

SMOS Newsletter # 4

(February 2013)

Stay up-to-date with the ESA SMOS web portal <http://earth.esa.int/SMOS>

The ESA SMOS web portal provides a comprehensive access point for all SMOS related information. Users are encouraged to visit the SMOS portal for announcements, updates on ground segment operations and scientific mission achievements. Recent SMOS newsletters are available on the ESA web portal:

<https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/newsletter>

Highlights

SMOS Near Real Time data distribution evolution

SMOS Near Real Time (NRT) “Light” (BUFR) products are now accessible via EUMETSAT’s EUMETCast service. The service uses a standard Digital Video Broadcast (DVB) technology to distribute data over the European region. For further details see <http://www.eumetsat.int/Home/Main/DataAccess/EUMETCast/index.htm?l=en>

SMOS registered users will be granted access to the service after registration on the EUMETSAT Earth Observation Portal: <https://eoportal.eumetsat.int/userMgmt/>

SMOS sea ice data continuously available

Sea ice has a large influence on the heat exchange between the ocean and the atmosphere. Although not originally designed for looking at ice, SMOS data are being evaluated to monitor Arctic sea ice up to values of ~50 to 100 cm, being complementary to CryoSat data. The product is generated at the University of Hamburg and data are now continuously accessible through the Integrated Climate Data Center: <https://icdc.zmaw.de/> for operational users.

RFI over Central Europe updates

The very strong RFI sources over Central Europe which were degrading the instrument measurements over significantly large areas in summer 2012 have been identified and mitigation actions are in the process of being implemented in agreement with the national authorities. Please see the RFI section of the newsletter for more information.

Using G-POD for processing SMOS data: call for proposals reminder

ESA would like to remind the SMOS user community of the availability of the Grid Processing-on-Demand (G-POD) service [<http://gpod.eo.esa.int>] for conducting Earth Science research activities. G-POD is offered by ESA’s Research and Service Support [http://wiki.services.eoportal.org/tiki-custom_home.php]

G-POD SMOS proposals need to be submitted directly onto the following Web site: <http://eopi.esa.int/G-POD>. This is an open call, i.e. proposals can be submitted at any time.

Correction of anomaly for level 1C reprocessed data in V5.05

The Level 1C data set has been re-generated to correct an anomaly that was found in the L1OP V5.04.

This anomaly only affects users basing their research on level 1C data to study sea-ice conditions and users retrieving salinity over the Arctic Sea in the areas above 72° latitude North and South. Those users should now use level 1C data from newly reprocessed level 1C data of data processor version V5.05 for their studies.

For all other SMOS data users, the improvements and known limitations in the quality of the SMOS level 1C V5.05 are exactly as announced previously. For further details please see the Level 1 read-me-first note available on:

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

SMOS over land - new application for ESA's water mission

Please see the ESA Bulletin Article from November 2012, attached to this newsletter.

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 https://earth.esa.int/c/document_library/get_file?folderId=118493&name=DLFE-5407.pdf]. The cumulative data loss due to instrument unavailability since the beginning of the routine operations phase in May 2010 amounts to 0.126% and the degraded data amounts to 1.7%. A detailed list of instrument anomalies is compiled on a weekly basis and is available on

https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/content?prp_564233524_assetIdentifier=mision-status-7060

No data loss has occurred during the acquisition of MIRAS raw data at the ground stations since the beginning of the routine operations phase in May 2010. This result has been achieved by implementing an on-board data recording overlap strategy.

Instrument Calibration

Several calibration activities are regularly performed on board and an overview on the calibration strategy implemented for the MIRAS instrument can be found on https://earth.esa.int/c/document_library/get_file?folderId=118493&name=DLFE-1732.pdf.

During calibration activities, science data is not available hence data users should consult the calibration plan available on

<https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/available-data-processing> for data availability.

Since the issue of newsletter #4, calibration activities were performed in accordance with the routine calibration plan and calibration results are within the nominal range. The last Flat Target Response (FTR) acquired in December 2012 does not show any significant deviation from the one used in the Level 1 ground processor (acquired in summer 2011) and therefore no update of the FTR has been implemented in the ground processor.

