AgriSens
DEMMIN 4.0

EARTH OBSERVATION DATA FOR OPTIMIZED PRECISION FARMING

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1: Deutsches GeoForschungsZentrum Potsdam GFZ, Deutschland;
2: Deutscher Wetterdienst (DWD);
3: Deutsches Zentrum für Luft- und Raumfahrt e.V.;
4: Hochschule Neubrandenburg;
5: Julius Kühn Institut Braunschweig,
6: Martin-Luther-Universität Halle-Wittenberg;
7:Julius-Maximilians-Universität Institut für Geographie und Geologie;
8: Friedrich-Schiller-Universität Jena

BMEL TRIAL FIELDS FOR IMPROVING DIGITIZATION IN AGRICULTURE

Digitale Experimentierfelder

Mit den digitalen Experimentierfeldern fördert das BMEL die Digitalisierung in der Landwirtschaft.

- Pflanzenbau
- Tierhaltung
- Bereichsübergreifend

Map markers: BeSt-SH, AgriSens-DEMMIN 4.0, DigiSchwein, Agro-Nordwest, FarmerSpace, EXPRESS, Landnetz, CattleHub, DIWAKOPTER, EF-Suedwest, DigiVine, Diabek, DiWenkLa, DigiMilch

bmel.de

Explore digital techniques for crop production and animal husbandry and test their practicality

Knowledge transfer in practice:
e.g. information material, training

14 trial fields
- 8 crop production
- 3 in livestock farming
- 3 cross-sectoral

DIGITAL TRIAL SITE AGRISENS DEMMIN 4.0

Remote sensing in crop production

Objectives

▪ Showing possibilities, but also limits

▪ Joint work on ...

... identifying specific applications for remote sensing data

... defining criteria for reliability and accuracy of remote sensing information

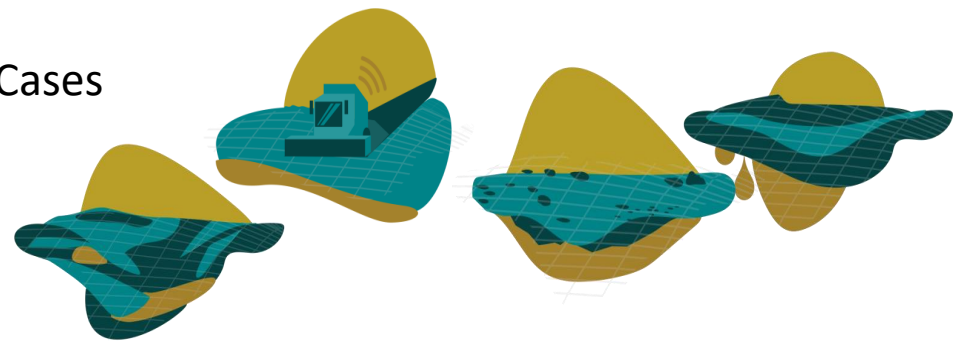▪ Promoting the use of geoinformation in crop production

contact: agrisens.info@gfz-potsdam.de

AGRISENS DEMMIN 4.0

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Status of digitisation	Information about plants and soil	Geo-data handling

