



Center for Hydrology
H y d r o l o g i c a l O b s e r v a t o r y

HVAD BETYDER JORDENS KULSTOFINDHOLD FOR VANDBALANCEN?

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& **Vicente Vásquez, Anton Thomsen, Maria Knadel**

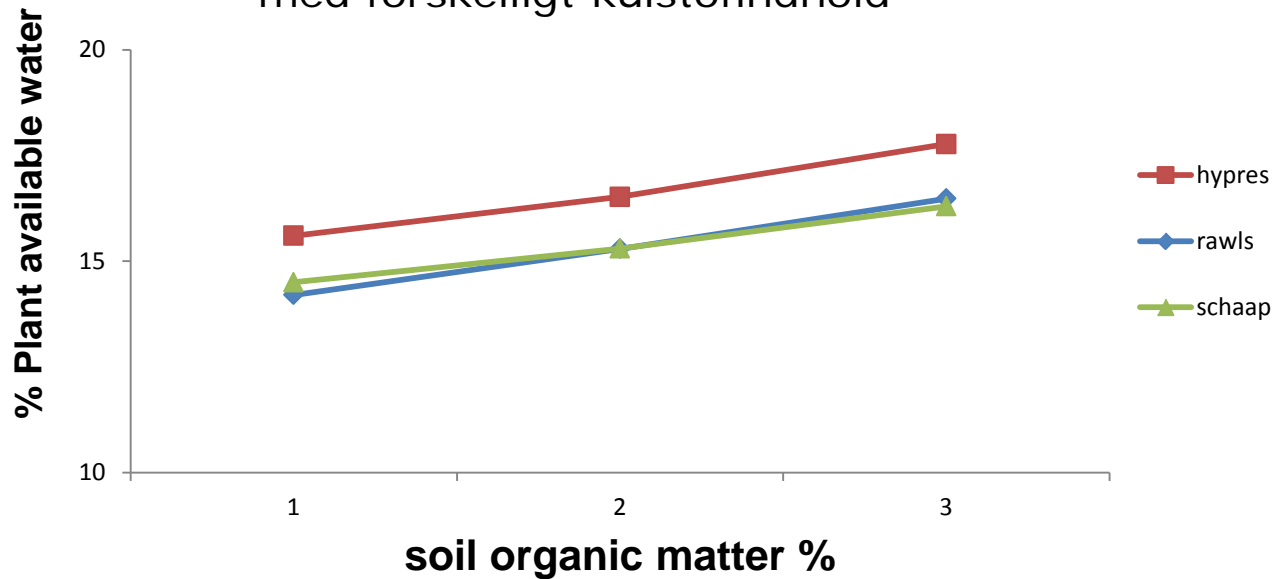
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AARHUS UNIVERSITY

KULSTOF I JORDEN HAR BETYDNING FOR JORDENS VANDHOLDENDE EVNE

Plantetilgængeligt vand
for jordtype ved Askov
med forskelligt kulstofindhold



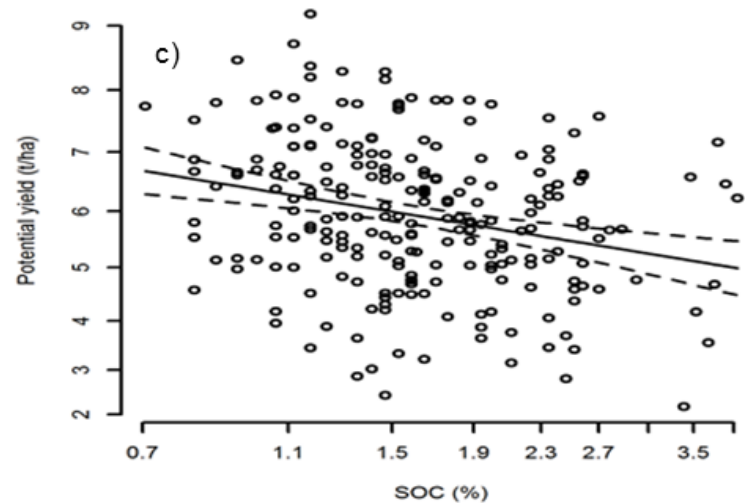
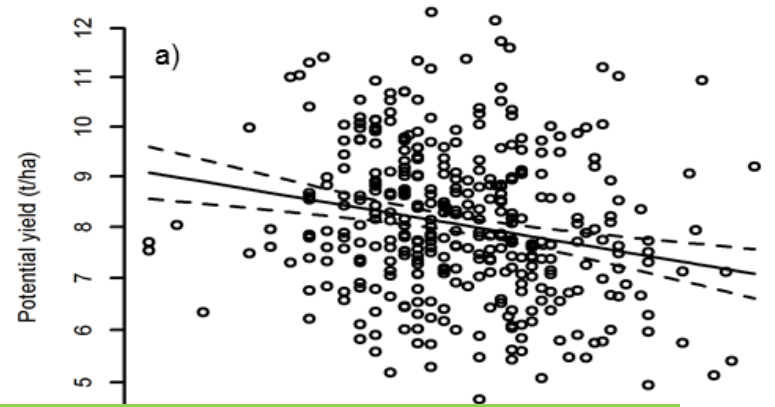
**Pedo-
transfer
funktioner**

Ghaley et al. (2014)

