

SMOS Newsletter # 2 (July 2012)

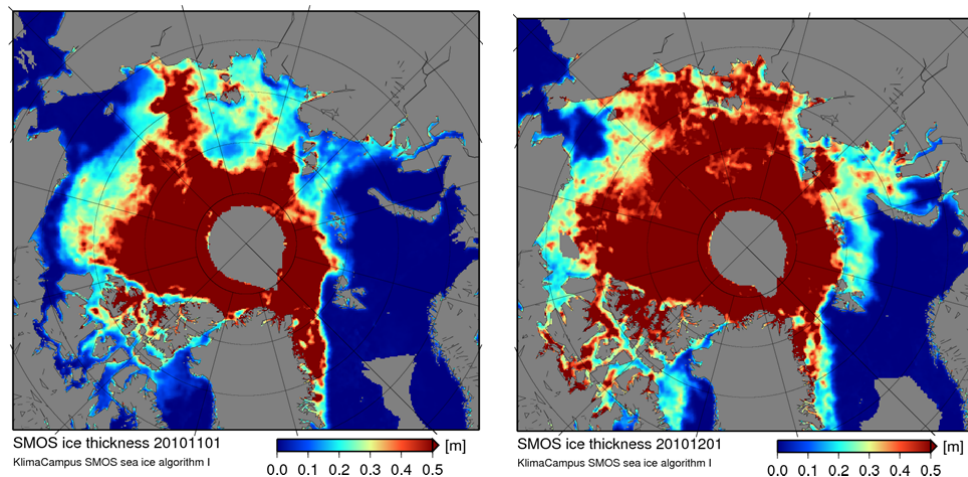
Recent SMOS newsletters are available on the ESA web portal:

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

Highlights

Sea ice applications

SMOS L-Band measurements are sensitive to sea ice and can be used to derive cryospheric information such as sea ice thickness. Within the SMOS Ice project, a consortium led by the University of Hamburg has developed a sea ice thickness product that complements the data sets derived from ESA's Cryosat mission. The figure below shows a monthly map of the sea ice thickness over the Arctic Sea in November 2010 (left panel) and December 2010 (right panel) derived from the SMOS LIC reprocessed data set. The figure clearly shows the increase of sea ice thickness in the East Siberian Sea and in the Laptev Sea during the month of December if compared to November.



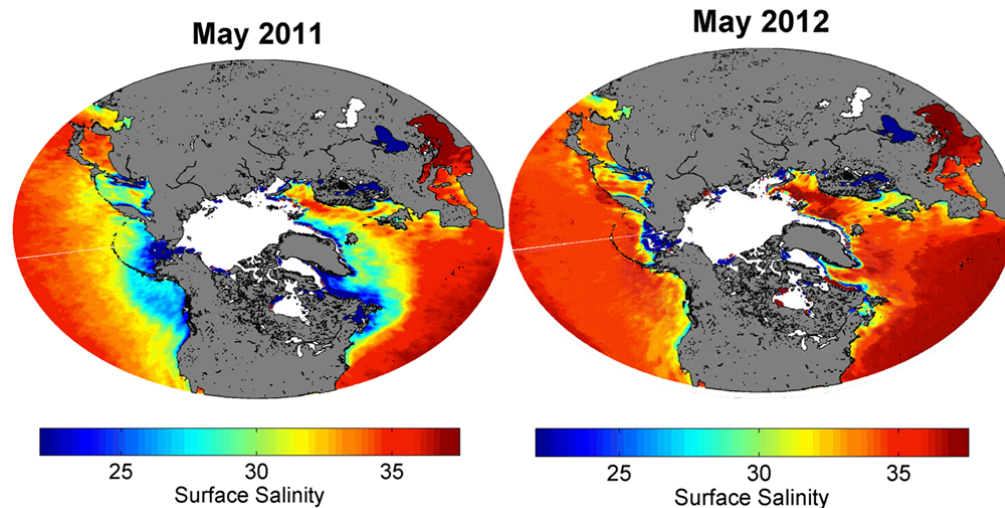
Sea ice thickness over Arctic Sea derived from SMOS data for November 2010 (left) and December 2010 (right). Image courtesy University of Hamburg.

The SMOS sea ice thickness product will become accessible to users on a continuous basis in the second half of 2012 through a dedicated web portal (details to follow once released). Further information on this product can be found on the ESA web portal (http://www.esa.int/esaEO/SEM361BX9WG_index_0.html).

Ocean salinity data quality improves as RFI sources are switched off

During recent months, progress has been made in the identification and switch-off of the RFI sources located in Canada and Greenland. The switch-off of those RFI sources has significantly improved the SMOS measurements above 45 degrees North. The figure

below shows a monthly map of the sea surface salinity derived from SMOS measurements, in May 2011 (left) and May 2012 (right). The figure clearly shows the improvements in the accuracy of the salinity measurements that are close to the expected values in May 2012 if compared to the same period in May 2011 when several RFI sources were still active in Canada and Greenland making the salinity retrieval less accurate.



