

→ ESA'S WATER MISSION

smos newsletter

Issue 9 | May 2015



SMOS satellite
launched on 2 November 2009

In this issue:

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Highlights

SMOS new level 1 and level 2 algorithm baseline V620

An improved algorithm baseline has been implemented in the SMOS operational ground segment. New level 1 and level 2 operational processors version 620 have been deployed since May 2015 and products are now available to the SMOS data users.

The main improvements in the SMOS products generated with the processors version 620 were reported in the previous SMOS newsletter (https://earth.esa.int/documents/10174/234899/SMOS_Newsletter_8). Detailed information about the performances of the new products version 620 and known caveats can be found in the level 1 and level 2 read-me-first notes available here (<https://earth.esa.int/web/guest/-/data-processors-7632>). The SMOS data users are invited to read these notes carefully to ensure optimum exploitation of the new data set.

SMOS second mission data reprocessing updates

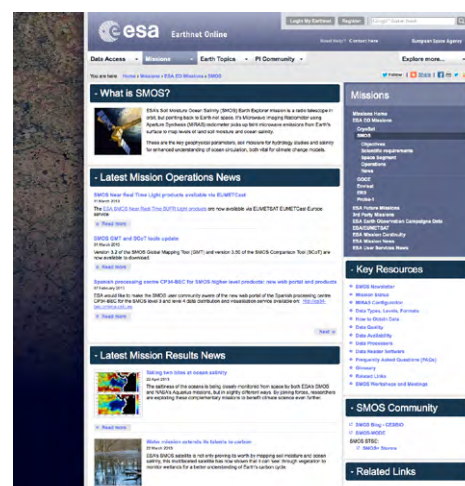
The 2nd SMOS reprocessing campaign will generate, with the state-of-the-art algorithm baseline version 620 (the current processing baseline), a complete and homogeneous set of level 1 and level 2 data products for the entire mission duration. The Level 1 reprocessing has been completed and data from January 2010 to May 2015 is now available. See the "Data Access" section of this newsletter for details on how to access the SMOS data. The Level 2 reprocessing is presently on-going. The distribution of the complete reprocessed level 2 data set is envisaged for end of 2015.

SMOS - Five years in orbit

On 2 November 2014 SMOS mission has celebrated its five years in orbit. The SMOS mission has provided global measurements of sea surface salinity and soil moisture that can now be used to improve our understanding of the Earth's water cycle. For further details about mission achievements see the SMOS news: "Five years of soil moisture

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>



and beyond" (www.esa.int/Our_Activities/Observing_the_Earth/SMOS/Five_years_of_soil_moisture_ocean_salinity_and_beyond) and "Salinity matters" (www.esa.int/Our_Activities/Observing_the_Earth/SMOS/Salinity_matters). The mission operations were extended by ESA and CNES, jointly operating the mission, until 2017.

Domex campaign data available for SMOS Cal/Val users

The L-Band radiometric measurements and in-situ snow temperatures acquired during the DOMEX campaign (Concordia station, East Antarctic plateau) are now available for SMOS Cal/Val users alongside the campaign report. Figure-1 shows the L-band brightness temperature measurements collected for different polarization by the in-situ radiometer. For further information and how to access

the data set see: <https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/news/-/article/domex-3-campaign-data-now-available-for-smos-cal-val-users>.

New Soil Moisture data product in Near-real time (SM-NRT) (available from summer 2015 onwards)

A new Soil Moisture data product in Near-real time (SM-NRT), within three hours from sensing, will be available soon through the EUMETCAST and GTS networks. The product will be generated from the Level 1 near-real time brightness temperature through a statistical algorithm (i.e. a Neural Net), which was trained with SMOS L2 soil moisture data. The product has a quality comparable to the Level 2 soil moisture product and it is provided on the same ISEA 4H9 grid (spatial resolution of grid: 15 km) for a slightly reduced

swath width. The data volume will be below 5 MB/orbit. Figure-2 shows an example of the soil moisture data product in Near-real time over Africa and Europe.