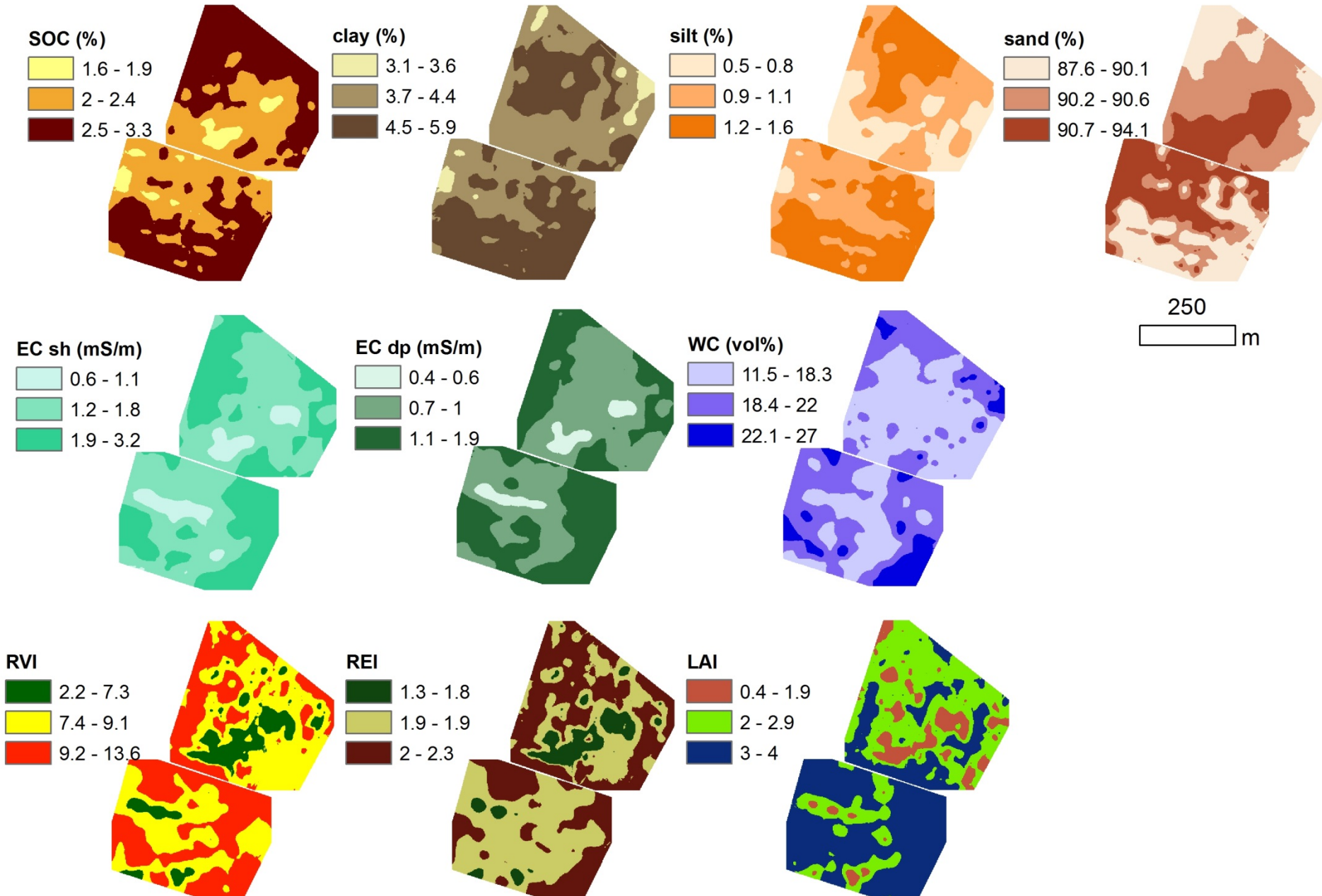
... mere plantetilgængeligt vand bør give udslag i afgrødeudbytter ...



Meget stor lokal variation: Vi må gå ned i skala for at se effekterne



HOBE: Markskala



HVORDAN MÅLER VI (NEMT) KULSTOF I JORDEN?

› Jordprøver + analyse i laboratorium

Conventional methods

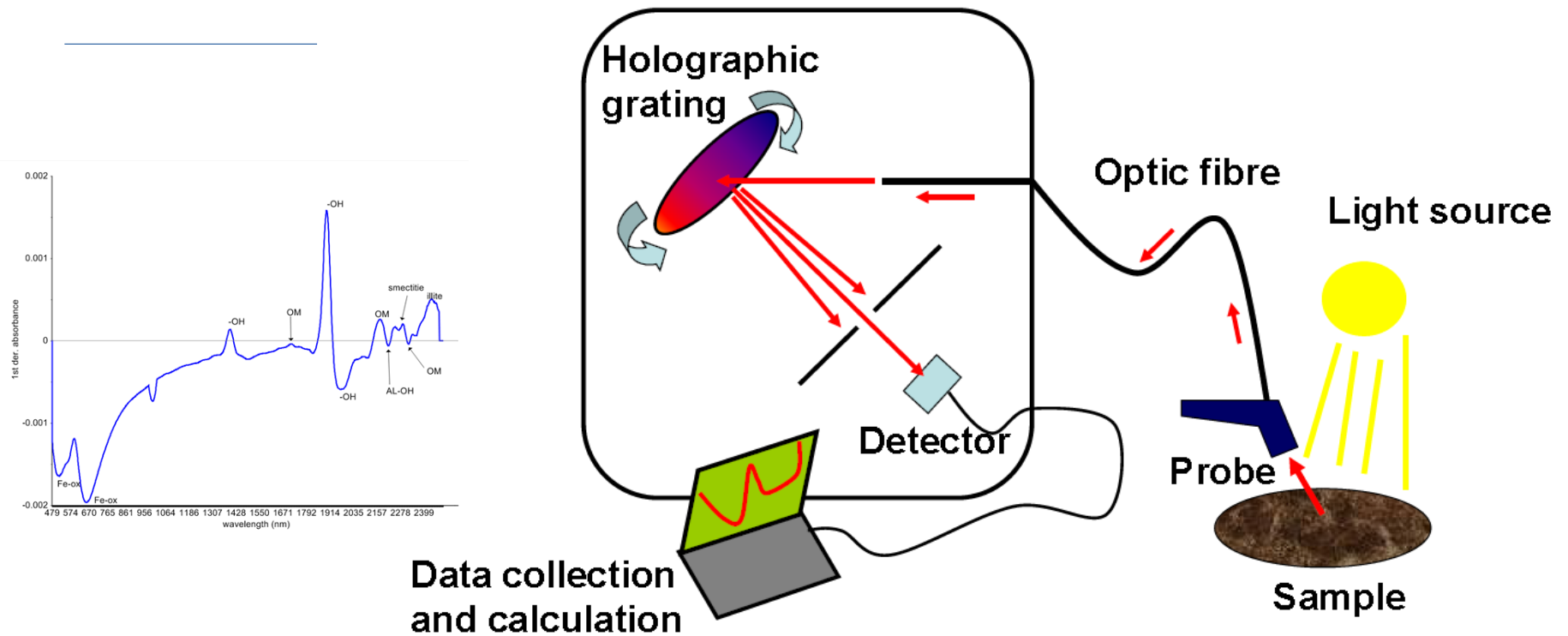
- Spatial variability of TotalOrgCarbon
- High sampling density
- Time consuming & costly

› Mobilt måleudstyr
(NIR, Near InfraRed)

NIR Spectroscopy (350-2500nm)

