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**Title** : IDEAS – SMOS Public Monthly Report - August 2011

**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**

<b>ISSUE</b>	<b>DATE</b>	<b>DCI No</b>	<b>REASON</b>
1	05 September 2011	N/A	First release
2	05 October 2011	N/A	Section 4.2.5: Typo in the AUX_BULL_B_ description has been corrected.
3	31 October 2011	N/A	Section 5: Added information on the RFI detected in Sahara on week 31



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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 August 2011.

The instrument health during August was found to be nominal. There were 5 unavailabilities 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 August was found to be nominal except in the time intervals listed in the section 4.4. 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
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
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
04 August 2011 09:12 Orbit 9213	4 August 2011 09:12 Orbit 9213	FOS-0100	No	MM Latchup (Partition 6)
08 August 2011 13:20 Orbit 9273	08 August 2011 13:20 Orbit 9273	FOS-0101	No	MM Latchup (Partition 7)



10 August 2011 15:28 Orbit 9303	10 August 2011 15:38 Orbit 9303	FOS-0102	No	CMN Unlock (B2)
24 August 2011 09:42 Orbit 9501	24 August 2011 09:52 Orbit 9501	FOS-0103	No	CMN Unlock (C3)
31 August 2011 17:51 Orbit 9607	31 August 2011 20:56 Orbit 9609	FOS-0104	No	Autonomous CCU reset

## 4. DATA SUMMARY

### 4.1 Reprocessing activities

No reprocessing activities have been conducted during the reporting period.

### 4.2 Processing changes

#### 4.2.1 Processor updates

No processor changes 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	346
L2OS	317
L2SM	401

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

Processor	Version
ECMWFP	313
VTECGN	309
LAI pre-processor	307
L2 Post-processors	307

#### 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:

**Table 4-3 Schema version status**

Product type	Version
MIR_SC_F1B	200
MIR_SCSF1C	201
MIR_SCLF1C	201
MIR_BWSF1C	200
MIR_BWLF1C	200
MIR_SMUDP2	202
MIR_OSUDP2	200
AUX_ECMWF_	201

The schema packages are available from the anonymous ftp site:

<ftp://131.176.251.163/smos/schemas>

#### 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 6.

**SM\_OPER\_AUX\_BULL\_B\_20110602T000000\_20500101T000000\_120\_001\_3**

Dissemination date: 2011-08-10 08:44:03z

Start sensing time at L1 processor: 2011-08-10 at 02:48:12z

Justification: Bulletin Update including values from June 2011 and the prediction for July 2011. Its usage is intended for the nominal production.

**SM\_OPER\_AUX\_BULL\_B\_20110602T000000\_20110701T235959\_120\_001\_3**

Dissemination date: 2011-08-10 08:44:03z

Start sensing time at L1 processor: File not used in the nominal processing chain

Justification: Bulletin Update including values from June 2011 and the prediction for July 2011. Its usage is intended for reprocessing.



### 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 calibration are acquired since 24 March 2011 but are not used in the nominal processing chain.

**Table 4-4 Calibration summary**

Start	Finish	Calibration	Comments
2011-08-04 14:13:00z	2011-08-04 14:14:44z	Short Calibration	Nominal
2011-08-10 14:58:53z	2011-08-10 16:21:06z	NIR Calibration	Nominal Brightness temperature: 3.77 K RMS: 0.10 K Moon elevation: -23.95 deg Sun Elevation: -4.37 deg Right Ascension: 52.91 deg Declination: -26.75 deg
2011-08-11 14:41:35z	2011-08-11 14:43:19z	Short Calibration	Nominal
2011-08-18 15:07:25z	2011-08-18 15:09:09z	Short Calibration	Nominal
2011-08-23 14:47:30z	2011-08-23 16:09:43z	NIR Calibration	Nominal Brightness temperature: 3.85 K RMS: 0.17 K Moon elevation: 19.49 deg Sun Elevation: -2.60deg Right Ascension: 70.18 deg Declination: -45.61 deg
2011-08-24 02:22:59z	2011-08-24 03:16:18z	Long Calibration	Nominal
2011-08-24 03:56:03z	2011-08-24 04:49:22z	Long Calibration	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.

**Table 4-5 Data loss summary**

Start	Finish	Data Level	Comments
31 August 2011 17:51  Orbit 9607	31 August 2011 20:56  Orbit 9609	All L1 Production	Autonomous CCU reset (FOS-0104). Instrument in dual polarization mode without Local Oscillator calibration.