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

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.

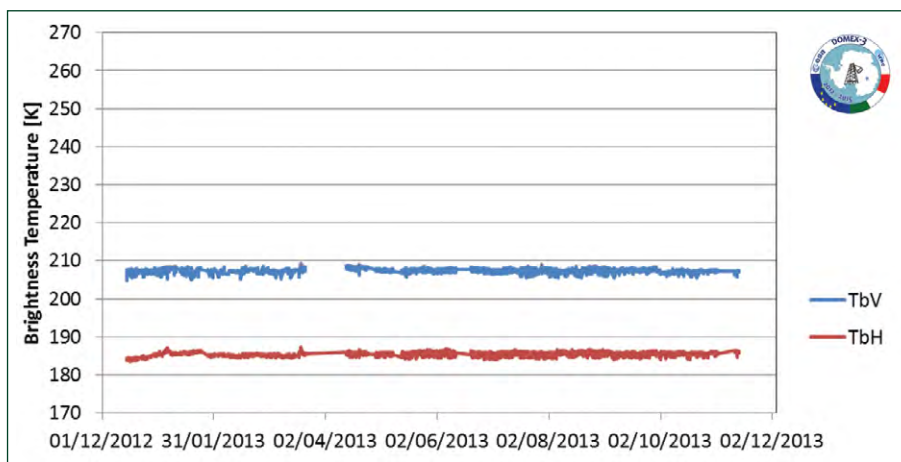


Figure 1:

L-band brightness temperatures measurements acquired over Concordia station during the period from December 2012 to December 2013. The blue curve is for vertical polarization data and the red curve is for horizontal polarization data.

Credits IFAC/ESA.

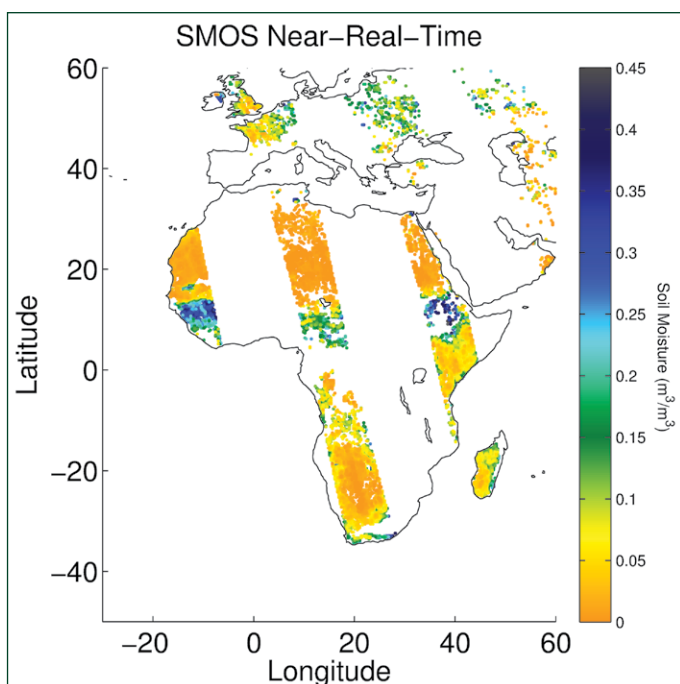


Figure 2:

SMOS Near-real time volumetric soil moisture over Africa and Europe. Credits CESBIO/ESA.



Data and Processors

Data availability

The SMOS instrument – MIRAS – is operating nominally with the exception of some 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 MIRAS instrument unavailability since the beginning of the routine operations phase in May 2010 amounts to 1.01% and the degraded data amounts to 0.93% [see Figure-3]. 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.

A detailed list of instrument anomalies is compiled on a weekly basis and is available on <https://earth.esa.int/web/guest/-/mission-status-7060>.