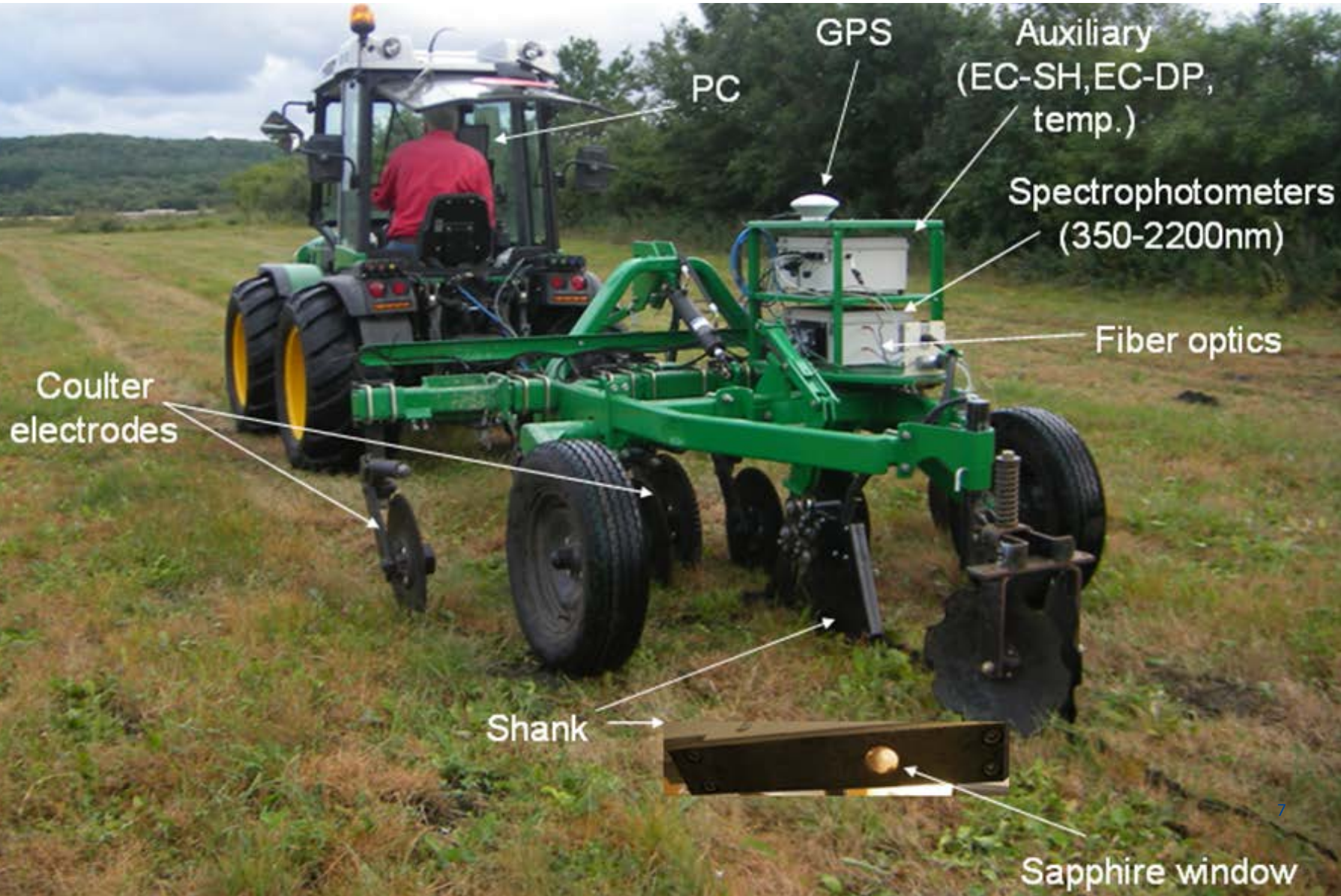
- Multiple constituents
- In-situ measurements, non-destructive
- No sample preparation
- Rapid & less expensive

NIR SPEKTROSKOPI - MÅLEPRINCIP





Veris Mobile Sensor Platform (MSP)



- DESUDEN MÅLES JORDENS ELEKTRISKE LEDNINGSEVNE 'EC' OG TEMPERATUR

- **widely used**

variation in soil:

- texture
- salinity
- water content
- bulk density
- Organic Matter OM
- temperature

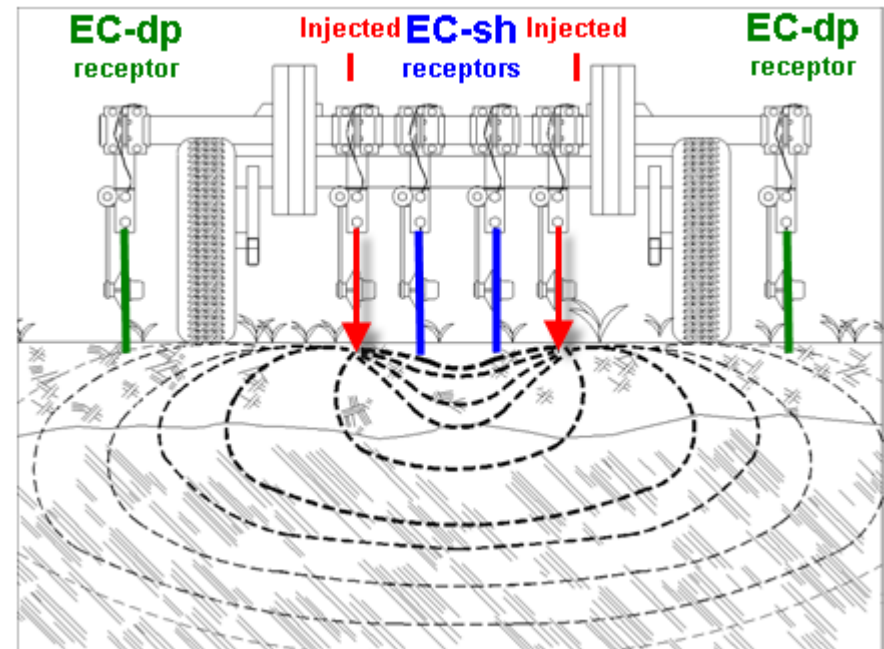
- **cost effective**

- **easy to mobilize**

Veris measurements:

EC-SH (0- 30 cm)

EC-DP (0- 90 cm)



