



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Federal Department of Economic Affairs,  
Education and Research EAER

**Agroscope**

# Smart Farming – Higher efficiency for agriculture and environment

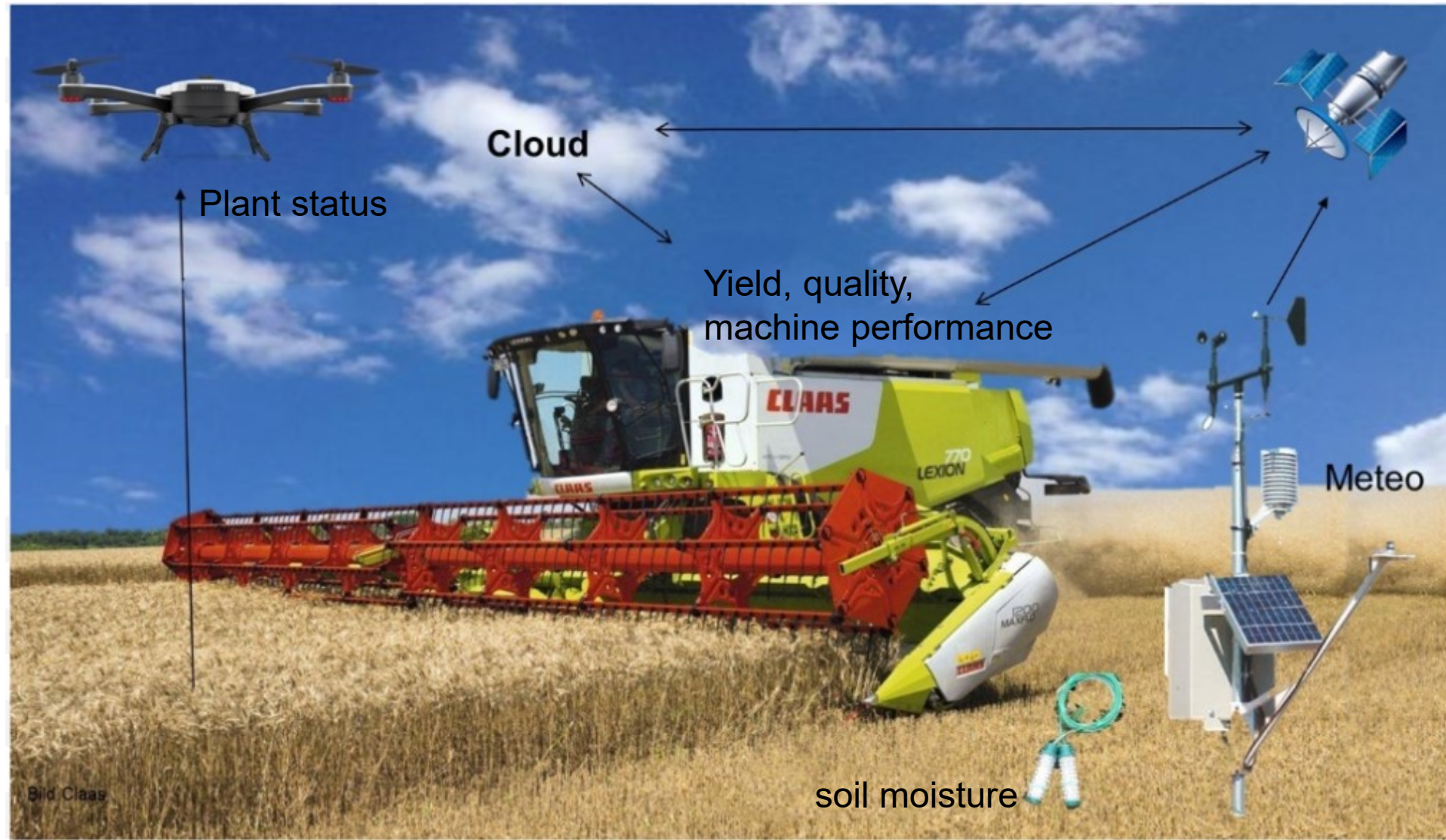
Thomas Anken, Agroscope  
Tänikon, CH-8356 Ettenhausen



[www.agroscope.ch](http://www.agroscope.ch)



