Geophysical Research Abstracts
Vol. 17, EGU2015-3727, 2015
EGU General Assembly 2015

Error Characterisation and Merging of Active and Passive Microwave Soil Moisture Data Sets

Wolfgang Wagner (1,4), Alexander Gruber (1), Richard de Jeu (2), Robert Parinussa (3), Daniel Chung (1), Wouter Dorigo (1), Christoph Reimer (1), Richard Kidd (1,4)

(1) Vienna University of Technology, Vienna, Austria, (2) Vrije Universiteit Amsterdam, Amsterdam, The Netherlands, (3) The University of New South Wales, Sydney, Australia, (4) EODC Earth Observation Data Centre for Water Resources Monitoring, Vienna, Austria

As part of the Climate Change Initiative (CCI) programme of the European Space Agency (ESA) a data fusion system has been developed which is capable of ingesting surface soil moisture data derived from active and passive microwave sensors (ASCAT, AMSR-E, etc.) flown on different satellite platforms and merging them to create long and consistent time series of soil moisture suitable for use in climate change studies. The so-created soil moisture data records (latest version: ESA CCI SM v02.1 released on 5/12/2014) are freely available and can be obtained from http://www.esa-soilmoisture-cci.org/. As described by Wagner et al. (2012) the principle steps of the data fusion process are: 1) error characterisation, 2) matching to account for data set specific biases, and 3) merging. In this presentation we present the current data fusion process and discuss how new error characterisation methods, such as the increasingly popular triple collocation method as discussed for example by Zwieback et al. (2012) may be used to improve it. The main benefit of an improved error characterisation would be a more reliable identification of the best performing microwave soil moisture retrieval(s) for each grid point and each point in time. In case that two or more satellite data sets provides useful information, the estimated errors can be used to define the weights with which each satellite data set are merged, i.e. the lower its error the higher its weight. This is expected to bring a significant improvement over the current data fusion scheme which is not yet based on quantitative estimates of the retrieval errors but on a proxy measure, namely the vegetation optical depth (Dorigo et al., 2015): over areas with low vegetation passive soil moisture retrievals are used, while over areas with moderate vegetation density active retrievals are used. In transition areas, where both products correlate well, both products are being used in a synergistic way: on time steps where only one of the products is available, the estimate of the respective product is used, while on days where both active and passive sensors provide an estimate, their observations are averaged.

REFERENCES

Dorigo, W.A., A. Gruber, R. de Jeu, W. Wagner, T. Stacke, A. Löw, C. Albergel, L. Brocca, D. Chung, R. Parinussa, R. Kidd (2015) Evaluation of the ESA CCI soil moisture product using ground-based observations, Remote Sensing of Environment, in press.

Wagner, W., W. Dorigo, R. de Jeu, D. Fernandez, J. Benveniste, E. Haas, M. Ertl (2012) Fusion of active and passive microwave observations to create an Essential Climate Variable data record on soil moisture, ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences (ISPRS Annals), Volume I-7, XXII ISPRS Congress, Melbourne, Australia, 25 August-1 September 2012, 315-321.

Zwieback, S., K. Scipal, W. Dorigo, W. Wagner (2012) Structural and statistical properties of the collocation technique for error characterization, Nonlinear Processes in Geophysics, 19, 69-80.