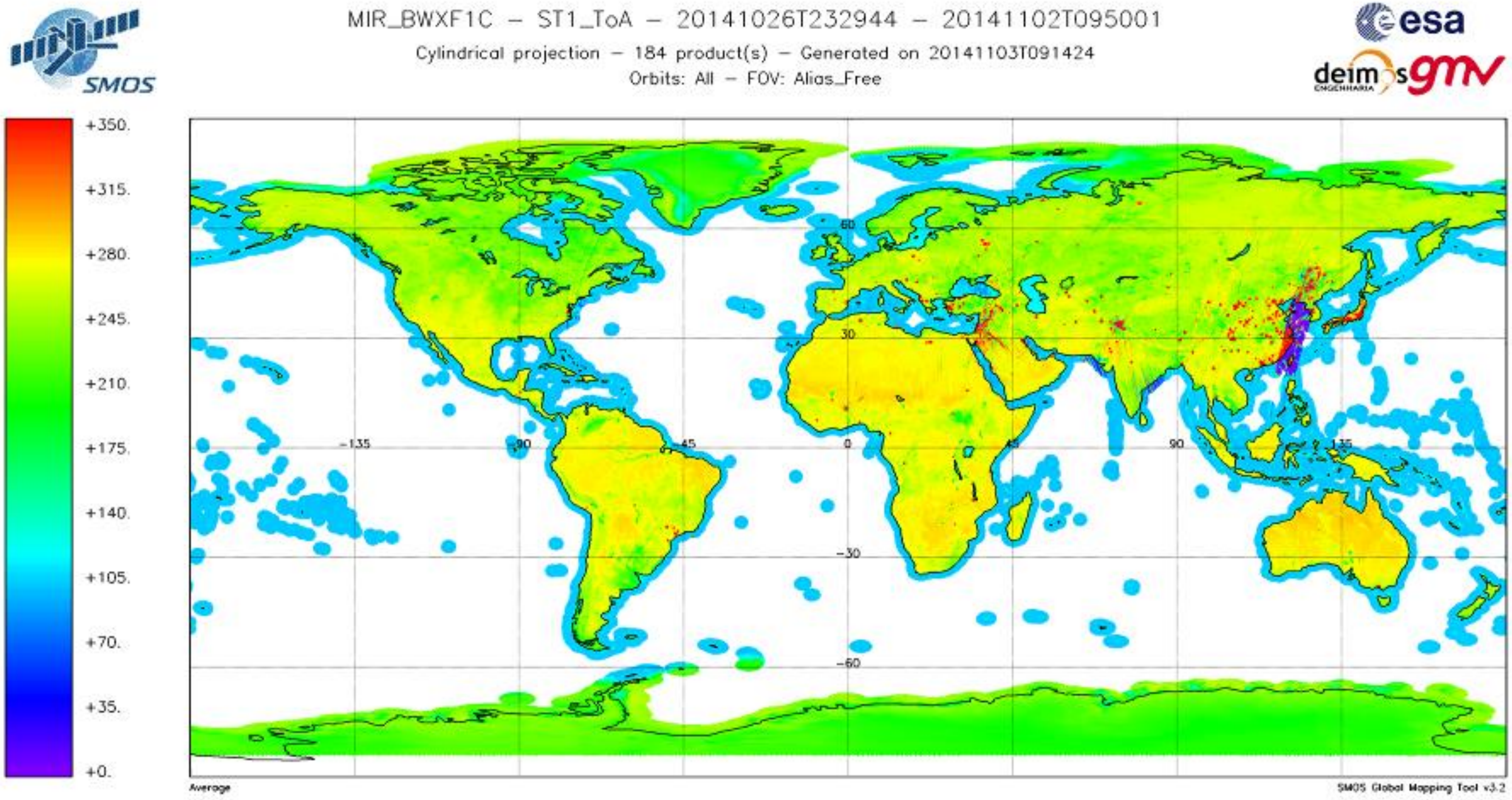

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Figure 39 Real Part of the XY Brightness temperature evolution over land during the reporting period (week 1)

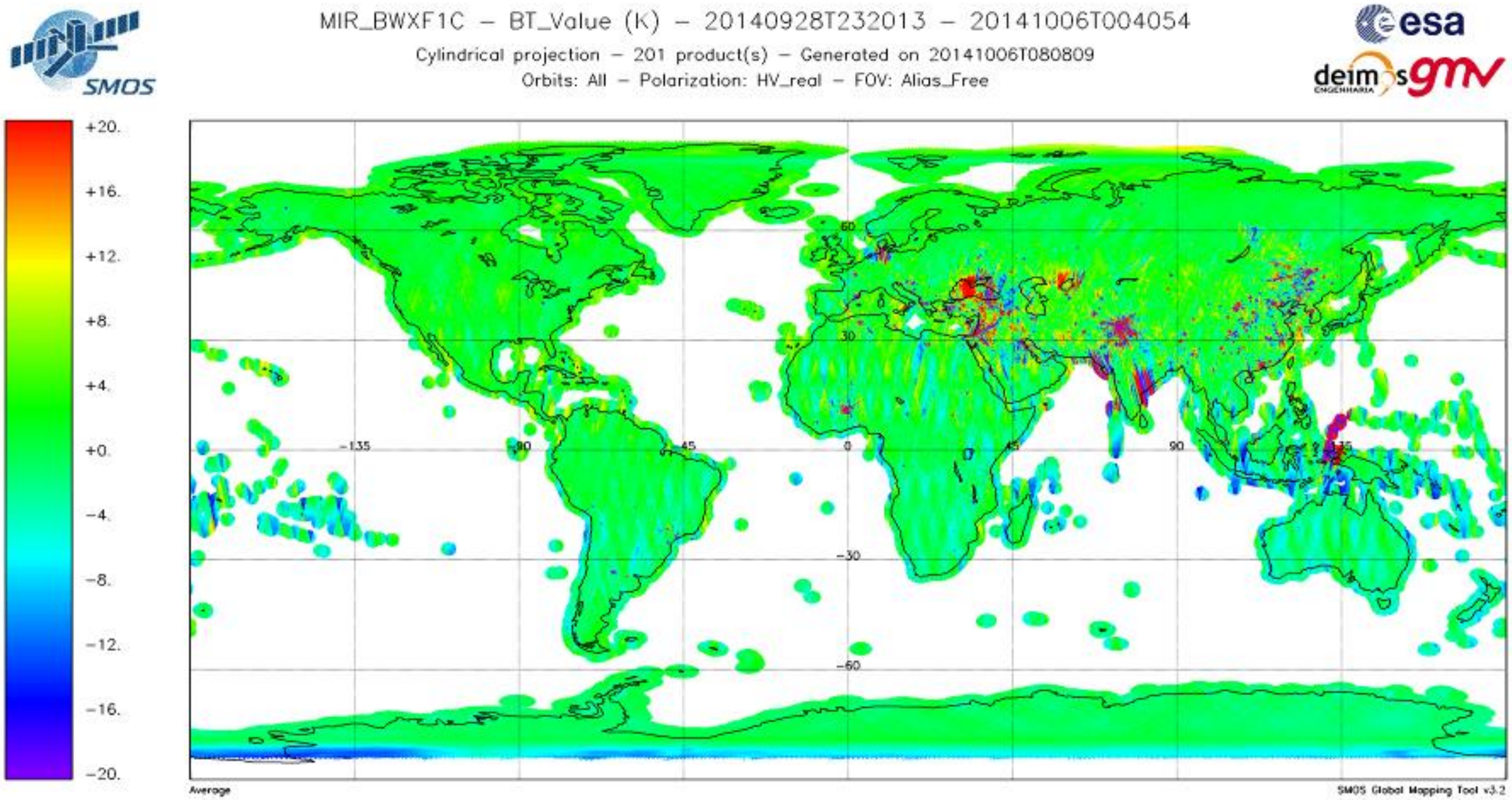

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Figure 40 Real Part of the XY Brightness temperature evolution over land during the reporting period (week 2)

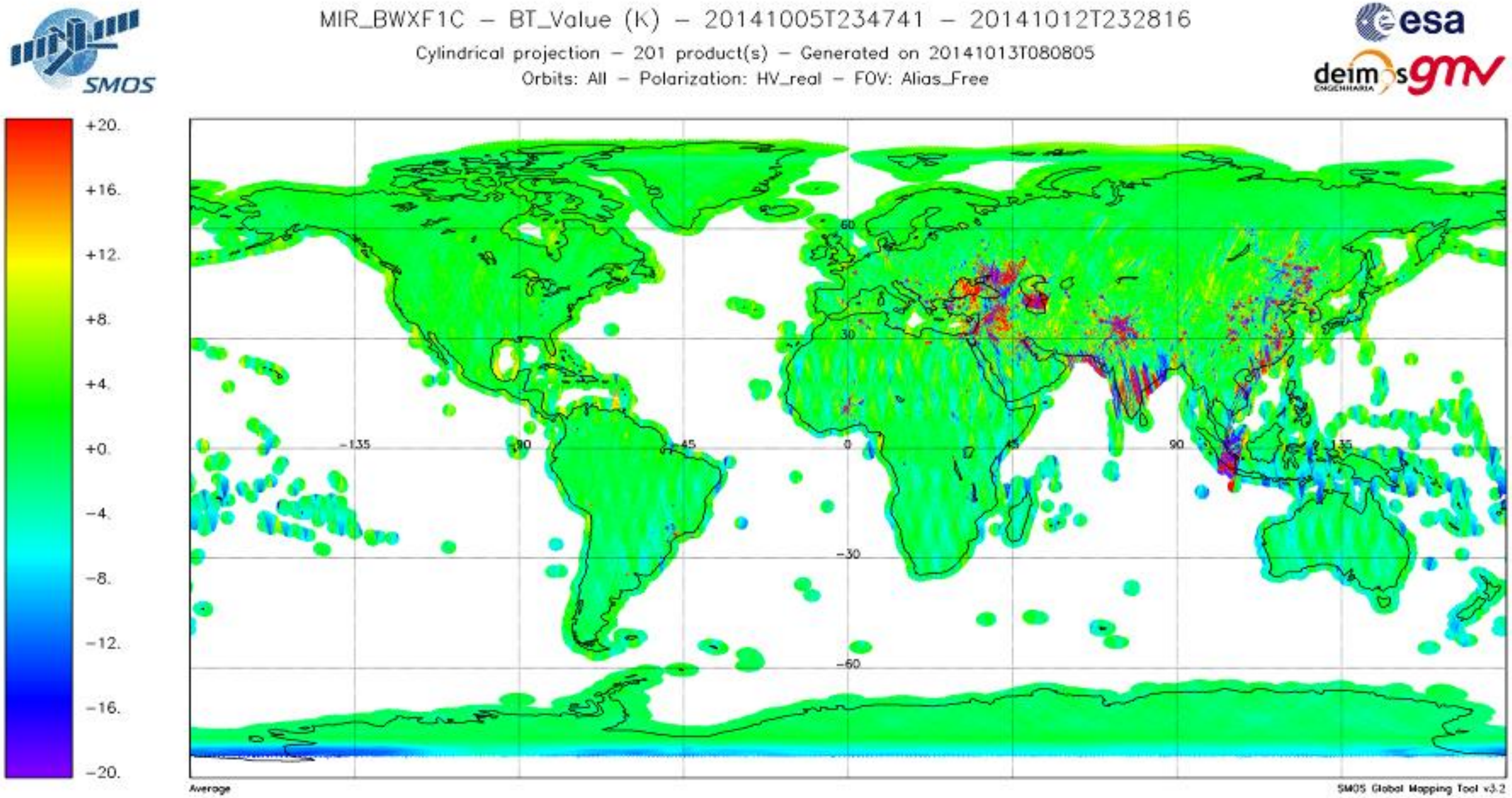

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Figure 41 Real Part of the XY Brightness temperature evolution over land during the reporting period (week 3)

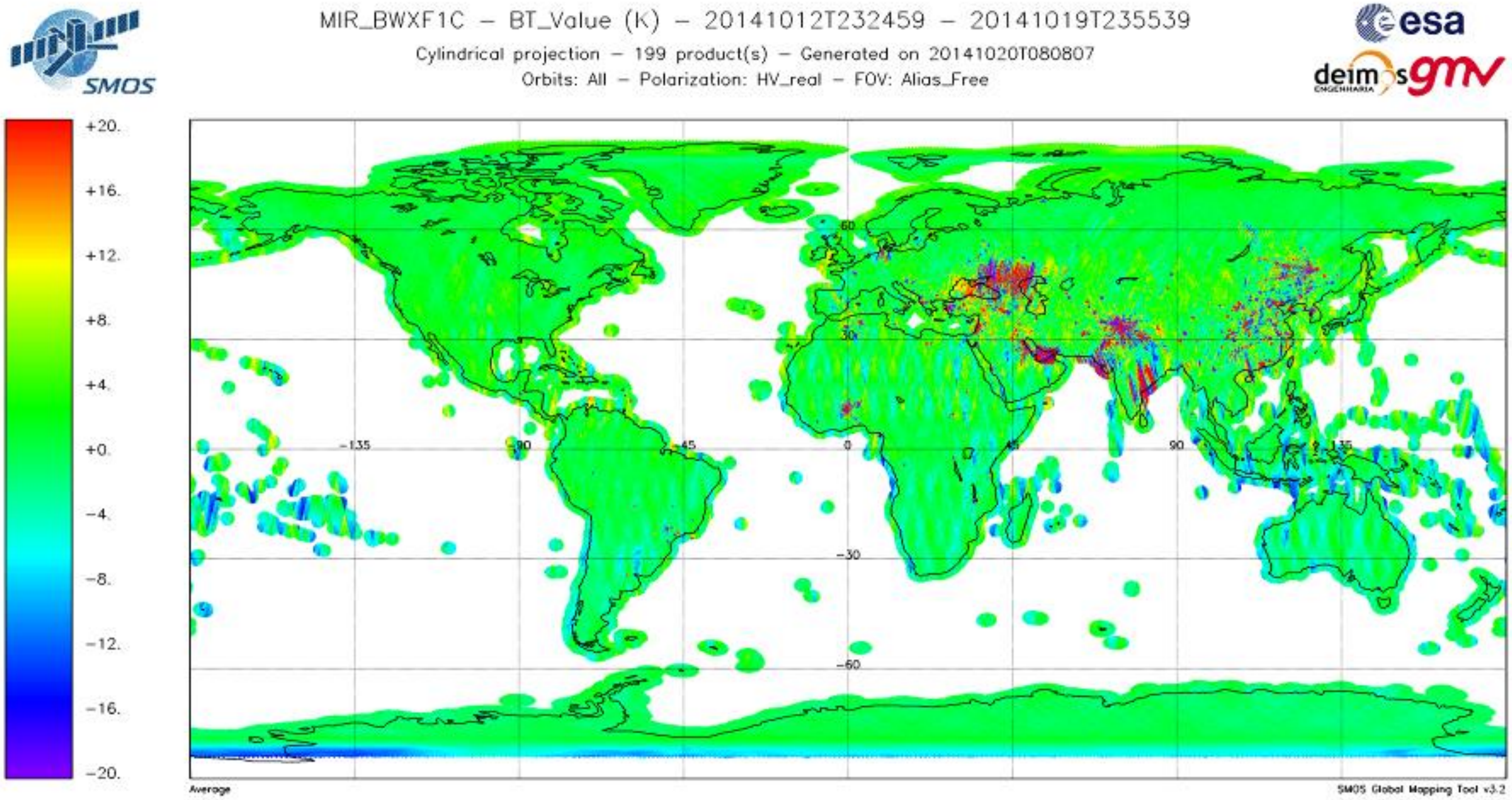

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Figure 42 Real Part of the XY Brightness temperature evolution over land during the reporting period (week 4)