- SEPARAT MÅLES JORDENS VANDINDHOLD OG PLANTEDÆKKET

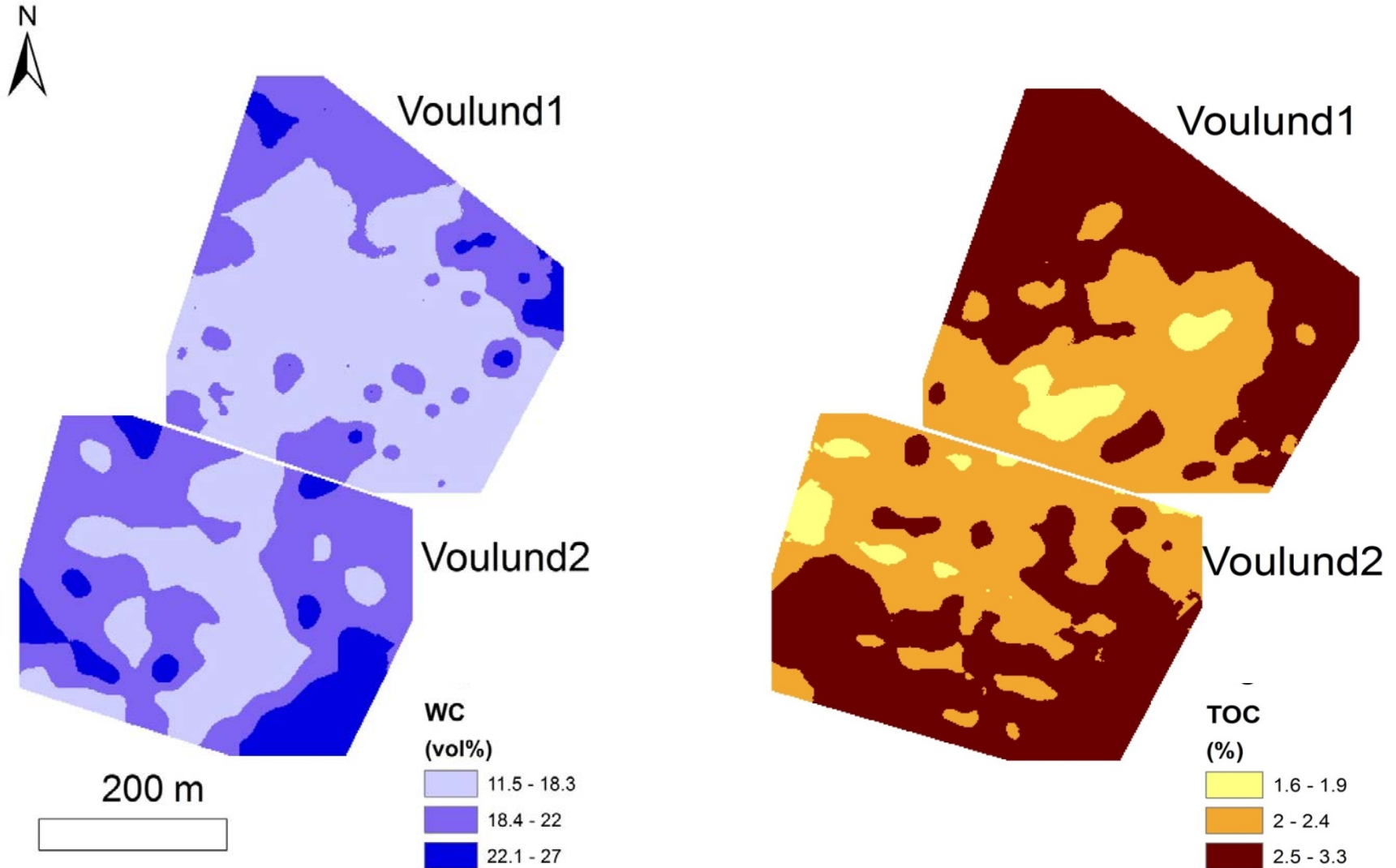


Mobile TDR:
Soil water content at field capacity

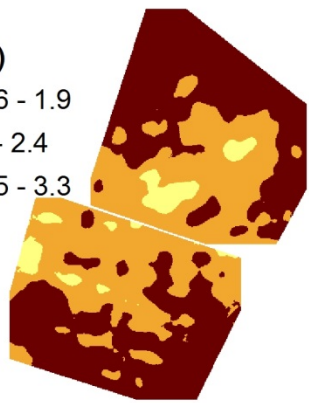
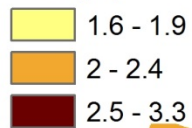


Mobilas canopy sensor:
canopy reflectance and LAI

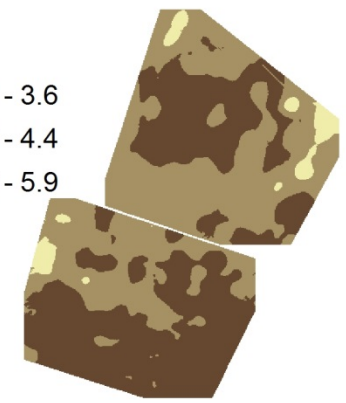
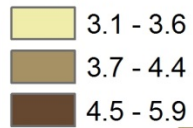
Kortlægning for at forstå og kvantificere vandbalance på markniveau



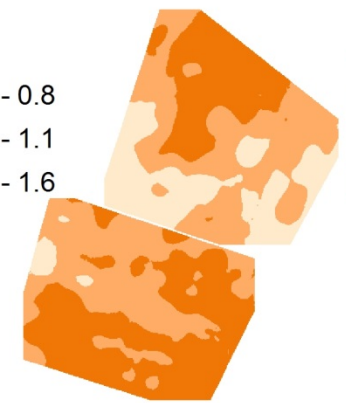
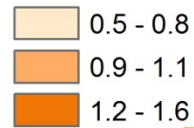
SOC (%)



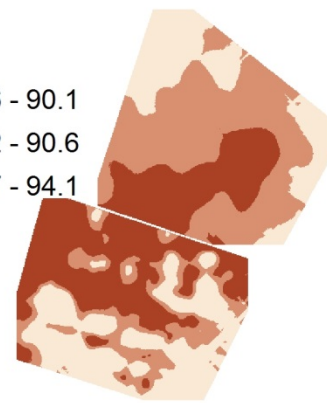
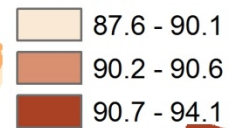
clay (%)



silt (%)

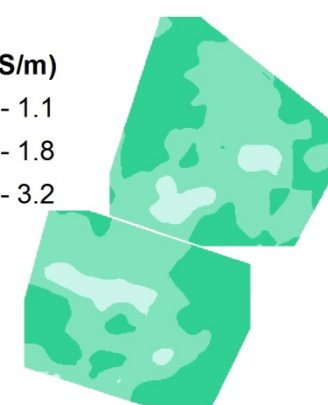
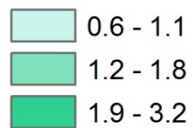


sand (%)

