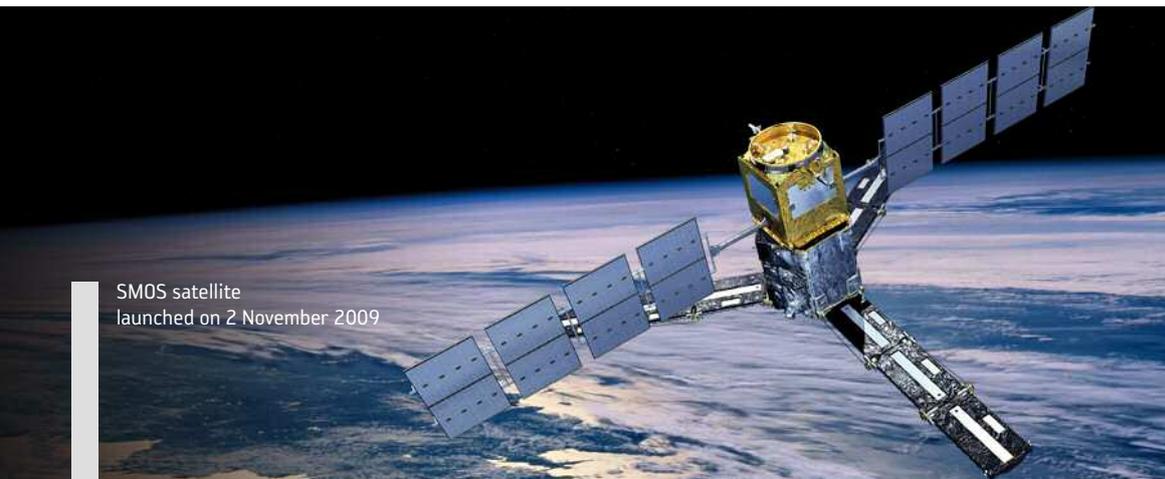


→ ESA'S WATER MISSION

smos newsletter

Issue 6 | December 2013



SMOS satellite launched on 2 November 2009

In this issue:

- Highlights
- Data and Processors
- Upcoming meetings & Publications
- Data Access
- PhD and post-doc positions

Highlights

DOMECair campaign data is now available online

DOMECair is an ESA funded airborne campaign over DOME C, Antarctica, where the EMIRAD L-Band radiometer was flown in a 350 km by 350 km area over the Concordia station in January 2013. Fully polarimetric (i.e. 4 Stokes) brightness temperatures at L-band were measured, and are now available on request, along with the final report from the Technical

University of Denmark (DTU). Figure 1 shows the measured brightness temperature at nadir for vertical (left panel) and horizontal (right panel) polarization over 11 tracks that were acquired over the test area. The data set is freely available and interested users should submit a request to the ESA EO campaigns data at <https://earth.esa.int/web/guest/campaigns> to gain access.

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>.

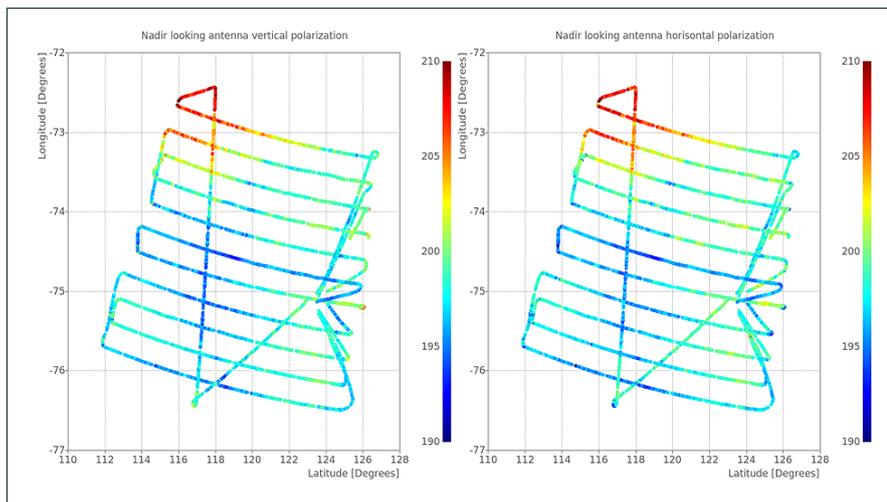


Figure 1: DOMECair nadir brightness temperatures. Left panel vertical polarization measurements, right panel horizontal polarization measurements. Scale in Kelvin. Credits DTU.