**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 August 2011 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
10 August 2011 15:28  Orbit 9303	10 August 2011 15:38  Orbit 9303	All products	Wrong instrument calibration due to the CMN unlock (FOS-0102)
15 August 2011 00:23  Orbit 9366	15 August 2011 02:03  Orbit 9367	L1C and L2 products	The auxiliary file with the prediction of the Ionospheric Electron Content has not been updated during this period.
24 August 2011 09:42	24 August 2011 09:52	All products	Wrong instrument calibration due to the CMN unlock (FOS-



Orbit 9501	Orbit 9501		0103)
31 August 2011 17:51 Orbit 9607	31 August 2011 20:56 Orbit 9609	L2 Production	Wrong instrument calibration and dual polarization instrument mode due to an autonomous CCU reset (FOS- 0104)

#### **4.6 Product Quality Disclaimers**

In August 2011, no quality disclaimers were issued.

## 5. LONG-TERM ANALYSIS

### 5.1 Calibration Analysis

The calibration parameters are under monitoring. No anomalies have been detected in the reporting period. During the reporting period, there have been NIR calibrations events on 10 August and 23 August. 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.

Also, a long calibration event has been conducted on 24 August to calibrate the PMS parameters, the FWF functions and the correlator offsets. All these parameters are monitored and in the range specified by the routine calibration plan.

### 5.2 Product Quality Analysis

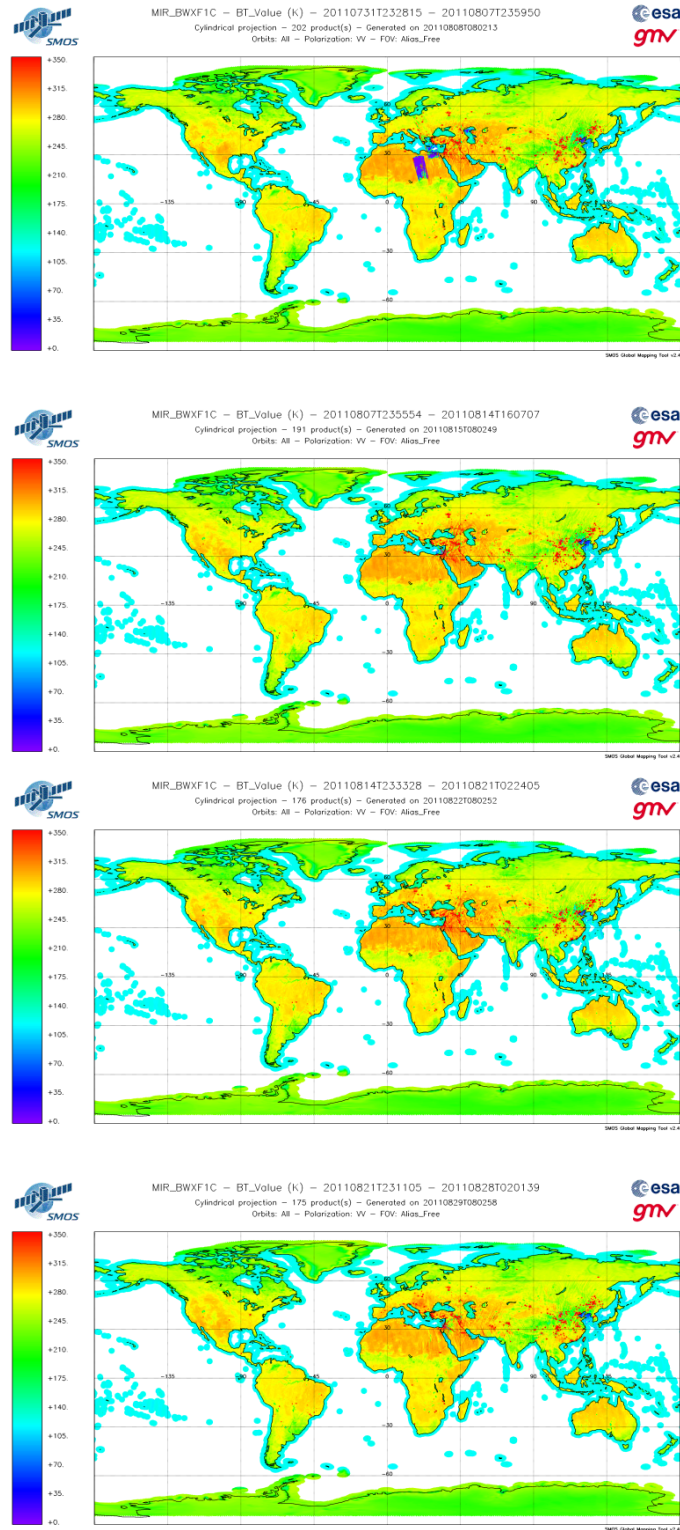
The data quality in the reporting period is nominal except in the time intervals reported in 4.5. The degradations in this period are due to CMN unlocks. That impacts in the instrument phase calibration affecting the radiometric accuracy of the measurements.

