climate change initiative

# → SOIL MOISTURE NEWSLETTER

Special Issue: COP-21 | September 2015

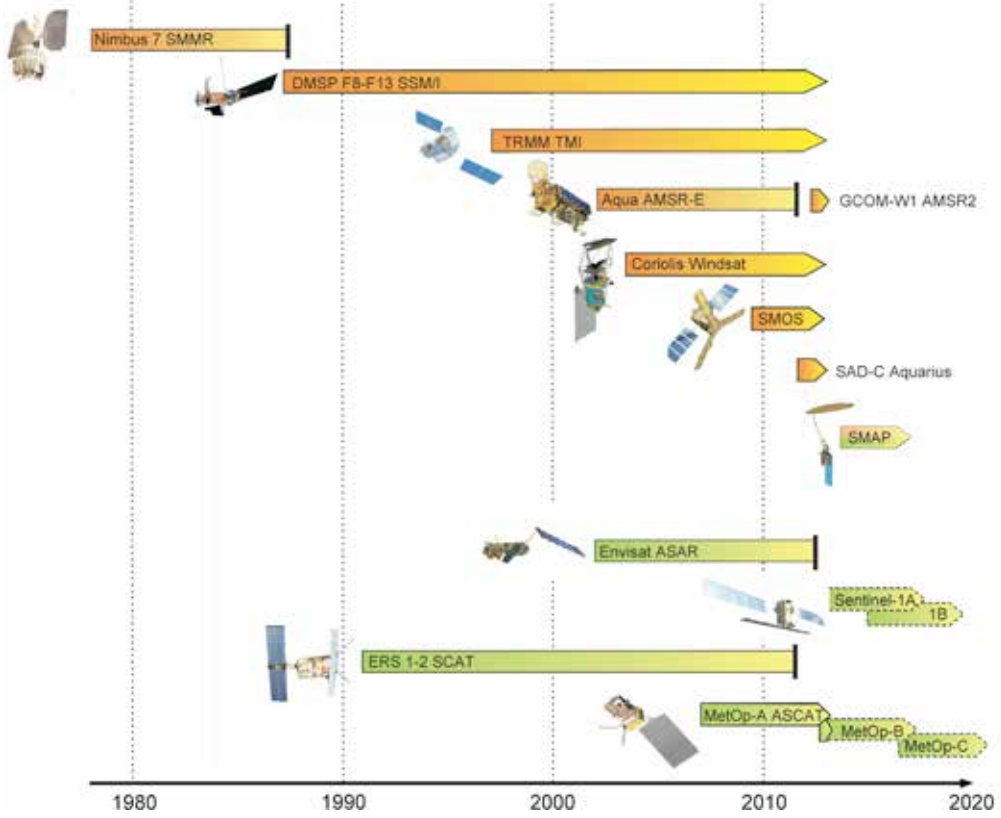


**Figure 1:** Missions in the ESA Soil Moisture CCI project.

## In this issue:



## 36 years of satellite observed soil moisture – ECV SM SM 02.2

The ESA CCI Soil moisture team is pleased to announce the publication of a new product release - the ECV SM 02.2 which will become available this fall. The data record has been extended to the end of 2014, which now covers a period of 36 years. The new release also has a couple new features including improved soil moisture dynamics, a better spatial coverage, and an improved inter-calibration between the different satellites.

The ECV soil moisture dataset has already been available to download for 3 years through the ESA CCI soil moisture website. With more than 1700 users worldwide the data has been very well received. The dataset covers a period from 1979 untill 2014 and is based on a series of active and passive microwave satellite sensors (Figure 1). The soil moisture data is given in volumetric units [m3 m-3] and represents daily surface soil moisture with a spatial resolution of 0.25 degree. The ECV SM 02.2 version has a significantly improved coverage, in particular for the 2002-2006 period. The old versions had a lot of gaps during this period due to the failure of ERS. These gaps have now been filled with observations from passive microwave sensors, which makes the dataset a more valuable data source to, for example, study droughts, like the European drought of 2003 (Figure 2).

Besides the coverage, improvements have been made with the individual satellites, AMSR-2, Windsat and ASCAT which has resulted in more realistic soil moisture dynamics.

