

EGU21-9796

<https://doi.org/10.5194/egusphere-egu21-9796>

EGU General Assembly 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



ESA CCI and C3S Soil Moisture Products: Generation and Quality Assurance

Tracy Scanlon¹, Wouter Dorigo¹, Wolfgang Preimesberger¹, Robin van der Schalie², Martin Hirschi³, Mendy van der Vliet³, Leander Moesinger¹, Nemesio Rodriguez-Fernandez⁴, Adam Pasik¹, Richard Kidd⁵, and Richard de Jeu²

¹TU Wien, Department of Geodesy and Geoinformation, Wien, Austria (tracy.scanlon@geo.tuwien.ac.at)

²VanderSat B.V, Haarlem, the Netherlands

³ETH Zurich, Department of Environmental Systems Science, Zürich, Switzerland

⁴CESBIO, Toulouse, France

⁵EODC GmbH, Vienna, Austria

Soil moisture Climate Data Records (CDRs) produced from active and passive microwave sensors are valuable for the study of the coupled water, energy and carbon cycles over land on a global scale. As part of the European Space Agency (ESA) Climate Change Initiative (CCI) a multi-decadal CDR is produced by systematically combining Level-2 datasets from separate missions. The combination of individual Level 2 datasets into a single product gives us the opportunity to profit from the advantages of individual missions, and to obtain homogenised CDRs with improved spatial and temporal coverage.

The most recent version of the ESA CCI product (v06) provides 3 products: (1978 – 2020), ACTIVE (1991 – 2020) and COMBINED (1978 – 2020). This latest version of the product includes several advances that result in the improved quality of the product. Improvements to the input datasets include updated passive (LPRM – Land Parameter Retrieval Model) data to improve inter-calibration and snow / frozen condition flagging as well as updated ASCAT data from the H-SAF project to improve vegetation correction.

Algorithmic improvements include the cross-flagging of snow / frozen conditions to take advantage of the flags provided for each input dataset across all sensors as well as the update of the Signal to Noise Ratio – Vegetation Optical Depth (SNR-VOD) regression used in gap-filling the SNR in locations where retrieval has failed. Additional data is also included through the use of the Global Precipitation Measurement (GPM) mission, the FengYun-3B (FY3B) mission and extending the Tropical Rainfall Measuring Mission (TRMM) dataset used to 2015.

An operational product based on the ESA CCI SM product continues to be provided through the EU Copernicus Climate Changes Services (C3S) Climate Data Store (CDS). This operational product provides daily data and decadal (10 daily) aggregates in near-real-time as well as monthly aggregates for the historical dataset. The anomalies derived from this dataset (with a base period of 1991 to 2010) can be seen on the TU Wien data viewer (<https://dataviewer.geo.tuwien.ac.at/>).

The accuracy of each data product is assessed through comparison to in-situ soil moisture observations from the International Soil Moisture Network (ISMN) as well as modelled data from

Land Surface Models (LSMs). Such assessments are undertaken each time a new ESA CCI version is generated, and the results compared against previous versions to assess the evolution of the product quality over time. For transparency and traceability, an online portal is provided for the public to perform similar validations (Quality Assurance for Soil Moisture – www.qa4sm.eu).

In this study, an overview of the product generation and the updates provided at ESA CCI SM v06 is presented as well as examples of how the data product has been used. The associated quality assurance requirements, assessment procedures and results will also be presented.

The development of the ESA CCI products has been supported by ESA's Climate Change Initiative for Soil Moisture (Contract No. 4000104814/11/I-NB and 4000112226/14/I-NB). Funded by Copernicus Climate Change Service implemented by ECMWF through C3S 312a Lot 7 Soil Moisture service.