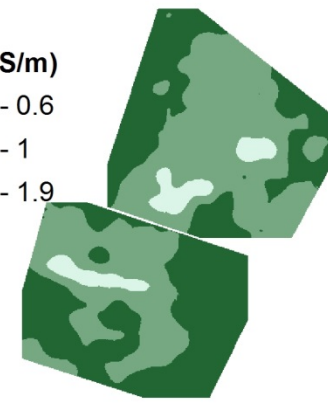
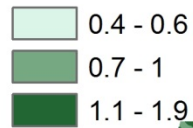


250
m

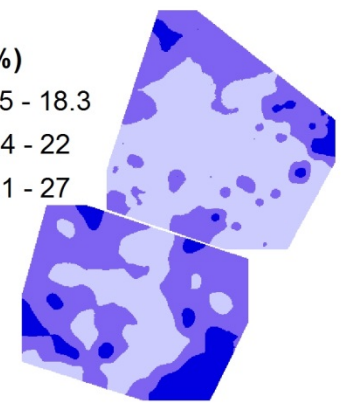
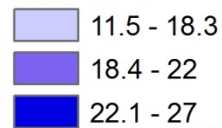
EC sh (mS/m)



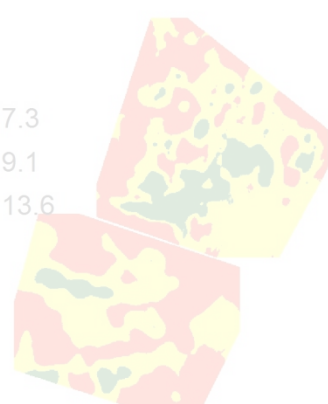
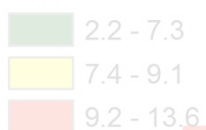
EC dp (mS/m)



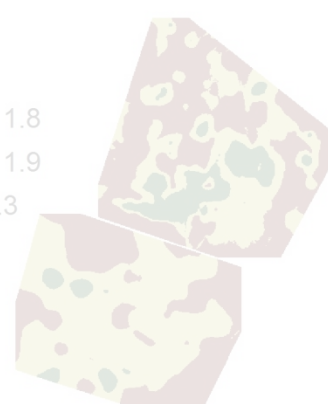
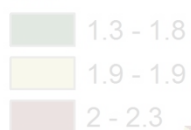
WC (vol%)



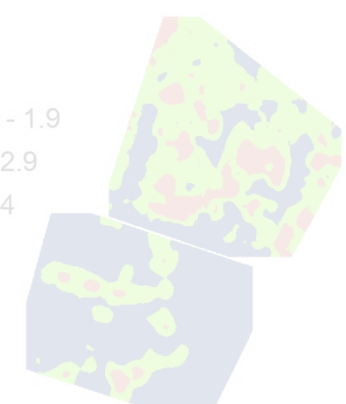
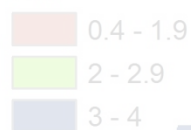
RVI