In January 2013, an on board calibration activity beyond the nominal calibration plan has been executed. The calibration involved external manoeuvres pointing the MIRAS instrument towards the Sun and therefore no science data over the Earth was available for about one semi orbit per day on 8, 9 10 and 13 January 2013. Precise information on the timing of this calibration is available in the SMOS Quality Report of January 2013 [https://earth.esa.int/c/document_library/get_file?folderId=402425&name=DLFE-5401.pdf]. The data acquired during this calibration will be used to improve the Sun correction algorithm and as consequence the radiometric accuracy of the level 1C data.

The evolution of the calibration parameters since the beginning of the mission is available on:

https://earth.esa.int/c/document_library/get_file?folderId=402425&name=DLFE-5401.pdf

Data quality

A monthly report summarising the main events which occurred in the SMOS flight and ground segment and the SMOS data products quality status can be found on https://earth.esa.int/c/document_library/get_file?folderId=402425&name=DLFE-5401.pdf

Since the issue of newsletter #4, no new anomaly has been identified in the level 1 and level 2 data generated by the Data Processing Ground Segment. For the Near Real Time data (NRT) we have identified the presence of a few corrupted snapshots (about 10 snapshots from a total of about 86000 available per day) containing very large negative values or values outside the expected natural variability. NRT data users have been informed about this problem and the proposed work around solution in December 2012. A new NRT processor will be deployed in March to remove this data corruption.

For further details on the SMOS data quality, please see the product quality disclaimer section in the latest monthly report available on

https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/content?p_r_p_564233524_assetIdentifier=data-quality-7059

Updates on operational processors

The current versions of the operational processors installed in the SMOS ground segment 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 |
| Near Real Time processor (NRTP) | V5.05 | 7 March 2012 |
| Level 2 soil moisture | V5.51 | 24 April 2012 |
| Level 2 ocean salinity | V5.50 | 15 December 2011 |

Below are further details on the current versions of the operational processors:

Level 1/ NRTP: No change has been implemented in the Level 1 processor during the period October 2012 – February 2013. Therefore, the algorithm baseline and data quality are as reported for the SMOS newsletter #3 issued in October 2012.

Level 2 Soil Moisture: No change has been implemented in the Level 2 Soil Moisture processor during the period October 2012 – February 2013. Therefore, the algorithm baseline and data quality are as reported for the SMOS newsletter #3 issued in October 2012.

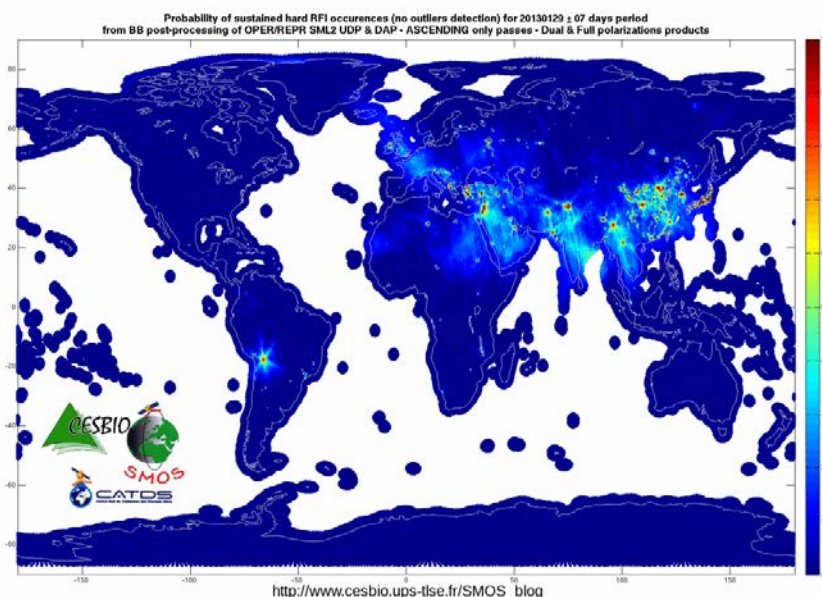
Level 2 Ocean Salinity: No change has been implemented in the Level 2 Ocean Salinity processor during the period October 2012 – February 2013. Therefore, the algorithm baseline and data quality are as reported for the SMOS newsletter #3 issued in October 2012.