**Sea Surface Salinity derived from SMOS data for May 2011 (left) and May 2012 (right).
Image courtesy N.Reul, IFREMER.**

For further details on the improvements of the SMOS measurements over Northern latitudes see the news [http://www.esa.int/esaEO/SEMQT12VW3H_index_0.html] on the ESA web portal.

Reprocessed level 1 and 2 data

Some corrective action had to be taken for an anomaly affecting a subset of the reprocessed Level 1C data product over ocean above 72 degrees latitude North and South, in particular impacting cryospheric applications. This work has been completed and the reprocessed data will be available to users by September from the ESA cal & val portal operated by Brockmann. Data users are strongly encouraged to consult with the read-me-first-notes available on [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

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]. The cumulative data

loss due to instrument unavailability since the beginning of the routine operations phase in May 2010 amounts to 0.127% and the degraded data amount to 2.061%. A detailed list of instrument anomalies is compiled on a weekly basis by the SMOS Flight Operation Segment (FOS) team and it is available in the FOS reports that can be found here [\[https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/content?p_r_p_564233524_assetIdentifier=mission-status-7060\]](https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/content?p_r_p_564233524_assetIdentifier=mission-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.

Several calibration activities are performed on board and an overview on the calibration strategy implemented for the MIRAS instrument can be found here [\[https://earth.esa.int/c/document_library/get_file?folderId=118493&name=DLFE-1732.pdf\]](https://earth.esa.int/c/document_library/get_file?folderId=118493&name=DLFE-1732.pdf). During calibration activities, science data is not available and users should consult the calibration plan available here [\[https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/available-data-processing\]](https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/available-data-processing) to know exactly when a calibration event occurred.

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

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

Level 1: No change has been implemented in the Level 1 processor during the period May – July 2012. Therefore, the algorithm baseline and data quality are as reported for the SMOS newsletter #1 issued in May 2012.

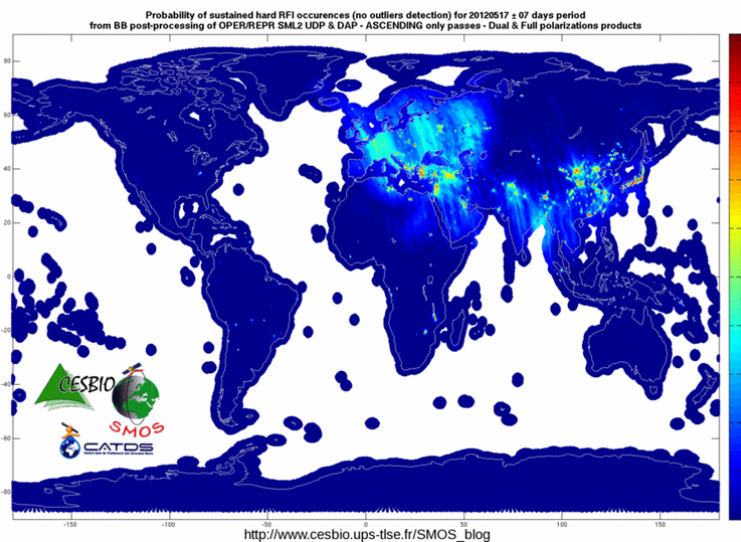
Level 2 Soil Moisture: No change has been implemented in the Level 2 Soil Moisture processor during the period May – July 2012. Analysis of the data generated with the current version V5.51 of the processor had shown that the change of the dielectric constant model from the Dobson’s formulation to Mironov’s formulation had increased significantly the global average of the retrieved soil moisture. Therefore great care should be taken when studying temporal evolution of the soil moisture derived from the V5.01 and V5.51 data sets. Please consult the read-me-first note [\https://earth.esa.int/c/document_library/get_file?folderId=127856&name=DLFE-

[1980.pdf](#)] for a detailed description of the improvements and known limitations in the quality of the soil moisture data.