Super storms tracked by SMOS

Strong winds over the oceans affect the microwave radiation emitted by the sea surface. The change in the emitted radiation can be used to retrieve information on the strength of the wind over sea. The French Research Institute for Exploration of the Sea (IFREMER) and Collect Localisation Satellites, (CLS) within ESA's Earth Observation Support to Science Element programme have developed an algorithm to measure surface sea wind

speed that has been applied on the SMOS data acquired over the recent cyclone "Phailin", active in the Gulf of Thailand and typhoons "Nari" and "Wipha" in the east Pacific close to Philippines and Guam in October 2013. The Figure-2 shows the wind speed retrieved from SMOS data along the track of the three super storms. Winds speeds up of to 140 Km/h have been recorded. Such valuable information can be used by researchers and operational meteorological

centres to improve tracking capability and forecasting storm strength. The effect of the super storms when they hit land is also tracked by SMOS data. Figure-3 shows areas that experienced extreme flooding caused by heaving rainfall and overflowing rivers due to the cyclone "Phailin". For further information see:

http://www.esa.int/Our_Activities/Observing_the_Earth/SMOS/SMOS_sees_triple_superstorms

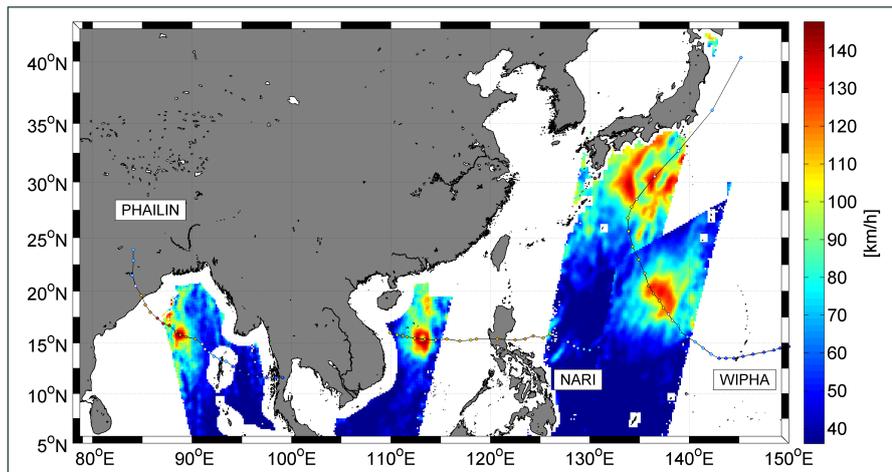


Figure 2: SMOS's microwave radiometer captured wind speed readings from three different typhoons during 10-15 October 2013. The image shows wind speeds up to 140 km/h (dark red) for Cyclone Phailin (left), Typhoon Nari (middle) and Typhoon Wipha (right). Credits ESA-IFREMER-CLS.