More information about the ECV SM 02.2 product can be found in the Product Specification Document (PSD) from the ESA CCI soil moisture project website.

http://www.esa-soilmoisture-cci.org

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## Overview of key improvements in the ESA CCI SM 02.2

- ◊ Dataset extends to the end of December 2014
- ◊ Improved bias correction for Windsat and AMSR-2 input products
- ◊ Improved calibration and resolution of ASCAT input product
- ◊ Data gaps due to ERS failure filled with AMSR-E for the period 2002-2006 (Figure 2)
- ◊ Improved soil moisture dynamics
- ◊ New data attributes.

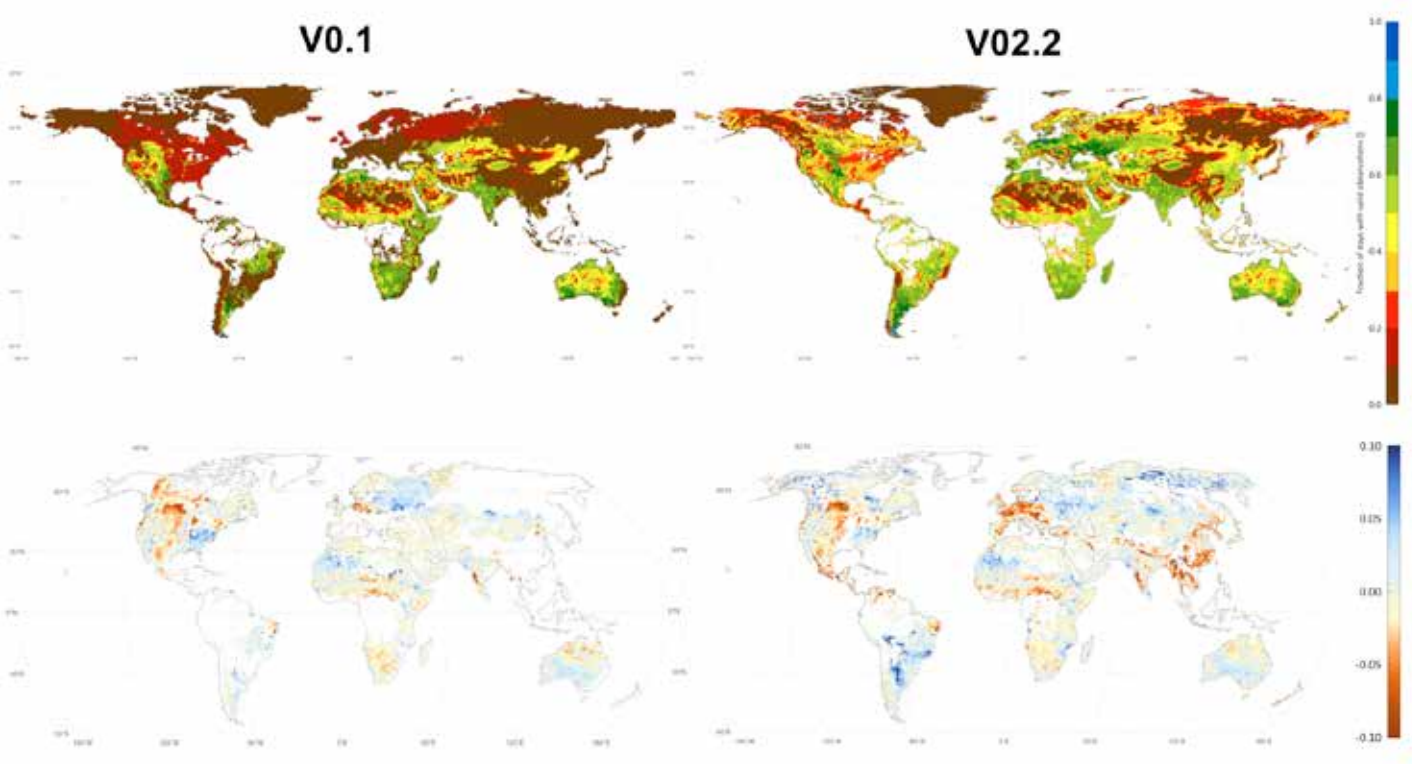


**Figure 2:** Impact of filling gaps occurring due to ERS-failure using AMSR-E data for version v02.2. On the top we show the impact on the temporal coverage, on the bottom the impact of gap filling on soil moisture anomalies. As an example we show August 2003, when a very strong heat-wave stroke Western Europe.