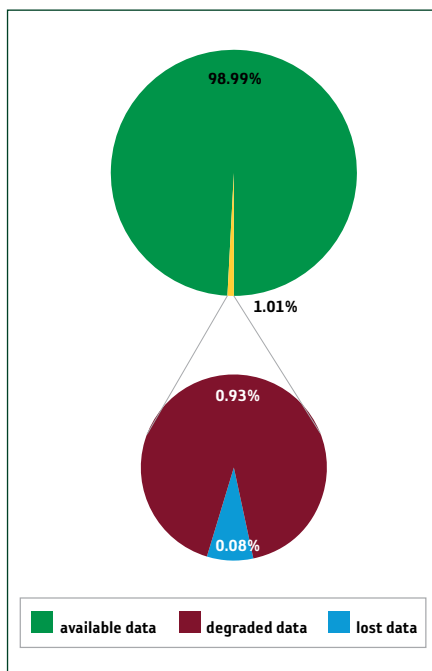


Figure 3:

SMOS Mission data availability percentage since May 2010. The value for the instrument data availability is extremely high, about 99%. Only 0.08% of data is lost due to MIRAS anomalies. Credits SMOS FOS/ESA.

Two orbit correction manoeuvres and two collision avoidance manoeuvres were successfully executed since the issue of newsletter #8 (September 2014). The

manoeuvres were executed on 27 October 2014, 21 January 2015, 20 February 2015, and 2 April 2015. During the manoeuvres the MIRAS instrument data were regularly acquired but not processed due to the degraded satellite pointing.

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 are not available hence data users should consult the calibration plan for data availability, available from: <https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/smos/available-data-processing>.

The Noise Injection Radiometer (NIR) calibration is executed, since October 2014 in the so called “warm-NIR” configuration with the Sun slightly in front of the antenna plane in order to have a better stable thermal environment of the NIRs receiver. This new configuration, together with the new

2014), calibration activities were performed in accordance with the routine calibration plan and calibration results are within the nominal range. The winter Flat Target Response (FTR) has been acquired and used only for monitoring purposes.

The evolution of the calibration parameters since the beginning of the mission is available in the SMOS quality reports accessible on the following web page: <https://earth.esa.int/web/guest/-/data-quality-7059>.

Data quality

A monthly report summarising significant events in the SMOS flight and ground segment and the SMOS data quality status can be found on: <https://earth.esa.int/web/guest/-/data-quality-7059>.

Since the issue of newsletter #8 (September 2014), no new anomaly has been identified in the routinely generated level 1 and level 2 data.

Updates on operational processors

The current versions of the operational processors installed in the SMOS ground segment are:

Processor	Current version In operations since	Previous version In operations since
Level 1A	V6.20 5 May 2015	V5.04 14 November 2011
Level 1B	V6.21 5 May 2015	V5.04 14 November 2011
Level 1C	V6.20 5 May 2015	V5.05 21 March 2012
Near Real Time processor (NRTP)	V6.20 5 May 2015	V5.05 7 March 2012
Level 2 soil moisture	V6.20 5 May 2015	V5.51 24 April 2012
Level 2 ocean salinity	V6.22 5 May 2015	V5.50 15 December 2011

calibration processor version 620, allows a more stable retrieval of the calibration coefficients and improves the overall data calibration for version 620.

Since the issue of newsletter #8 (September

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

Level 1/ NRTP: A new version 6.20 of the level 1 and NRTP processors have been deployed in the operational ground segment



on May 2015. A detailed description of the implemented algorithms is presented in the Detailed Processing Module (DPM) documents available here: <https://earth.esa.int/web/guest/-/data-processors-7632>

Level 2 Soil Moisture: A new version 6.20 of the level 2 soil moisture processor has been deployed in the operational ground segment on May 2015. A detailed description of the implemented algorithms is presented in the Algorithm Theoretical Basis Document (ATBD) available here: <https://earth.esa.int/web/guest/-/data-processors-7632>