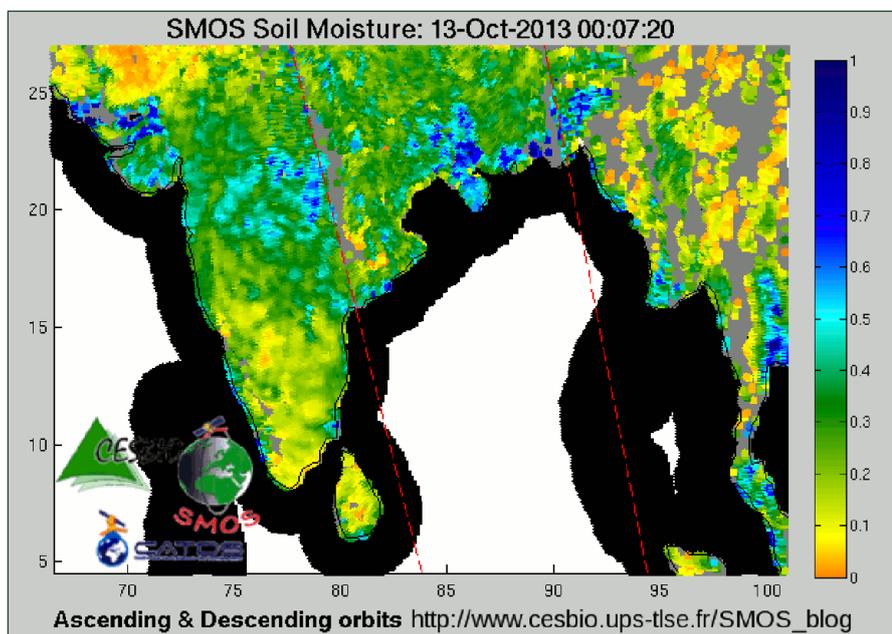


Figure 3: SMOS reading of soil moisture in southern Asia when Cyclone Phailin hit land in October 2013. Wetter soils are shown in blue with drier soils in yellow and orange, due to the passage of the storm and the intense rain falls it causes. Credits ESA-CESBIO-CATDS.

SMOS data reprocessing

The 2nd mission reprocessing is planned for 2014 with Level 1 data being reprocessed by spring 2014 and reprocessed Level 2 soil moisture and ocean salinity data being available by summer 2014. Details on the improvements in the new Level 1 and 2 processors can be found in the section on "data and processors".

New information and tools available on line

A new version [1.6.5] of the SMOS Data Viewer (SDV) is available for the user community. This version of the tool includes a new visualization functionality for the Ocean Target Transformation auxiliary data files (AUX_OTT) and can be used for visualization of the SMOS products that will be generated by the next baseline version V6xx of the

SMOS operational processors. For more information and to download the tool, go to:

<https://earth.esa.int/web/guest/-/data-reader-software-7633>



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.

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 0.11% and the degraded data amounts to 1.42%. 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?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.

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, 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 #6, calibration activities were performed in accordance with the routine calibration plan and calibration results are within the nominal range. The next Flat Target Response (FTR) will be acquired, for monitoring purposes, close to the next winter solstice.

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 #6, no new anomaly has been identified in the level 1 and level 2 data generated by the Data Processing Ground Segment.

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 new version has been implemented in the Level 1 processor during the period July 2013 – December 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 July 2013 – December 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 July 2013 – December 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.

Summary of improvements to level 1 and 2 processors for 2nd mission reprocessing (planned to be deployed in the operational chain over the course of 2014)

Level 1

The next version of the SMOS Operational Processor (baseline V6xx) will be deployed in the ground segment in the first half of 2014. The foreseen major improvements for the L1OP are the following:

- Better RFI flagging of the level 1C data based on:
 - an RFI detection algorithm that uses both NIR brightness temperature and system temperature measurements to signal the presence of the RFI in the data
 - improved maps of potential RFI detected on the Earth surface to signal the presence



of the RFI at the level of the discrete ground grid point.

- Better radiometric stability, in particular long term, of the brightness temperature on antenna frame [level 1C data]
- Improved spatial bias after several improvements at calibration and image reconstruction level
- Improved accuracy in the computation of the 3rd and 4th Stokes parameters by a full cross-polarization data processing approach

The same improvements will be introduced, simultaneously, in the near real time products disseminated in BUFR format to the operational meteorological centres.