## Project achievements and news

### The CCI team contributed to the BAMS 'State of the Climate' report 2014

"Soil moisture matters" - this was also underlined by NOAA who selected our contribution to the BAMS State-of-the-Climate report (https://www2.ametsoc.org/ams/index.cfm/publications/bulletin-of-the-american-meteorological-society-bams/state-of-the-climate/) as one of their climate highlights (https://www.climate.gov/news-features/understanding-climate/2014-state-climate-soil-moisture).

For the fifth time in a row the project has been invited to contribute with our ESA CCI soil moisture dataset to this yearly report series in which a state-of-the-art overview is given of recent global climate conditions. The report aims to provide a climate overview that is as complete as possible and covers the majority of import meteorological, hydrological, and biospherical observables.

While slightly wetter than 2013, the global soil moisture conditions in 2014 were near-normal, but with large regional difference [Figure 3]. The near-average global soil moisture conditions observed in 2014 were largely related to the El Niño-Southern Oscillation (ENSO), which was in a largely ENSO neutral/marginal El Niño phase. On a global-average scale, El Niño tends to yield drier-than-normal soil conditions, which was observed during the 1997–98 El Niño, while La Niña tends toward wetter-than normal, particularly in the Southern Hemisphere.

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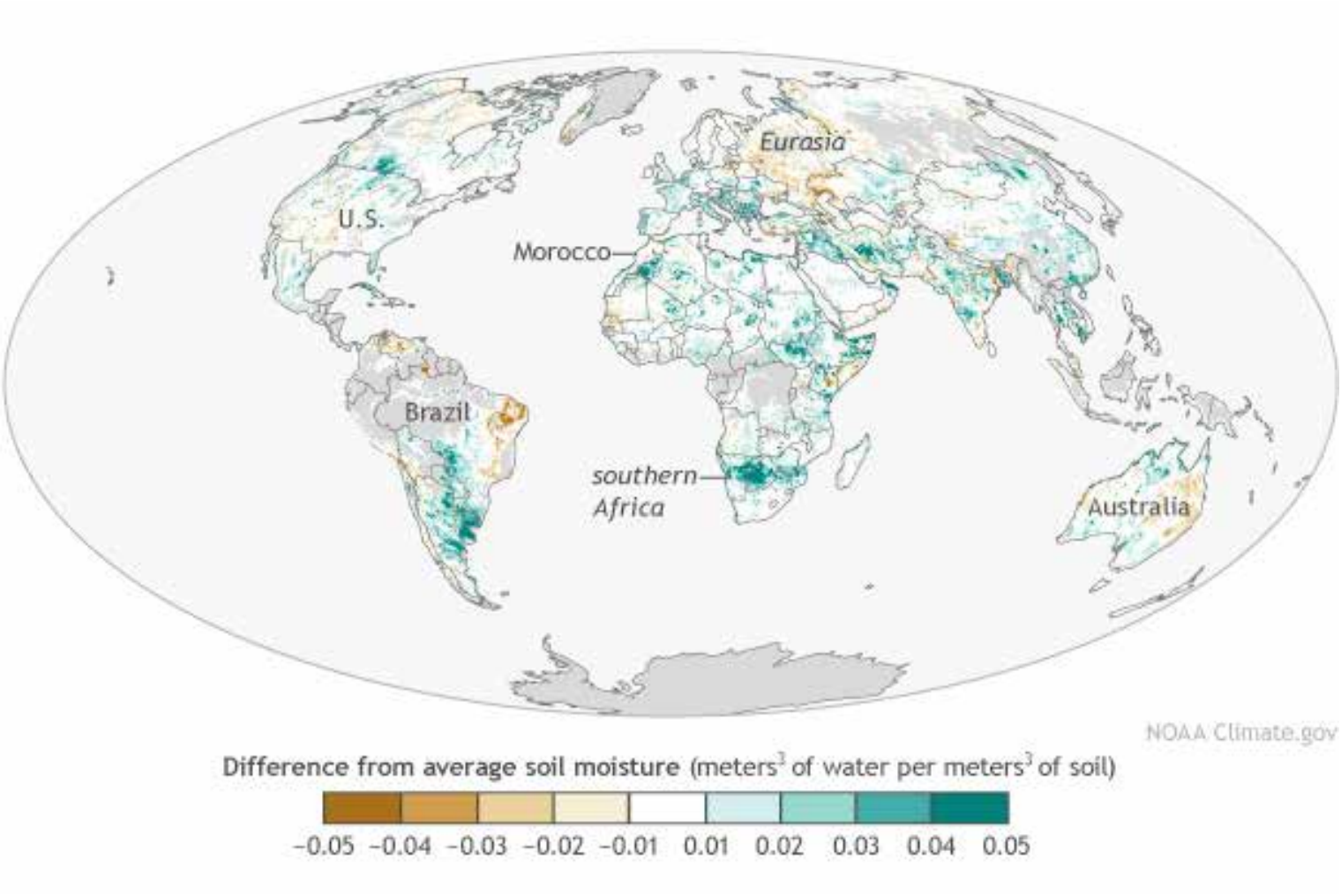