The L1 production is nominal as no artefacts are observed in the 1<sup>st</sup> Stokes maps in Figure 1 and Figure 2. The figures plot the 1<sup>st</sup> 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 some cases, the influence of the RFI sources may impact on regions far from their location. That is the case observed in the orbits 9181 and 9195 on 2<sup>nd</sup> and 3<sup>rd</sup> August, respectively, where a significant area in Libya is polluted by a RFI located in Europe which is seen in the Earth horizon by the instrument.

The L2 Soil Moisture and Ocean Salinity production is nominal in the reporting period. Figure 4 shows the evolution of the soil moisture retrievals. Those values present a correlation with the Volumetric Soil Water at L1 (see Figure 5) provided by ECMWF. Some differences between the ECMWF forecast and the soil moisture retrieved were observed in the ascending passes during July. The Level 2 ESL has pointed out that the possible cause is that the predicted precipitation event might not actually occur. Another hypothesis could be the lack of soil moisture retrievals due to RFI. This hypothesis is supported by the inferior amount of retrievals during the second week of July (see Figure 5 of the July QC Monthly report).



Figure 1 1st Stokes evolution over land during the reporting period



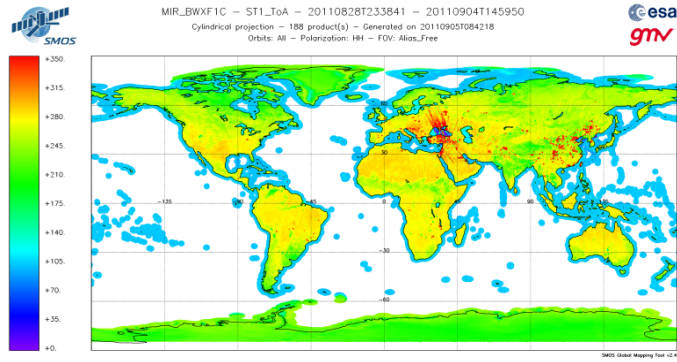
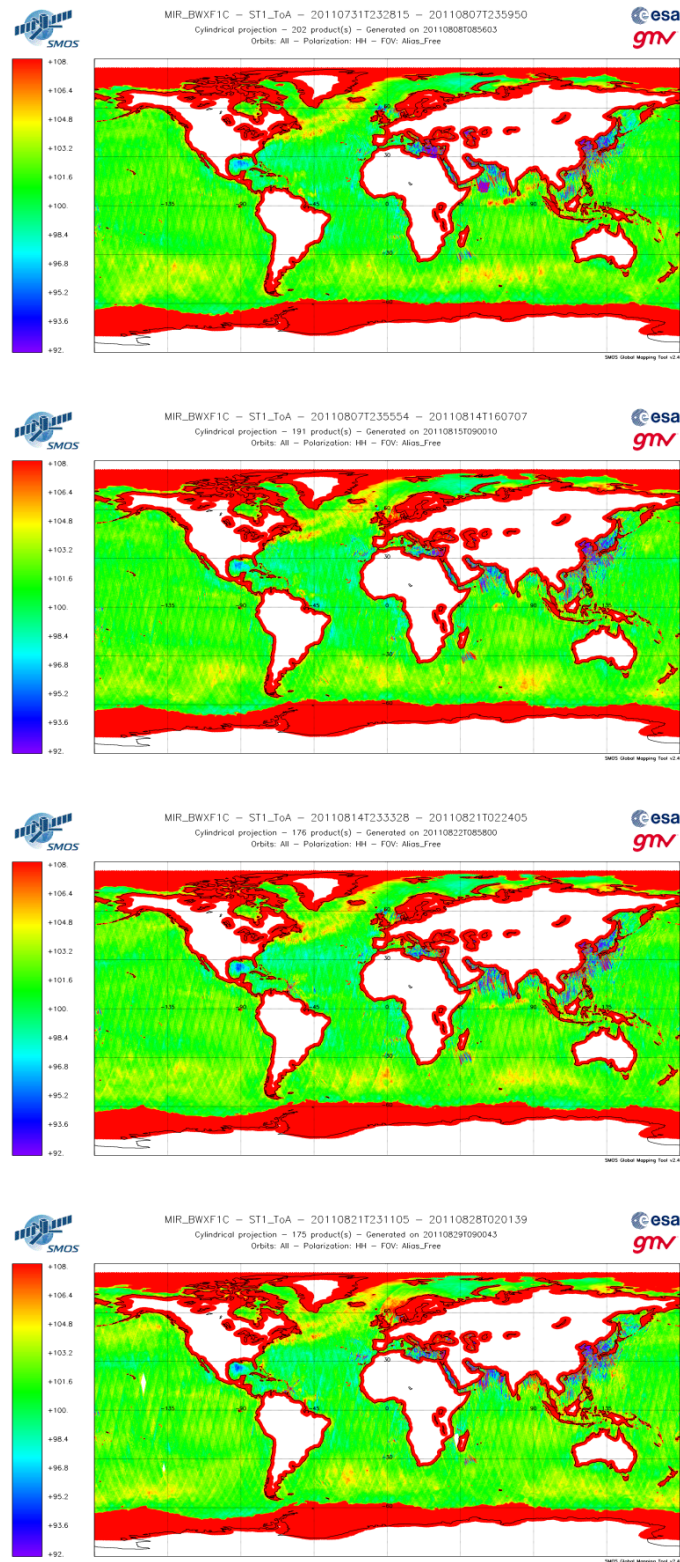