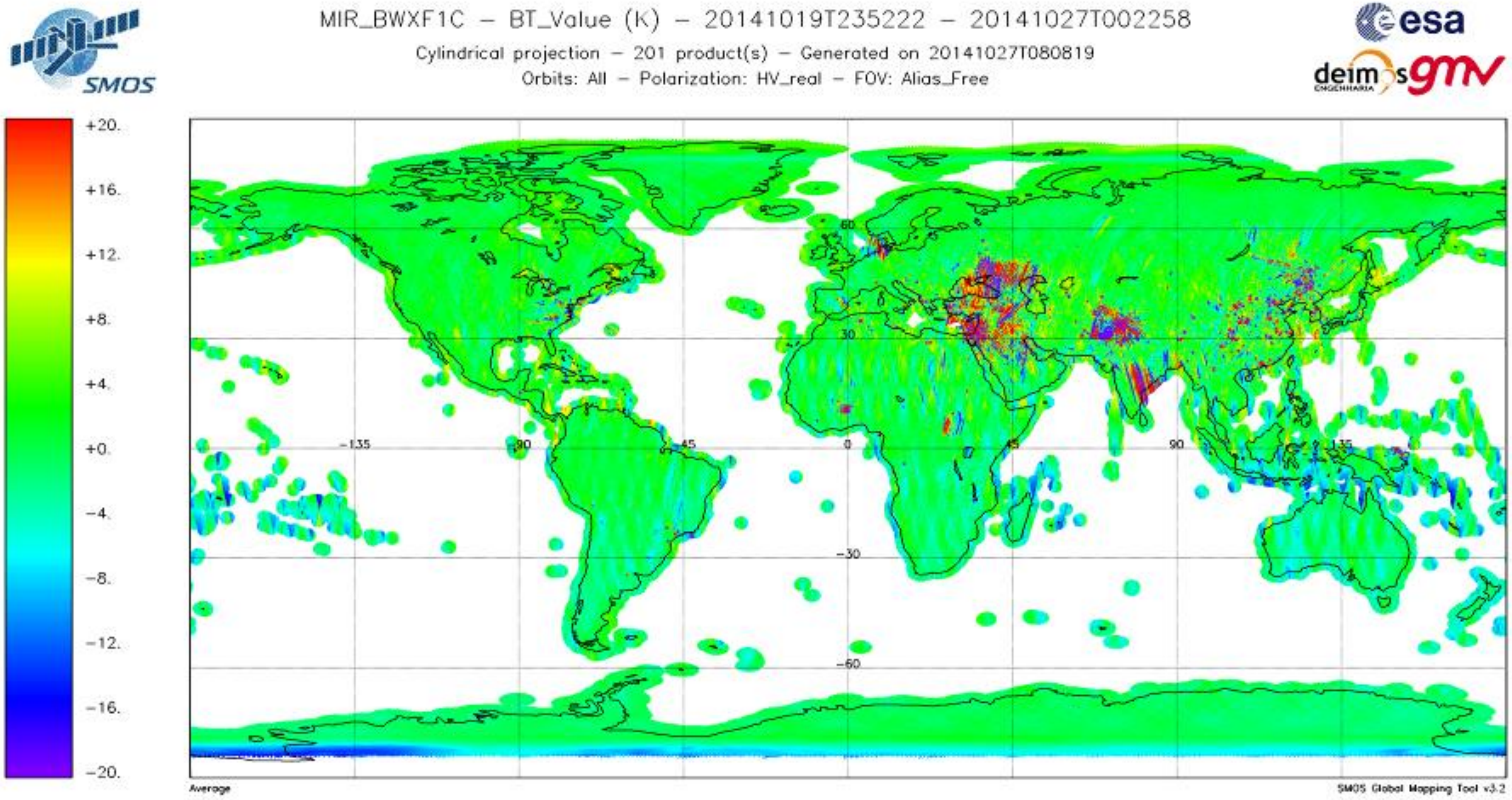

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Figure 43 Real Part of the XY Brightness temperature evolution over land during the reporting period (week 5)

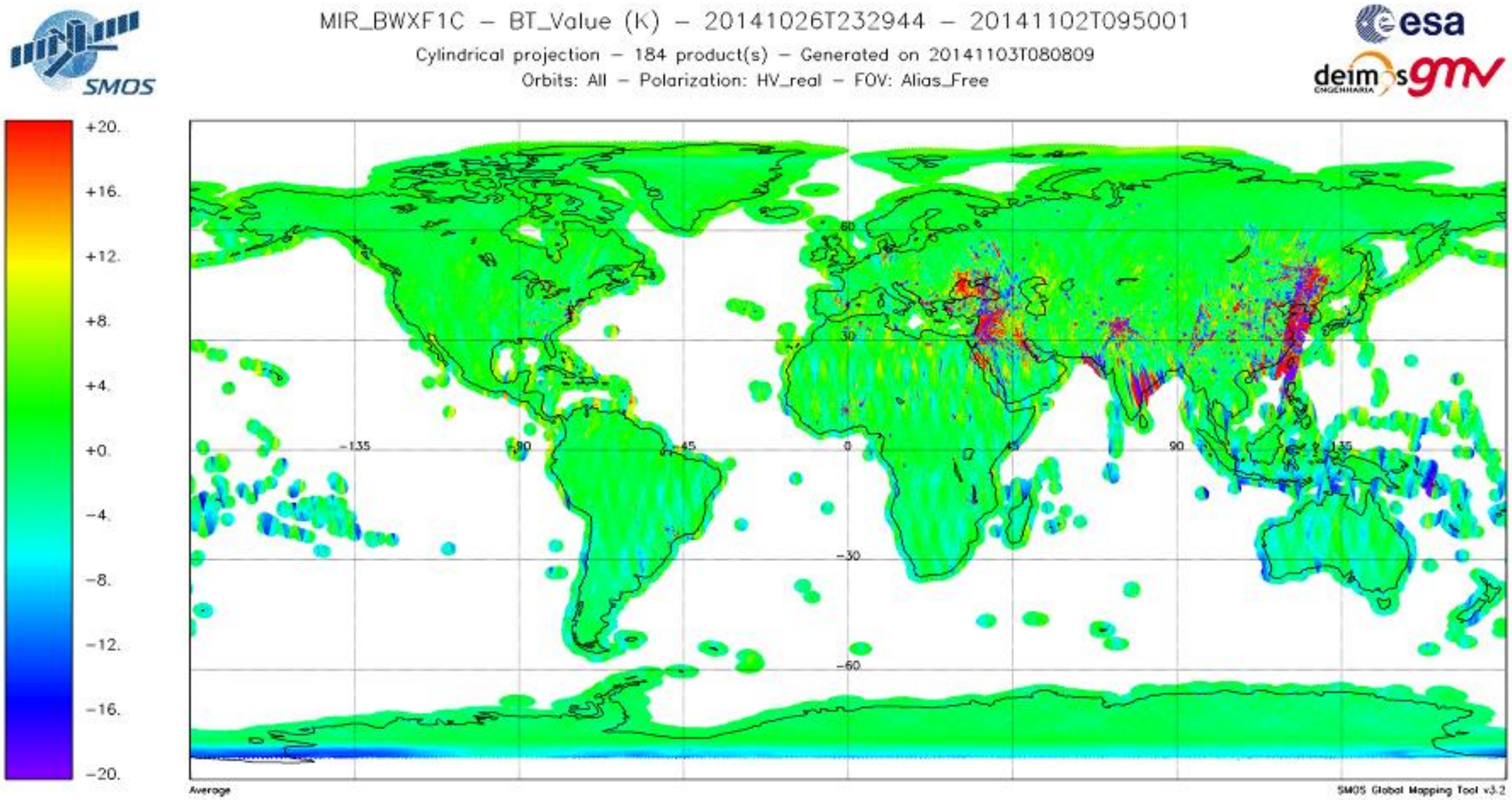

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Figure 44 Imaginary Part of the XY Brightness temperature evolution over land during the reporting period (week 1)

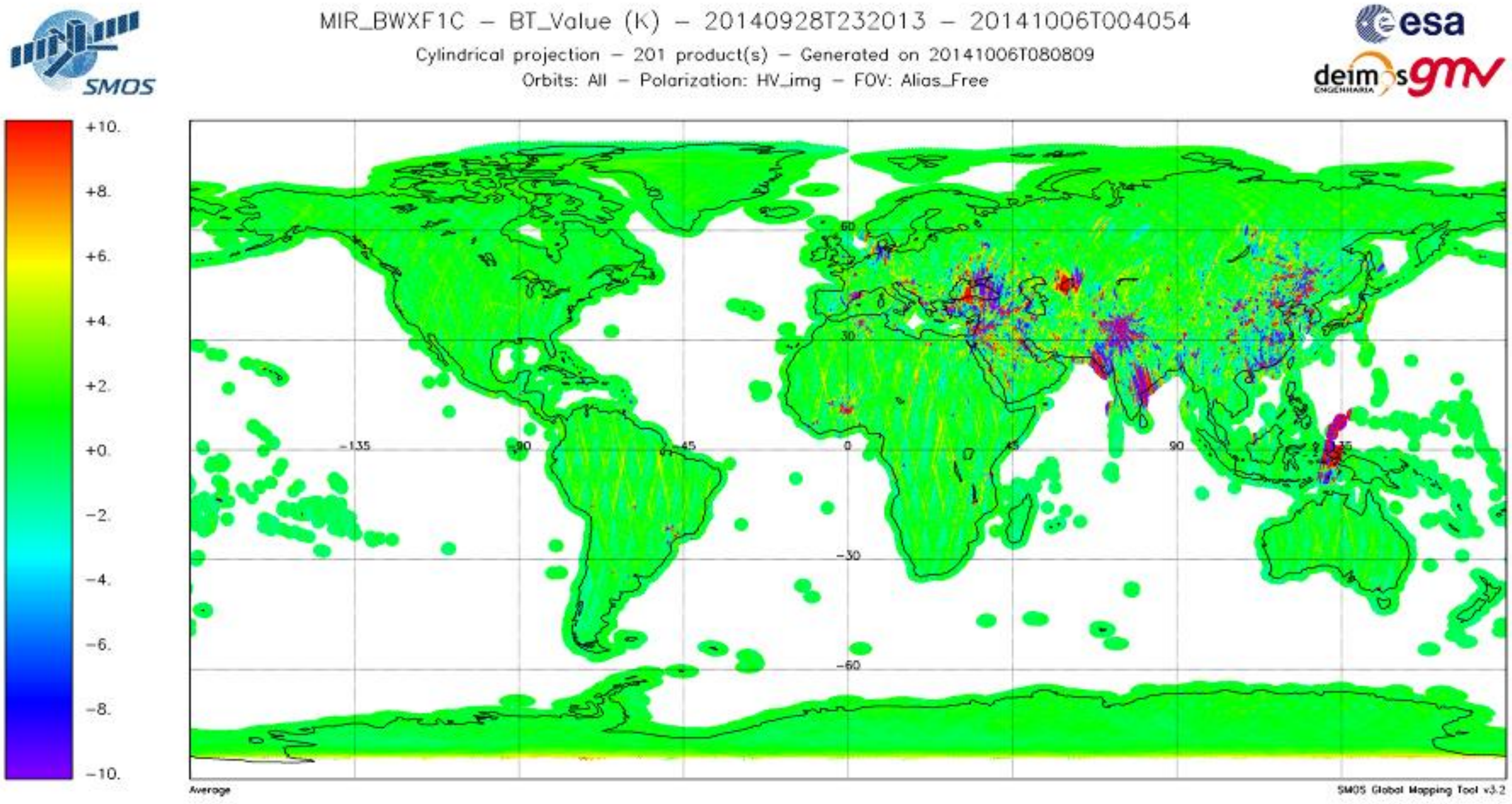

Figure 45 Imaginary Part of the XY Brightness temperature evolution over land during the reporting period (week 2)

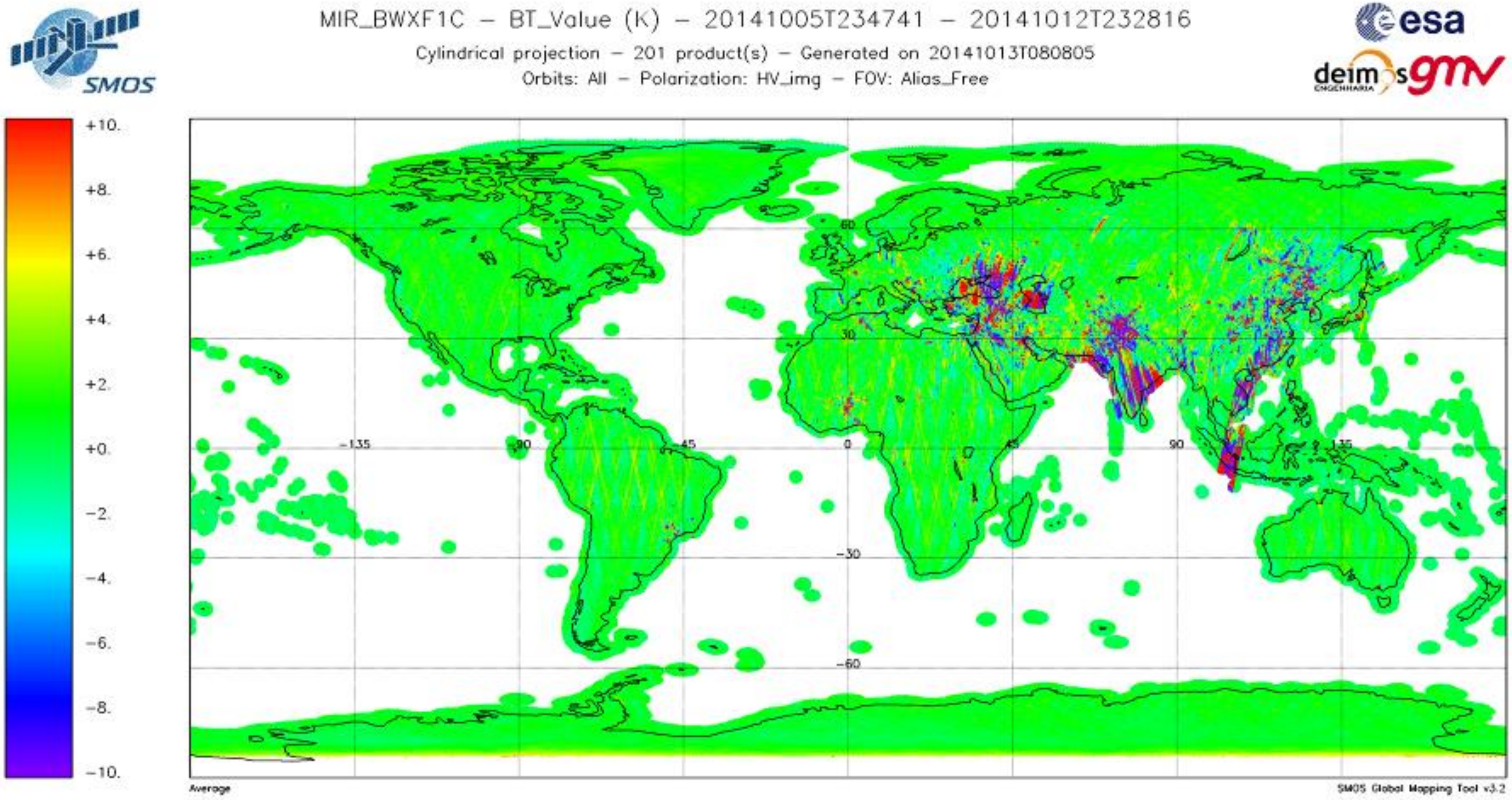

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Figure 46 Imaginary Part of the XY Brightness temperature evolution over land during the reporting period (week 3)

