AARHUS UNIVERSITY

AGROSENS

MOBILE CROP AND SOIL SENSORS FOR PRECISION AGRICULTURE

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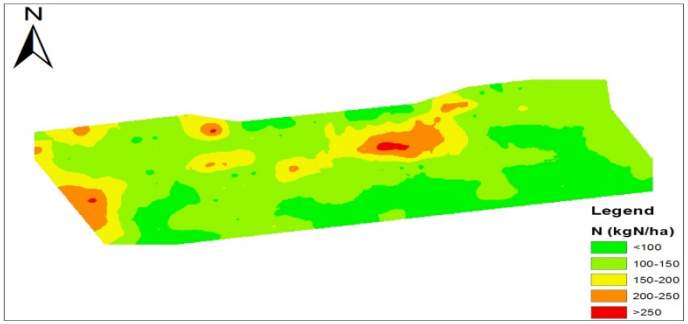
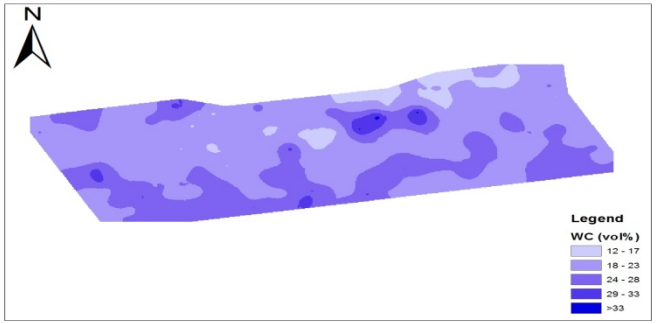
In precision agriculture differences in soils and crop development is taken into account

This requires the use of capable sensors
Novel mobile sensors are introduced and examples of application to N-fertilization and delineation of management units given.
Crops: Wheat and potatoes





Sensors:

- **MobilLas** canopy sensor
- **MobilTDR** soil sensor

Current version of **MobilLas** developed as part of the FIGARO EU project

Current version of **MobilTDR** developed as part of a MUDP project

MobilLas canopy sensor

- Double sensor measuring both canopy multispectral reflectance and canopy structure (height, density, leaf area index (LAI))
- LAI calculated from scanning laser measurements of canopy gap fractions
- Spectral measurements comparable to commercial canopy sensors (Yara, GreenSeeker, CropSpec, **CropCircle**, etc.)

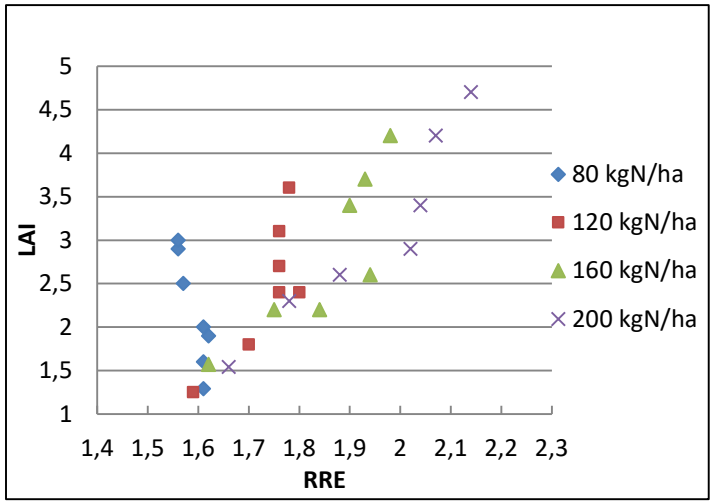
MobilTDR soil sensor

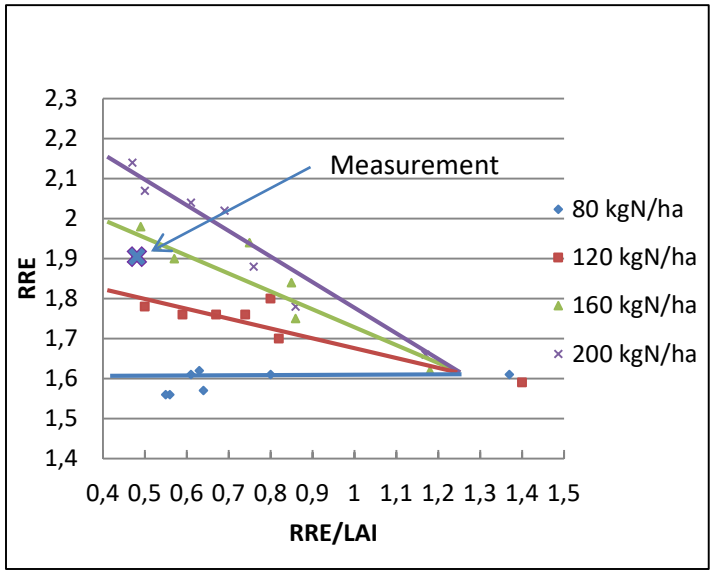
- TDR soil moisture probe developed as attachment to the Wintex 2000 soil sampler. Maximum measuring and sampling depth 60 cm
- Measures volumetric soil water content and optionally electrical conductivity. Measuring depth can be varied between 20 cm and 60 cm
- Can be used with ATV's, tractors, etc.

