Inter-comparison of Microwave Satellite Soil Moisture retrievals over Australia

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INTRODUCTION

The use of microwave satellite soil moisture data for scientific and operational hydrologic, meteorological and climatological applications is advancing quickly due to increasing capability and temporal coverage of current and future missions and their increasing utilities in land surface models. The constellation of SMOS, GCOM-W1/AMSR-E, and MetOp-A/ASCAT now provides up to 8 subs-daily observations over Australia with 2.5-5 hours time intervals.

Characterisation of the relative skills of various soil moisture products from different sensors in a common spatial grid is crucial for integrating them into models, cross-validation, error correction and multi-satellite blending. This work (1) evaluated 3 products characteristics from EOS-AQUA/AMSR-E, MetOp-A/ASCAT and SMOS/MIRAS against in-situ 0-5cm topsoil moisture observations from 49 sites over Murray-Murrumbidgee Catchment (South-East Australia) over the period of July 2002 to September 2011. Satellite observations are systematically different from the ground data because of their differences in scale, extent, sensing depth, retrieval algorithms, and instrument features. Satellite data often needs to be renor- malised for evaluation studies and data assimilation. Here we studied the utilities and limitations of 3 common renormalisation strategies.

DATASETS

Ground observations from Murrumbidgee Soil Moisture Monitoring Network (ozNET) - 0-5cm topsoil moisture measurements averaged over 20-30 min periods from 49 stations distributed over 17 000 km² catchments across 82 000 km² Murrumbidgee River Catchment (2).

Satellite Level 3 Soil Moisture Products:
- NASA-VUA (Vrije Universiteit Amsterdam) product of AMSR-E soil moisture (X- and C-band combined) available at 1.30am on regular 0.25° grid.
- TU-WIEN (Vienna University of Technology) relative saturation product of MetOp-A/ASCAT (C-band) based on change-detection algorithm, sampled at 0.30am on regular 0.25° grid.
- CATDS (Centro de Tratamiento de Datos) SMOS product based on ESA's algorithm with multi-orbit retrieval enhancement, sampled at 0.30am on EASE (Equal-Area Scalable Earth) 25 km grid.

REFERENCES AND ACKNOWLEDGEMENTS

3. The authors thank the staff of the University of Melbourne and 2 Water and his colleagues at the Monash University who have been involved in the provision of all moisture monitoring data from the Murrumbidgee ozNET network. This SMOS data is data removed from the Climate Data for the Treatment of Data (CDT) server. The data were produced by the European Space Agency (ESA) within the framework of EUMETSAT's Satellite Application Facility on Support of Operational NWP and other Applications (SOF) from MetOp-A observations. National and local data provided by the Australian Collaborative Land Experiments Program ALEXL experiment through the National Committee on Soil and Terrain (NCST) (www.ncst.esci.ox.ac.uk). This research was conducted with financial support from the Australian Research Council (ARC) Linkage Project No. LP100100514.