

SMOS Newsletter # 1 (May 2012)

Highlights

Release of reprocessed data

The recent reprocessing campaign for the entire SMOS data set has been completed and the data set has been released to the SMOS user community in March 2012. The Level 1 data set has been generated with the processor version V5.04, covering data acquired in the period 12 January 2010 to 22 December 2011. The Level 2 Soil Moisture data set has been generated with the processor version V5.01, covering data acquired in the period 12 January 2010 to 28 November 2011. The Level 2 Ocean Salinity (Sea Surface Salinity) data set has been generated with the processor version V5.50, covering data acquired in the period 12 January 2010 to 22 December 2011. Please check below for the details of the new processor versions. Data users are strongly encouraged to consult with the read me-first-notes available here [\[https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/content?p_r_p_564233524_assetIdentifier=data-processors-7632\]](https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/content?p_r_p_564233524_assetIdentifier=data-processors-7632), which list all the known caveats in the quality of the SMOS Level 1 and Level 2 data products.

Near Real Time “light” data product operationally available

A new NRT light data product is available since the beginning of March 2012. The new NRT light product is significantly reduced in size (10% of original size, approximately 20-30 MB per half orbit with 28 half orbits per day) whilst keeping full angular resolution on a reduced regular grid, including only land coverage. The product specification can be found here [\[https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1504.pdf\]](https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1504.pdf). To gain access to this new data product please send an email to Susanne.Mecklenburg@esa.int. This data product is intended for use by operational agencies mainly and will be provided through the UK Meteorological Office.

SMOS ocean user meeting, 27 April 2012, EGU, Vienna

At the recent EGU 2012 conference, ESA together with lead scientists in the field organised a SMOS ocean user meeting. The aim of the meeting was to

- Inform and prepare SMOS sea surface salinity (SSS) data users for the content, quality and the caveats of the data available from the operational processing and the recent reprocessing of SMOS level 2 SSS data and to raise awareness for the present issues in the level 1 brightness temperatures and how they progress to level 2 SSS data; and
- To gather detailed feedback from present data users across various areas of interest.

The meeting was attended by approximately 30 to 40 people. The presentations and summary of recommendations are available here [\[https://earth.esa.int/web/guest/smos-egu-2012\]](https://earth.esa.int/web/guest/smos-egu-2012) and contain detailed recommendations.

Publications

An IEEE TGRS special issue on SMOS has just been released and can be found here <http://ieeexplore.ieee.org/xpl/tocresult.jsp?isnumber=6186863&punumber=36>

Data and Processors

Data availability

The SMOS instrument – MIRAS - is operating nominally with the exception of some well-known on-board anomalies [see description of anomalies http://earth.eo.esa.int/missions/smos/MIRAS_ANOMALIES.pdf]. A complete list of anomalies that have occurred so far can be found here https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/content?p_r_p_564233524_assetIdentifier=mission-status-7060].

The cumulative data lost since the beginning of the routine operations phase on 1 May 2010 amounts to 0.14%. The 99.5% of the acquired data are successfully processed to level 1 brightness temperatures and level 2 ocean salinity and soil moisture data products. The degraded data, due to instrument anomalies, amounts to 2.31%. Information about calibration activities can be found here <https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/available-data-processing>].

Data users are strongly advised to check for data availability before using SMOS data on the above link.

Updates on operational processors

The current versions of processors are:

Processor	Current version	In operations since
Level 1A	V5.04	14 November 2011
Level 1B	V5.04	14 November 2011
Level 1C	V5.05	21 March 2012
Level 2 soil moisture	V5.51	24 April 2012
Level 2 ocean salinity	V5.50	15 December 2011

Further details on current versions of operational processors:

Level 1: The current version of the Level 1C processor (V5.05, in operations since 21 March 2012) corrects for erroneous measurements in the brightness temperature over sea located above 72 deg latitude North and South in the L1C Sea Product. The reprocessed data set still contains this erroneous data but will be replaced by the corrected version by end of June 2012.

The current Level 1 operational processor implements the V500 algorithm baseline (which is used in the reprocessed data set), the versions in operations being V5.04/5.05 to fix various anomalies in the operational implementation. This algorithm baseline provides several improvements in the data quality with reference to the previous V300 algorithm baseline. The major improvements are (please consult the read-me-first note

[\[https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1513.pdf\]](https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1513.pdf) for a detailed description of the improvements and known limitations in the quality):