For the Level 2 soil moisture operational processor the foreseen major improvements are the following:

- Better characterization of the auxiliary files generated by the post-processor by splitting the values of Tau, Roughness and RFI probability for ascending and descending

orbit, and improved utilization of these data in the L2SM processor

- Enhancement of soil moisture retrieval in forest areas
- Enhancement in the computation of the RFI probability, used to adjust radiometric uncertainty in the retrieval of the soil moisture, by using most recent SMOS observations instead of historical data
- Improvements to UDP reported fields, including enhanced reporting for modelled TB at 42.5°, reporting the distance of the observed target from the satellite track, and several bug fixes with minor impacts on reported values.

For the L2 sea surface salinity operational processor the foreseen major improvements are the following:

- Ocean Target Transformation correction applied on daily basis to better track level 1 radiometric drift and spatial biases
- Estimation through level 1C Stokes 3 measurements of the Vertical Total Electron

Content (VTEC) for the descending passes and usage in the retrieval of the sea surface salinity (ascending passes still use the predicted VTEC value from IGS)

- Better RFI detection and flagging, including use of cumulative RFI probability to adjust radiometric accuracy
- Improved roughness model 3

Further information on the improvements achieved with this processor baseline V6xx will be provided in the software release note of the operational processors and in the data release note that will be available just after the deployment of the processors in the operational ground segment.

Radio Frequency Interference (RFI)

Illegal RFI sources operating in the L-band adversely affect the SMOS measurements, making affected SMOS data products largely unusable for scientific applications. Users can check whether data are corrupted by RFI by using the quality flags, available in the SMOS

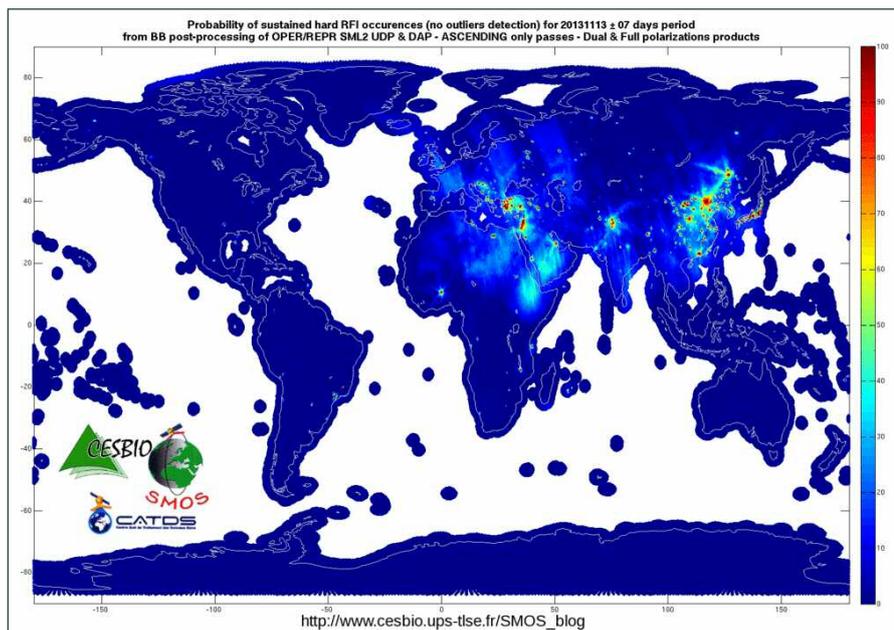


Figure 4: Probability of sustained RFI occurrences during the period 6 - 20 November 2013 for ascending passes. Credits CESBIO, CATDS.

