

Technical University of Denmark



Hyperspatial mapping of water, energy and carbon fluxes with Unmanned Aerial Vehicles

Wang, Sheng; Köppl, Christian Josef ; Bandini, Filippo; Jakobsen, Jakob; Olesen, Daniel Haugård; Ibrom, Andreas; Bauer-Gottwein, Peter; Garcia, Monica

Publication date:
2016

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Wang, S., Köppl, C. J., Bandini, F., Jakobsen, J., Olesen, D. H., Ibrom, A., ... Garcia, M. (2016). Hyperspatial mapping of water, energy and carbon fluxes with Unmanned Aerial Vehicles. Abstract from Nordic UAS Event, Odense, Denmark.

DTU Library

Technical Information Center of Denmark

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Hyperspatial mapping of water, energy and carbon fluxes with Unmanned Aerial Vehicles

Sheng Wang¹, Christian Josef Köppl¹, Filippo Bandini¹, Jakob Jakobsen², Daniel Haugård Olesen², Andreas Ibrom¹, Peter Bauer-Gottwein¹, Monica Garcia^{1*}

1. Department of Environmental Engineering, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark
2. National Space Institute, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark

*corresponding author: mgarc@env.dtu.dk

Having spatially distributed estimates of energy, water and carbon fluxes between the land and the atmosphere is of critical importance for improving water resource management, agricultural production, weather forecasting, and climate prediction. Traditionally, satellite based remote sensing data of vegetation or temperature has been used as inputs into land surface models (LSMs). However, the coarse resolution of satellite based remote sensing (3-90 km) data could not accurately capture spatial heterogeneity in fluxes due to changes in topography, soil types, and vegetation. With significant advances in navigation, flight control, miniaturized platforms and sensors, Unmanned Aerial Vehicles (UAVs) can provide ultra-high spatial resolution imagery (1 cm to 1 m). This presents a good opportunity to improve land surface modeling. From this perspective, our study explores the possibility to incorporate UAV-based remote sensing into LSMs. A site growing an energy crop with field sensors (eddy covariance, radiation or soil moisture) at DTU-Risø is chosen for the pilot study. A hexacopter (Tarot) equipped with a six band multispectral camera (Visible and near infrared), a thermal camera and a digital camera regularly flew over the flux site. In the near future, a smart UAV platform combining rotary and fixed wing functionality will be used as platform. The imagery acquired by UAVs will be used to retrieve the vegetation indices and land surface temperature. These data used for land surface modeling to estimate biomass, plant diseases or stress, water uptake.