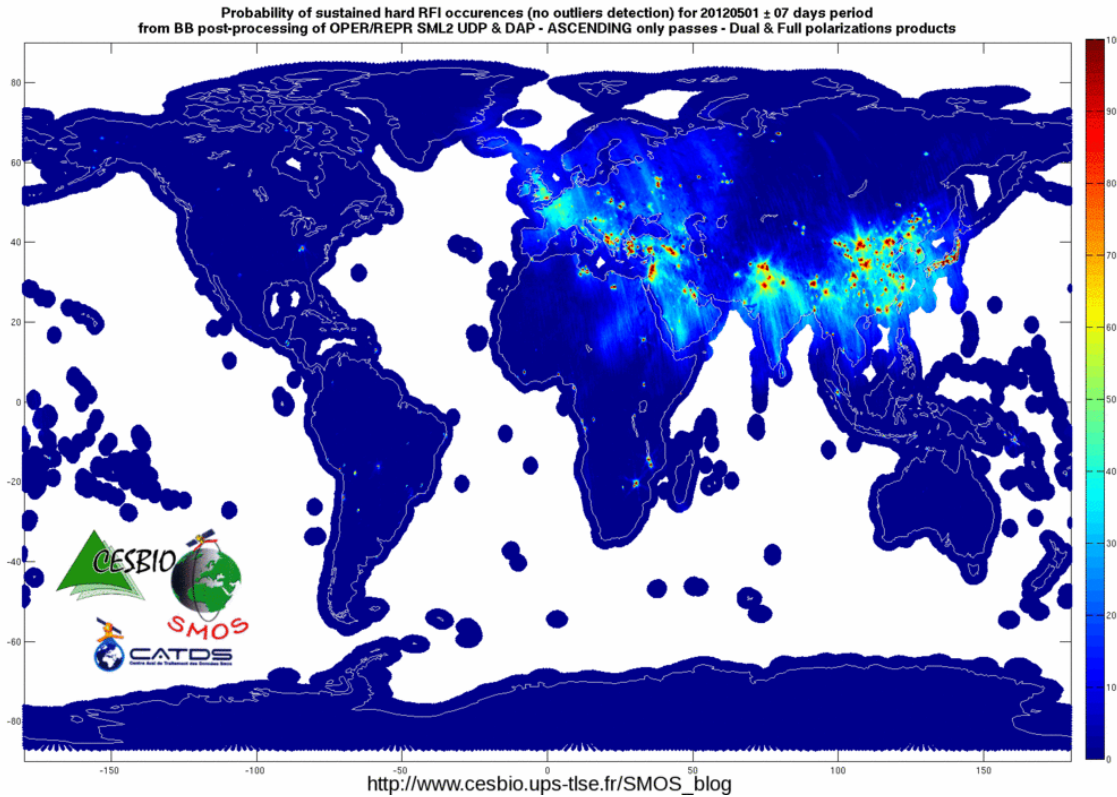
- Correct the land-sea contamination in brightness temperature along the coastline,
- Mitigate the short and long term radiometric drifts,
- Include enhanced RFI flagging in the L1C data products.

Level 2 Soil Moisture: The current version of the Level 2 Soil Moisture processor (V5.51, in operation since 24 April 2012) implements the change of the dielectric constant model used in the retrieval algorithm. The processor now uses the Mironov formulation instead of the Dobson Model. This change improves the soil moisture estimates, increases the number of successful retrievals over dry and warm surface and reduces extreme values of soil moisture. Please consult the [read-me-first note \[https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1634.pdf\]](https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1634.pdf) for a detailed description of the improvements and known limitations in the quality.

Level 2 Ocean Salinity: The current version of the Level 2 Sea Surface Salinity (V5.50, in operations since 15 December 2011) provides an important improvement in the data quality with reference to the previous processor baseline through using a separate Ocean Target Transformation (OTT) to correct radiometric signal for both ascending and descending orbits being updated on a monthly basis to account for calibration drifts. Please consult the read-me-first note [\[https://earth.esa.int/c/document_library/get_file?&folderId=127856&name=DLFE-1514.pdf\]](https://earth.esa.int/c/document_library/get_file?&folderId=127856&name=DLFE-1514.pdf) for a detailed description of the improvements and known limitations in the quality.

