Hyperspectral imaging from UAVs enables flexible and low cost monitoring tools for agriculture applications. The increasing fertilizer cost and decreasing natural resources push researches to find out effective solutions for precision agriculture. Below some scientific studies made with Fabry-Perot filter based camera are presented.

# HYPERSPECTRAL CAMERA

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### CASE STUDY 1

**Processing and Assesment of Spectrometric, Sterescopic Imagery collected using a lightweight UAV Spectral Camera for Precison Agriculture**

The entire processing chain from raw images up to georeferenced reflectance image, digital surface models and biomass estimates were developed.
The processing integrates photogrammetric and quantitative remote sensing approaches.

The dataset was collected in Vihti agricultural test site in 2 July 2012 under extremely variable imaging conditions using the FPI camera prototype 2012a.

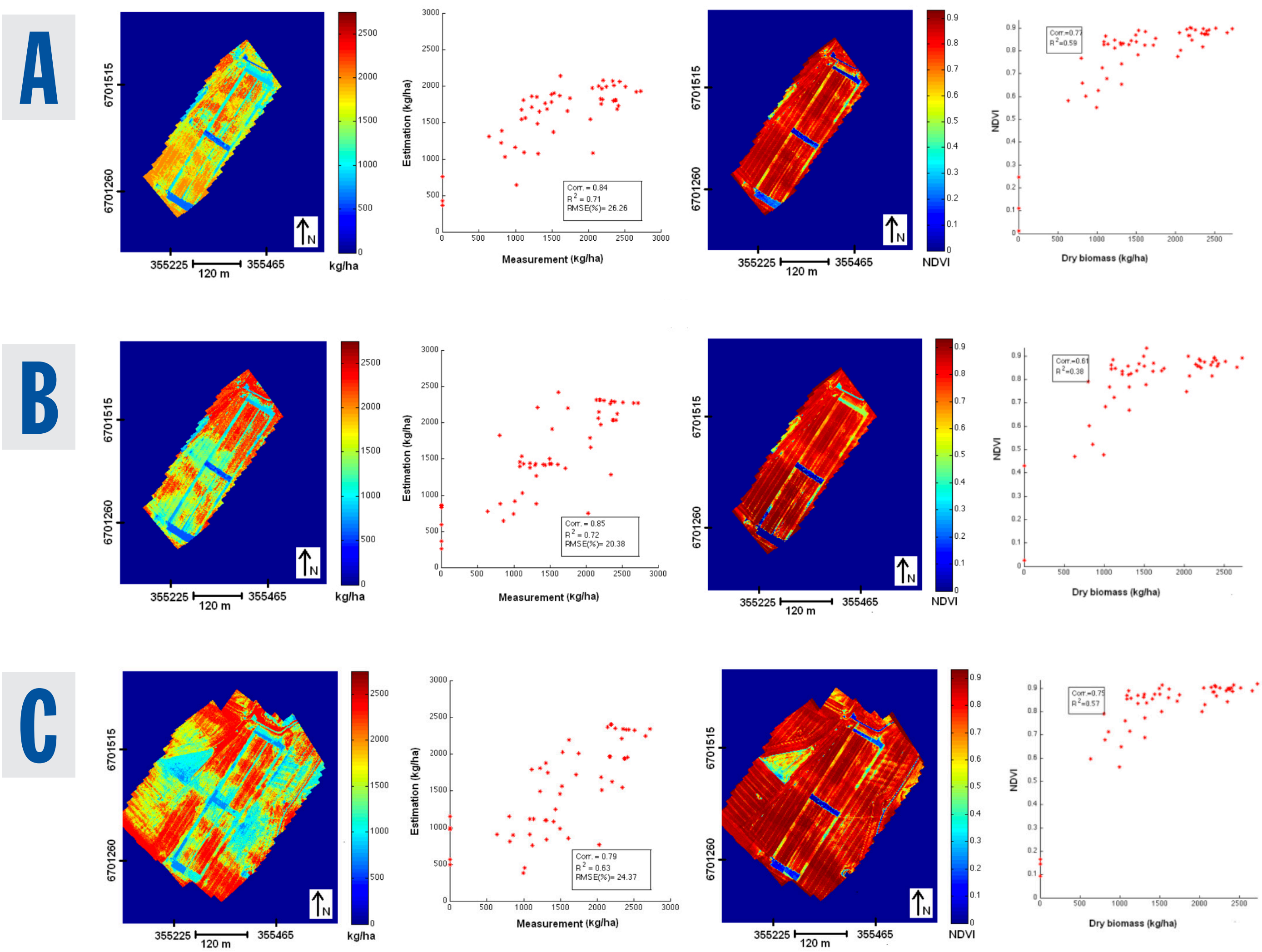