Figure 2 1st Stokes evolution over sea during the reporting period



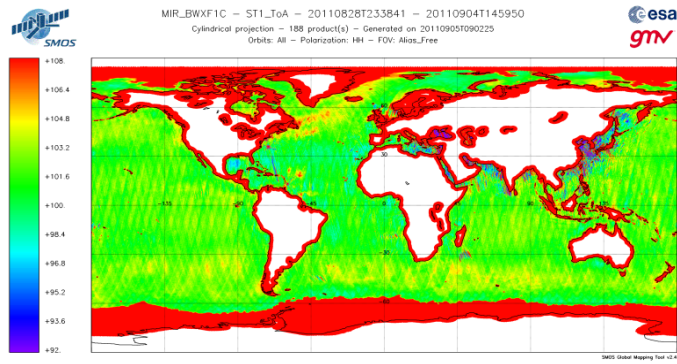
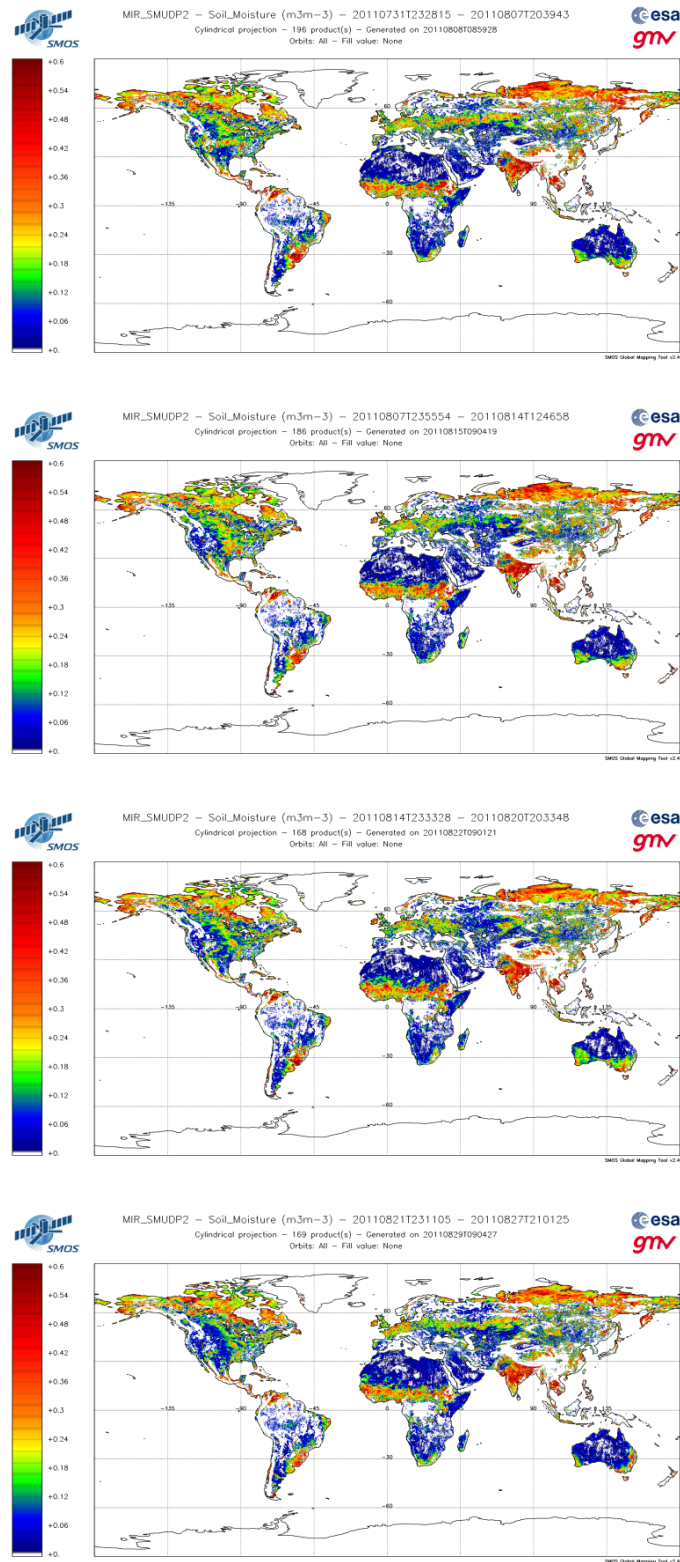