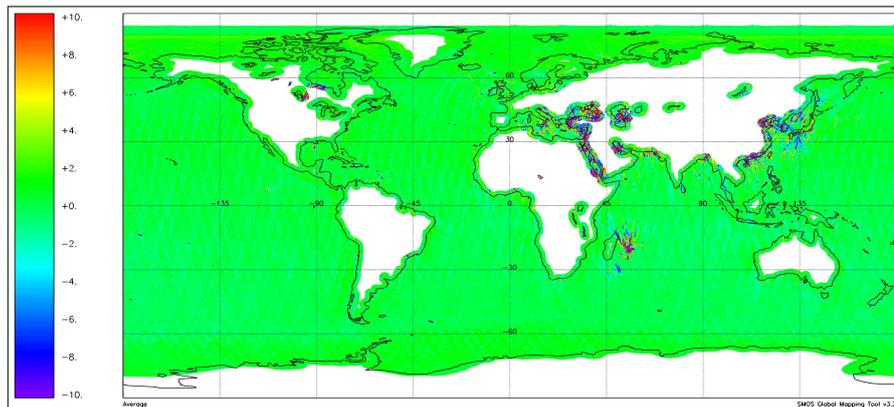
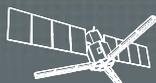


Figure 5: Weekly average of the 4th Stokes parameter over the Ocean during the period 11 - 18 November 2013. Areas affected by strong RFI show a 4th Stokes parameter above 10K in absolute value as shown in the map, for example, for the west Indian Ocean close to the Madagascar coast. Credits ESA.



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/smos_rfi/].

The figure-4 shows an example of the map generated for the period centred on 13 November 2013. 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 a larger deviation in the 3rd and 4th Stokes parameter, 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 11 - 18

November 2013. The map for example identifies the presence of a strong RFI over the west Indian Ocean. 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>.

Upcoming Meetings & Publications

Ocean Sciences Meeting, 23–28 February 2014, Honolulu, Hawaii, USA

See <http://www.sgmeet.com/osm2014/default.asp> for further details.

European Geoscience Union (EGU) General Assembly 2014, 27 April – 2 May, Vienna, Austria

A dedicated session on 'SMOS continuing to provide global soil moisture and ocean salinity' has been organized. This session will address major scientific achievements based on data provided by the SMOS mission so far. The session will also put an emphasis on new applications with potential for operational services, which start to emerge given the availability of multi-annual, high quality data. A detailed description of the programme and organization is available here:

<http://meetingorganizer.copernicus.org/EGU2014/session/15052>.

Deadline for abstract submission is 16 January 2014.

Soil moisture validation and application workshop, Amsterdam, 10–11 July 2014.

The objective of the workshop is to further explore the methodological advances in the validation and application of global satellite

soil moisture datasets. The main aim of this workshop is to bring satellite soil moisture users and developers together and focuses on the derivation of soil moisture from both passive and active microwave satellite missions. Deadline for abstracts submission is 31 March 2014, workshop website will be available soon.

IGARSS 2014, 13–18 July, Québec, Canada

A dedicated SMOS session has been organised, please see details on

<http://www.igarss2014.org/Papers/Submission.asp?SessionType=Invited&ID=2054>.

Deadline for abstract submission is 13 January 2014.

Meeting on sea surface salinity at UK Metoffice

A dedicated meeting focussing on sea surface salinity is planned for late November 2014 at the UK Metoffice in connection with the STSE SOS study. Further details will be announced over coming months.

2nd SMOS workshop

The 2nd SMOS workshop is planned to take place at the beginning of 2015. Further details will be announced over coming months.

Special section in the Journal of Geophysical Research (Oceans): deadline for paper submission extended

The call for papers for a special section entitled Early scientific results from the salinity measuring satellites Aquarius/SAC-D and SMOS, has been extended to 28 February 2014. The call is accessible on the Wiley Online website:

http://onlinelibrary.wiley.com/journal/10.1002/%28ISSN%292169-9291/home-page/call_for_papers.htm.

Special issue in the Remote Sensing Open Access Journal

The call for papers for a special section entitled Earth Observation for water resource management in Africa" is accessible on the following website:

http://www.mdpi.com/journal/remotesensing/special_issues/water_management_in_africa.

The deadline for manuscript submission is 31 March 2014.

