Geophysical Research Abstracts
Vol. 20, EGU2018-13839, 2018
EGU General Assembly 2018

A comparison of evapotranspiration obtained from land surface temperature based remote sensing estimates and *in-situ* eddy covariance measurements in the Czech Republic

Milan Fischer (1,2), Kyle Knipper (3), František Jurečka (1,2), Martha Anderson (3), Gabriela Pozníková (1,2), Zdeněk Žalud (1,2), Miroslav Trnka (1,2)

(1) Department of Climate Change Impacts on Agroecosystems, Global Change Research Institute CAS, Brno, the Czech Republic (fischer.milan@gmail.com), (2) Department of Agrosystems and Bioclimatology, Faculty of AgriSciences, Mendel University in Brno, the Czech Republic, (3) Agricultural Research Service, United States Department of Agriculture, Beltsville, MD ,USA

Evapotranspiration (ET) represents the dominant component of the terrestrial water balance. Despite that advanced methods, such as eddy covariance (EC), have been developed and commercialized during last two decades, routine measurements providing information about ET at the field level and at a density which would conform the spatial variability in ET is still lacking. In comparison to *in-situ* observation networks, remote sensing estimates of ET through land surface temperature (LST) has a capability to provide complete land spatial coverage. Although, the high spatial resolution is compromised by low time resolution and *vice versa*, the high spatiotemporal resolution can be attained by combining satellite retrievals from different platforms with different spatiotemporal characteristics. In this study, we tested a global product of Atmosphere-Land Exchange Inverse (ALEXI) model relying on the two-source energy balance approach and LST retrievals from a single Moderate Resolution Imaging Spectroradiometer (MODIS) sensor (two observations per day) on the Aqua platform. Since the resolution of this product is ∼5 km we further used a disaggregation approach DisALEXI using biweekly Landsat 8 with subsequent image sharpening and Spatial and Temporal Adaptive Reflectance Fusion Model (STARFM) to obtain daily ET with 30 m resolution. These ET_{STARFM} estimates were compared with EC measurements at a 26-ha spring barley (*Hordeum vulgare* L.) field in Polkovice (49.395 N, 17.247 E, 200 m a.s.l., the Czech Republic) in 2016. The preliminary results indicate that in average ET_{STARFM} exceeded ET_{EC} by 22 % (R^2=0.54). The results turned out and led to higher correlation by considering imperfect energy balance closure of EC measurements (0.76) and by adjusting ET_{EC} to force the closure (by assigning the entire energy residuum to latent heat flux) with mean ET_{STARFM} being 6 % (R^2=0.64) lower as compared to mean ET_{EC}. This study demonstrates that LST based remote sensing techniques provide a physically based and effective means for determining ET in a mosaic landscape. Further, we confirm the necessity of treating EC data according to different energy balance closure scenarios when ET_{EC} is compared with other methods respecting mass and energy conservation law.

Acknowledgement: This work was supported by the Ministry of Education, Youth and Sports of CR within the National Sustainability Program I (NPU I), grant number LO1415, and by project SustES - Adaptation strategies for sustainable ecosystem services and food security under adverse environmental conditions (CZ.02.1.01/0.0/0.0/16_019/0000797).