Further information on the SMOS data quality can be found in the products read-me-first notes available on the web page:

https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/content?p_r_p_564233524_assetIdentifier=data-processors-7632. The SMOS data users are invited to consult the read-me-first note before using the SMOS data for their research activities.

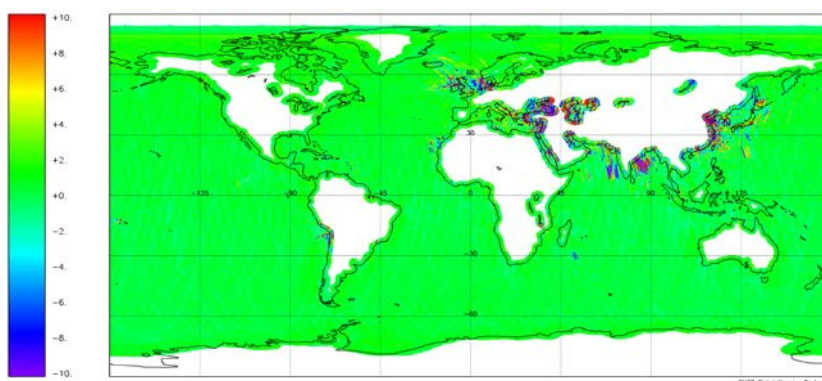
Radio Frequency Interference (RFI)

Illegal RFI sources operating in the L-band adversely affect the SMOS measurements, making SMOS data products largely unusable for scientific applications when they are present. Users can check whether data are corrupted by RFI by using the quality flags, available in the SMOS data products, as indicators. A detailed description of these flags was included in the SMOS newsletter #1 issued in May 2012. Additional information with regard to RFI contamination can be found on the RFI probability maps, generated fortnightly by CESBIO and available on the SMOS blog [http://www.cesbio.ups-tlse.fr/SMOS_blog/?p=2963]. The figure below shows an example of the map generated for the period centred on 29 January 2013. Thus the user can visually inspect the map to identify areas with strong RFI presence over land.



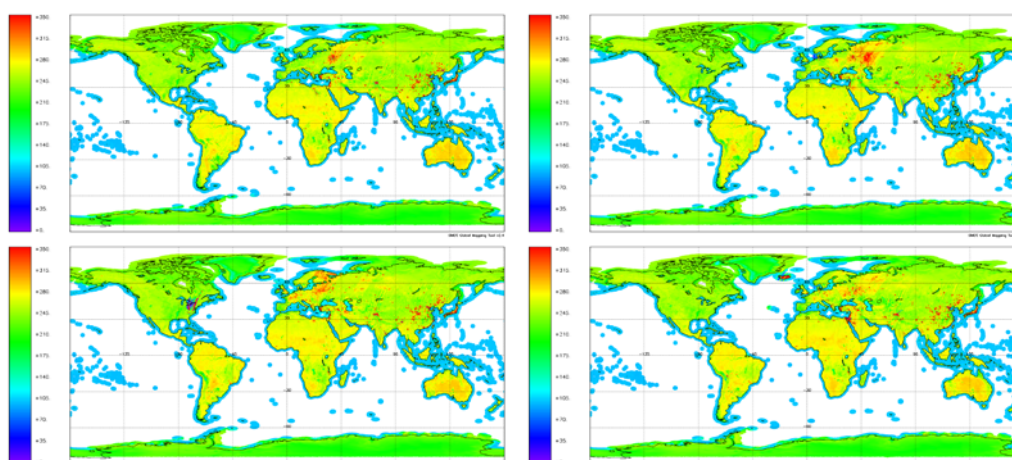
RFI probability of sustained RFI occurrences during the period 22 January – 5 February 2013 for ascending passes.

The 3rd and 4th Stokes parameter can also be used to detect RFI. Nominal values for the 3rd and 4th Stokes parameters are expected to be very small for natural targets at L-band. Hence larger deviation in the 3rd and 4th Stokes parameter, i.e. beyond a few Kelvin, would indicate the presence of RFI. The figure below shows an example of the weekly map of the 4th Stokes parameter for the week of 28 January 2013. 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 3rd and 4th Stokes parameter are available in the SMOS Monthly QC Report available on https://earth.esa.int/c/document_library/get_file?folderId=402425&name=DLFE-5401.pdf.