Use Cases
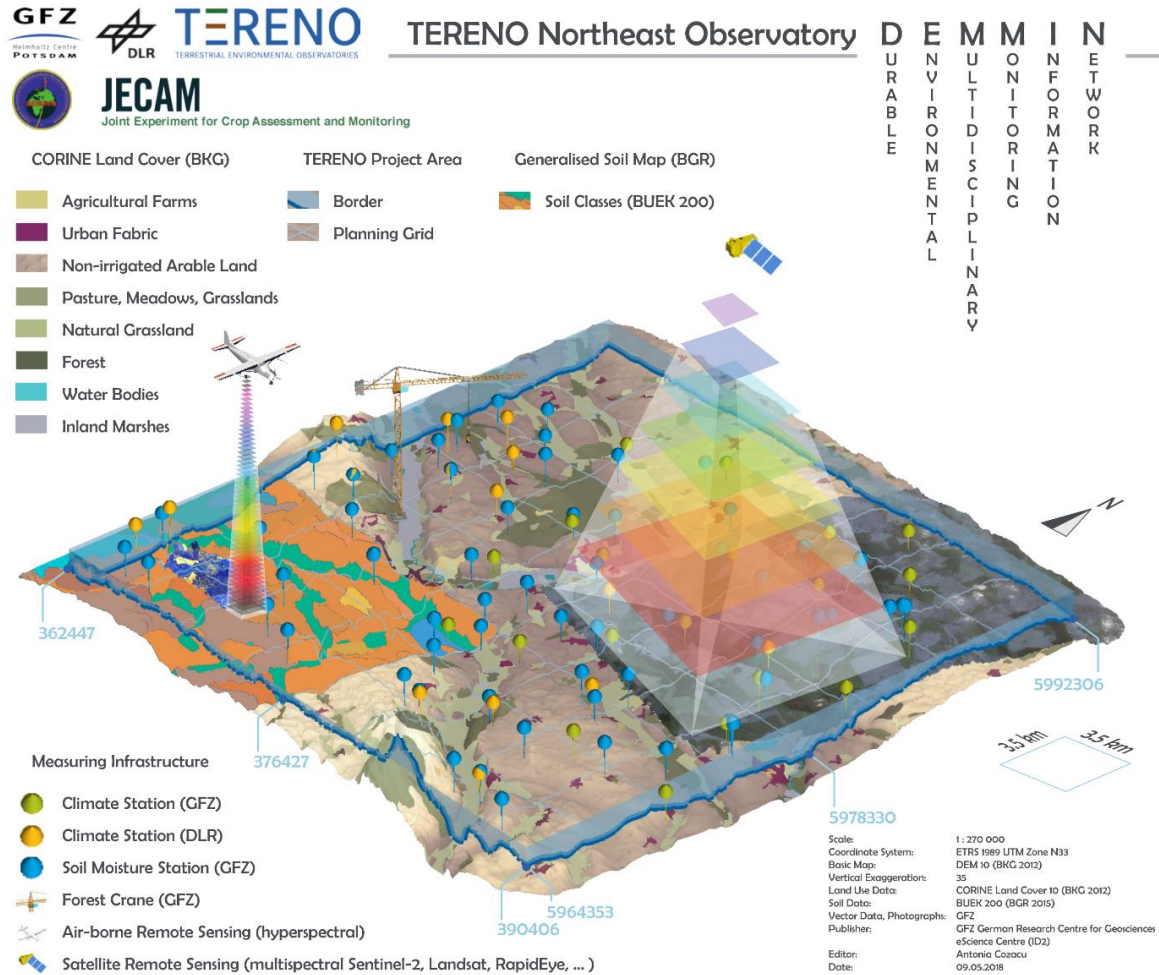
Knownledge and technology transfer

M. Thiele, GFZ Potsdam

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contact: agrisens.info@gfz-potsdam.de
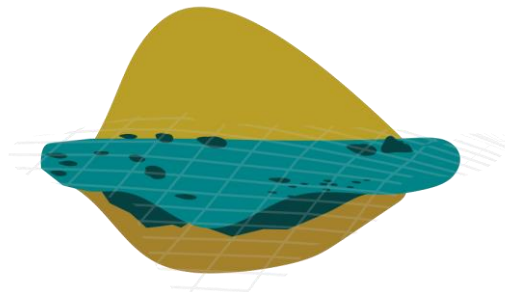
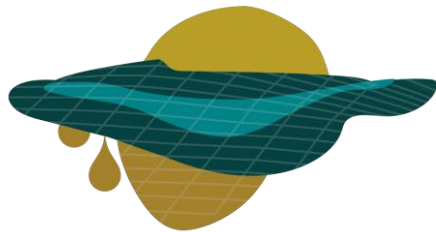# TEST SITE DEMMIN