**Figure source:**

Honkavaara, E., Saari, H., Kaivosoja, J., Pölönen, I., Hakala, T., Litkey, P., . . . , & Pesonen, L. (2013). **Processing and assessment of spectrometric, stereoscopic imagery collected using a lightweight UAV spectral camera for precision agriculture. Remote Sensing,** 5 (10), 5006-5039. doi:10.3390/rs5105006

Retrieved from **https://jyx.jyu.fi/dspace/handle/123456789/42524**

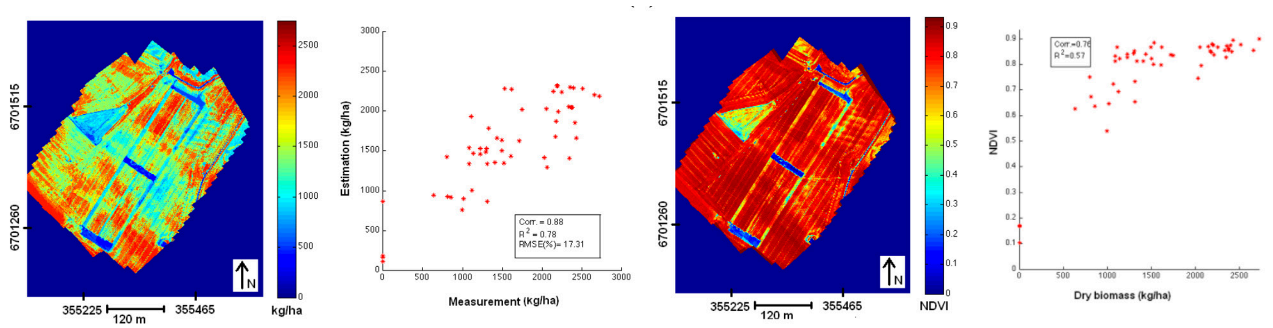
## Biomass estimation statistics for different radiometric processing options:

a) strip 3 without any radiometric corrections (no corr);
b) strip 3 with radiometric block adjustment using additive and BRDF correction (BA: relB, BRDF);
c) full block with corrections using the irradiance measurement in the UAV (uav);
d) full block with corrections using the irradiance measurement on the ground (ground)
e) full block with the radiometric block adjustment with a multiplicative correction (BA: relA).

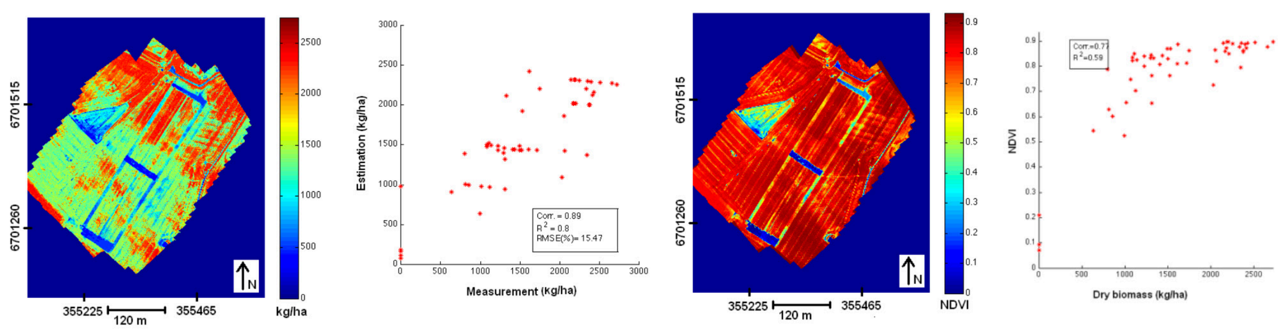
### Figures from left on each row:

