

AGRISENS DEMMIN 4.0

APPLICATION OF REMOTE SENSING TECHNOLOGIES FOR DIGITIZATION IN CROP PRODUCTION

Establishment of experimental fields for
digitization in agriculture

*Spengler, D.; Ahmadian, N.; Asam, S.; Böttcher, F.; Borg, E.; Dober, S.;
Garbe, L.-A.; Hohmann, C.; Hüttich, C.; Itzerott, S.; Langosch, R.; Lilienthal,
H.; Missling, K.D.; Teucher, M.; Truckenbrodt, S., Türkow, D. & C. Conrad +
DEMMIN Farmers*

Project expected for: 02/2020 – 01/2023 + 2 years
Budget: 3.6 Mio €



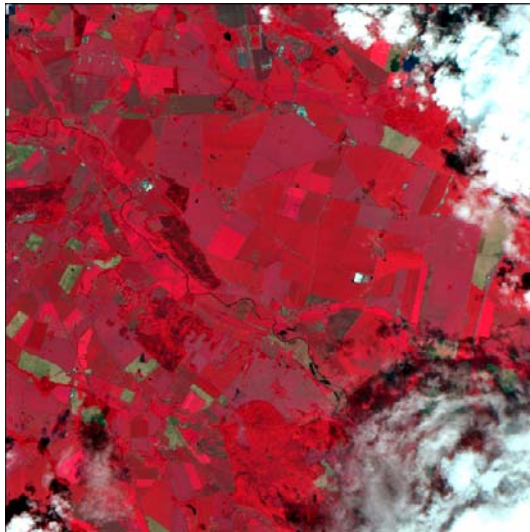
OBJECTIVES

- Presenting the concept of AgriSens DEMMIN 4.0
- Showing the potential of TERENO infrastructure for a success story – DEMMIN as part of TERENO – NE
- Implementing TERENO infrastructure for thematic research → agriculture
- Linking TERENO research to end user → farmer / authorities
- Supporting long-term perspectives of TERENO infrastructure in DEMMIN
- Linking external partners to TERENO observatory
- Linking DEMMIN observatory to national / international initiatives

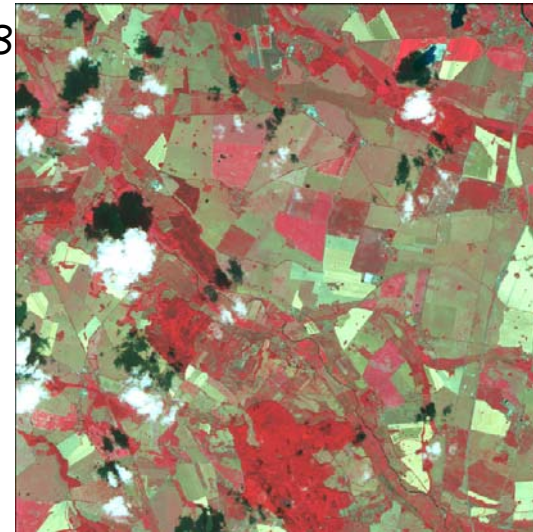
SUMMER 2018

DEMMIN JULY 2017 AND JULY 2018 (NIR-R-G)