Level 2 Ocean Salinity: A new version 6.22 of the level 2 sea surface salinity processor has been deployed in the operational ground segment on May 2015. A detailed description of the implemented algorithms is presented in the Algorithm Theoretical Basis Document (ATBD) available here: <https://earth.esa.int/web/guest/-/data-processors-7632>

Further information on the SMOS data quality can be found in the products read-me-first notes available here: <https://earth.esa.int/web/guest/-/data-processors-7632>. 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, rendering the affected SMOS data products largely unusable for scientific applications in the affected areas. Users can check whether level 1C measurements are corrupted by RFI by using the RFI flags, available in the SMOS data products. With the new processor version 6.20 the RFI detection algorithms were revised and the RFI sources list is now monthly updated (previously was a static information) with the information retrieved by the RFI probability computed by CESBIO.

As result the accuracy to flag measurements affected by RFI has improved. Details about the level 1C RFI flags can be found in the level 1 product specification document available here: <https://earth.esa.int/web/guest/-/data-types-levels-formats-7631>.

Information with regard to the evolution of the RFI contamination can be found on the frequently updated RFI probability maps, generated fortnightly by CESBIO and available on the SMOS blog [http://www.cesbio.upstlse.fr/SMOS_blog/smos_rfi].

The 3rd and 4th Stokes parameters 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 a larger deviation in the 3rd and 4th Stokes parameters, i.e. beyond a few Kelvin, would indicate the presence of RFI. Figure 5 shows an example of the weekly map of the 4th Stokes parameter for the week of 19–27 April 2015. The map, for example, identifies the presence of several RFI sources over Pacific and Indian oceans. The user can visually inspect the map to identify areas with possible RFI presence over Sea (i.e. 3rd and 4th Stokes parameters above 10 K in absolute value). Weekly maps of 3rd and 4th Stokes parameter are presented in the SMOS Monthly QC Report available on the following web page: <https://earth.esa.int/web/guest/-/data-quality-7059>.

Figure 4:

below shows an example of the map generated for the period centred on 21 April 2015. Thus the user can visually inspect the map to identify areas with strong RFI presence over land.

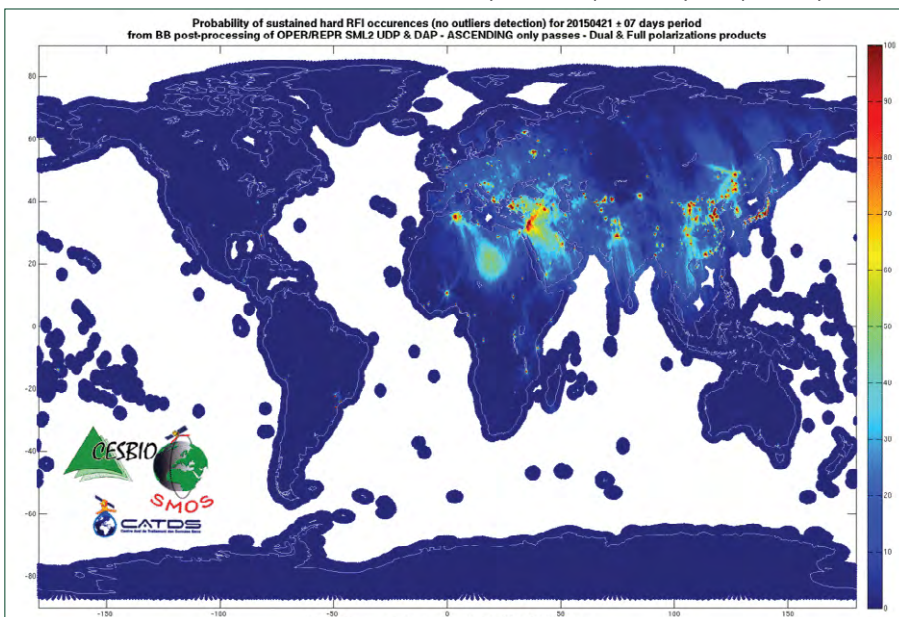
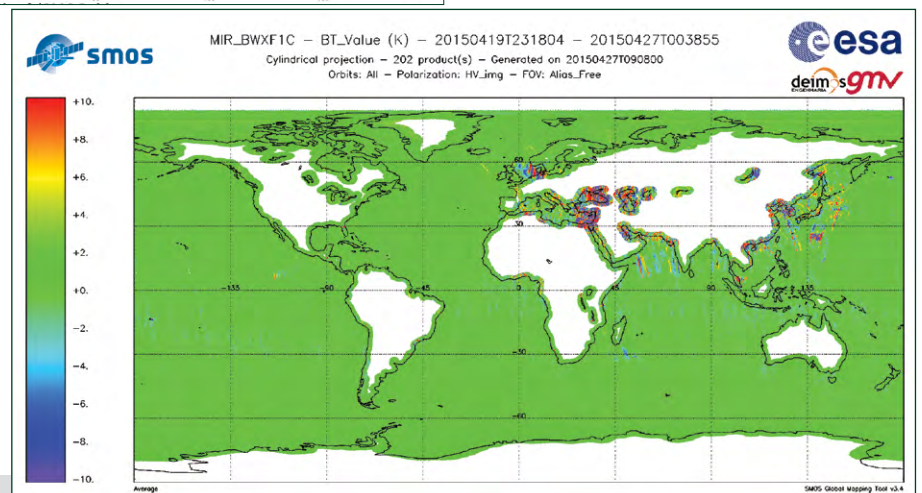