Figure 3 Soil moisture evolution during the reporting period



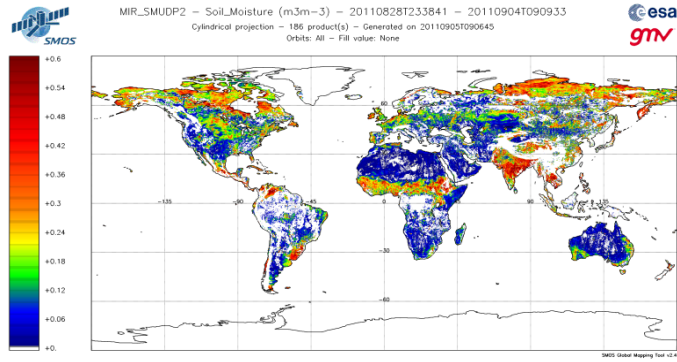




Figure 4 Soil moisture on Taklamakan desert during the reporting period: SM in ascending passes (left) and SM in descending passes (right)

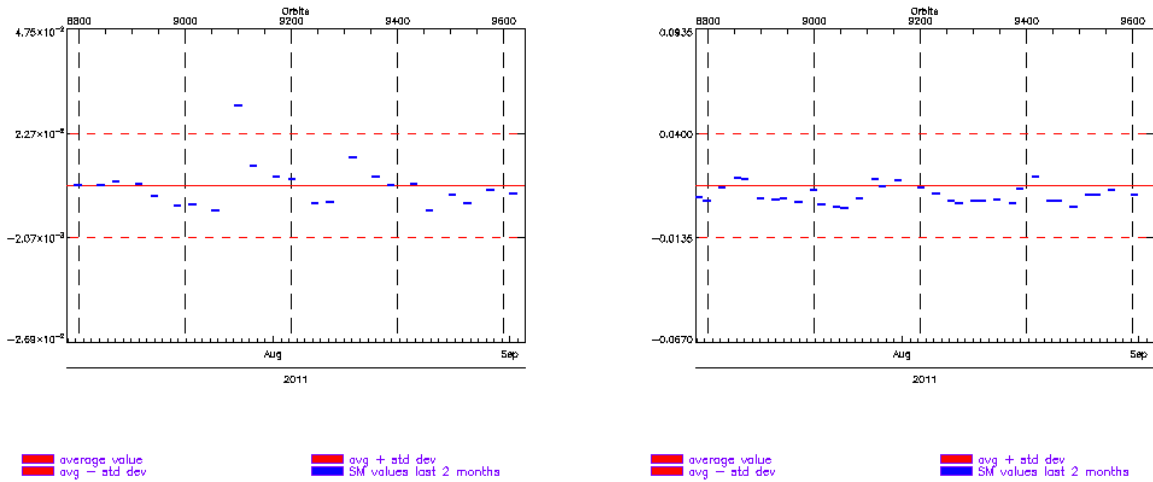
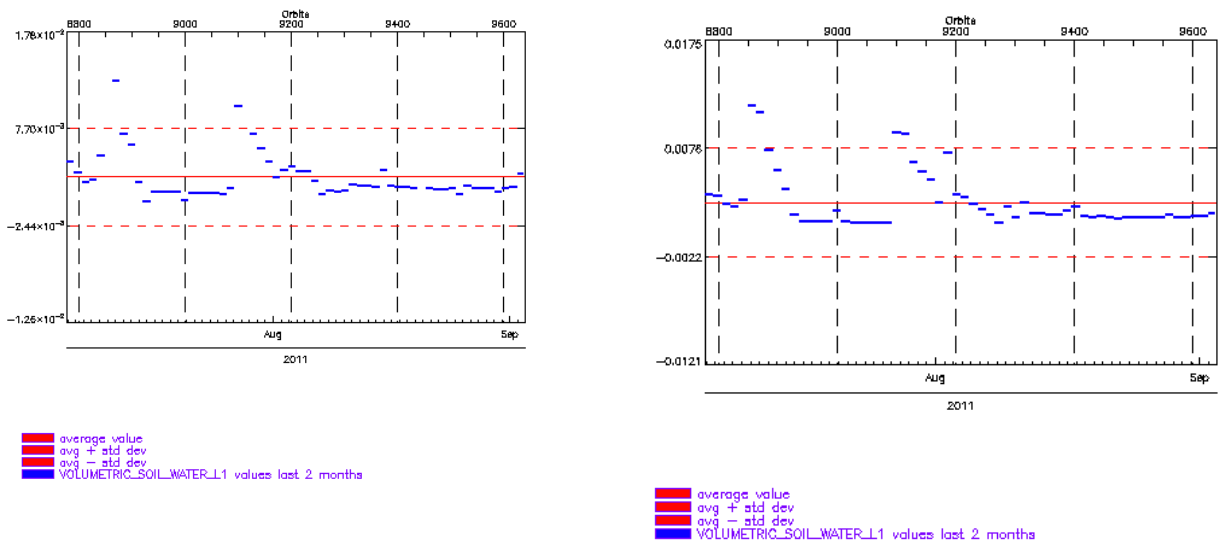


Figure 5 Volumetric Soil Water L1 provided by ECMWF on Taklamakan desert during the reporting period: ascending passes (left) and descending passes (right)



