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Next-generation ASCAT surface soil moisture near real-time service

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The European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) has been operationally distributing a global Surface Soil Moisture (SSM) product derived from the Advanced Scatterometer (ASCAT) on board the series of Metop satellites since December 2008. The first Metop mission (Metop-A launched in October 2006) has been successfully concluded in November 2021, while two Metop satellites are still operational at the moment (Metop-B launched in September 2012 and Metop-C launched in November 2018), both providing an ASCAT SSM product in near real-time (NRT) sampled at 12.5 km and 25 km. EUMETSAT directly manages the ASCAT SSM NRT service, with the soil moisture processing chain implemented as part of the EUMETSAT Polar System (EPS) Core Ground Segment (CGS). In September 2015 the EUMETSAT Satellite Application Facility on Support to Operational Hydrology and Water Management (H SAF) formally took over the ASCAT SSM NRT product evolution and maintenance, while product generation stayed at the EUMETSAT EPS CGS. At that time, H SAF has already been responsible for the development and generation of the ASCAT SSM Data Record (DR) products, which consistently advanced through multiple algorithmic iterations in recent years. Beyond minor updates and occasional model parameter substitutions, the ASCAT SSM NRT products do not incorporate the latest algorithmic developments. Hence, a next-generation ASCAT SSM NRT service is currently being set up, aiming to enhance various aspects including spatial resolution and vegetation correction. The new service will run alongside the current NRT system, ensuring that users will experience a seamless transition.

In this study, we introduce the scientific innovations and algorithmic updates of the upcoming H SAF ASCAT SSM NRT products sampled at both 6.25 km and 12.5 km. A validation was performed by comparing the old and new ASCAT SSM with other satellite soil moisture products, in-situ data, and soil moisture information derived from land surface models. The results show an improved performance particularly with respect to the capability of the data to characterise extremes. Furthermore, we will discuss product format changes, such as a new Discrete Global Grid (DGG) defining a more homogeneous sampling distribution of grid points on the Earth's surface.