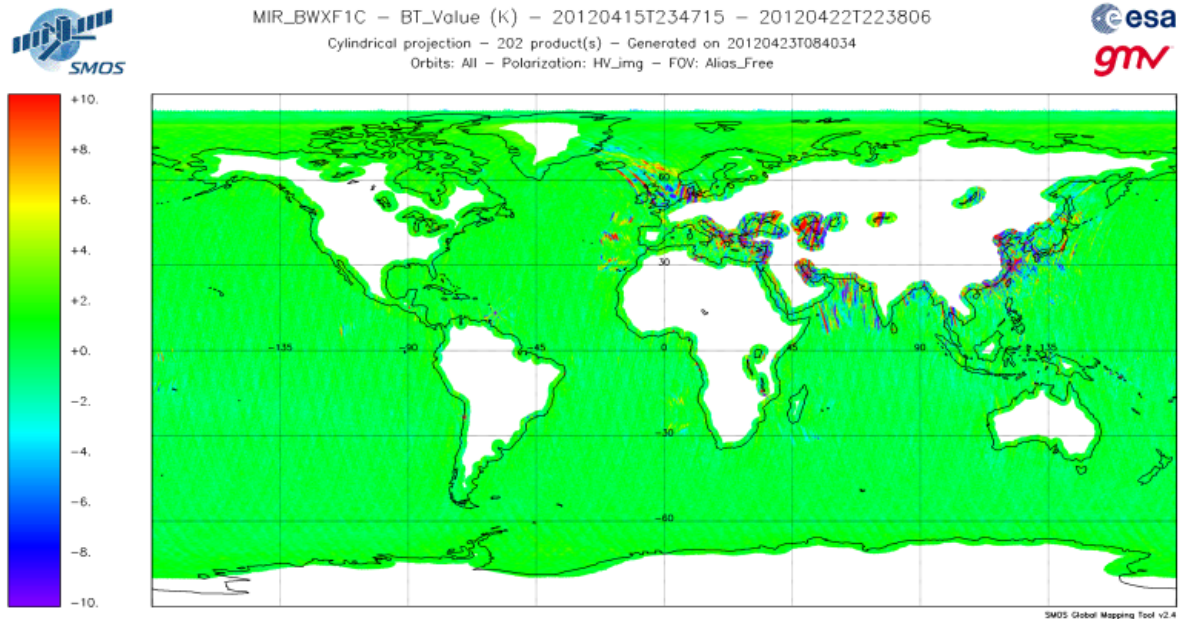
Radio Frequency Interface (RFI) in the L-band adversely affects the SMOS measurements, making SMOS data products unusable for scientific applications when it is present. There are different ways to check whether data are corrupted:

- A number of flags have been included in the Level 1C data product and the RFI flags can be found in field 37 of the MIR_SCLF1C and MIR_SCSF1C data type. A detailed description of the RFI flags is given in the L1 Product specification [\[https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1507.pdf\]](https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1507.pdf) on page 288. The RFI flags (bit number 12, 15 and 16) can be used to filter out the corrupted measurements.
- The accuracy of the RFI detection algorithms at Level 1 still has room for improvement and hence also the usage of Level 2 data to detect RFI contamination should be considered in addition to the flags.
 - By using L2 Soil Moisture data, a RFI presence probability can be computed for the grid point over Land. The global maps of RFI probability are generated every two weeks by CESBIO and are available on the SMOS blog [\[http://www.cesbio.ups-tlse.fr/SMOS_blog/?p=2963\]](http://www.cesbio.ups-tlse.fr/SMOS_blog/?p=2963). The next figure shows an example of the map for 1 May 2012. The user can visually inspect the map to identify areas with strong RFI presence.



- A number of flags have been included in the Level 2 Soil Moisture (SM) data and the RFI flags can be found in field 39: Confidence Flags of the MIR_ SMUDP2 data type. A detailed description of the RFI flags for SM data is given in the L2 Product specification [\[https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1508.pdf\]](https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1508.pdf) on page 96. The RFI flags (bit number 2 and 3) can be used to filter out measurements acquired on area with high RFI presence probability.
- A number of flags have been included in the Level 2 Sea Surface Salinity (SSS) data and the RFI flags can be found in field 27 - 30: Control Flags of the MIR_ OSUDP2 data type. A detailed description of the RFI flags for SSS data is given in the L2 Product specification [\[https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1508.pdf\]](https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-1508.pdf) on page 152. The RFI flags (bit number 27) can be used to filter out measurements being suspected to be contaminated by RFI.
- Other approaches to detect RFI are under investigation by using Stokes third and fourth measurements. Nominal values for the third and fourth Stokes parameters are expected to be very small at L-band for natural targets. The azimuthal signal at Ku-band over ocean is around a few kelvins and is expected to be smaller at L-band due to the longer wavelength. The next figure shows an example of the weekly map of the fourth Stokes parameter for the week 15 April 2012. The user can visually inspect the map to identify

areas with possible RFI presence over Sea (i.e. third and fourth Stokes parameters above 10 K in absolute value). Weekly maps of third and fourth Stokes measurements are available in the SMOS QC Monthly Report [https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/content?p_r_p_564233524_assetIdentifier=data-quality-7059].



Upcoming Meetings

SMOS sessions at IGARSS, 22-27 July, Munich.

Dedicated sessions on SMOS instrument performance and applications over land and ocean have been organised for the IGARSS conference, see www.igarss2012.org for further details.

Data Access

If you wish to access science data please see here [https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/content?p_r_p_564233524_assetIdentifier=how-to-obtain-data-7329].

If you wish to access near-real time data (full or NRT light product), please send an email to Susanne.Mecklenburg@esa.int.