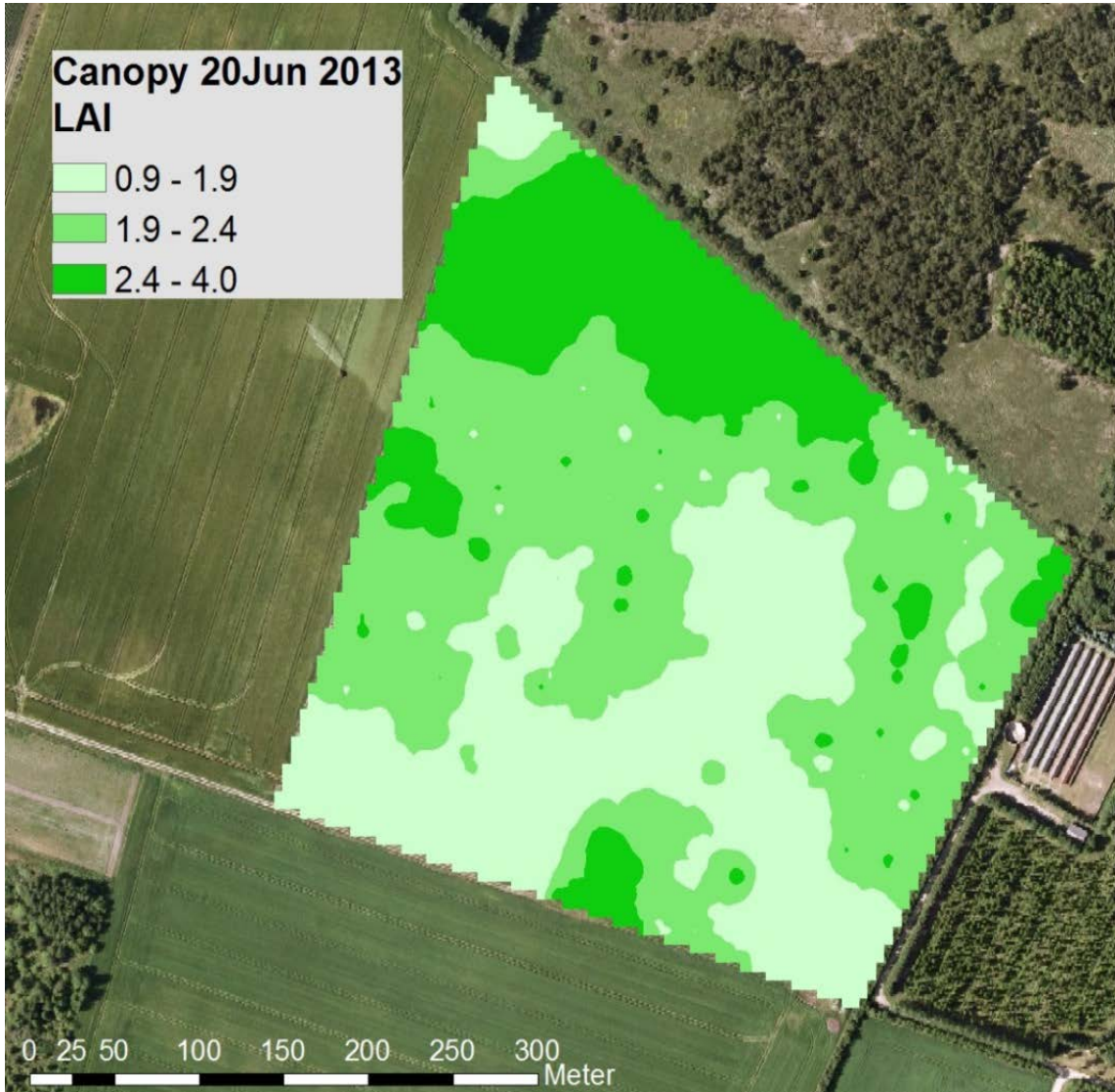
REI

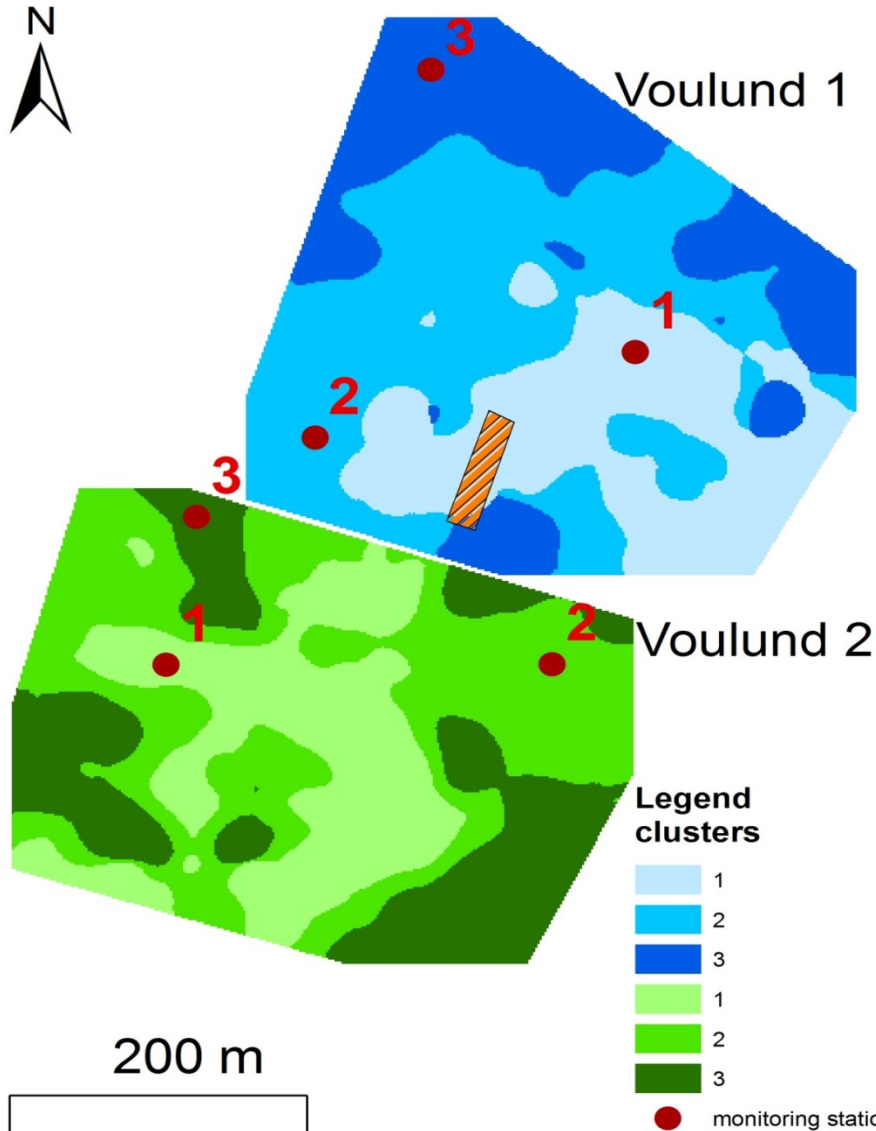


LAI



Vårbyg 2013: Bladareal den 20. juni





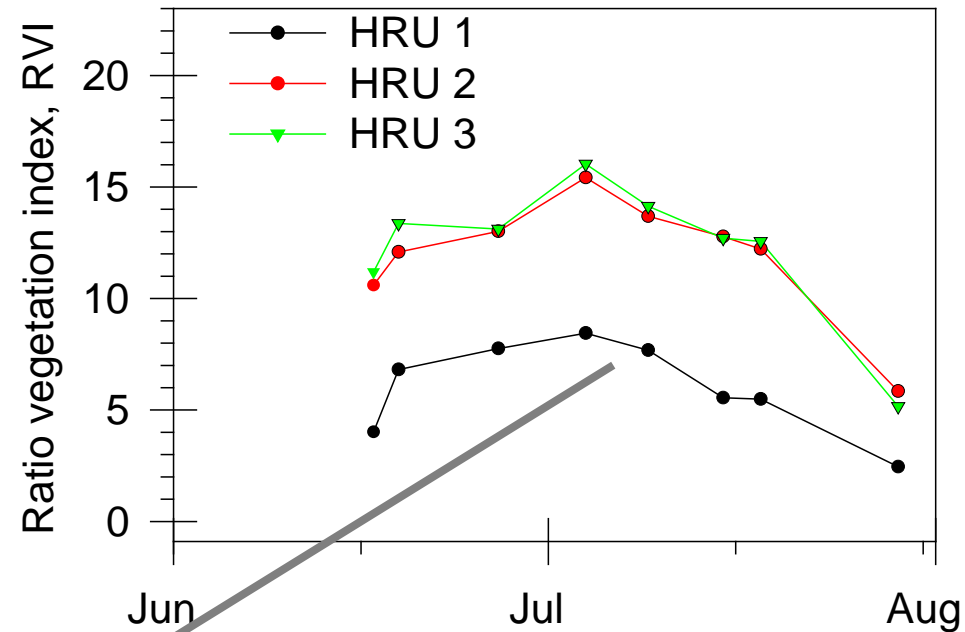
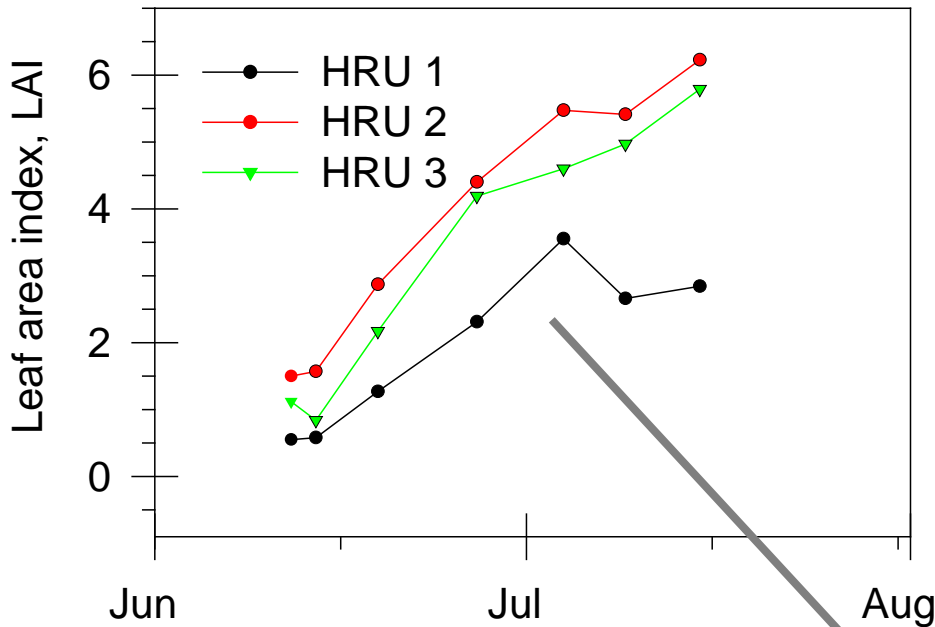
Hydrological response units:
Statistisk beregnet
zoneinddeling baseret på