A. Cozacu, GFZ Potsdam
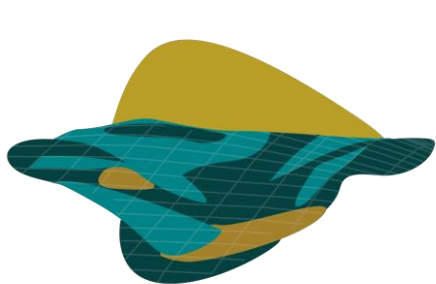
USE CASES

Crop monitoring and yield estimation
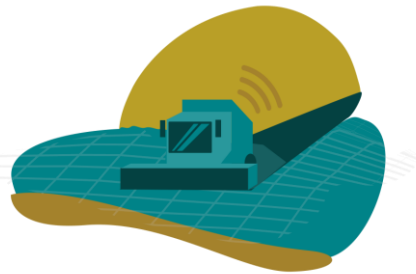
Sustainable farming

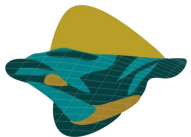**Detection of stones**

Irrigation

Kontakt: daniel.spengler@gfz-potsdam.de
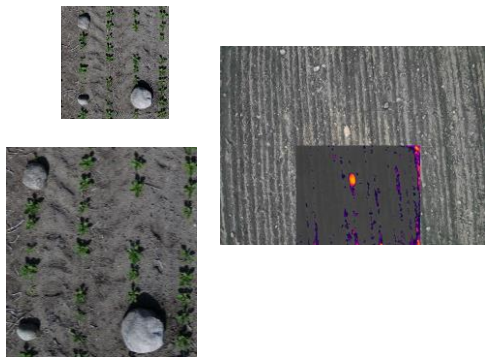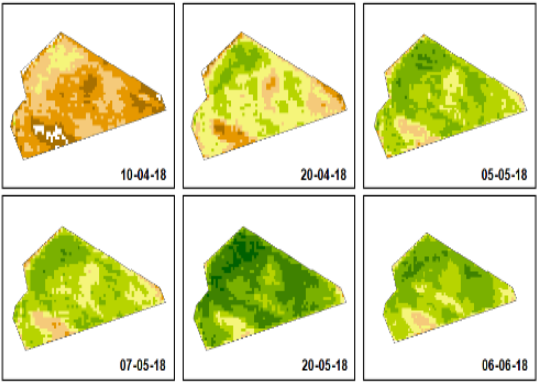
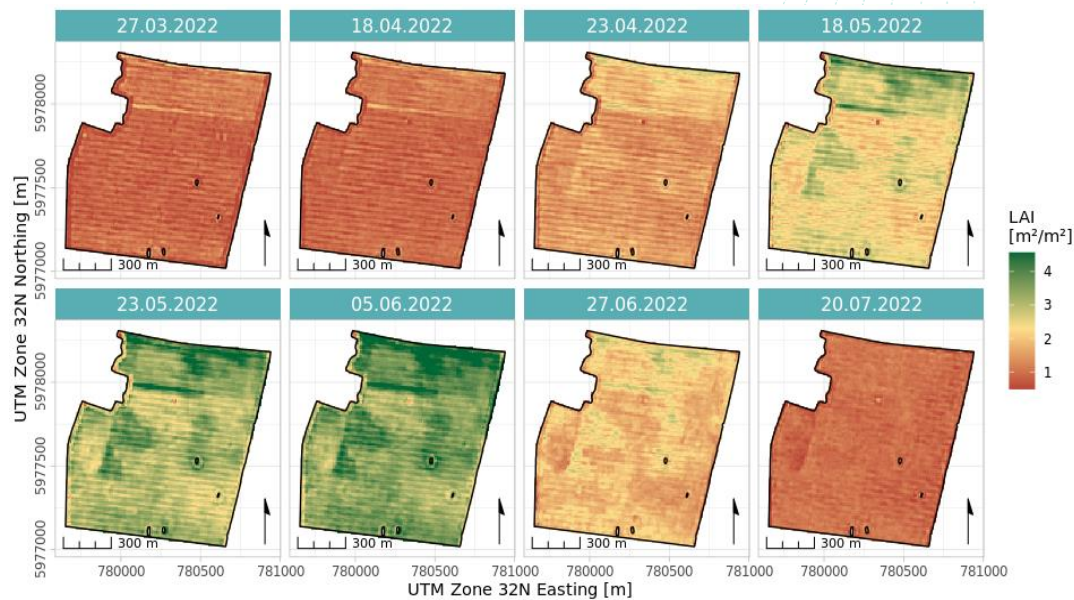# USE CASE: CROP MONITORING & YIELD ESTIMATION