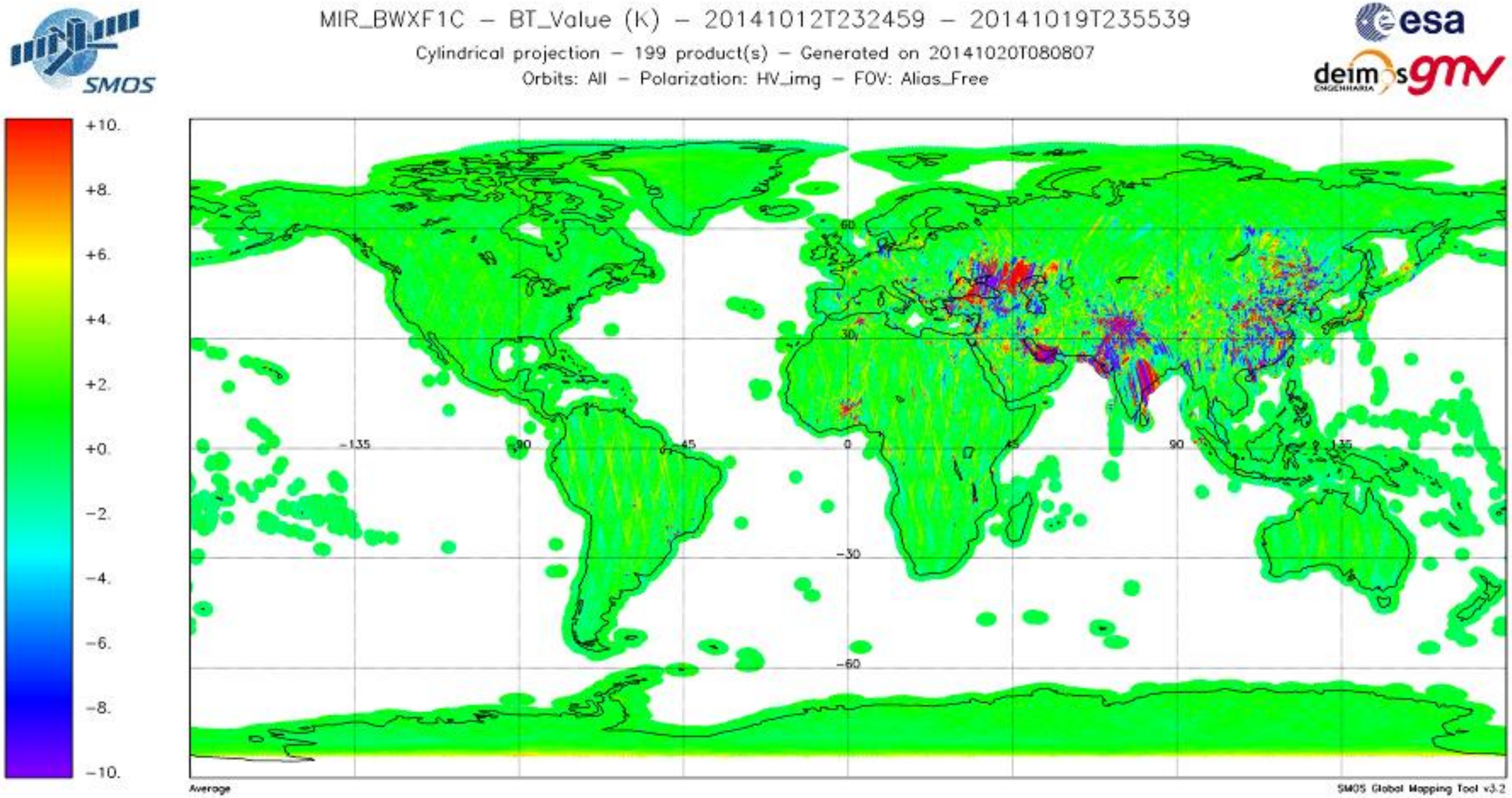

Figure 47 Imaginary Part of the XY Brightness temperature evolution over land during the reporting period (week 4)

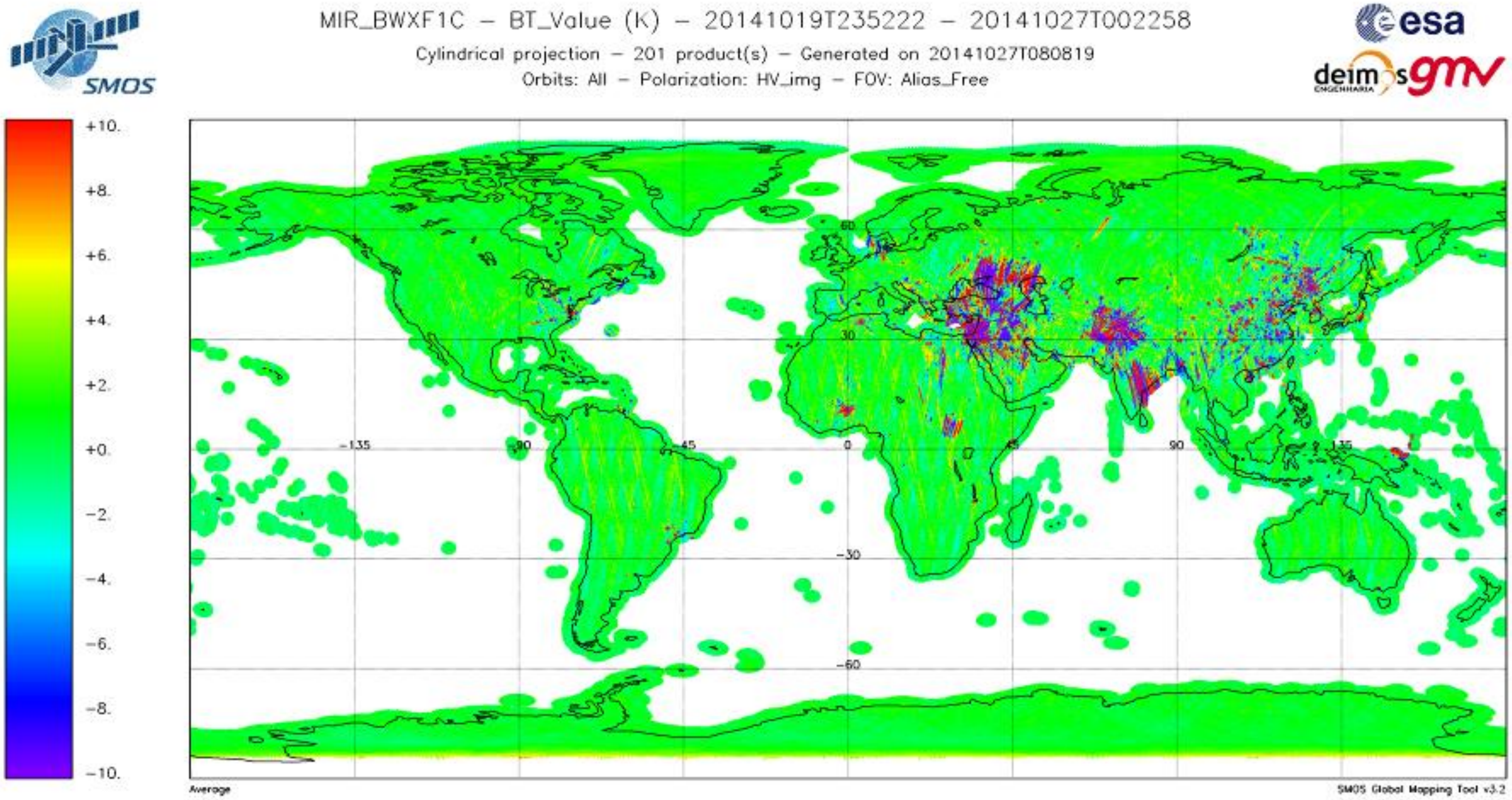

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Figure 48 Imaginary Part of the XY Brightness temperature evolution over land during the reporting period (week 5)

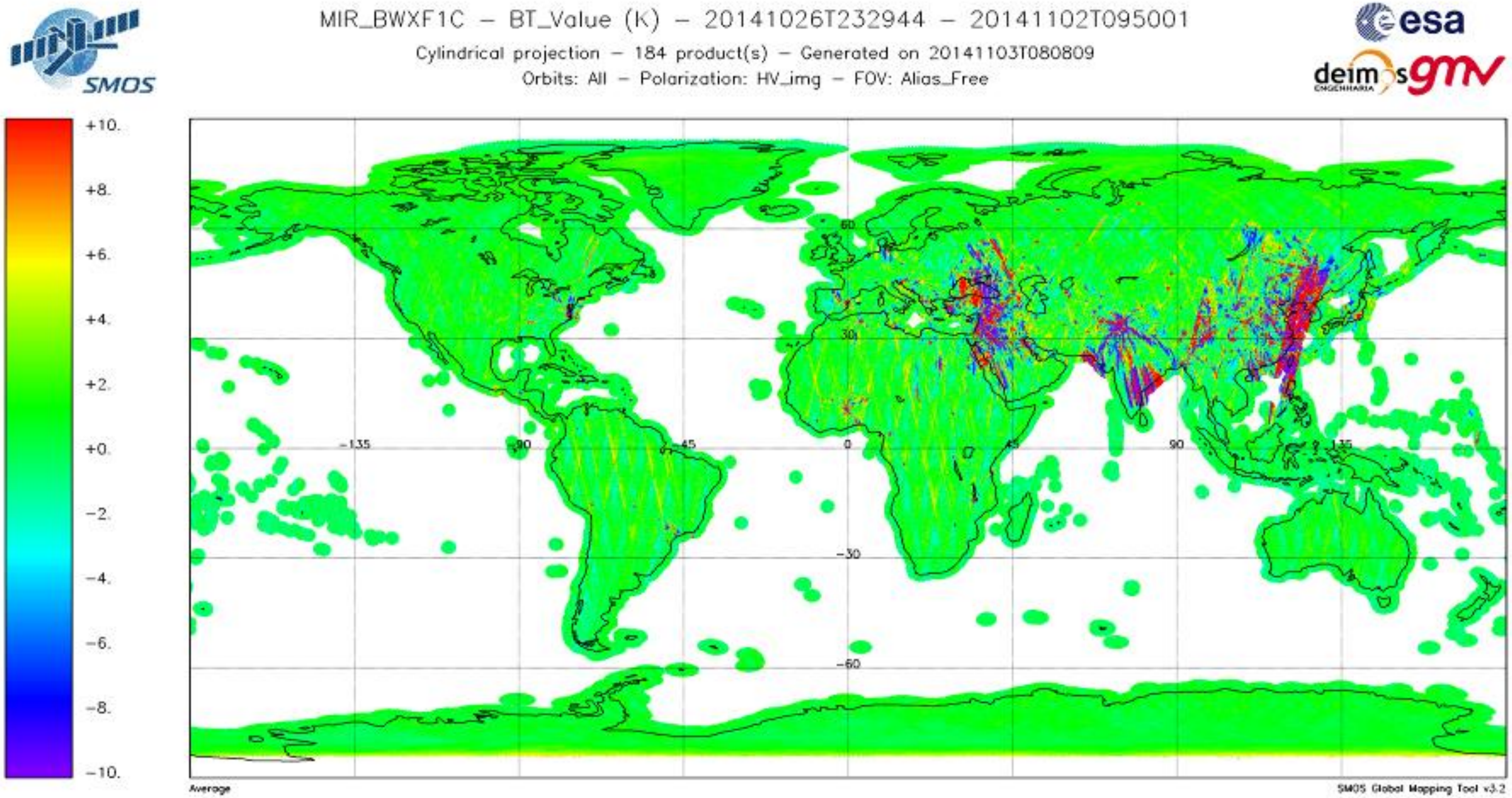

Figure 49 1st Stokes evolution over sea during the reporting period (week 1)

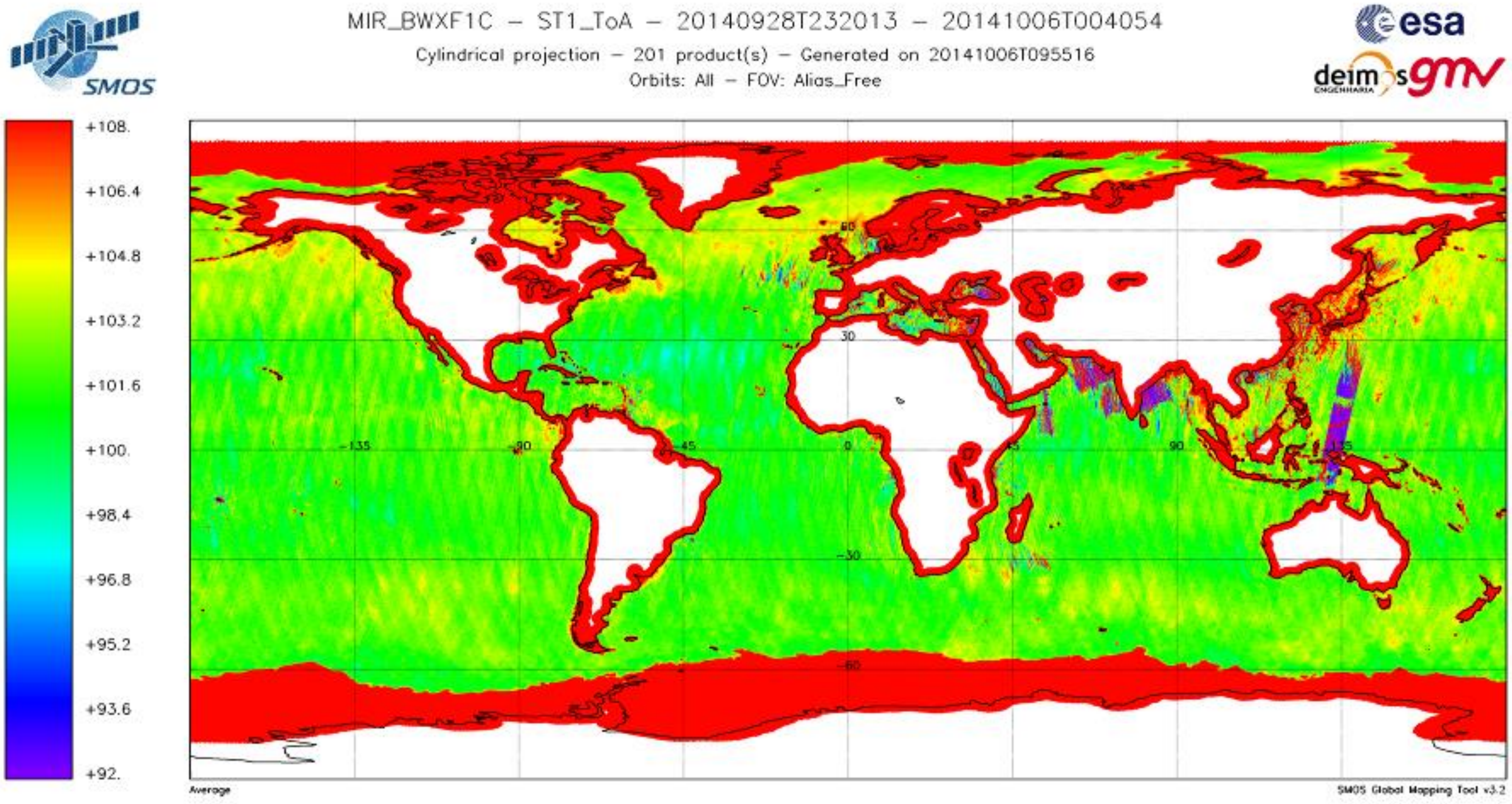

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Figure 50 1st Stokes evolution over sea during the reporting period (week 2)