**Figure 3.** Soil moisture across the globe in 2014 compared to the average from 1991-2012. Map adapted from Plate 2.1f in State of the Climate in 2014.

## Soil Moisture special issue in International Applied Earth Observation and GeoInformation

By the end of this year the International Applied Earth Observation and GeoInformation Journal will publish a special issue on the " Advances in the Validation and Application of Remotely Sensed Soil Moisture", edited by the CCI soil moisture science team members.

The contribution was overwhelming and the Journal had to decide to make two issues, one will be published at the end of 2015 and one in 2016.

## The integration of SMOS within the CCI

Significant progress have been made on the integration of SMOS within the CCI data record. ESA recently supported an additional study to facilitate a seamless integration of SMOS data in the CCI climate data record. Different scenarios have been applied and show promising results. In the next version SMOS will become part of CCI soil moisture data record.

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## Latest publications


De Nijs AHA, RM Parinussa, RAM de Jeu, J Schellekens & TRH Holmes (2015). A Methodology to Determine Radio Frequency Interference in AMSR2 Observations. IEEE Transactions on Geoscience and Remote Sensing, doi: 10.1109/TGRS.2015.2417653

Dorigo, W.A., Gruber, A., De Jeu, R.A.M., Wagner, W., Stacke, T., Loew, A., Albergel, C., Brocca, L., Chung, D., Parinussa, R.M., Kidd, R. (2015). Evaluation of the ESA CCI soil moisture product using ground-based observations. Remote Sensing of Environment, 162, 380-395, doi: 10.1016/j.rse.2014.07.023

Dorigo, W.A., Reimer, C., Chung, D., Parinussa, R.M., Melzer, T., Wagner, W., De Jeu, Kidd, R. (2015): [Hydrological cycle] Soil Moisture [in "State of the Climate in 2014"]. Bulletin of the American Meteorological Society (BAMS), 96 (7), S28-29.

Griesfeller, A., W.A. Lahoz, R.A.M. de Jeu, W. Dorigo, L.E. Haugen, T.M. Svendby, and W. Wagner (2015). Evaluation of satellite soil moisture products over Norway using ground-based observations. Int. J. Appl. Earth Obs. & Geoinfo. (JAG) http://dx.doi.org/10.1016/j.jag.2015.04.016

Holmes, TRH, W Crow, RAM de Jeu, Leveraging Microwave Polarization Information for the Calibration of a Land Data Assimilation System, Geophysical Research Letters, Geophys. Res. Lett., 41, doi:10.1002/2014GL061991.

Kim, S., Y. Y. Liu, F. M. Johnson, R. M. Parinussa & A. Sharma (2015). A global comparison of alternate AMSR2 soil moisture products: Why do they differ? Remote Sensing of the Environment, 161, 43-62, doi:10.1016/j.rse.2015.02.002

Parinussa RM, TRH Holmes, N Wanders, W Dorigo & RAM de Jeu (2015). A Preliminary study towards consistent soil moisture records from AMSR2, J. Hydrometeor, 16, 932–947.doi: http://dx.doi.org/10.1175/JHM-D-13-0200.1

Van der Schalie, RM Parinussa, LJ Renzullo, AIJM van Dijk, CH Su & RAM de Jeu (2015). SMOS Soil Moisture Retrievals from the Land Parameter Retrieval Model over the Murrumbidgee Catchment, southeast Australia, Remote Sensing of Environment, 163, 70-79, doi:10.1016/j.rse.2015.03.006.