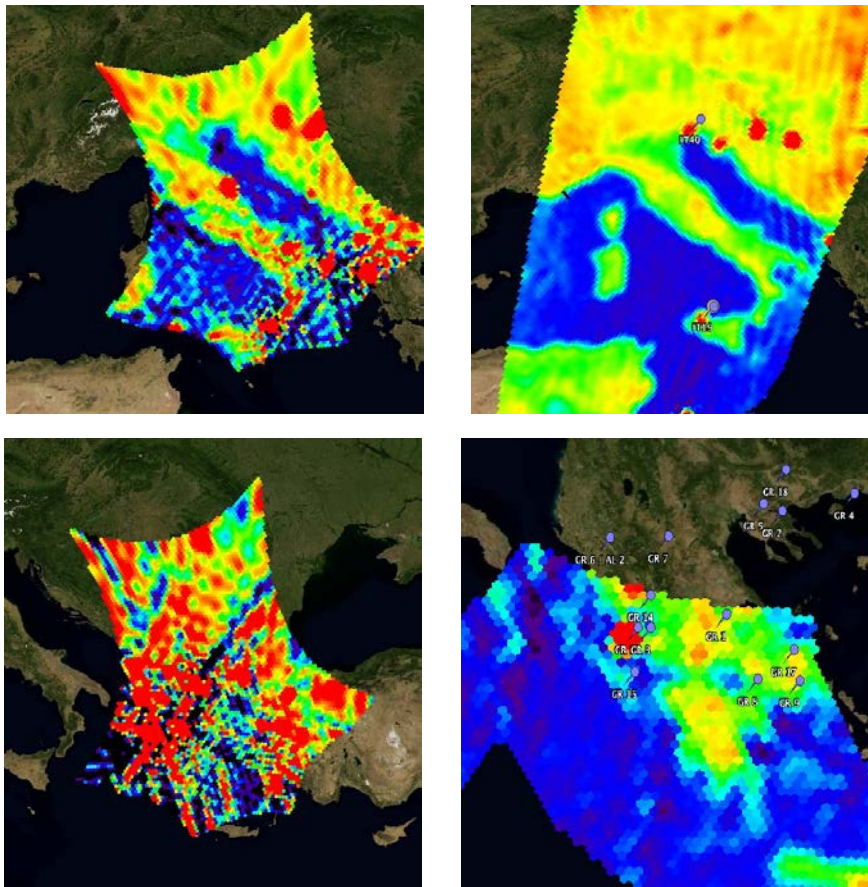
Weekly average of the 4th Stokes parameter over the Ocean during the period 28 January – 4 February 2013. Areas affected by strong RFI show a 4th Stokes parameter above 10K in absolute value.

The RFI status over Central Europe has improved only recently with the switch-off of some of the strong sources of RFI in Poland. For January 2013 the status of the L-band brightness temperature is shown in the figure below. The large area over Central Europe affected by RFI and reported in the previous SMOS newsletter #3 has been greatly reduced. ESA is in contact with the Polish frequency department to have more feedback on the actions undertaken and to understand if the switch-off of the sources can be considered a permanent decision or only temporary.



Weekly average of the L-band brightness temperature (1st Stokes parameter) as sensed by SMOS: Week of 7 Jan (top left), Week of 14 Jan (top right), Week of 21 Jan (bottom left), Week of 28 Jan (bottom right). Corrupted areas affected by RFI are in red and violet colour.

Over recent months improvements in the RFI situation over Greece and Italy have been achieved (see Figure below). Military radars in Spain, Iceland, Belgium and Germany have been adjusted to limit the interference to SMOS.



L-band brightness temperature as sensed by SMOS over: Italy May 2010 (top left), Italy February 2013 (top right), Greece June 2010 (bottom left), Greece February 2013 (bottom right). Corrupted areas affected by RFI are in red colour.

The evolution of the SMOS RFI sources worldwide is regularly monitored by ESA and results are reported to the Space Frequency Coordination Group meeting and to the national administrations responsible for the radio frequency requesting the illegal transmissions to be switched off. Improvements in the RFI detection and mitigation will be regularly reported in this newsletter.