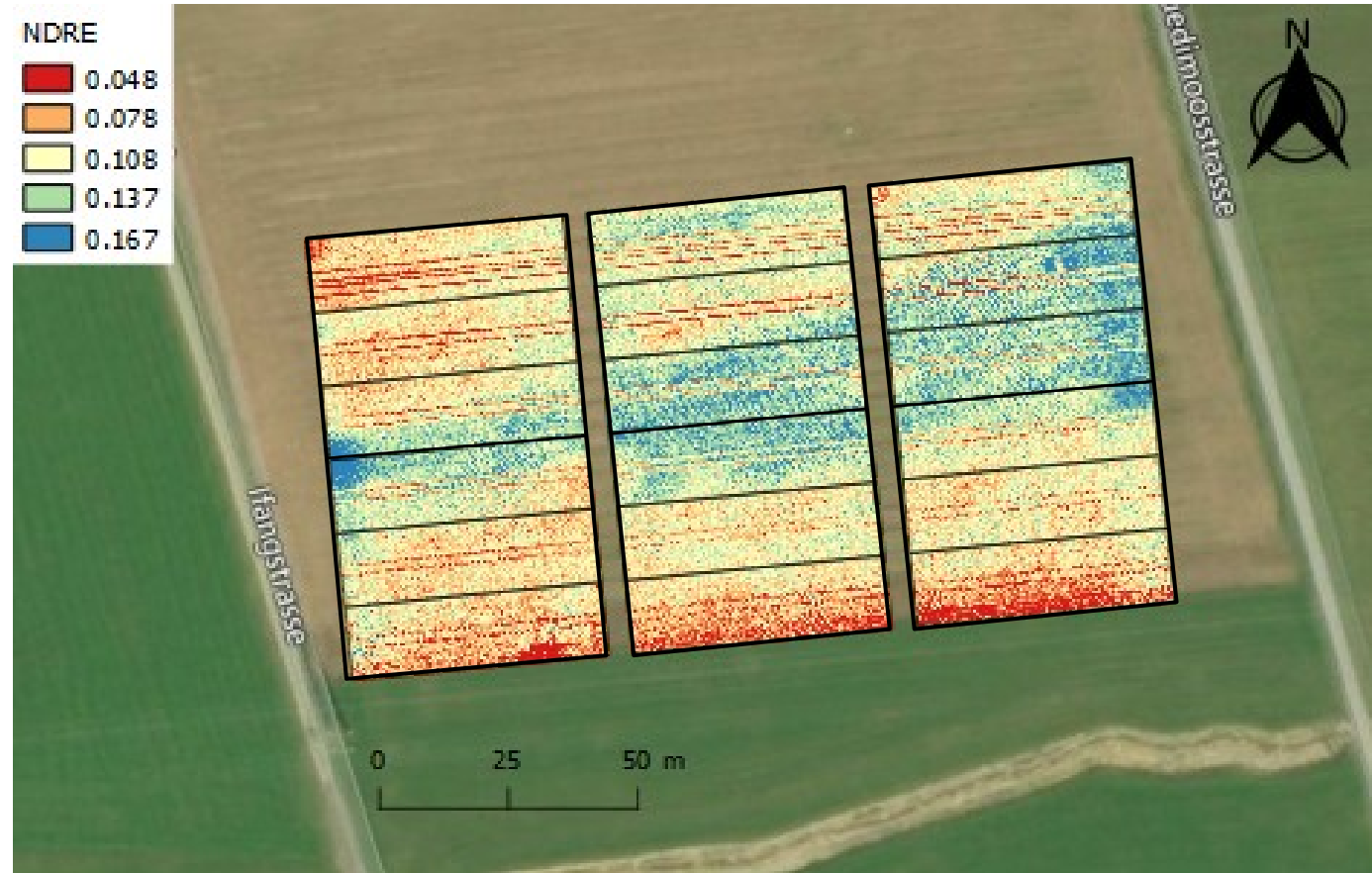
# Connected agriculture is the future!





# Multispectral image of a wheat field, Tänikon, 06.04.2018

## Red-edge index (NDRE)



Connected drones ease data processing

Source: Francesco Argento

Adjusting the fertilization locally led to a decrease of 10 % of fertilizer.