## Users of the Soil Moisture data sets since June 2012

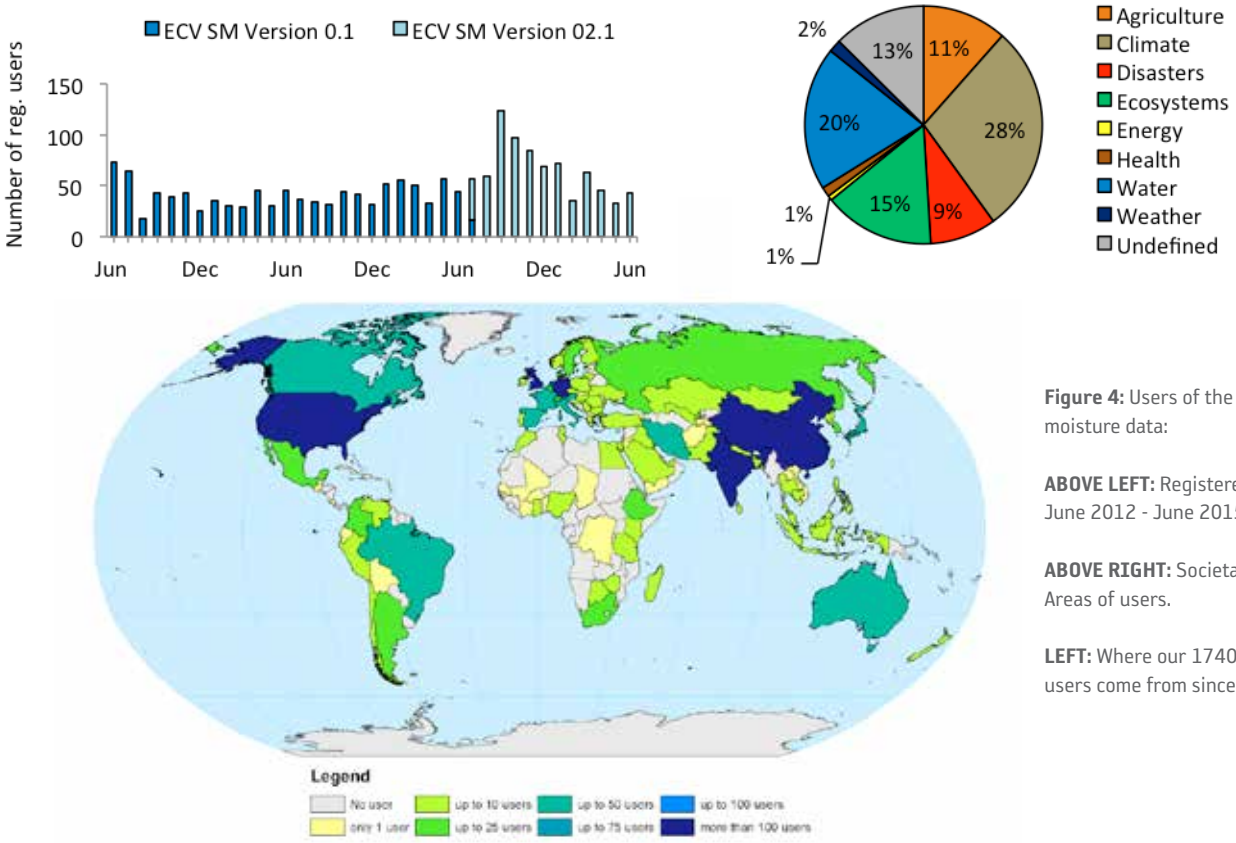


**Figure 4:** Users of the CCI soil moisture data:

**ABOVE LEFT:** Registered users from June 2012 - June 2015.

**ABOVE RIGHT:** Societal Benefit Areas of users.

**LEFT:** Where our 1740 registered users come from since June 2012

**www.esa-soilmoisture-cci.org**


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