Upcoming Meetings

SMOS second training course at CESBIO , 27-31 May 2013, Toulouse, France

A second training course will be organised by the SMOS team at CESBIO. The training course, sponsored by CNES and ESA, will provide both theoretical and practical sessions and is an opportunity for SMOS data users and researchers to learn about the theoretical background of the SMOS mission, the data processing algorithms and how to deal with the brightness temperature, soil moisture and ocean salinity products. The technical program and organisational details will be available on the CESBIO blog http://www.cesbio.ups-tlse.fr/SMOS_blog/

SMOS workshop for applications over land 25-27 February 2013, ESRIN, Frascati, Italy

A workshop addressing the SMOS land surface component is jointly organized by ESA, CESBIO, and CNES. The workshop themes will be grouped around the level 2 soil moisture and vegetation opacity products. Key topics will be the soil moisture retrieval using SMOS brightness temperature observations, the SMOS L2 processor and soil moisture product verification including performance indicators. In addition, novel products (e.g. wetland monitoring or detection of frozen soils) and applications over land will be addressed. The workshop will provide a forum for discussion and the exchange of the latest scientific results. Further information on the workshop are available on the web site: <http://www.congrexprojects.com/13c11/>

EGU General Assembly 07-12 April 2013, Wien, Austria

The SMOS mission successfully achieved its nominal 3-years life time in November 2012 and to mark this important milestone a specific session on EGU has been organized by ESA and the SMOS Principal Investigators. The session, ***SMOS: successfully completing 3-years nominal life time***, will address major scientific achievements based on data provided by the SMOS mission so far.

Further information on EGU 2013 is available on the conference web site: <http://www.egu2013.eu>

SMOS - Aquarius workshop 15-17 April 2013, IFREMER, Brest, France

ESA, NASA, IFREMER, SMOS MODE and CNES are jointly organising a SMOS-Aquarius workshop. The objective of this workshop is to explore common L-band sensor and algorithm issues for sea surface salinity and soil moisture retrievals derived by SMOS and Aquarius data and explore synergistic use of and validation approaches for these two missions and other sensors' data over land and ocean. In addition, the workshop will provide a forum for discussion on specific topics related to improving sea surface salinity and soil moisture retrievals through dedicated working groups. Over 80 abstracts have been received and the final programme is presently discussed.

Further information on the workshop is available on the web site: www.smosaquarius2013.org

Satellite soil moisture validation and application workshop 1-3 July 2013, ESRIN, Frascati, Italy

The objective of the workshop is to discuss and reconcile recent methodological advances in the validation and application of global satellite soil moisture data. The workshop will bring together producers and users of satellite soil moisture data, providing a platform to discuss data quality, error characterization, validation approaches, data assimilation, and the broadening range of applications. The workshop will focus on soil moisture products derived from current and future active and passive microwave sensors operating in the low frequency range from 1 to 10 GHz, including but not limited to ASCAT, SMOS, AMSR-E, ASAR, SMAP, Sentinel-1 and any combination thereof.

One concrete goal of the workshop will be to collect material for a white paper on "Best practice guidelines for the validation of satellite soil moisture data using in situ data hosted by the International Soil Moisture Network (ISMN)" which is foreseen as a contribution to GEWEX, CEOS, TOPC, and WMO.

The deadline for the submission of abstracts and registration is 1 March 2013. Further information on the workshop is available on the web site: <http://www.soil-moisture-workshop-2013.com/>

SMOS sessions at IGARSS, 21-26 July, Melbourne, Australia.

Dedicated sessions on SMOS results over land and ocean have been organised for the IGARSS conference in 2013, see www.igarss2013.org for further details.

ESA Living Planet Symposium 9-13 September 2013, Edinburgh, UK

The ESA Living Planet Symposium 2013 will be held in Edinburgh, United Kingdom from 9 to 13 September 2013 and it is organised with the support of the UK Space Agency. SMOS data users are invited to present and discuss their results on the on-going science activities. A detailed description of the programme and the organization is available here: <http://lp2013.congrexprojects.com>.

Data Access

If you wish to access science data please see the following link for the procedure to follow: 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.