## 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_001_4.EEF	No
AUX_APDNRT	SM_OPER_AUX_APDNRT_20050101T000000_20500101T000000_207_001_6.EEF	No
AUX_APDS	SM_OPER_AUX_APDS_20050101T000000_20500101T000000_300_001_4.EEF	No
AUX_ATMOS	SM_OPER_AUX_ATMOS_20050101T000000_20500101T000000_001_010_8.EEF	No
AUX_BFP	SM_OPER_AUX_BFP_20050101T000000_20500101T000000_340_002_3.EEF	No
AUX_BNDLST	SM_OPER_AUX_BNDLST_20050101T000000_20500101T000000_300_001_3	No
AUX_BSCAT	SM_OPER_AUX_BSCAT_20050101T000000_20500101T000000_300_002_3	No
AUX_BWGHT	SM_OPER_AUX_BWGHT_20050101T000000_20500101T000000_340_004_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_20100413T000000_20500101T000000_346_013_3.EEF	No
AUX_CNFNRT	SM_OPER_AUX_CNFNRT_20050101T000000_20500101T000000_341_008_3.EEF	No
AUX_CNFOSD	SM_OPER_AUX_CNFOSD_20050101T000000_20500101T000000_001_017_3.EEF	No
AUX_CNFOSF	SM_OPER_AUX_CNFOSF_20050101T000000_20500101T000000_001_017_3.EEF	No
AUX_CNFSMD	SM_OPER_AUX_CNFSMD_20050101T000000_20500101T000000_001_006_3.EEF	No
AUX_CNFSMF	SM_OPER_AUX_CNFSMF_20050101T000000_20500101T000000_001_006_3.EEF	No
AUX_DFFFRA	SM_OPER_AUX_DFFFRA_20050101T000000_20500101T000000_001_003_3	No
AUX_DFFLMX	SM_OPER_AUX_DFFLMX_20050101T000000_20500101T000000_001_004_3	No
AUX_DFFXYZ	SM_OPER_AUX_DFFXYZ_20050101T000000_20500101T000000_001_002_3	No
AUX_DGG	SM_OPER_AUX_DGG_20050101T000000_20500101T000000_300_002_4	No
AUX_DGGXYZ	SM_OPER_AUX_DGGXYZ_20050101T000000_20500101T000000_001_003_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_FAIL	SM_OPER_AUX_FAIL_20050101T000000_20500101T000000_300_001_4.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_001_9	No
AUX_GAL2OS	SM_OPER_AUX_GAL2OS_20050101T000000_20500101T000000_001_013_3	No
AUX_GALAXY	SM_OPER_AUX_GALAXY_20050101T000000_20500101T000000_300_002_4	No
AUX_GALNIR	SM_OPER_AUX_GALNIR_20050101T000000_20500101T000000_300_001_3	No
AUX_LANDCL	SM_OPER_AUX_LANDCL_20050101T000000_20500101T000000_001_002_3.EEF	No