# Camera steered hoe reduces workload and of pesticides



Hoe with steering person



Row recognition action between crop rows



# Hoe with single plant recognition





# Plant specific treatment with fungicides and insecticides



camera recognizes salads:  
→ only salads are sprayed  
→ fungicide reduction up to 90 %



**A common project of**  
Steketee, Möri Aarberg  
Swiss Association of Vegetable Growers, Koppigen  
Agroscope Tänikon & Wädenswil



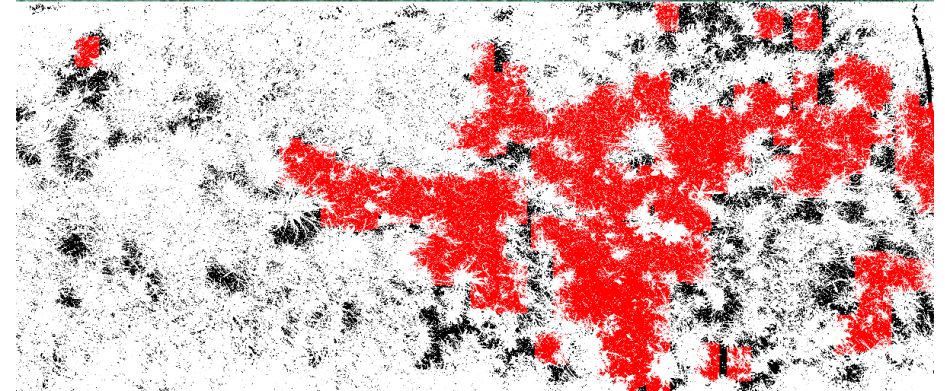
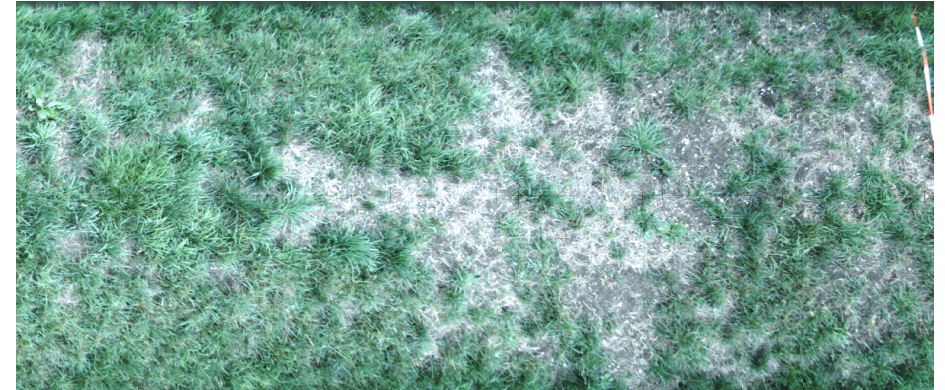


# Site specific overseeding of gaps in grassland

camera



onboard computer



camera detects gaps –  
seeding occurs only on red spots

## Common project with:

Krummenacher, Dietwil; CSEM, Neuenburg; Agroscope, Tänikon

source: M. Sax





# Autonomous vehicles



Single plant weeding  
saves over 80%  
herbicides

5G: Intelligence in the  
cloud instead on the  
vehicle?

[www.ecorobotix.com](http://www.ecorobotix.com)





# Drones for treatments and data acquisition



Distribution of trichogramma wasps  
Fenaco; HAFL; tueftelberger.ch

- plant protection for the treatment of steep vineyards
- In the same time drones can collect valuable information



# Connected trees: Internet of things driven irrigation



weather station



soil moisture



dendrometer  
(stem diameter)



flow meter

water savings of over 30 % have been realized in Switzerland and Brazil (cocoa)





# High automation of the milk production



→ over 800 milking robots in CH

→ better management of the whole process chain

automated feeding







# Monitoring health & feed intake



Sensor of Aotoso (CN) for heat detection  
Narrowband-IoT eases  
the use for the farmer

Thomas Anken  
Agroscope, Tänikon, CH 8356 Ettenhausen

RumiWatch  
by  
Agroscope,  
Itin & Hoch



Monitoring of  
feeding &  
rumination  
frequencies

pressure hose

data  
logger





# 5G will enable data driven farming

- **Data to manage complexity:** Farming happens in complex environmental systems  
→ better data and algorithms will allow to increase the productivity and to reduce environmental issues
- **Machine learning:** Recognition of weeds, pests, malnutrition of crops etc. are feasible by means of multi-spectral images and machine learning  
→ many data intense applications will appear in the near future
- **Ease of handling:** The cloud will connect many different applications and ease the handling for the user. Maintenance of connected systems is becoming easier too.
- **Telemetry:** Machines will be fully connected and deliver all needed data
- **Connectivity:** Many farms don't have optical fiber connection – 5G will bridge many gaps







Thank you!  
[www.agroscope.ch](http://www.agroscope.ch)