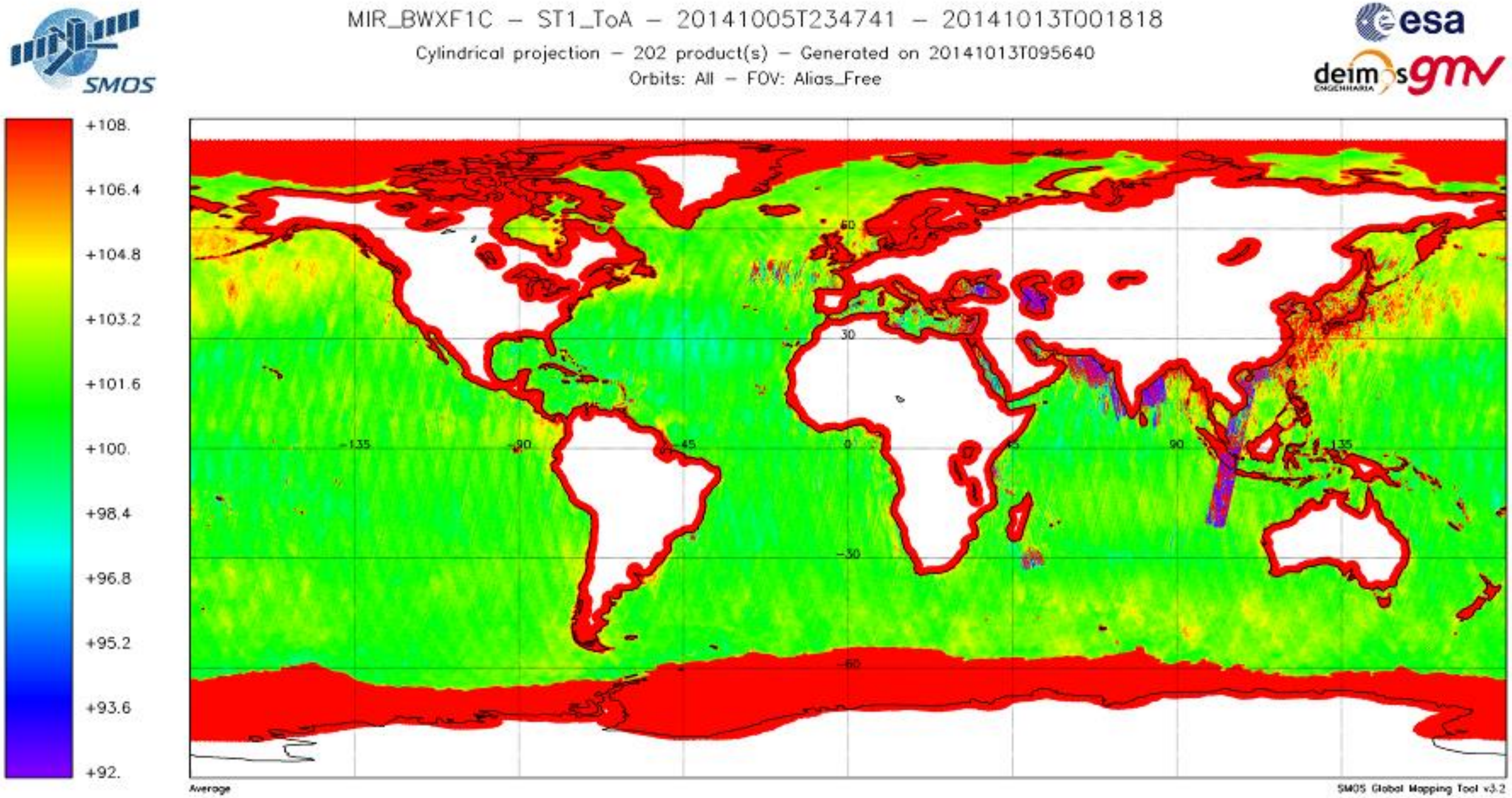

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Figure 51 1st Stokes evolution over sea during the reporting period (week 3)

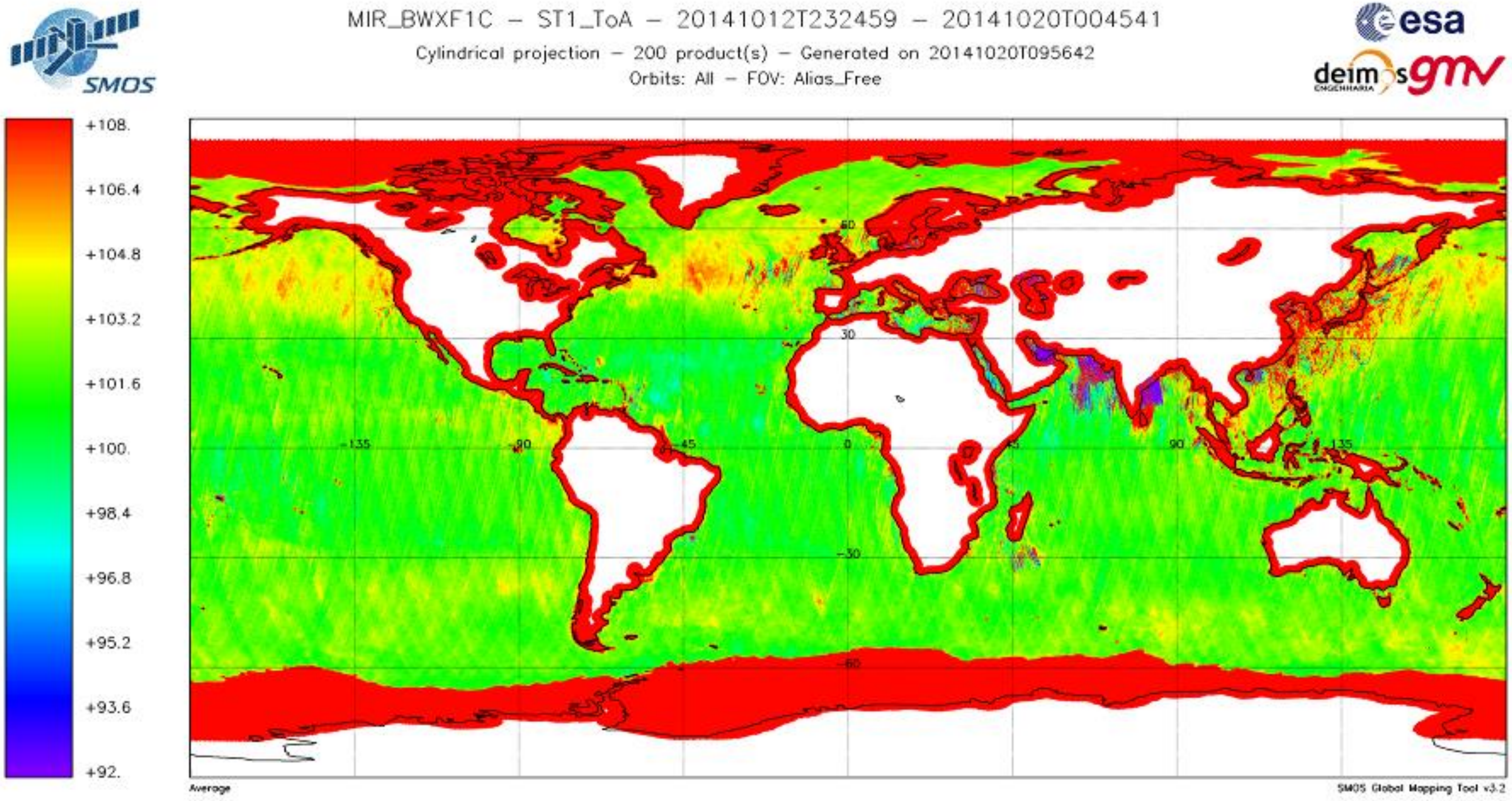

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Figure 52 1st Stokes evolution over sea during the reporting period (week 4)

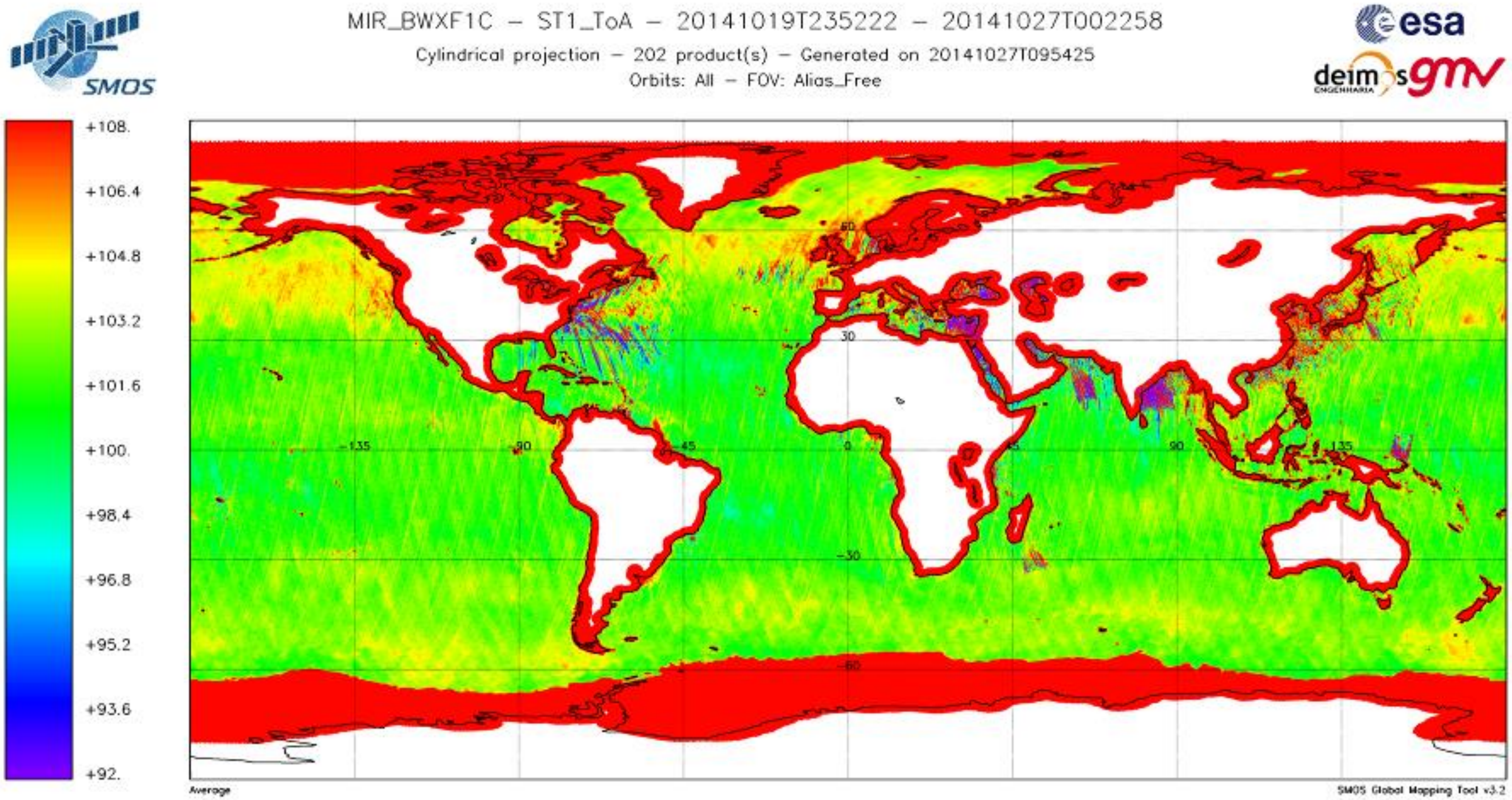

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Figure 53 1st Stokes evolution over sea during the reporting period (week 5)

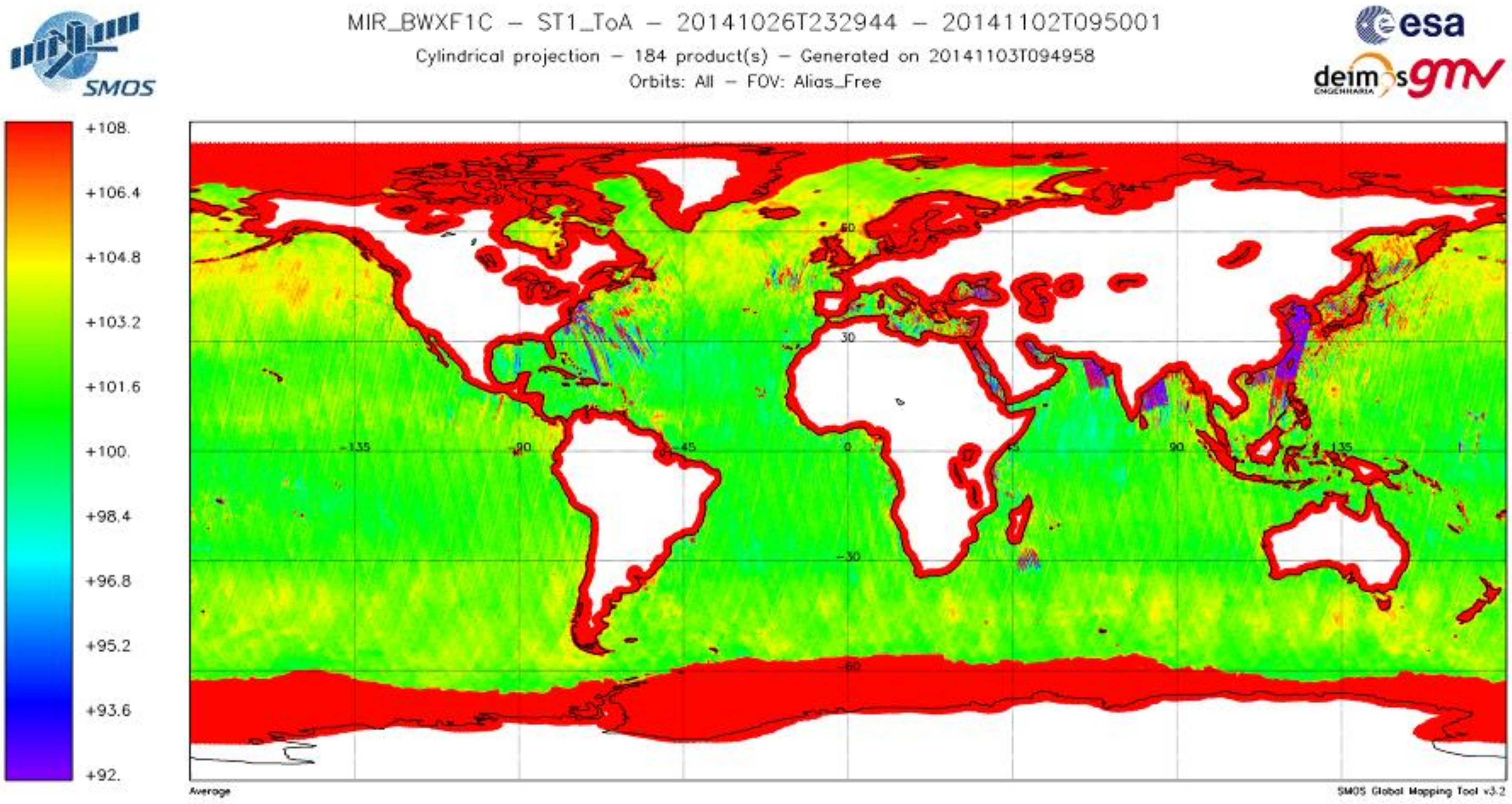

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Figure 54 Real Part of the XY Brightness temperature evolution over sea during the reporting period (week 1)

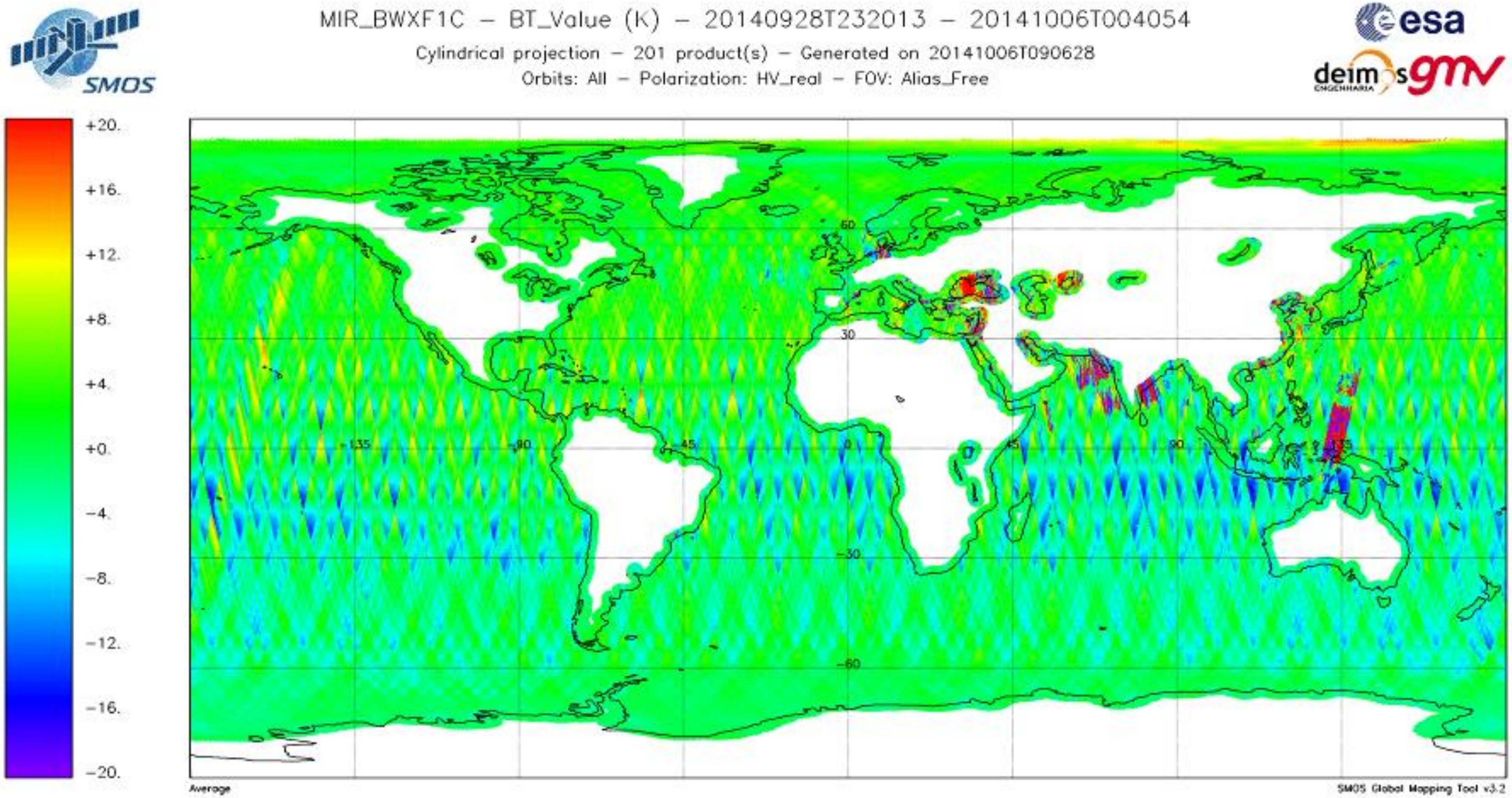

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Figure 55 Real Part of the XY Brightness temperature evolution over sea during the reporting period (week 2)