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Objectives:

Sentinel-2 based monitoring of crop development over the year
- **Assessment of leaf area index and biomass**
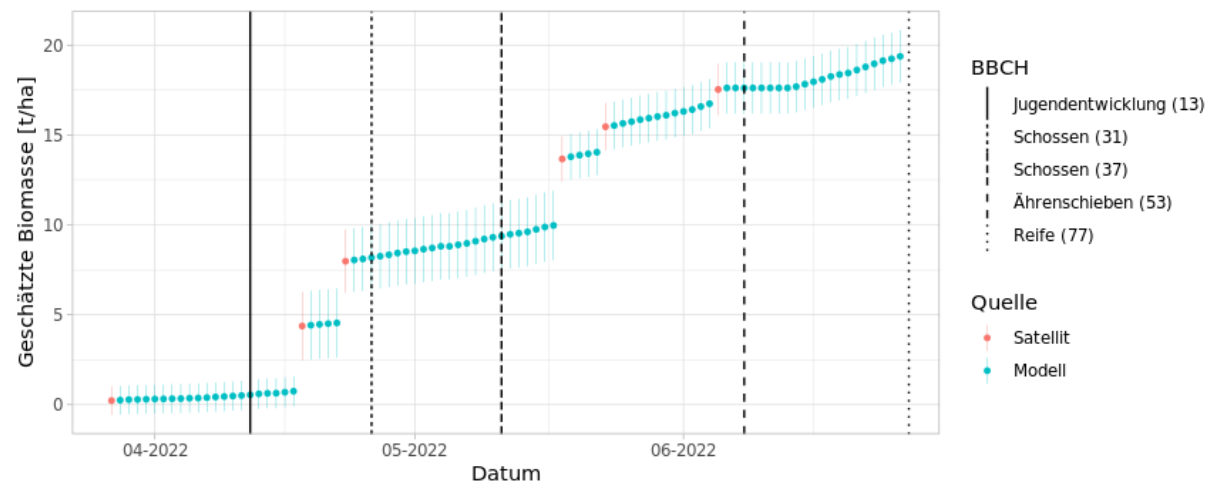- **Modelling crop development**
- **Yield estimation**

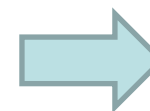## 1) LAI estimation of winter wheat using Sentinel-2

P. Borrmann, JKI

2) modelling crop development: e.g. biomass, LAI

BBCH
- Jugendentwicklung (13)
- Schossen (31)
- Schossen (37)
- Ährenschieben (53)
- Reife (77)