biomass estimate map (kg·ha–1), a scatter plot of the measured and estimated biomass values, Normalized Difference Vegetation Index (NDVI) map and a scatter plot of the NDVI with respect to measured biomass values. In the scatter plots, the measurements were carried out in areas of a size of 1m by 1m.

**D**




**E**




# HYPERSPECTRAL CAMERA

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## CASE STUDY 2

**Nitrogen fertilization plan based on nitrogen and biomass maps formed by UAV hyperspectral imaging data.**

The nitrogen content and biomass maps of the field were determined by Fabry-Perot filter based hyperspectral camera. By combining these maps with yield prediction information, the map for nitrogen fertilization rate were able to form.

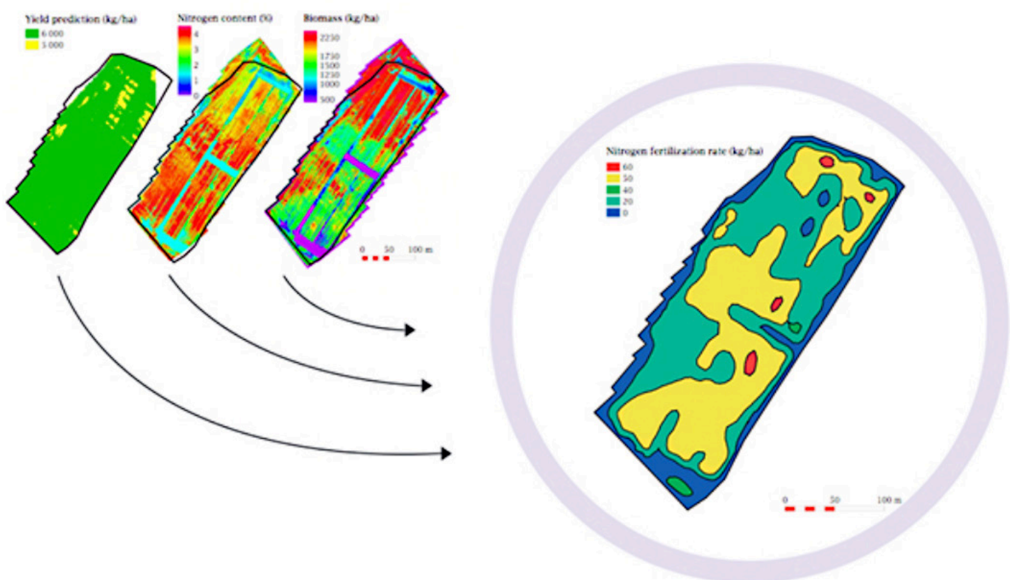


**Figure source:**

Kaivosoja, J., Pesonen, L., Kleemola, J., Pölönen, I., Salo, H., Honkavaara, E., . . . Rajala, A. (2013). **A case study of a precision fertilizer application task generation for wheat based on classified hyperspectral data from UAV combined with farm history data.** In C. Neale, & A. Maltese (Eds.), Remote Sensing for Agriculture, Ecosystems, and Hydrology XV (pp. 88870H). SPIE Conference Proceedings (8887). SPIE – International Society for Optical Engineering. doi:10.1117/12.2029165


SENOP

Senop Oy
Optronics
Tutkijantie 5 K
FI-90590 Oulu, Finland
Tel. +358 20 734 3500
optronics@senop.fi

senop.fi