Wheat N fertilization algorithm

- Algorithm based on measurements of both LAI and spectral index (here RRE = NIR / Red edge). Measurements made in 2014 winter wheat (Hereford) experiment

- Canopy nitrogen status found by interpolation. N-status for measurement approx. 145 kgN/ha

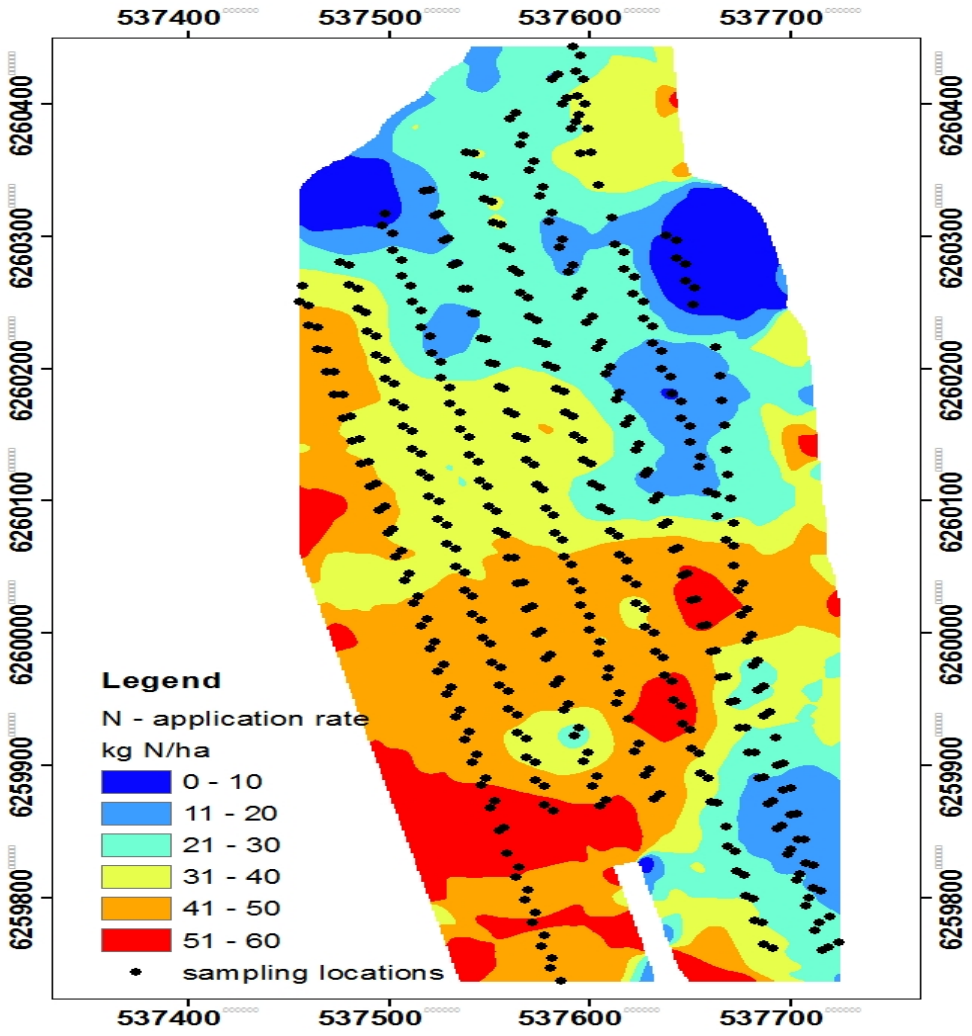




N-application map

N-application map for 12 ha winter wheat (Hereford) field based on N-status measured on May 31, 1915. Target rate 160 kgN/ha.