Quelle
- Satellit
- Modell

3) estimation of potential yield
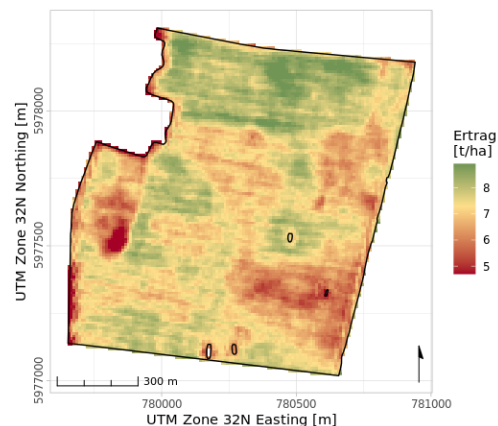
P. Borrmann, JKI

Information services for farmers

P. Borrmann, JKI

contact: agrisens.info@gfz-potsdam.de

USE CASE: SUSTAINABLE FARM MANAGEMENT

EFFICIENT MANAGEMENT BY TAKING INTO ACCOUNT AREAS OF LOW YIELD (ALY)

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Objectives
Prototype for a mobile App FieldMApp
Recording the characteristics of LYAs by farmers during management
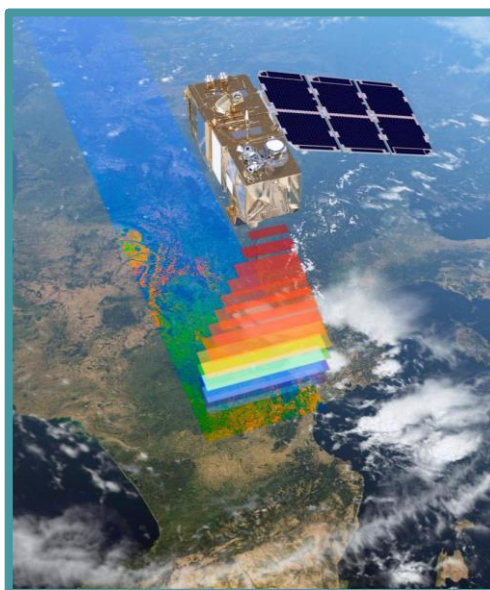

S. Truckenbrodt, Universität Jena

Method Development and user test
… with farmers under real conditions

Feedback
- Farmers experiences, further options for uses

S. Truckenbrodt, Universität Jena

ESA/ATG medialab.

Future perspective
- Linking remote sensing data with FieldMApp data for methods calibration and validation
- Support of interpretation of anomalies in remote sensing data
- Scaling from local to regional analysis

input information e.g. for crop monitoring services

GFZ
Helmholtz-Zentrum POTSDAM

DLR

Julius-Maximilians-UNIVERSITÄT WÜRZBURG

MARTIN-LUTHER-UNIVERSITÄT HALLE-WITTENBERG

FRIEDRICH-SCHILLER-UNIVERSITÄT JENA

FLF JKI
Forschungszentrum für landwirtschaftliche Fernerkundung

DWD
Deutscher Wetterdienst
Wetter und Klima aus einer Hand

HELMHOLTZ

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USE CASE: STONE DETECTION

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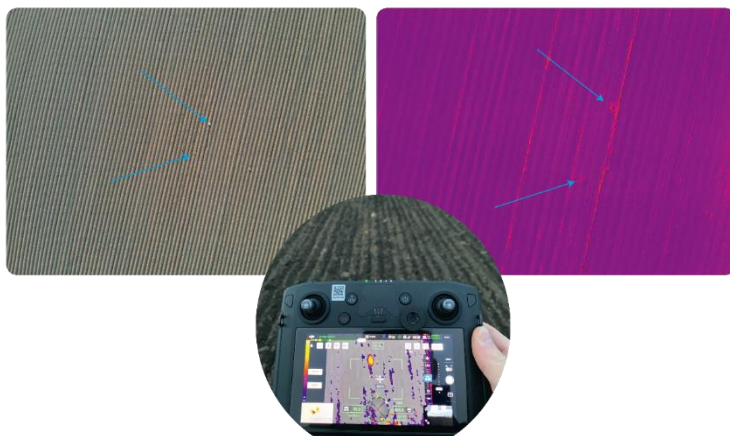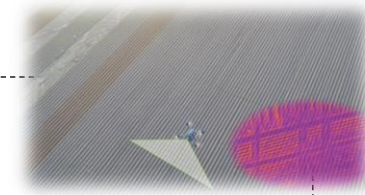### Objectives