- Elektrisk ledningsevne
- Kulstofindhold
- Vandindhold (forår)

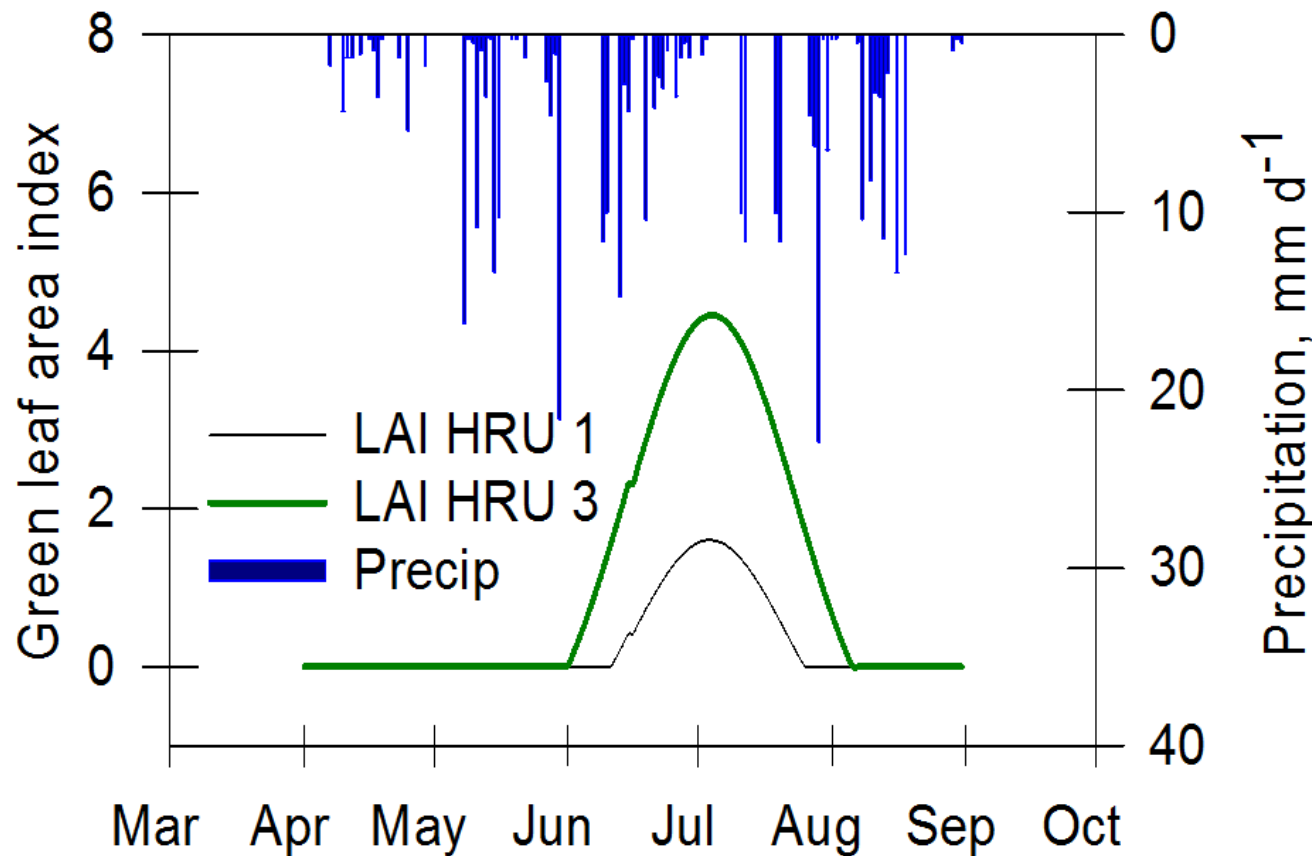
Hydrologiske målepunkter:

- Jordvandindhold i 3 dybder
- Bladareal (LAI) og reflektans (RVI)

