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The Soil Moisture and Ocean Salinity (SMOS) satellite is the first mission specifically designed to measure soil moisture (hereafter SM) from space. The instrument on-board SMOS is a L-band aperture synthesis radiometer, with full-polarization and multi-angular capabilities (Mecklenburg et al. 2012). The operational SM retrieval algorithm is based on a physical model (Kerr et al. 2012). In addition, Rodriguez-Fernandez et al. (2014) have recently implemented an inverse model based in neural networks using the approach of Aires & Prigent (2006), which consists in training the neural networks with numerical weather prediction models (ECMWF, Balsamo et al. 2009). In the context of an ESA funded project (de Jeu et al, this conference, session CL 5.7), we have studied this neural network approach to create a consistent soil moisture dataset from 2003 to 2014 using NASA/JAXA Advanced Scanning Microwave Radiometer (AMSR-E) and ESA SMOS radiometers as input data. Two neural networks algorithms have been defined and optimized using AMSR-E or SMOS as input data in the periods 2003-Oct 2011 and 2010-2014, respectively. The two missions overlapping period has been used to demonstrate the consistency of the SM dataset produced with both algorithms by comparing monthly averages of SM and by comparing with time series of in situ measurements at selected locations and other SM products such as the SMOS operational SM, ECMWF model SM, and AMSR-E LPRM SM (Owe et al. 2008). Finally, the long time series of SM obtained with neural networks will be compared to in-situ measurements and ECMWF ERA-Interim SM at selected locations. This long-term soil moisture dataset can be used for hydrological and climate applications and it is the first step towards a longer dataset which will include additional sensors.

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