- Development of a workflow for drone-based detection of stones (>10cm)
- Drone-based maps as support for farmers

Methods

- Test of different sensors (optical, thermal, LiDAR)
- Test of different recording scenarios
- Development of best practice applications

Service prototype

- Based on thermal imagery → lead to best results!
- Prototype OGC-conform service will be implemented and tested on the terminal of the agricultural machinery of a regional practice partner (AEVZ Merbitz, Deppe & Stücker)
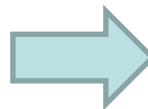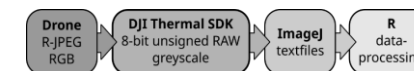

Images: M. Teucher Universität Halle-Wittenberg

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USE CASE: IRRIGATION

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Objectives

- Optimisation of site-specific irrigation by means of coupled analysis of soil water balance models and remote sensing
- Analysing potentials for saving water
- Analysing economic effects

Methods

- Combining evapotranspiration and soil moisture-based approaches to estimate plant water requirements.
- Use of spatial patterns of plant population, soil type and weather conditions
- Incorporating the efficiency of irrigation systems to derive actual irrigation needs

Arable Mark 2 Station

Field Trials 2020/2021

- potato variety "Henriette„
- Fields equipped with sensors
- Different irrigation strategies

Results

- 10-15% saving of irrigation water is possible - at the same yield stability and quality
- Identification of subplots whose yields could have been optimised by higher irrigation

Modelled water balance
High water balance
→ lower irrigation need

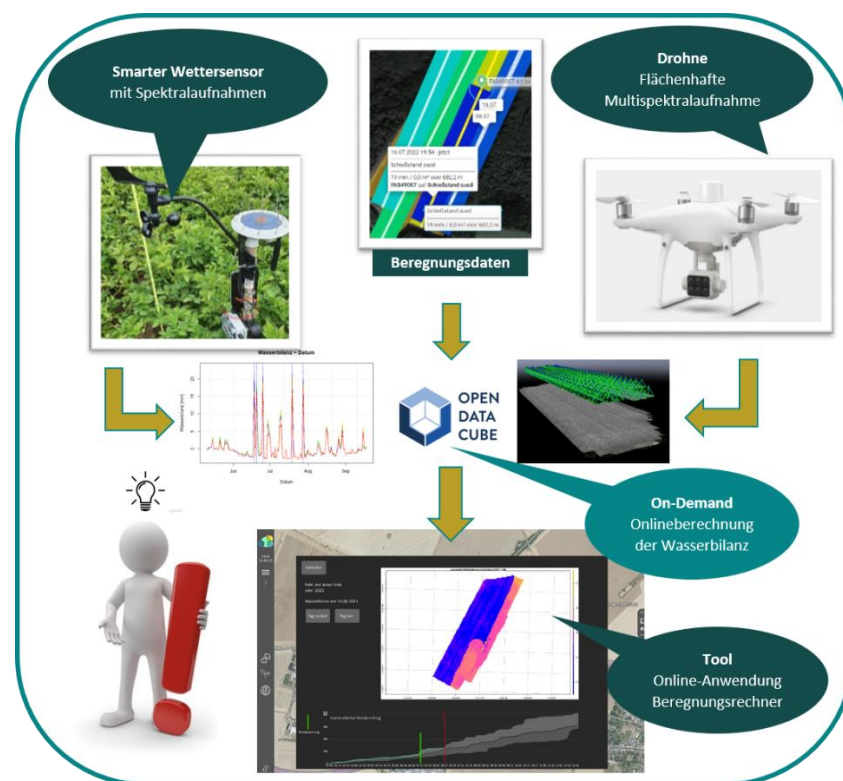Low water balance
→ Higher irrigation need