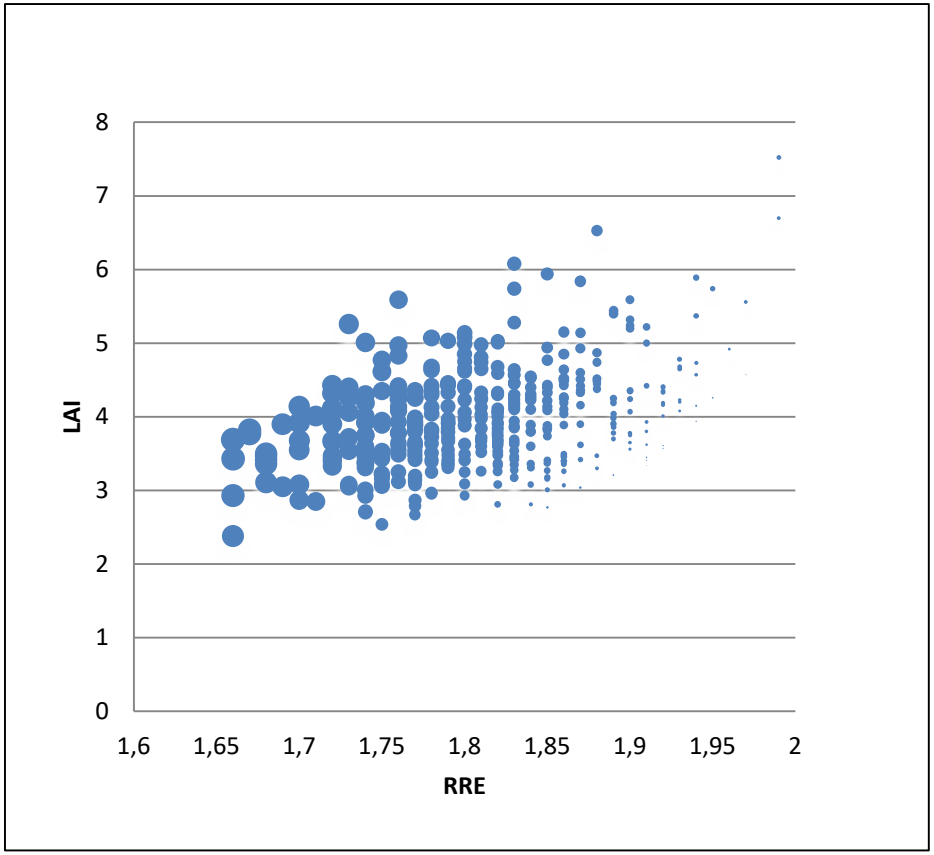
Mean N-status 130 kgN/ha.
Field fertilized with 140 kgN/ha



Single/double sensor?

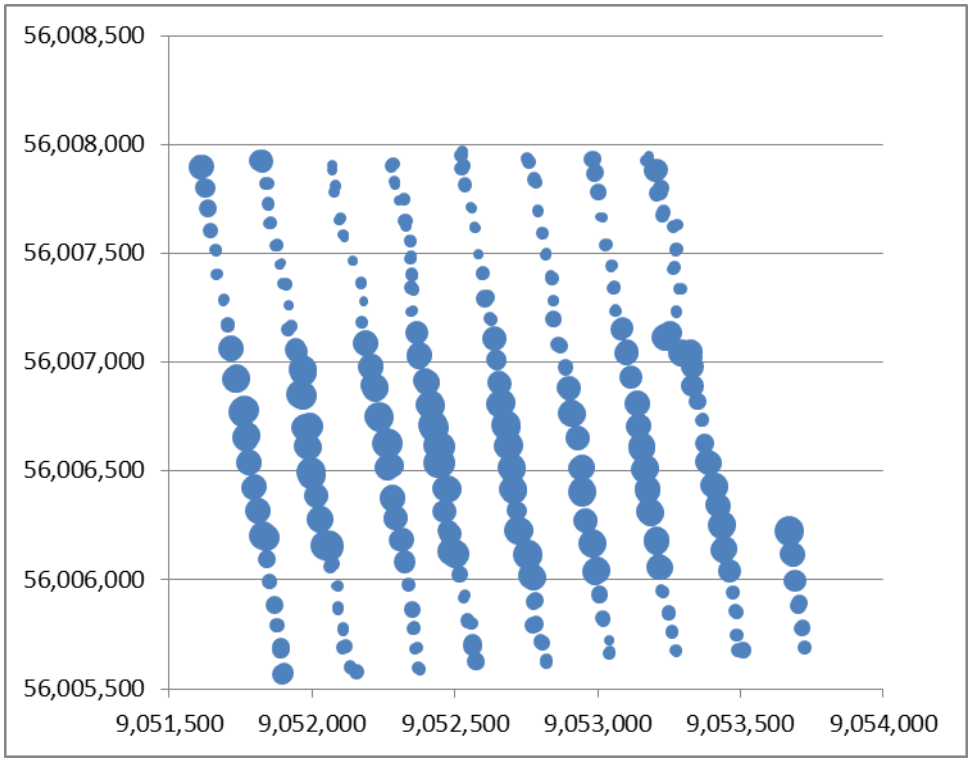
Recommended N-rates from map shown as function of LAI and RRE.

Shows limitation of single sensor approach



Potato yield-response to N in 2016

Water content May 2, 2016. Range 15 – 40 vol. %



Management units based on TDR measurements