Data Access

If you wish to access science data, please see the following link for instructions:

[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 SMOS Near Real Time

(NRT) "Light" (BUFR) products via EUMETSAT's EUMETCast service (by a standard Digital Video Broadcast technology to acquire data over the European region) see <http://www.eumetsat.int/Home/Main/DataAccess/EUMETCast/index.htm?l=en>

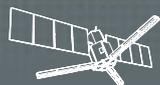
SMOS registered users will be granted access to the service after registration on the EUMETSAT

Earth Observation Portal:

<https://eoportal.eumetsat.int/userMgmt/>

If you wish to access near-real time data "Full" (BUFR) or "Light" (BUFR) product by network over the entire Earth region, please send an email to

Susanne.Mecklenburg@esa.int.



PhD and post-doc positions

PhD (or post-doc) fully funded position on sea ice data assimilation at NERSC: apply until 22 December 2013

In the frame of the new Nordic Center of Excellence on Ensemble Based Monitoring and Forecasting of the Environment, the Nansen

Environmental and Remote Sensing Center (NERSC) is opening one position in the modelling and data assimilation department of the Mohn-Sverdrup Center. The position is fully funded for a period of three years and in principle intended for a PhD candidate, but

can be converted to a Post-Doc if there is no qualified PhD candidate available. For further details see

<http://www.nersc.no/news/yet-another-phd-post-doctoral-position-open-nansen-center>



The newly-installed distributed DFG Research Unit on
Data Assimilation for Improved Characterization of Fluxes Across Compartmental Interfaces (FOR2131)
 accepts applications for

8 Postdoc and one PhD scholarship positions

for initially 3 years starting at April 1, 2014.

The Research Unit FOR2131 sets out to design and install a data assimilation framework for catchment-scale terrestrial systems encompassing all compartments from the groundwater to the atmosphere including soil, vegetation, and river networks. Observations to be assimilated into a physically-based simulation platform of the terrestrial system encompass groundwater levels, in-situ soil moisture, river levels and discharge, turbulent fluxes and other micrometeorological observations, in-situ and radar-based precipitation, and brightness temperatures from satellites, amongst others.

We welcome in particular applicants with strong backgrounds in one or more of the following fields: high-performance computation, computational geosciences, data assimilation and inverse modeling, boundary-layer meteorology, microwave radiative transfer and remote sensing, geostatistics including scaling behavior of fields, land-surface hydrology, hydrology and hydrogeology. Interdisciplinary work in a team is an important aspect of the announced positions. More detailed information about the overall project and its subprojects including contacts can be found on www.for2131.de.

The institutions contributing to FOR2131 intend to increase the number of female faculty members, and specifically encourage female candidates to apply.

Address your application electronically to the speaker of the Research Unit **Prof. Dr. Clemens Simmer** (csimmer@uni-bonn.de) at the Rheinische Friedrich-Wilhelms-University, Bonn and to the contact person for the specific subproject you are applying for until **January 1, 2014**.

Figure 6:

Postdoc and PhD advertisement FOR2131 initiative.

Postdoctoral position in biogeochemistry and salinity remote sensing at LOCEAN/IPSL

The Laboratoire d'Océanographie et du Climat – Expérimentation et Approches Numériques (LOCEAN)/ Institut Pierre Simon Laplace (IPSL) invites applications for a 15 months, possibly renewable, postdoctoral position. The position is opened in the frame of the EU FP7 Carbochange (carbochange.b.uib.no) and of the European Space Agency SMOS+SOS (<http://www.smos-sos.org>) projects. The

successful candidate will join a LOCEAN team which has a lead expertise in salinity remote sensing and air-sea CO₂ fluxes. Applicants should have a background in ocean biogeochemistry, and preferentially in ocean remote sensing. They should have significant experience in data processing.

The position starts in January 2014 and is located at UPMC-PARIS 6 University. The net monthly salary is about 1900 euros per month, commensurate with experience.

Applicants should submit a CV, a letter of interest and the names (email and telephone numbers) of three references to J. Boutin (jb@locean-ipsl.upmc.fr; tel: 33 1 44 27 47 65).

Postdoc and PhD scholarship positions on data assimilation: apply until 1 January 2014

For further details see the advertisement in Figure 6.