Figure 5:

Weekly average of the 4th Stokes parameter over the ocean during the period of 19 – 27 April 2015. Areas affected by strong RFI show a 4th Stokes parameter above 10K in absolute value as shown in the map, for example, for the Pacific and Indian ocean.

Credits ESA.



Upcoming Meetings & Announcements



IGARSS 2015 Remote Sensing: Understanding the Earth for a Safer World Conference, 26–31 July, Milan, Italy

Hosted by the IEEE Geoscience and Remote Sensing Society, the International Geoscience and Remote Sensing Symposium 2015 (IGARSS 2015) will be held from 26 July to 31 July 2015 at the Convention Center in Milan, Italy. Dedicated SMOS sessions have been organized to contribute to the standard IGARSS theme of the conference:

Wednesday, 29 July 2015

- ESA's SMOS Mission: Continuing to Provide Global Soil Moisture and Ocean Salinity Data (see www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1029 and www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1030)

Friday, 31 July 2015

- Synergistic use of SMOS Observations to Improve our Understanding of the Water and Energy Cycle

(see www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1081 and www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1082)

Contributions from the SMOS mission are also present in the following sessions :

Monday, 27 July 2015

- Ocean Temperature and Salinity (see www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1260 and www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1261)
- RFI in Microwave Remote Sensing: Observations and Management Techniques (see www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1063 and www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1064)

Tuesday, 28 July 2015

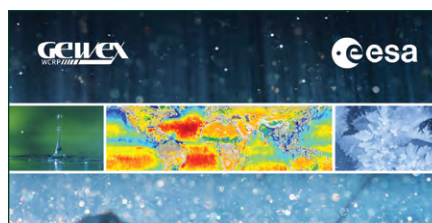
- Microwave Synthetic Aperture Radiometry (see www.igarss2015.org/Papers/)

[PublicSessionIndex3.asp?Sessionid=1274](http://www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1274))

- Soil Moisture Algorithms and Downscaling (see www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1233)
- Validation of Soil Moisture Products (see www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1236)
- Vegetation and Roughness Effects on Soil Moisture (see www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1238)
- Soil Moisture Validation and Algorithms (see www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1321)
- Soil Moisture Data Assimilation (see www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1234)
- Downscaling Soil Moisture (see www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1237)

Thursday, 30 July 2015

- The European Space Agency Earth Explorer Science Missions (see www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1099 and www.igarss2015.org/Papers/PublicSessionIndex3.asp?Sessionid=1100)



Earth Observation for Water Cycle Science 2015 Conference, 20–23 October, ESA-ESRIN, Italy

This joint ESA-GEWEX Conference aims: to review knowledge on the water cycle science, to advocate for the development of robust satellite geo-information data products and to foster the improvement of models and data assimilation systems. A detailed description of the programme and organization is available here: www.eo4water2015.info

Registration deadline is September 2015.



