

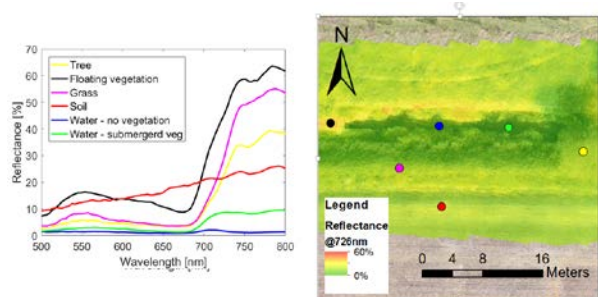


UAS hyperspectral payload

Imaging freshwater ecosystems

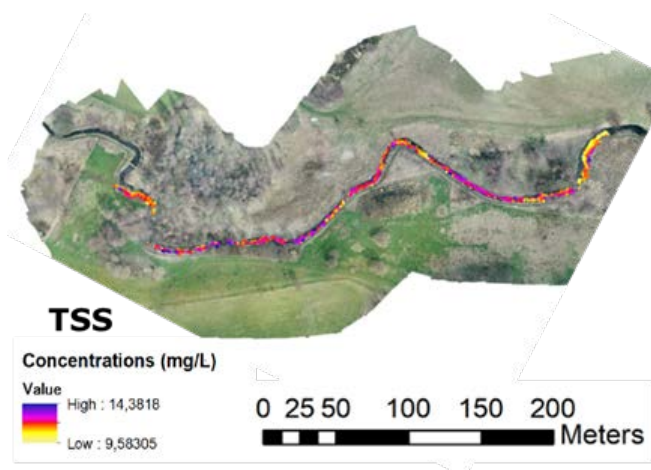
Overview:

A hyperspectral (Firefly CUBERT) camera acquiring data over 138 contiguous bands in the visible and near infrared ranges (450-998 nm) range is being used to assess the ecological status of streams in Denmark.



Spectra extracted from a hyperspectral CUBERT image over Åmose river (Denmark).

Stream water quality parameters such as chlorophyll-a, turbidity (TSS) or organic matter (CDOM) can then be retrieved using statistical approaches, band ratios or radiative transfer modelling.



Total Solids in Suspension (TSS) derived from UAS hyperspectral dataset in Usseørd Å, Denmark.

The Hyperspectral Payload:

The CUBERT camera has been calibrated radiometrically and spectrally at DTU using an integrating sphere and ASD radiometer and a monochromator in collaboration with DTU Photonics. The payload includes a downwelling irradiance sensor (Ocean Optics), a GNSS receiver, inertial measurement unit and a Gimbal to stabilize the camera.



Downwelling irradiance sensor
Ocean Optics
Flame VIS-NIR
2048 bands
350 -1000 nm

UAV platform
DJI Matrice 600 Pro
20 – 30 min
Max. 6 kg payload

GNSS receiver + IMU
Position accuracy:
ca. 3 cm
10 Hz data



Gimbal
Gremsy H7
Max. 3.2 kg payload
Interface to encoder

Hyperspectral camera
Cubert Fireflye
138 bands
450 – 998 nm
50x50 pixels
0.5 Hz

Components of the UAS hyperspectral payload

Applications:

The drone payload is applied in Riverscapes to map physico-chemical stream water quality parameters. Additional ongoing applications include:

- Mapping of river bed components
- Plant species mapping in tropical wetlands
- Assessment of vegetation structure (biomass) and function (fluxes)