Geophysical Research Abstracts
Vol. 21, EGU2019-16219, 2019
EGU General Assembly 2019

Analyzing trends in backscatter and surface soil moisture observations from Metop ASCAT

Sebastian Hahn, Mariette Vreugdenhil, Thomas Melzer, Matthias Forkel, Wouter Dorigo, and Wolfgang Wagner
TU Wien, Department of Geodesy and Geoinformation, Vienna, Austria (sebastian.hahn@geo.tuwien.ac.at)

Satellites are key observing systems to provide information on essential climate variables over large spatial scales. Soil water content is an important essential climate variables that regulates the exchange of energy, water, and carbon between the land surface and the atmosphere.

The Advanced Scatterometer (ASCAT) on-board the series of Metop satellites measures the Radar backscatter of the Earth's surface and allows to derive soil water content in the top-most soil layer at a spatial resolution of 25/50 km. The launch of Metop-C in November 2018 completes the first generation of the EUMETSAT Polar System (EPS) programme consisting of three polar orbiting Metop satellites (Metop-A, Metop-B, Metop-C).

As part of the Satellite Application Facility on Support to Operational Hydrology and Water Management (H SAF) project, a surface soil moisture data record is processed every year by merging Metop-A and Metop-B ASCAT backscatter measurements and by applying the TU Wien soil moisture retrieval algorithm. The TU Wien change detection algorithm uses the multi-incidence angle measurement capabilities of the ASCAT instrument to compute surface soil moisture expressed in degree of saturation. The latest surface soil moisture data record covers 11 years (2007-2017) and is globally available at spatial resolution of 25 km.

In this study we analyze the consistency of trends in the Metop ASCAT surface soil moisture data record. Land cover changes contribute to backscatter variations and hence might cause inconsistencies in the retrieved soil moisture record. We compare the ASCAT soil moisture trends against state-of-the-art reference data sets such as the ESA CCI Passive soil moisture data set, the ECMWF ERA5 reanalysis, and to land cover changes from the ESA CCI land cover maps. Furthermore, we test how a new calibration scheme of the TU Wien algorithm effects the consistency of soil moisture trends.

In our work we will present the compliance between the different data sets and discuss sources causing trend artifacts in the Metop ASCAT surface soil moisture data set, which were predominantly eliminated with the new calibration scheme. In summary, our results highlight the benefit of assessing decadal trends in satellite products to improve retrieval algorithms and satellite-based climate data records.