Open Science Conference on "Salinity and Freshwater Changes in the Ocean", 12–15 October 2015, Hamburg, Germany

Through the advent of new observing technologies, salinity research has gained much attention over the recent years, and this conference intends to bring together communities working on all aspects related to ocean salinity and freshwater cycle studies in the ocean, to review most recent results and to discuss further progress expected in these areas. A detailed description of the programme and organization is available here:

<http://for1740.zmaw.de/Salinity-and-Freshwater-Changes-in-the-Ocean-Con.3078.0.html>

Abstract submission deadline is 30 June 2015.

The AGU Fall Meeting, 14-18 December 2015, San Francisco, CA, USA

The AGU Fall Meeting is the largest Earth and space science meeting in the world, bringing together these entire communities for discussions of emerging trends and the latest research. SMOS and related applications are intended to be covered by three session proposals (not confirmed yet):

- ESA's Soil Moisture and Ocean Salinity (SMOS) mission: continuing to provide global soil moisture data
- ESA's Soil Moisture and Ocean Salinity (SMOS) mission: continuing to provide global



sea surface salinity data

- Synergistic use of SMOS with other Earth Observation sensors

A detailed description of the programme and organization is available here:

<http://fallmeeting.agu.org/2015>

Abstract Submission Deadline is 5 August 2015



2016 "Ocean Sciences" meeting, 21-26 February 2016, New Orleans, LA, USA

The 2016 Ocean Sciences Meeting will consist of a diverse program covering topics in all areas of the ocean sciences discipline. Ocean salinity and related applications are intended to be covered by two session proposals (not confirmed yet):

- ESA's SMOS Satellite Mission Salinity Datasets and Relevant Oceanographic Applications
- Ocean salinity and water cycle variability and change

A detailed description of the programme and organization is available here:

<http://osm.agu.org/2016>

Abstract Submission Opening is 15 July 2015.

Physical Oceanographer Post-doctoral position open at Ifremer: estimation of surface currents using sea surface salinity derived from satellite data.

The combination of the new SMOS, Aquarius and SMAP satellite sea surface salinity with sea surface temperature and sea surface height (SSH) data provide a first opportunity to estimate the synoptic surface density fields on mesoscales and to further assess the level of correlation between the latter and the SSH fields. The post-doc candidate will analyse such correlation in several key dynamical areas of the world ocean.

Ifremer offers post-doctoral positions to young French or foreign scientists who have completed their PhD. and are motivated by development and innovation in various fields of Marine Sciences: technology and ecotechnology, aquaculture, fisheries, environment, risks analysis, physics of oceans, etc.

Postdoctoral positions are contracted for a duration of 12 months, possibly renewable for a non-renewable 6-month period.

Interested applicants should send:

- a handwritten letter including the specific skills and competence for the particular postdoctoral position you are interested in.
- a detailed curriculum vitae.
- a summary of work previously done, mentioning the date of submission of the thesis.
- a list of publications and communications / symposia.
- two letters of recommendation

Complementary information can be obtained through exchanges with the Scientist Contact at IFREMER. The criteria for selecting candidates are the following :

- The Curriculum Vitae of the nominee must be consistent with the proposal regarding the post-doctoral position.
- The candidate must be under 35 years old at December 31, 2014.
- The candidate has not previously performed post-doctoral research at Ifremer.
- The candidate has spent a majority of his (her) doctoral position out of Ifremer.

