



## **A long term soil moisture data set derived from AMSR-E and AMSR2**

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Soil moisture is recognized as an Essential Climate Variable (ECV). Long term soil moisture data set could provide valuable information for climate change study. In this study, we developed a long term soil moisture data set by inputting AMSR-E and AMSR2 observations into an Artificial Neural Network (ANN). The surface soil moisture products of SMAP were set as the reference data, while brightness temperature (TB) of various channels and the microwave vegetation index (MVI) obtained or derived from AMSR2 were input into the ANN. The ANN system performs well during training period, with a correlation coefficient (CC) of 0.74 and Root Mean Square Error (RMSE) of 0.033 m<sup>3</sup>/m<sup>3</sup>. With this well-calibrated ANN system, we derived long term soil moisture (named as ANNs<sub>m</sub>) from AMSR2 and AMSR-E. With using the ground observation from the Soil Climate Analysis Network sites (named as SCANs<sub>m</sub>) as references, ANNs<sub>m</sub> was compared with the soil moisture product provided by JAXA, and that retrieved from the land parameter retrieval model (LPRM). The comparison demonstrates that ANNs<sub>m</sub> outperform the other two in both CC and RMSE. Our work provides a reliable soil moisture data set which covering the period from 2002 to now, with consistent accuracy spanning over multi-satellites.