Vårbyggens udvikling i 2013

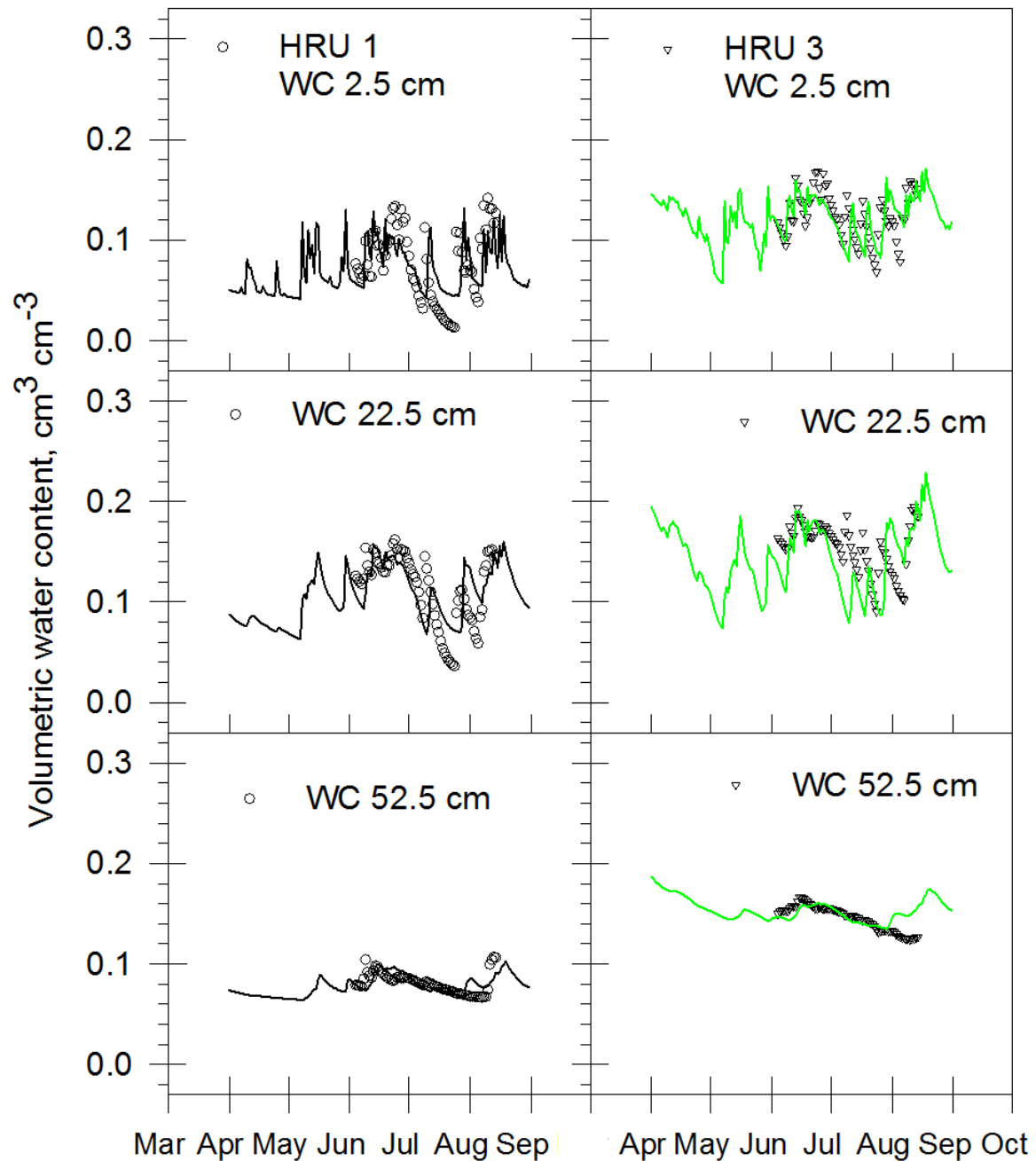


En svag planteudvikling
i zonen med lavt kulstofindhold
og med lille vandholdende evne

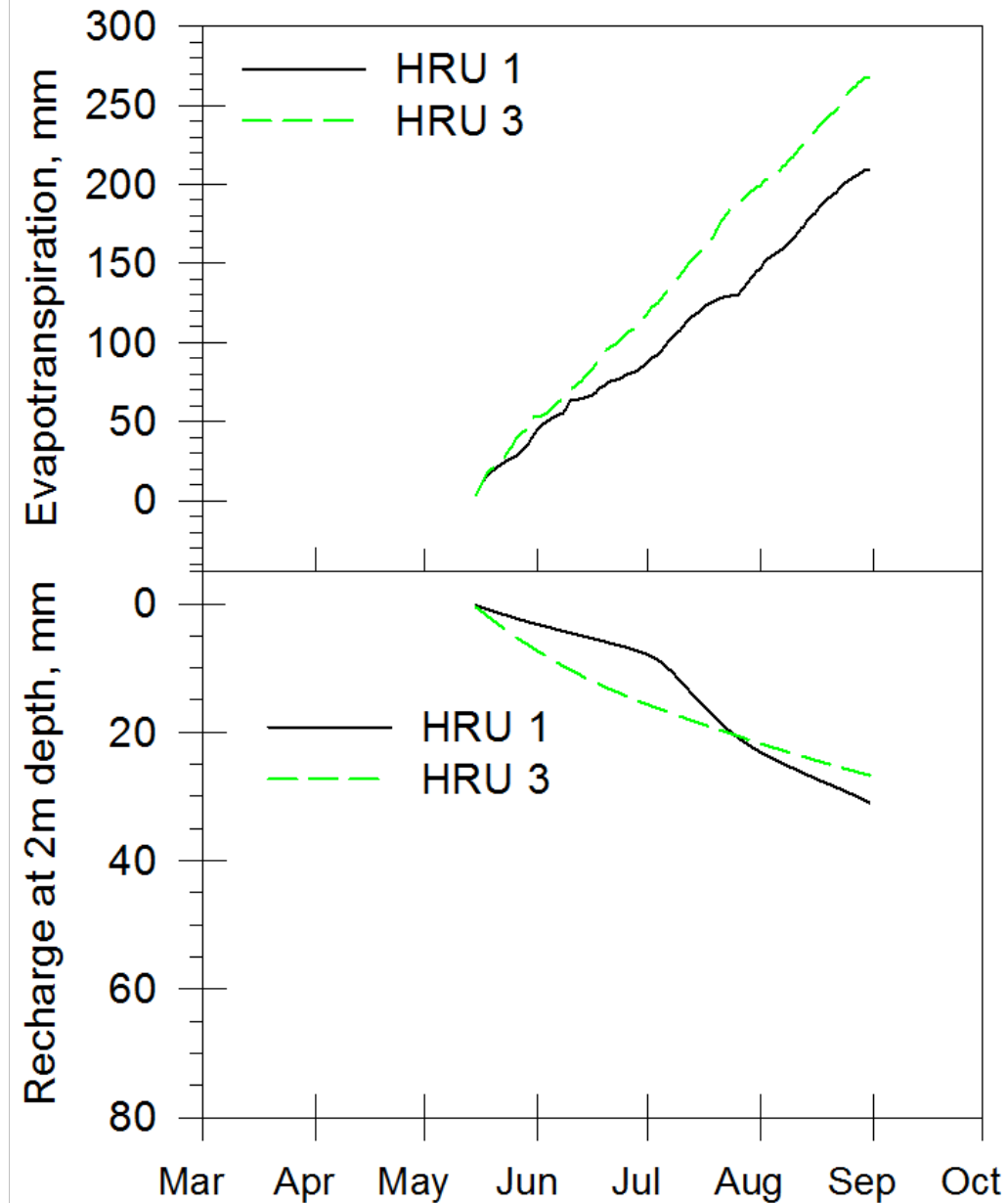


- Quantify (= model) differences in water balance for established clusters

Good agreement with
measured soil water content,
RMSE < 0.025



Variation in water holding capacity - determined by soil carbon distribution - indicated differences in evapotranspiration as large as **60 mm** for the late planted spring barley field of 2013



Betyder kulstofindholdet noget?

- På visse jordtyper kan jordens kulstofindhold være betydende for jordens vandholdende evne
- Forskelle i kulstofindhold og den vandholdende evne kan være udslagsgivende for hvordan plantedækket udvikler sig
- Variationen betyder tilsvarende rumlig variation i fordampning over en vækstsæson
- Kulstofindholdet og andre væsentlige jordparametre kan på sigt måles rutinemæssigt med mobile instrumenter, herunder NIRS mobil sensor platform (Veris Technologies)

Tak for opmærksomheden