161   Tag im Jahr   160   180

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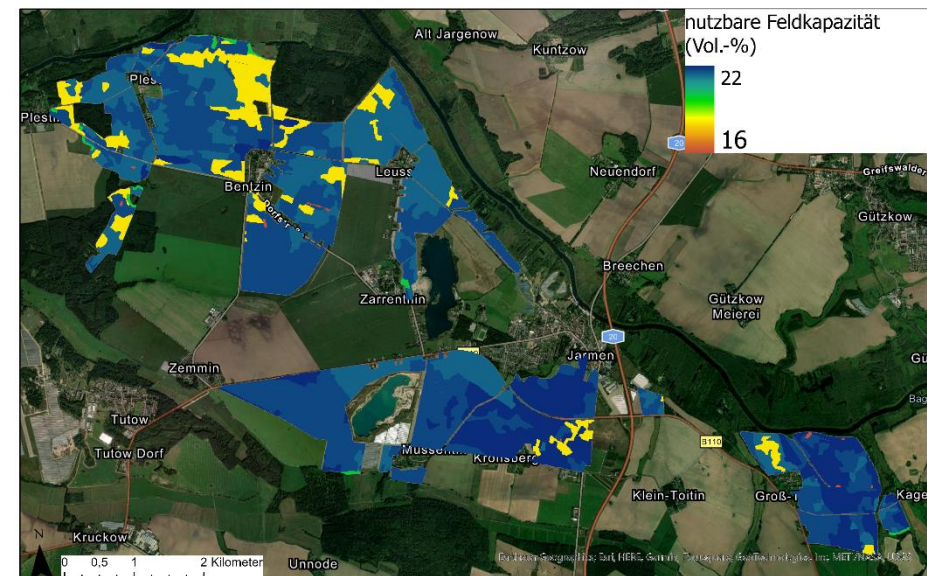# USE CASE: IRRIGATION

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Service prototype
- Based on thermal imagery
- Prototype OGC-conform service will be implemented and tested on the terminal of the agricultural machinery of a regional practice partner (AEVZ Merbitz, Deppe & Stücker)

Regional scaling

App development

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TRANSFER TO AGRICULTURAL PRACTICES

Development of trainings
=> Module 1: Introducing QGIS to farmers
=> Module 2: Use of remote sensing data in QGIS
=> further, practical relevant modules planned

Online an offline training for modules 1 & 2 for farmers
=> courses in Nov/Dez 2021, Jan/Feb 2022 + Jan 2023
=> Online and Present formats
=> Feedback is supporting further optimization / new module focus

REGIONAL CONFERENCE UND PRACTICE DAY – DEMMIN (MECKLENBURG VORPOMMERN)

"Fernerkundung ganz nah!"

- 15.02.2023 Regional Conference
  - Scientific presentations and workshops with focussed topics of AgriSens DEMMIN 4.0
- 16.02.2023 Practice Day
  - Demonstration of applications / services
  - Panel Discussion
- Registration:

www.agrisens-demmin.de

https://events.dlg.org/booking-event?id=1134

www.instagram.com/agrisens_demmin/

contact: agrisens.info@gfz-potsdam.de

- Farmers are interested and open for field trials and new digital techniques

- See high potentials and needs for area wide information
→ so far rarely integrated into the real agricultural practice

- High barrier to integrate new digital techniques into practice

- Especially for geodata / remote sensing data

  → potentially intermediate actors are needed, like agricultural advice services, machinery companies

- Economic benefits needs to be analysed better

  → should be presented best on local specific use cases

Thank you very much!

Get in contact with AgriSens

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🌐 *www.agrisens-demmin.de*

📷 *www.instagram.com/agrisens_demmin/*