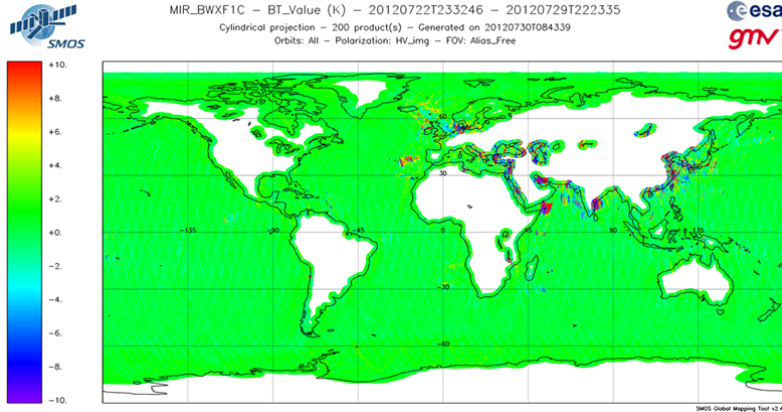
Level 2 Ocean Salinity: No change has been implemented in the Level 2 Ocean Salinity processor during the period May – July 2012. Therefore, the algorithm baseline and data quality are as reported for the SMOS newsletter #1 issued in May 2012

Radio Frequency Interference (RFI)

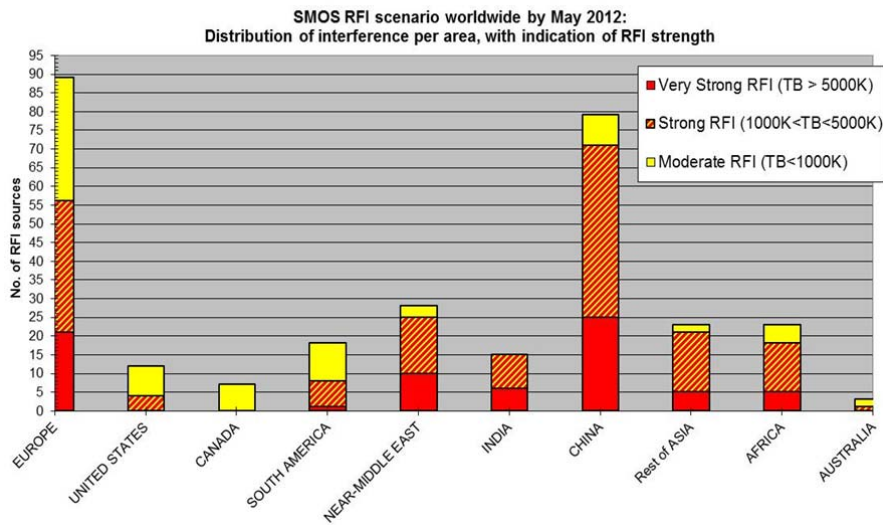
Illegal RFI sources operating in L-band adversely affect the SMOS measurements, making SMOS data products largely unusable for scientific applications when they are present. Users can check whether data are corrupted by RFI by using the quality flags, available in the SMOS data products, as indicators. 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. Thus the user can visually inspect the map to identify areas with strong RFI presence over land.



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 22 July 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 3rd and 4th Stokes parameter are available in the SMOS Monthly QC Report [https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/content?p_r_p_564233524_assetIdentifier=data-quality-7059].



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. The worldwide distribution of RFI sources per continent is shown in the figure below.



Distribution of detected RFI sources per continent (current status)

Upcoming Meetings

SMOS training course at CESBIO 5-9 November, Toulouse, France

The training course is organised by the SMOS team at CESBIO and it is sponsored by CNES and ESA. The training course 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 are available on the CESBIO blog (<http://www.cesbio.ups->

tlse.fr/SMOS_blog/?p=3313). Applications should be sent to 'smos-training-course@cesbio.cnes.fr', stating name, institution, area of interest and experience with SMOS data, no later than 31 August 2012.

SMOS sessions at AGU 3-7 December, San Francisco, US

It is for the first time that we have the chance to promote the mission and the results at the largest scientific geophysical conference in the world and we would like to encourage you to submit an abstract. The deadline for the submission of abstracts is 8 August (see <http://fallmeeting.agu.org/2012/> for details). SMOS related sessions are (please check the webpage for the full list of sessions):

- H045. SMOS - ESA's Water Mission
- OS034. Science Results from the Aquarius and SMOS Ocean Salinity Missions
- H033. Using Field Measurements and Experiments to Advance Science
- OS028: Ocean Surface Emissivity for Passive Remote Sensing Observations
- OS024: Observations and Modelling of Regional and Global Freshwater and Saltwater Budgets and Transports

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. The detailed announcement will be available shortly via the SMOS (<https://earth.esa.int/smos>) webpage and the CESBIO blog (http://www.cesbio.upstlse.fr/SMOS_blog/). A dedicated workshop webpage for abstract submission and registration will be available soon.

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

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. The detailed announcement will be made shortly via the SMOS (<https://earth.esa.int/smos>) and Aquarius (<http://aquarius.nasa.gov/>) webpages. There will be a dedicated website, which will be up and running shortly with a detailed description of the programme and the organisation: www.smosaquarius2013.com

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://congrexprojects.com/living-planet-2013/home>.

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. The NRT light product will also become available, in the near future, through EUMETCAST, the data dissemination system operated by EUMETSAT.