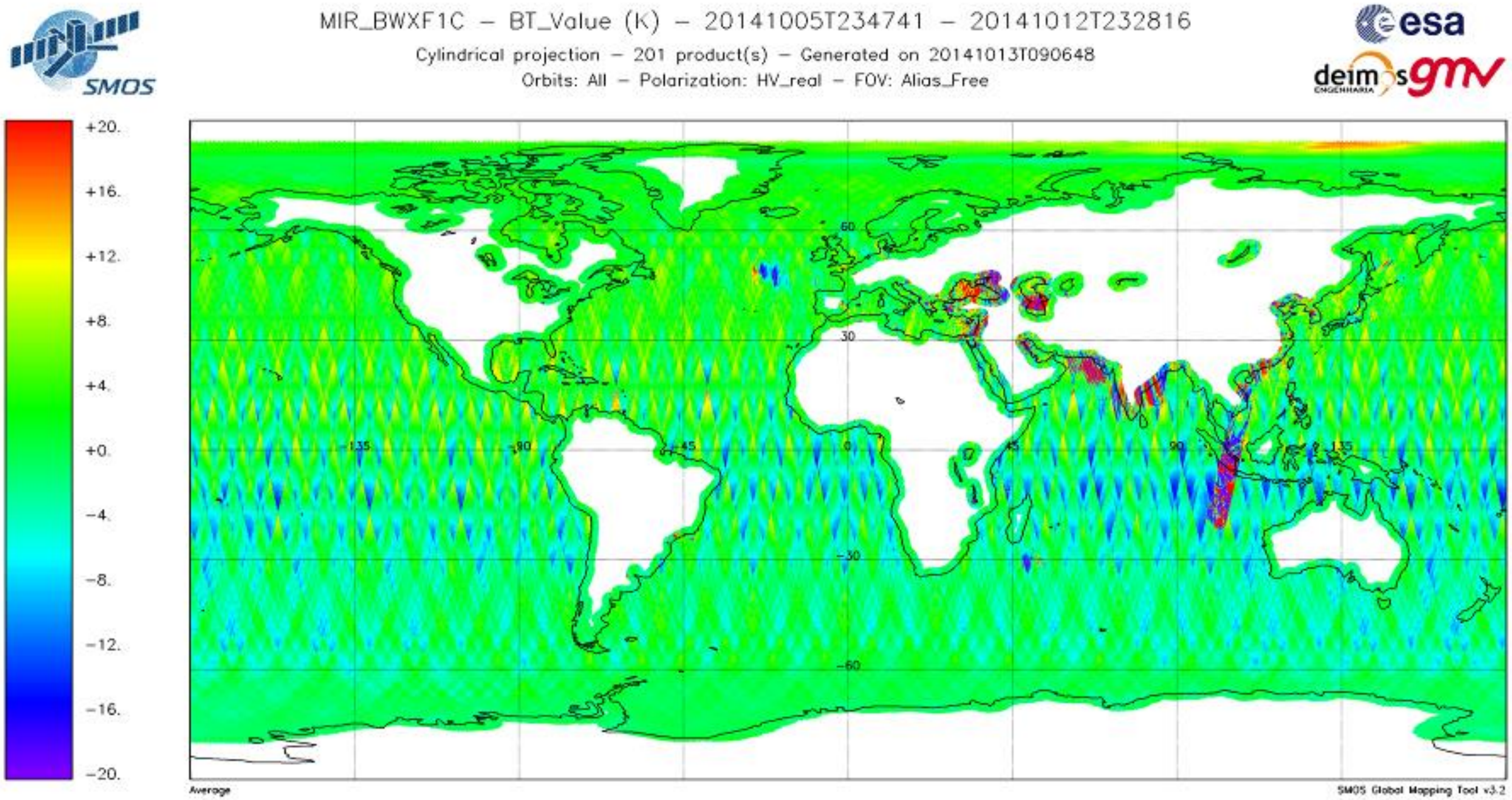

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Figure 56 Real Part of the XY Brightness temperature evolution over sea during the reporting period (week 3)

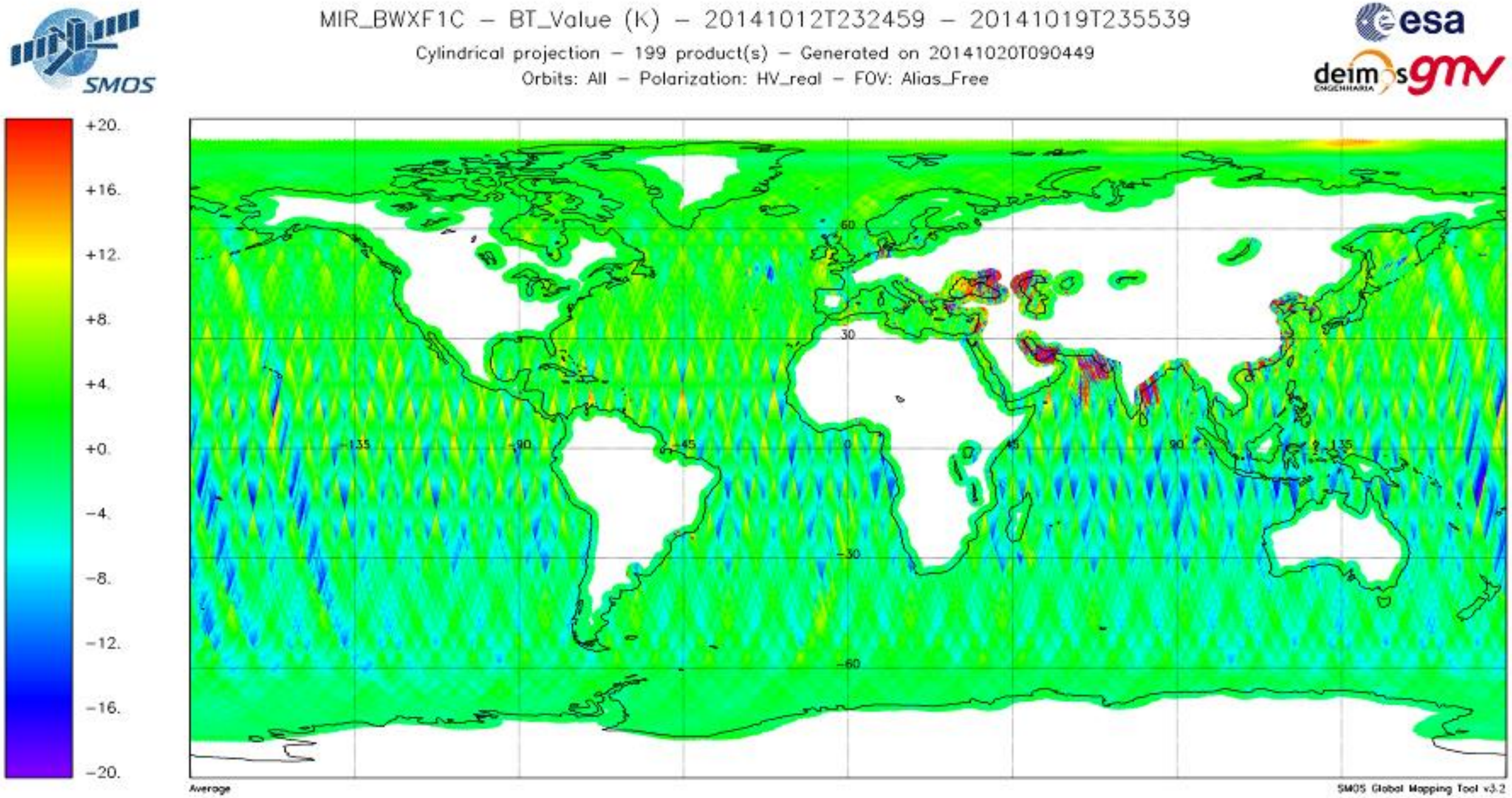

Figure 57 Real Part of the XY Brightness temperature evolution over sea during the reporting period (week 4)

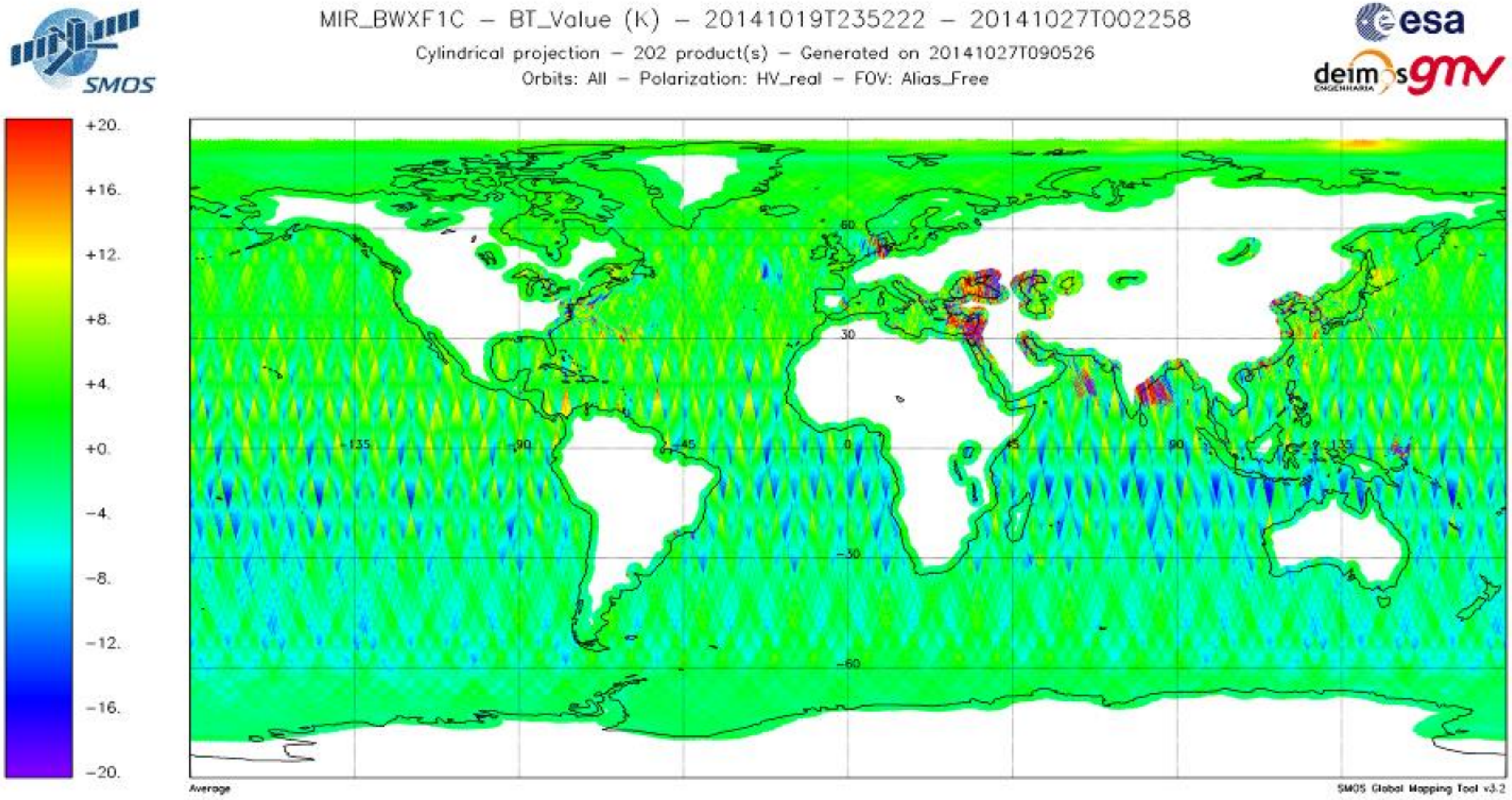

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Figure 58 Real Part of the XY Brightness temperature evolution over sea during the reporting period (week 5)

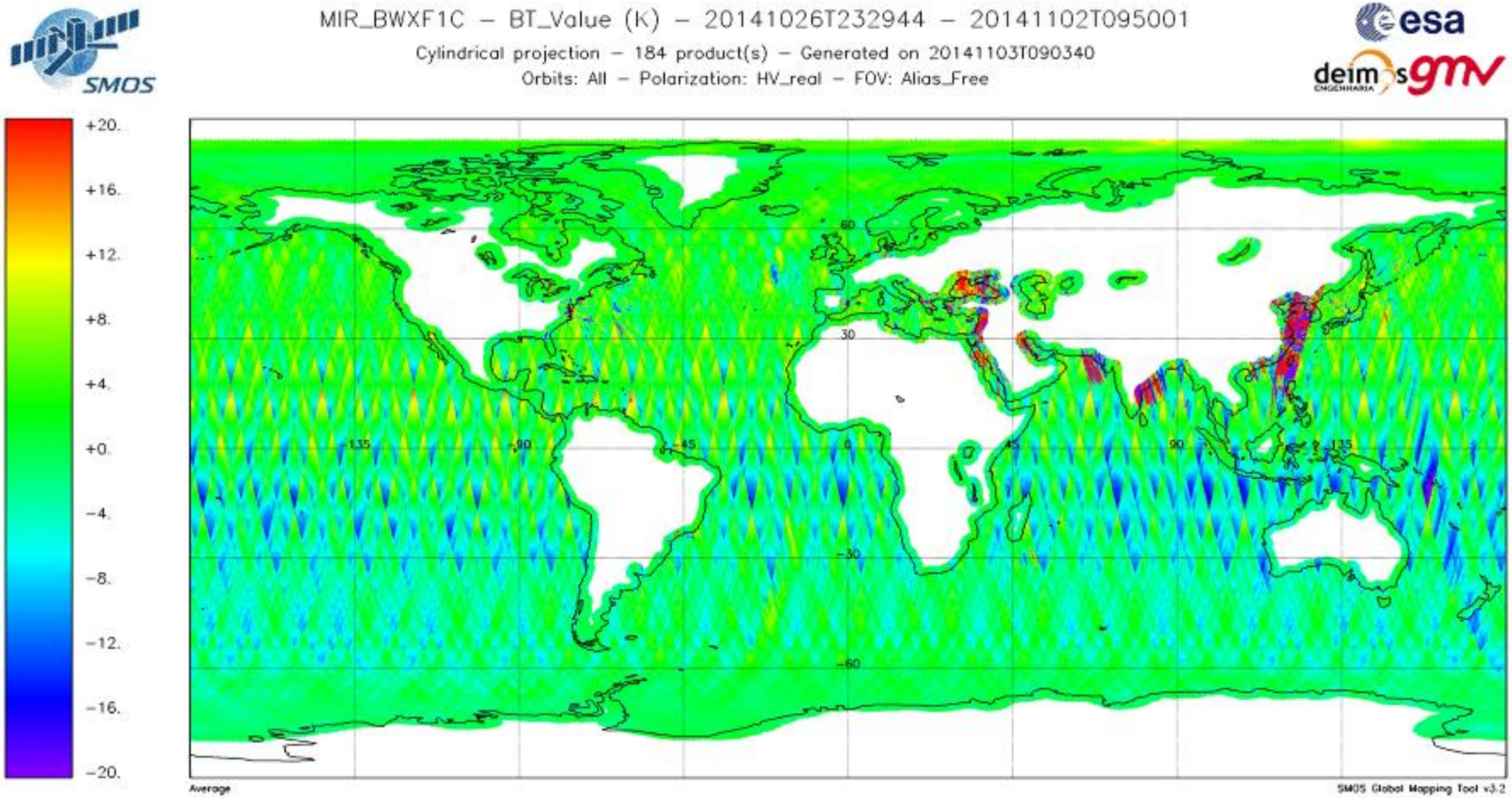

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Figure 59 Imaginary Part of the XY Brightness temperature evolution over sea during the reporting period (week 1)