AUX_LCF	SM_OPER_AUX_LCF_20110112T091500_20500101T000000_340_009_3.EEF	No
AUX_LSMASK	SM_OPER_AUX_LSMASK_20050101T000000_20500101T000000_300_002_4	No
AUX_MASK	SM_OPER_AUX_MASK_20050101T000000_20500101T000000_300_001_4	No
AUX_MISP	SM_OPER_AUX_MISP_20050101T000000_20500101T000000_300_002_3.EEF	No
AUX_MN_WEF	SM_OPER_AUX_MN_WEF_20050101T000000_20500101T000000_001_001_9	No
AUX_MOONT	SM_OPER_AUX_MOONT_20050101T000000_20500101T000000_300_001_4	No
AUX_NIR	SM_OPER_AUX_NIR_20050101T000000_20500101T000000_340_003_3.EEF	No
AUX_NRTMSK	SM_OPER_AUX_NRTMSK_20050101T000000_20500101T000000_207_001_6	No
AUX_OTT1D	SM_OPER_AUX_OTT1D_20050101T000000_20500101T000000_001_006_3	No
AUX_OTT1F	SM_OPER_AUX_OTT1F_20050101T000000_20500101T000000_001_007_3	No
AUX_OTT2D	SM_OPER_AUX_OTT2D_20050101T000000_20500101T000000_001_006_3	No
AUX_OTT2F	SM_OPER_AUX_OTT2F_20050101T000000_20500101T000000_001_007_3	No
AUX_OTT3D	SM_OPER_AUX_OTT3D_20050101T000000_20500101T000000_001_006_3	No





AUX_OTT3F_	SM_OPER_AUX_OTT3F_20050101T000000_20500101T000000_001_007_3	No
AUX_PATT_	SM_OPER_AUX_PATT_20050101T000000_20500101T000000_320_002_3	No
AUX_PLM_	SM_OPER_AUX_PLM_20050101T000000_20500101T000000_300_006_3.EEF	No
AUX_PMS_	SM_OPER_AUX_PMS_20050101T000000_20500101T000000_340_009_3.EEF	No
AUX_RFI_	SM_OPER_AUX_RFI_20050101T000000_20500101T000000_300_002_3	No
AUX_RGHNS1	SM_OPER_AUX_RGHNS1_20050101T000000_20500101T000000_001_014_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_001_9	No
AUX_SPAR_	SM_OPER_AUX_SPAR_20110112T091500_20500101T000000_340_003_3.EEF	No
AUX_SSS_	SM_OPER_AUX_SSS_20050101T000000_20500101T000000_001_011_3	No
AUX_SUNT_	SM_OPER_AUX_SUNT_20050101T000000_20500101T000000_300_001_4	No
AUX_WEF_	SM_OPER_AUX_WEF_20050101T000000_20500101T000000_001_001_9	No
MPL_ORBSCT	SM_OPER_MPL_ORBSCT_20091102T031142_20500101T000000_350_003_1	No



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