Postdoctoral positions will begin from 1 November, 2015.

The candidate will work in the Ifremer Mediterranean Center located in La Seyne-sur-Mer Cedex

The deadline for applications is 10 September 2015

For further information see:

www.salinityremotesensing.ifremer.fr/news

Contact Scientist: Dr Nicolas Reul

Laboratoire d'Océanographie Spatiale

Nicolas.Reul@ifremer.fr

Tel 33 (0)4 94 30 44 86

Fax: 33 (0)4 94 30 49 40

Site: IFREMER Toulon

Address: Centre Méditerranée - Zone Portuaire de Brégaillon - CS20 330 - 83507 La Seyne-sur-Mer Cedex

Data Access

If you wish to access science data, please see the following link for the instructions: <https://earth.esa.int/web/guest/-/how-to-obtain-data-7329>.¹

If you wish to access SMOS Near Real Time (NRT) "Light" (BUFR) products via EUMETSAT's EUMETCast service based on standard Digital Video Broadcast DVB-S2 technology please refer to www.eumetsat.int/website/home/Data/DataDelivery/EUMETCast/index.html² for service details and coverage map.

SMOS registered users will be granted access to the service after registration on the EUMETSAT Earth Observation Portal: <https://eoportal.eumetsat.int/userMgmt>.³

If you wish to access SMOS Near Real Time (NRT) "Full" (BUFR) or "Light" (BUFR) product by network over the entire Earth region, please send an email to Susanne.Mecklenburg@esa.int.



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2



3



QR codes

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SMOS Newsletter 8

https://earth.esa.int/documents/10174/234899/SMOS_Newsletter_8



level 1 and level 2 read-me-first notes

<https://earth.esa.int/web/guest/-/data-processors-7632>



ESA SMOS web portal

<http://earth.esa.int/SMOS>



Recent SMOS newsletters

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

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Five years of soil moisture and beyond

www.esa.int/Our_Activities/Observing_the_Earth/SMOS/Five_years_of_soil_moisture_ocean_salinity_and_beyond



Salinity matters

www.esa.int/Our_Activities/Observing_the_Earth/SMOS/Salinity_matters



For further information and how to access the Domex data set

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Grid Processing-on-Demand (G-POD) service

<http://gpod.eo.esa.int>



ESA's Research and Service Support

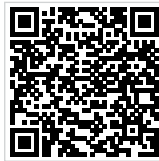
http://wiki.services.eoportal.org/tiki-custom_home.php



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Description of anomalies

https://earth.esa.int/c/document_library/get_file?folderId=118493&name=DLFE-5407.pdf



Detailed list of instrument anomalies

<https://earth.esa.int/web/guest/-/mission-status-7060>



Overview on the calibration strategy implemented for the MIRAS instrument

https://earth.esa.int/c/document_library/get_file?folderId=118493&name=DLFE-1732.pdf



Calibration plan for data availability

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



SMOS quality reports

<https://earth.esa.int/web/guest/-/data-quality-7059>

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Algorithm Theoretical Basis Document (ATBD)

<https://earth.esa.int/web/guest/-/data-processors-7632>



Level 1 product specification document

<https://earth.esa.int/web/guest/-/data-types-levels-formats-7631>



SMOS blog

http://www.cesbio.ups-tlse.fr/SMOS_blog/smos_rfi



SMOS Monthly QC Report

<https://earth.esa.int/web/guest/-/data-quality-7059>



Upcoming Meetings & Announcements



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www.igarss2015.org



Earth Observation for Water Cycle Science 2015 Conference

www.eo4water2015.info



Open Science Conference on "Salinity and Freshwater Changes in the Ocean"

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The AGU Fall Meeting

<http://fallmeeting.agu.org/2015>



2016 "Ocean Sciences" meeting

<http://osm.agu.org/2016>



Physical Oceanographer Post-doctoral position open at Ifremer

www.salinityremotesensing.ifremer.fr/news