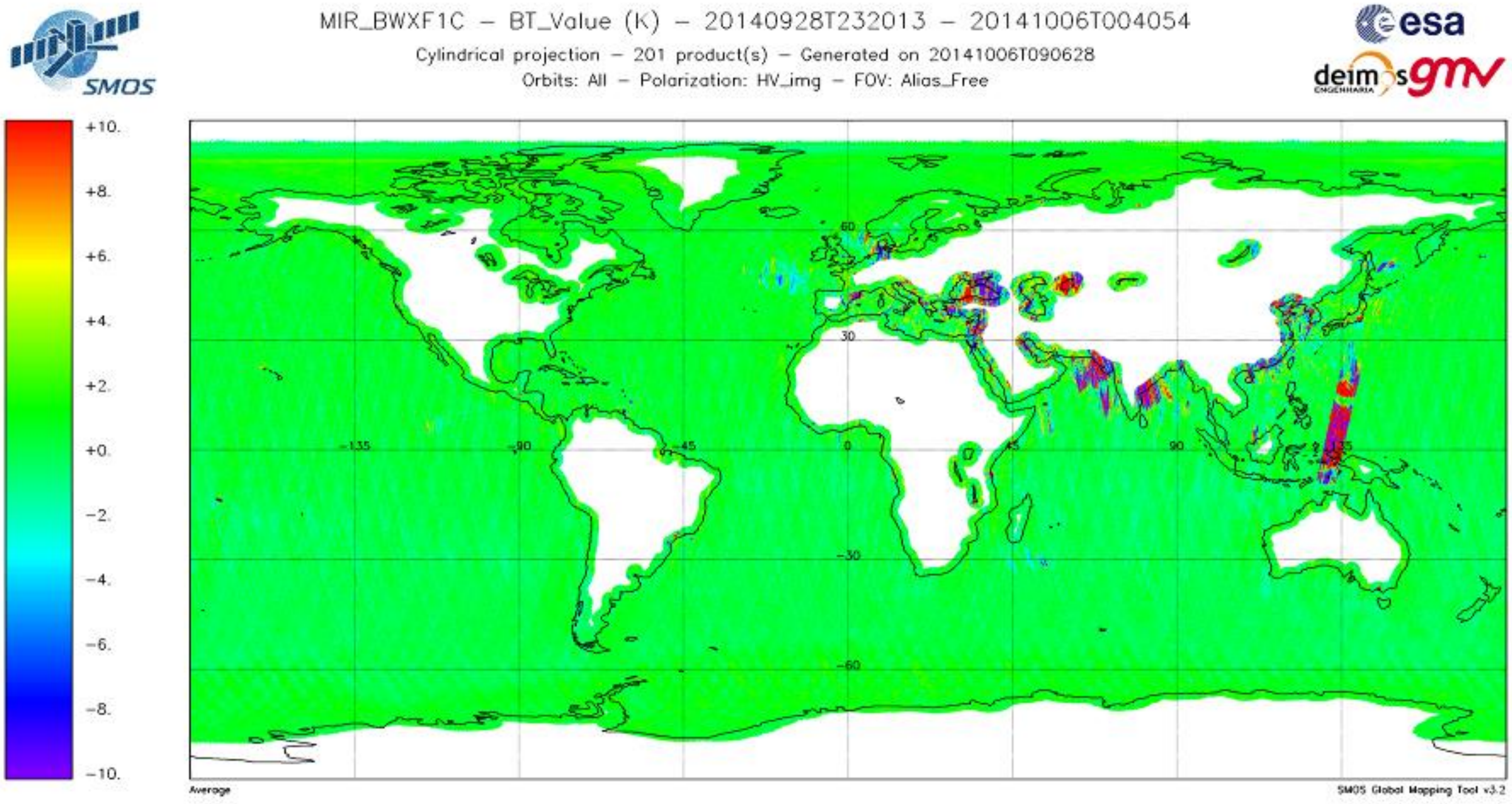

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Figure 60 Imaginary Part of the XY Brightness temperature evolution over sea during the reporting period (week 2)

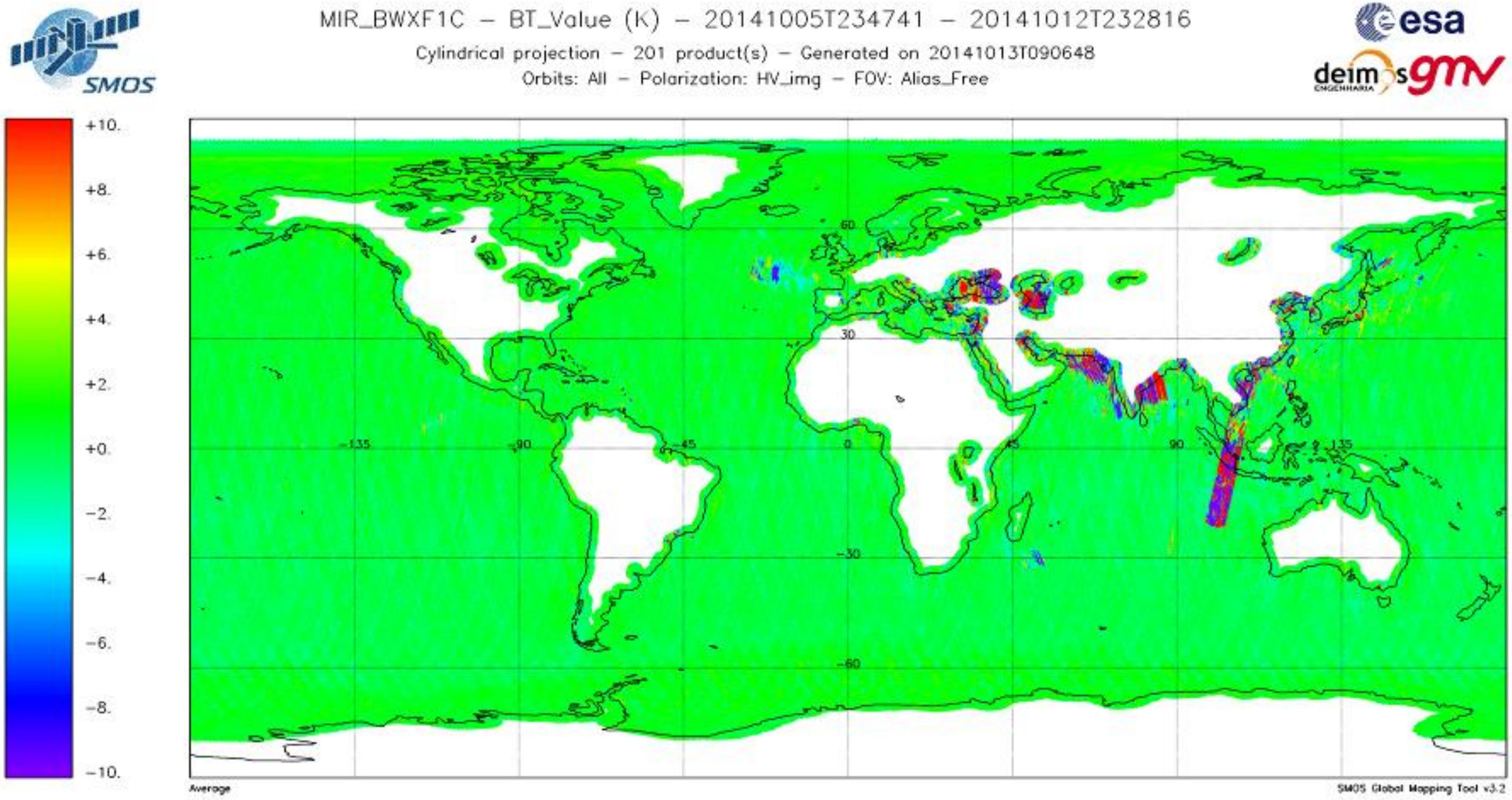

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Figure 61 Imaginary Part of the XY Brightness temperature evolution over sea during the reporting period (week 3)

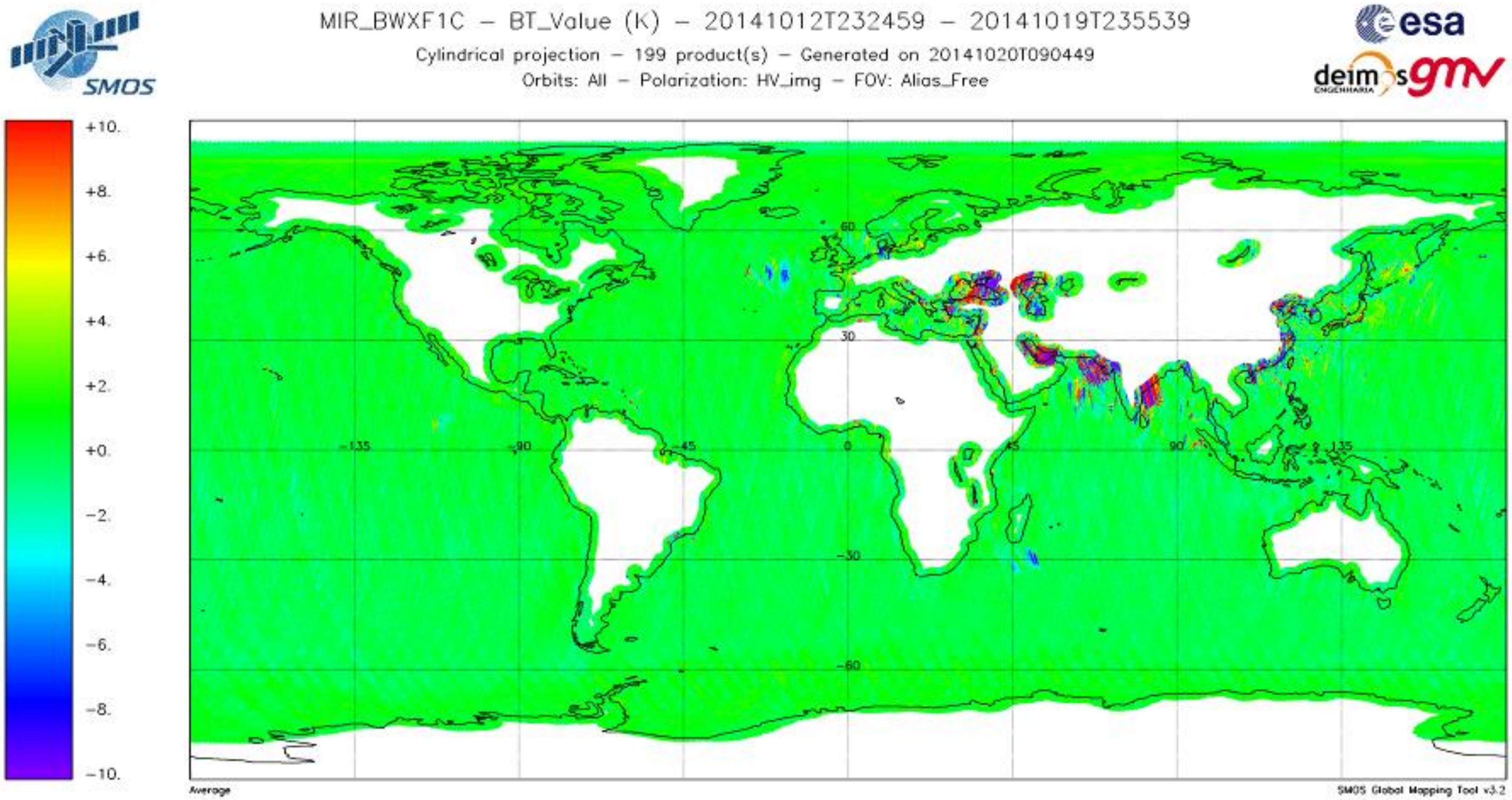

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Figure 62 Imaginary Part of the XY Brightness temperature evolution over sea during the reporting period (week 4)

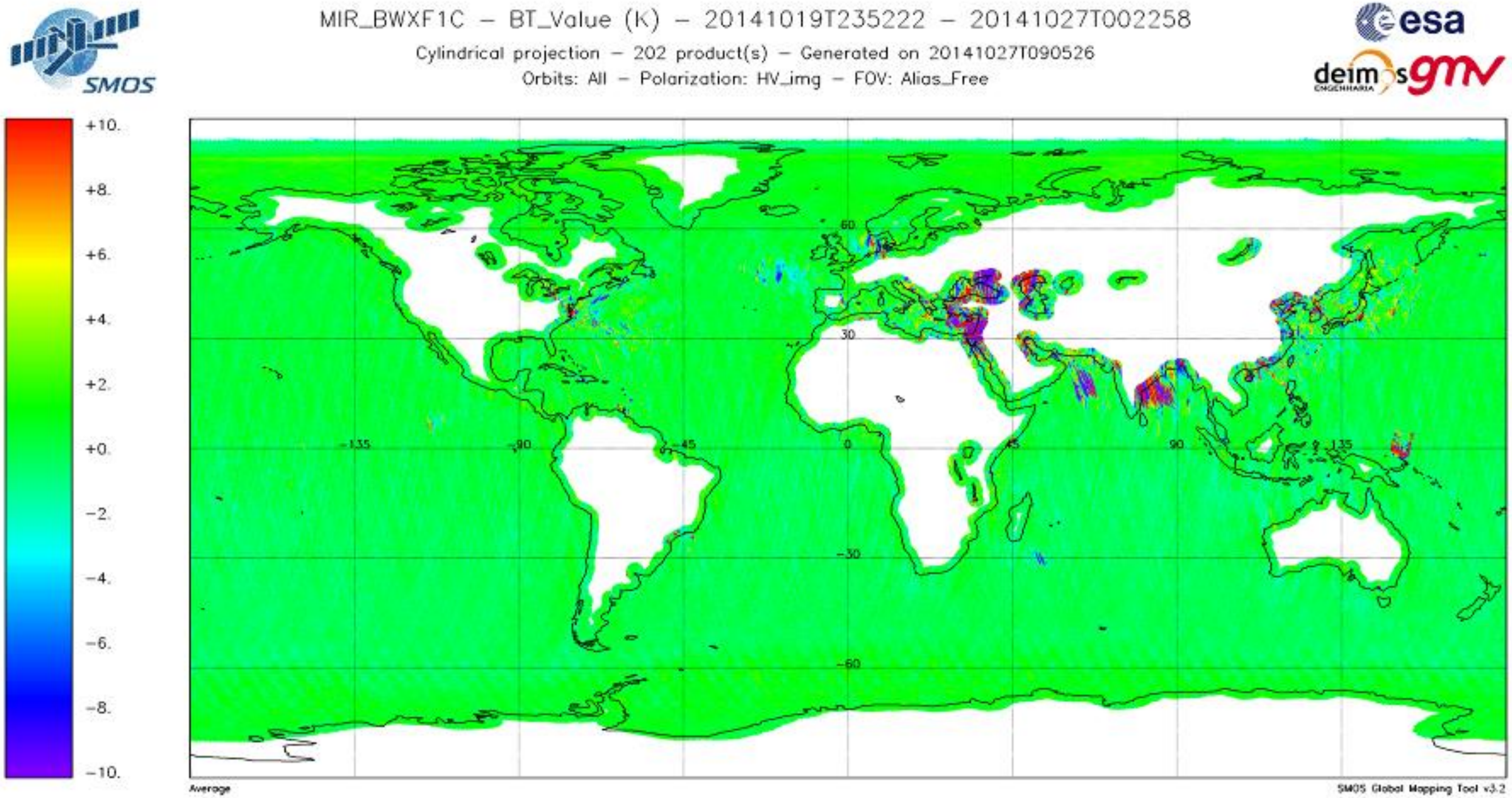

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Figure 63 Imaginary Part of the XY Brightness temperature evolution over sea during the reporting period (week 5)

