Geophysical Research Abstracts
Vol. 17, EGU2015-4594, 2015
EGU General Assembly 2015

Comparison of heat flux estimations from two turbulent exchange models based on thermal UAV data.

Helene Hoffmann (1), Hector Nieto (2), Rasmus Jensen (1), and Thomas Friborg (1)

(1) Department of geosciences and natural resource management, University of Copenhagen, Copenhagen, Denmark , (2) Instituto de agricultura sostenible, Cordoba, Spain

Advantages of UAV (Unmanned Aerial Vehicle) data-collection, compared to more traditional data-collections are numerous and already well-discussed (Berni et al., 2009; Laliberte et al., 2011; Turner et al., 2012). However studies investigating the quality and applications of UAV-data are crucial if advantages are to be beneficial for scientific purposes.
In this study, thermal data collected over an agricultural site in Denmark have been obtained using a fixed-wing UAV and investigated for the estimation of heat fluxes. Estimation of heat fluxes requires high precision data and careful data processing. Latent, sensible and soil heat fluxes are estimates through two models of the two source energy modelling scheme driven by remotely sensed observations of land surface temperature; the original TSEB (Norman et al., 1995) and the DTD (Norman et al., 2000) which builds on the TSEB. The DTD model accounts for errors arising when deriving radiometric temperatures and can to some extent compensate for the fact that thermal cameras rarely are accurate. The DTD model requires an additional set of remotely sensed data during morning hours of the day at which heat fluxes are to be determined. This makes the DTD model ideal to use when combined with UAV data, because acquisition of data is not limited by fixed time by-passing tracks like satellite images (Guzinski et al., 2013).
Based on these data, heat fluxes are computed from the two models and compared with fluxes from an eddy covariance station situated within the same designated agricultural site. This over-all procedure potentially enables an assessment of both the collected thermal UAV-data and of the two turbulent exchange models.
Results reveal that both TSEB and DTD models compute heat fluxes from thermal UAV data that is within a very reasonable range and also that estimates from the DTD model is in best agreement with the eddy covariance system.