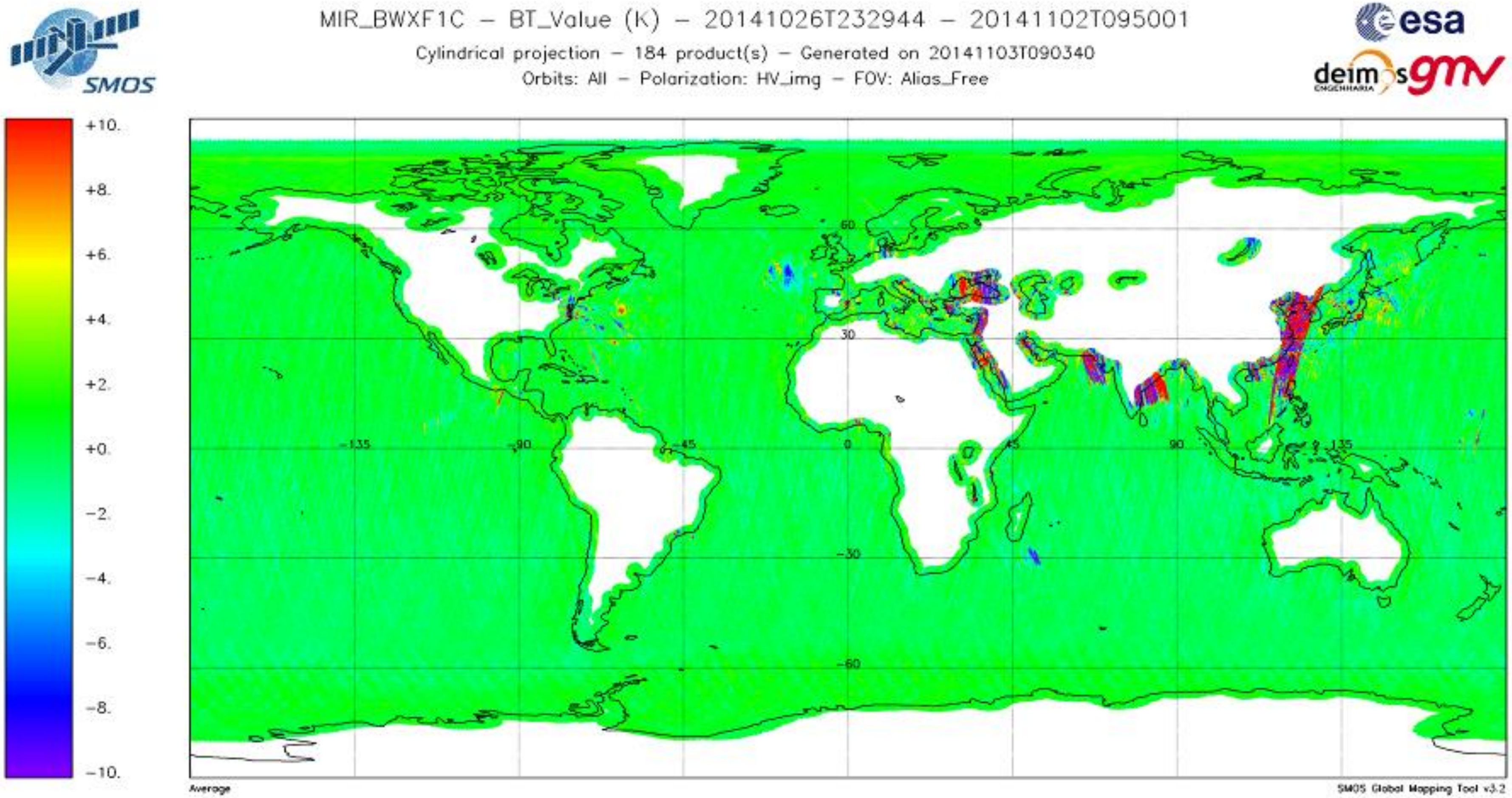

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Figure 64 Soil moisture evolution during the reporting period (week 1)

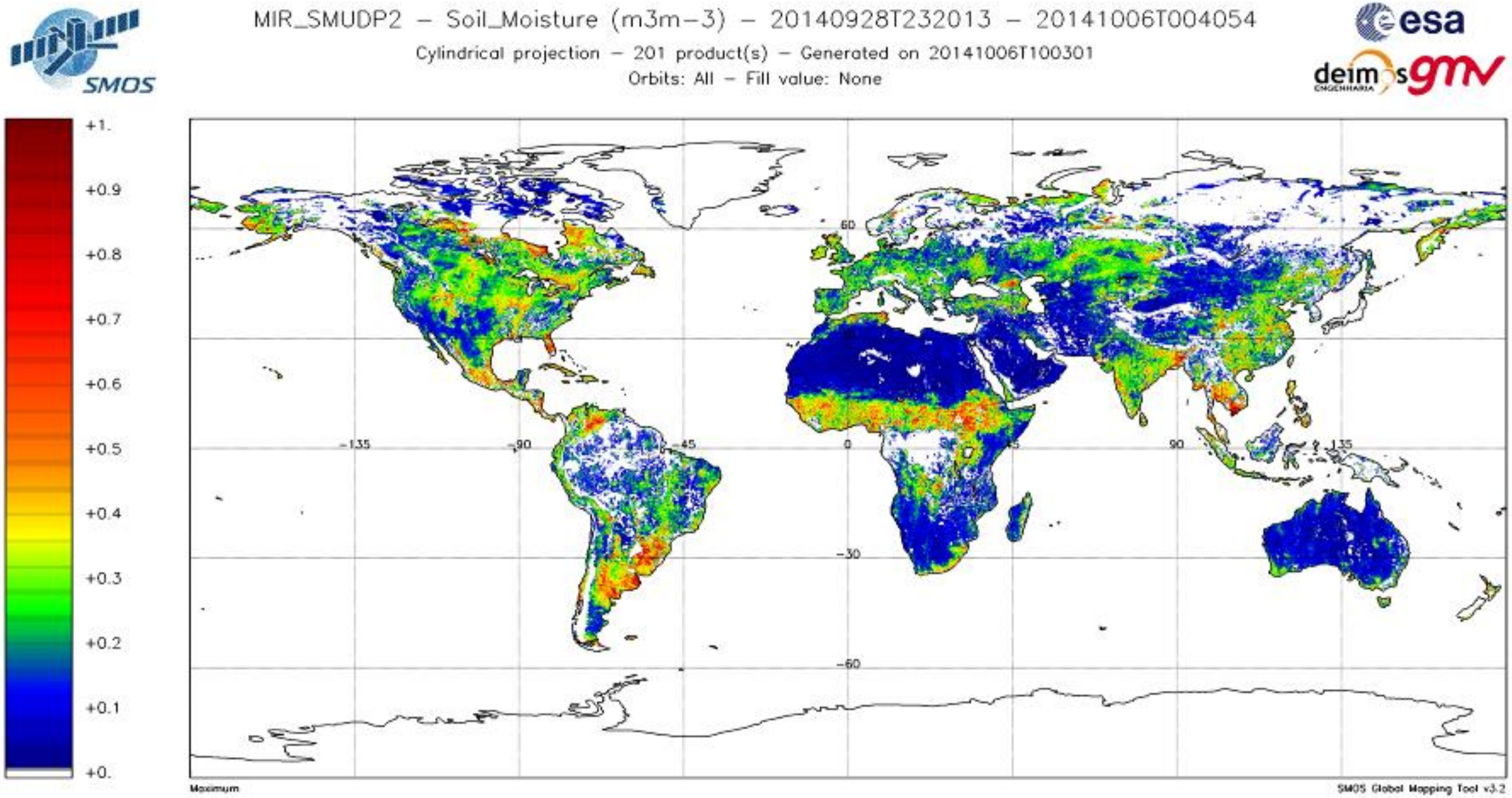

Figure 65 Soil moisture evolution during the reporting period (week 2)

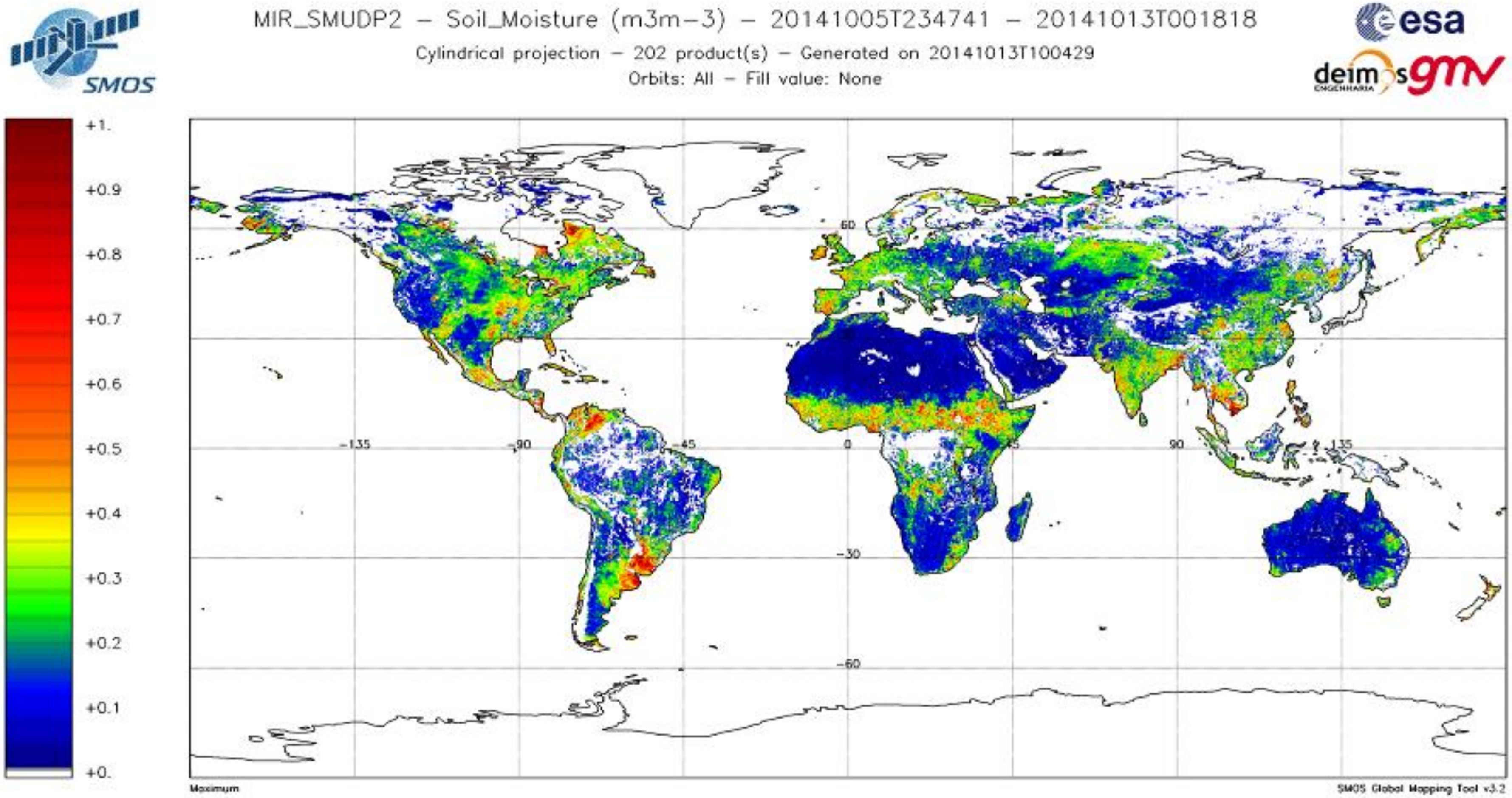

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Figure 66 Soil moisture evolution during the reporting period (week 3)

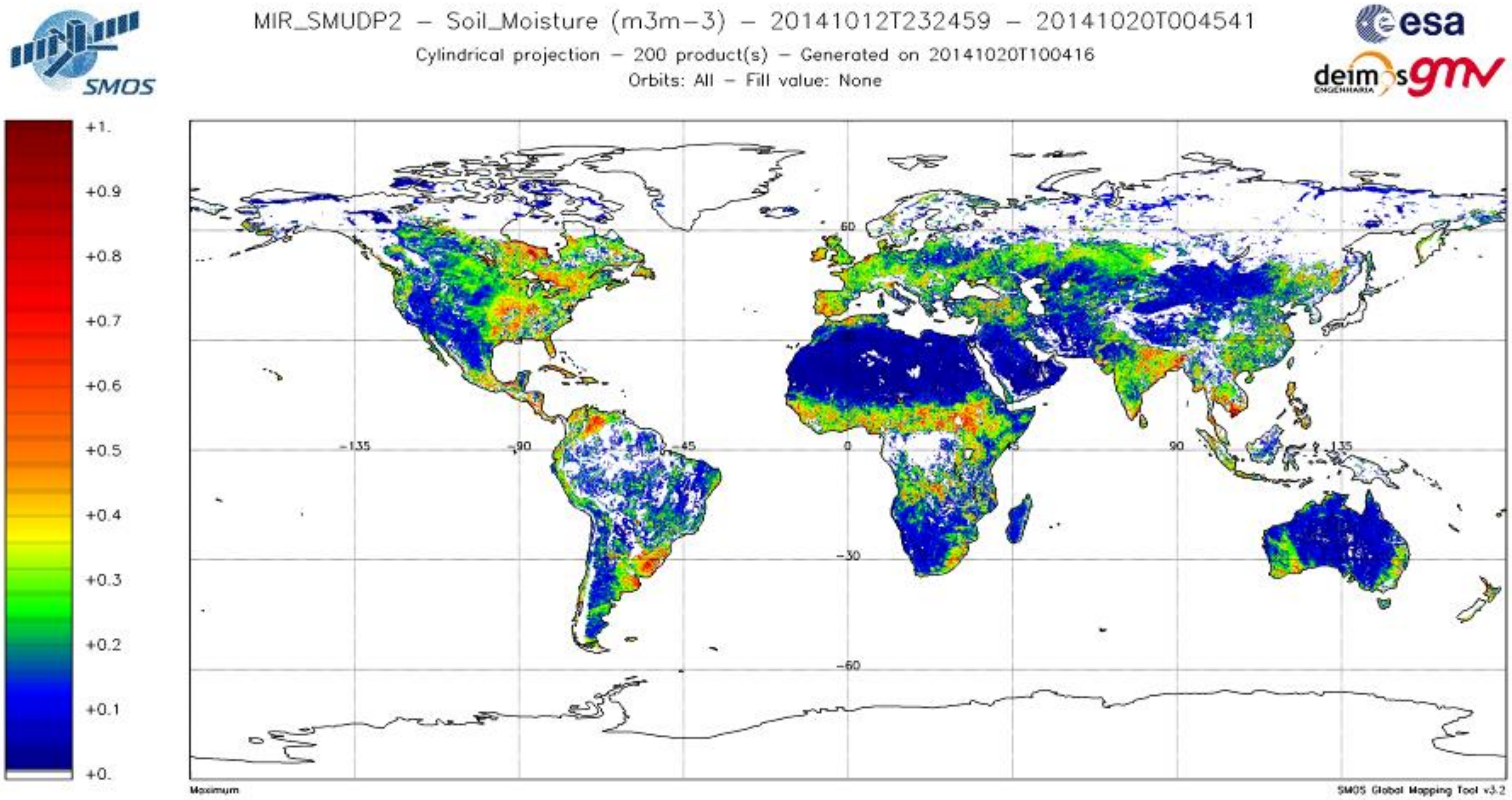

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Figure 67 Soil moisture evolution during the reporting period (week 4)

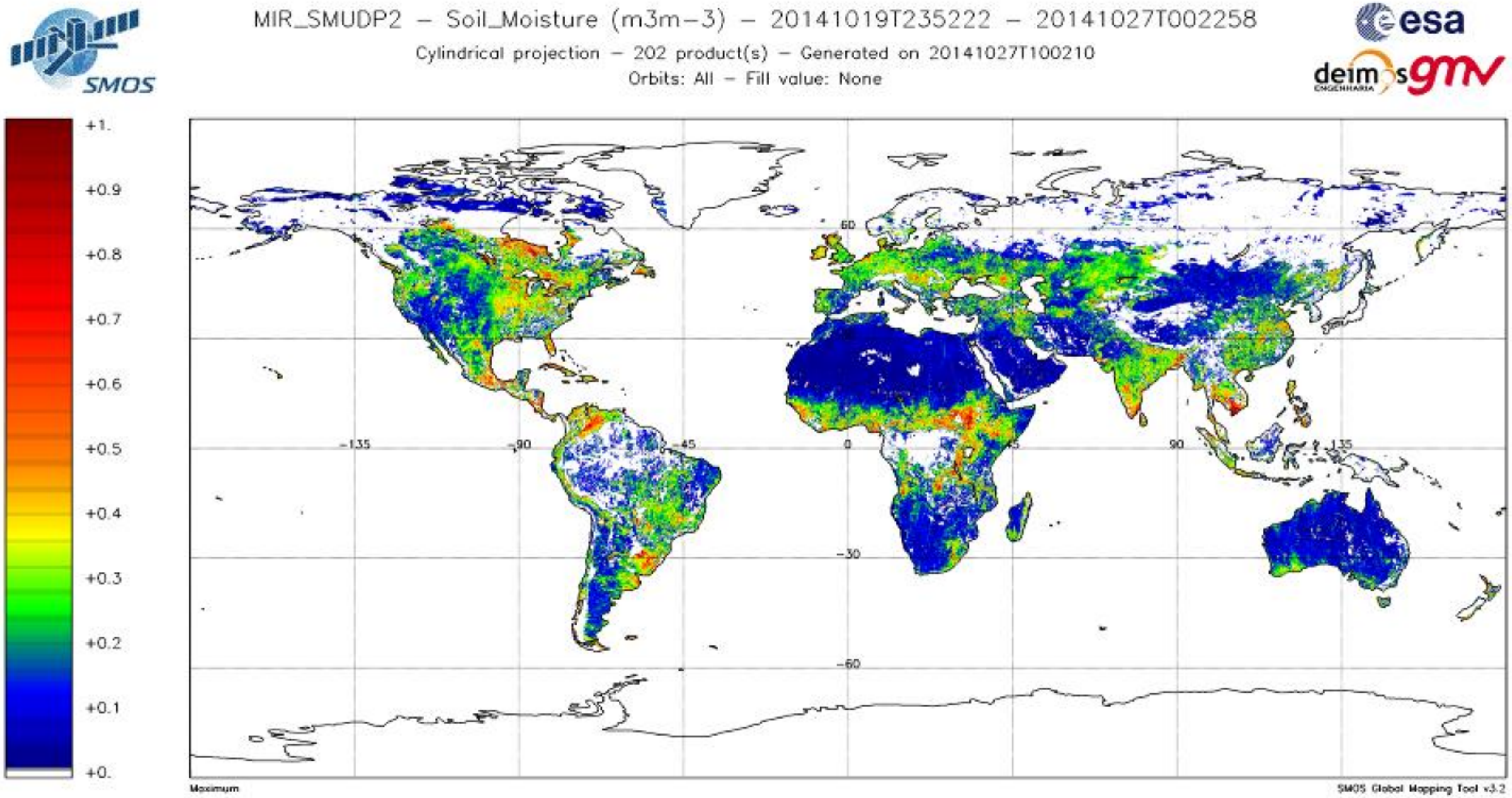

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Figure 68 Soil moisture evolution during the reporting period (week 5)

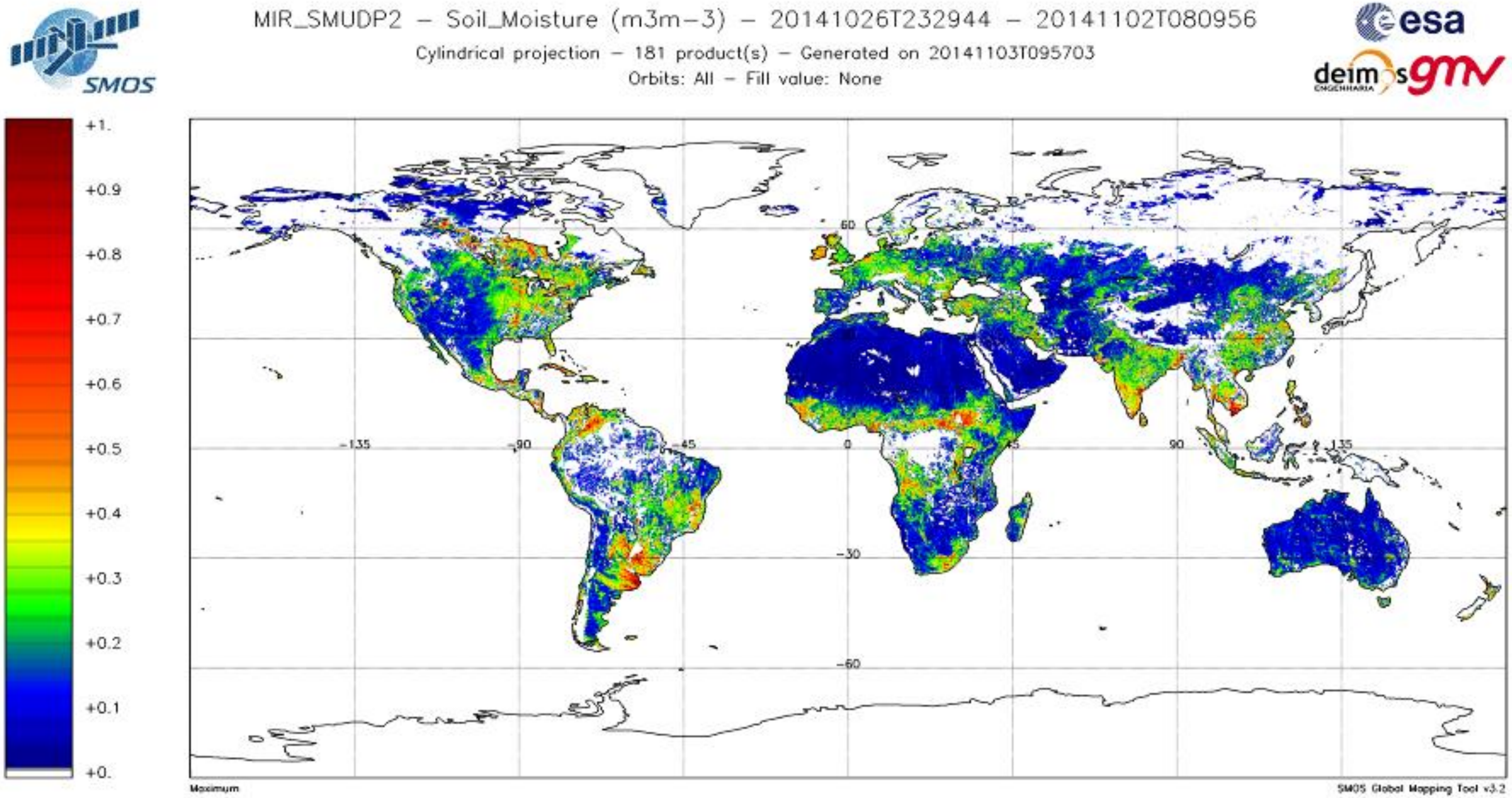

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Figure 69 Soil moisture on Taklamakan desert during the reporting period: SM in ascending passes (left) and SM in descending passes (right)

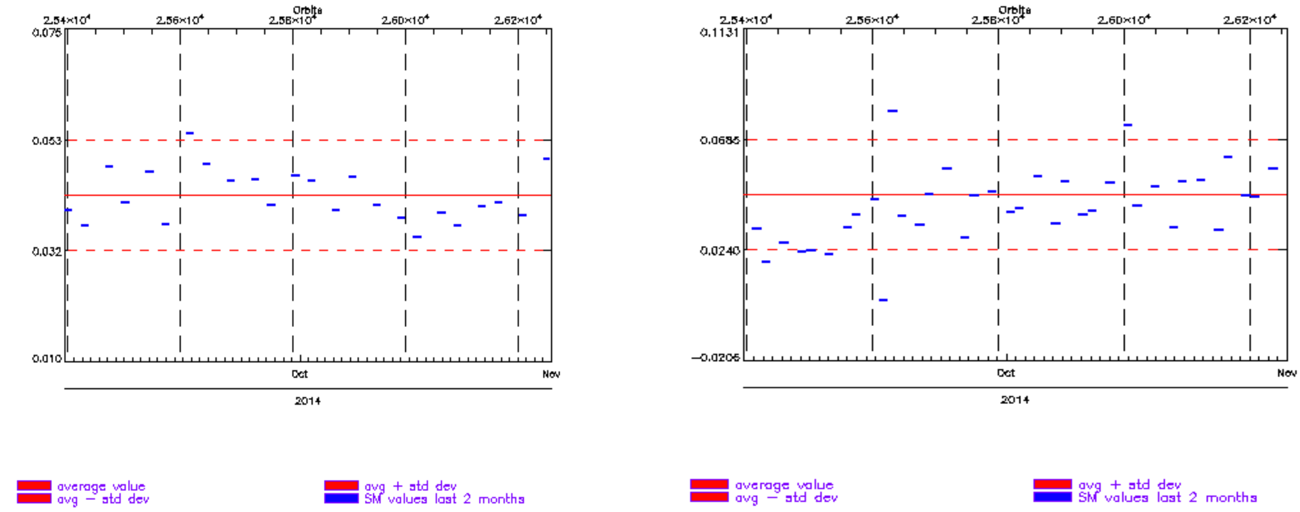
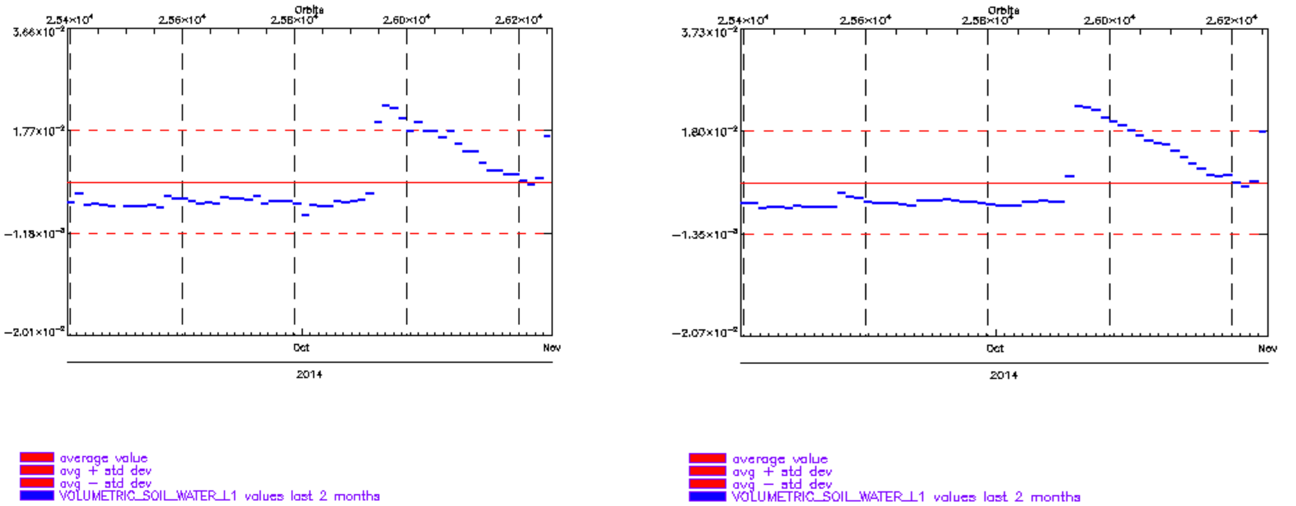


Figure 70 Volumetric Soil Water L1 provided by ECMWF on Taklamakan desert during the reporting period: ascending passes (left) and descending passes (right)



7. ADF CONFIGURATION AT THE END OF THE REPORTING PERIOD

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AUX_APDS__	SM_OPER_AUX_APDS___20050101T000000_20500101T000000_300_004_3.EEF	No
AUX_ATMOS_	SM_OPER_AUX_ATMOS__20050101T000000_20500101T000000_001_010_3.EEF	No
AUX_BFP___	SM_OPER_AUX_BFP____20050101T000000_20500101T000000_340_004_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_BULL_B	SM_OPER_AUX_BULL_B_20140802T000000_20500101T000000_120_001_3	Yes
AUX_BWGHT_	SM_OPER_AUX_BWGHT__20050101T000000_20500101T000000_340_006_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_620_048_3.EEF	No
AUX_CNFNRT	SM_OPER_AUX_CNFNRT_20050101T000000_20500101T000000_505_009_3.EEF	No
AUX_CNFOSD	SM_OPER_AUX_CNFOSD_20050101T000000_20500101T000000_001_022_3.EEF	No
AUX_CNFOSF	M_OPER_AUX_CNFOSF_20050101T000000_20500101T000000_001_023_3.EEF	No
AUX_CNFSMD	SM_OPER_AUX_CNFSMD_20050101T000000_20500101T000000_001_011_3.EEF	No
AUX_CNFSMF	SM_OPER_AUX_CNFSMF_20050101T000000_20500101T000000_001_011_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_DFFSOI	SM_OPER_AUX_DFFSOI_20050101T000000_20500101T000000_001_002_3	No
AUX_DFFXYZ	SM_OPER_AUX_DFFXYZ_20050101T000000_20500101T000000_001_003_3	No
AUX_DGG___	SM_OPER_AUX_DGG____20050101T000000_20500101T000000_300_003_3	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_DTBCUR	SM_OPER_AUX_DTBCUR_20000101T000001_20500101T000000_611_001_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
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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_003_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_004_3.EEF	No
AUX_LCF___	SM_OPER_AUX_LCF____20050101T000000_20500101T000000_500_016_3.EEF	No
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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
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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_350_010_3.EEF	No
AUX_NRTMSK	SM_OPER_AUX_NRTMSK_20050101T000000_20500101T000000_207_001_6	No

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AUX_OTT1D_	SM_OPER_AUX_OTT1D__20141001T000000_20500101T000000_550_001_3	Yes
AUX_OTT1F_	SM_OPER_AUX_OTT1F__20141001T000000_20500101T000000_550_001_3	Yes
AUX_OTT2D_	SM_OPER_AUX_OTT2D__20141001T000000_20500101T000000_550_001_3	Yes
AUX_OTT2F_	SM_OPER_AUX_OTT2F__20141001T000000_20500101T000000_550_001_3	Yes
AUX_OTT3D_	SM_OPER_AUX_OTT3D__20141001T000000_20500101T000000_550_001_3	Yes
AUX_OTT3F_	SM_OPER_AUX_OTT3F__20141001T000000_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
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AUX_RFI___	SM_OPER_AUX_RFI____20050101T000000_20500101T000000_300_003_3	No
AUX_RFILST	SM_OPER_AUX_RFILST_20050101T000000_20500101T000000_100_005_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_014_3.EEF	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_012_3.EEF SM_OPER_AUX_SPAR___20100111T120700_20110112T091500_340_011_3.EEF SM_OPER_AUX_SPAR___20050101T000000_20100111T120700_340_010_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

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APPENDIX A. CONFIGURATION DOCUMENT LIST

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

- Unavailability.xls
- Details_Calibrations.xls
- SMOS-CEC-VEG-IPF-REP-0609_v1.69_SMOS_Auxiliary_Data_File_List_20141027.pdf

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