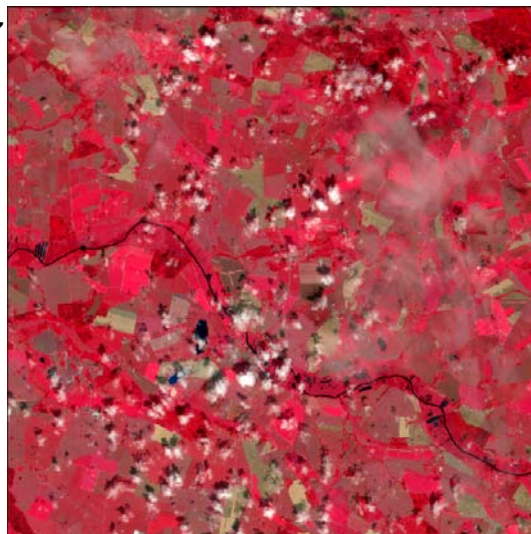
3. July 2017



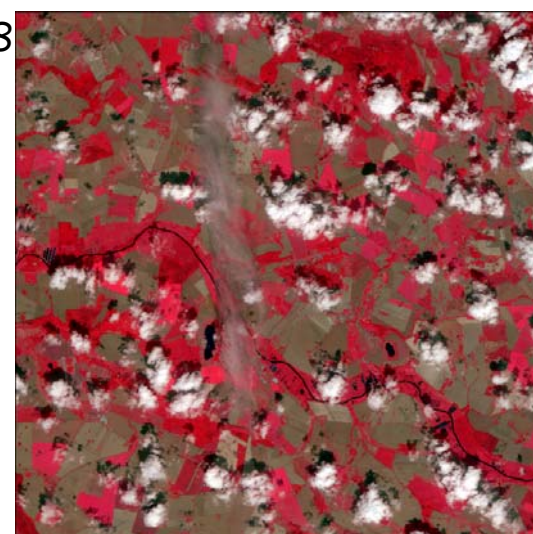
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11. July 2017



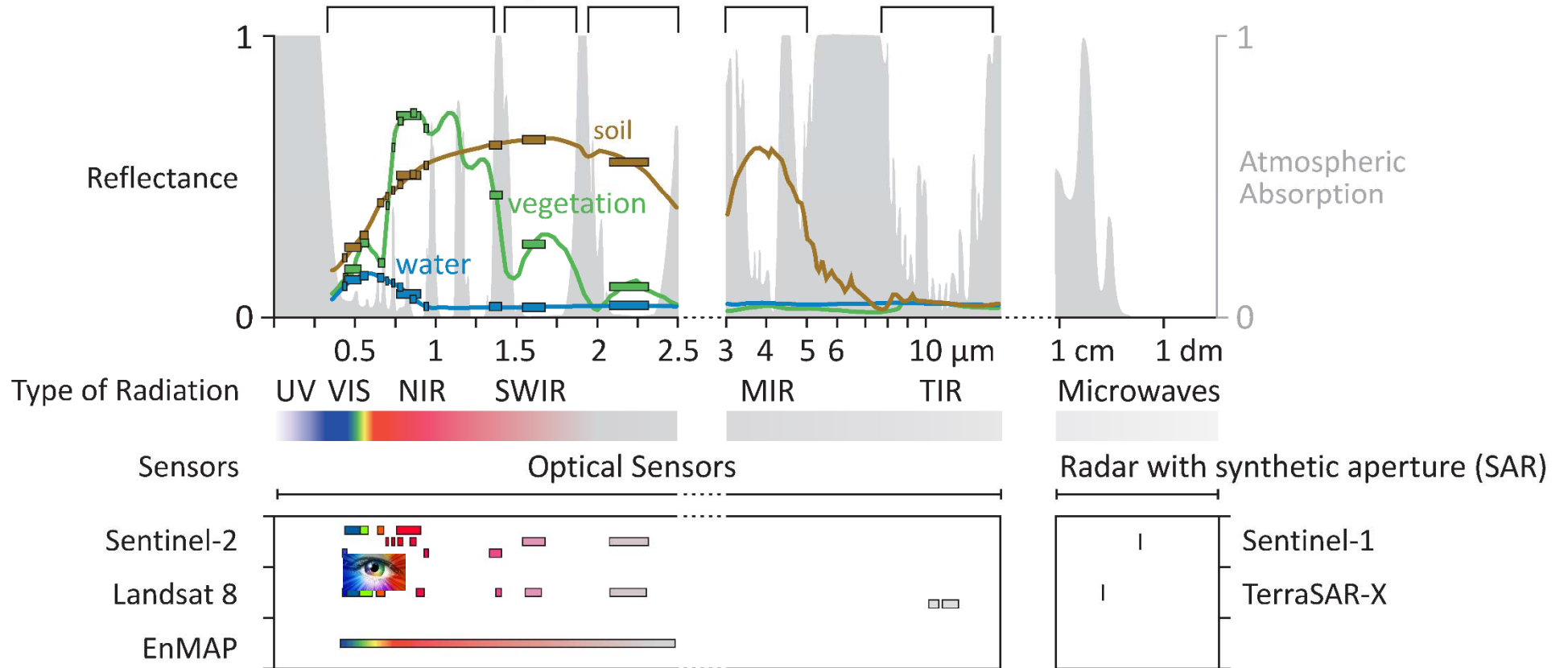
13. July 2018



RADIATION USED FOR REMOTE SENSING



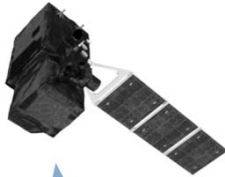
Atmospheric Windows



REMOTE SENSING DATA ANALYSIS

Satellites

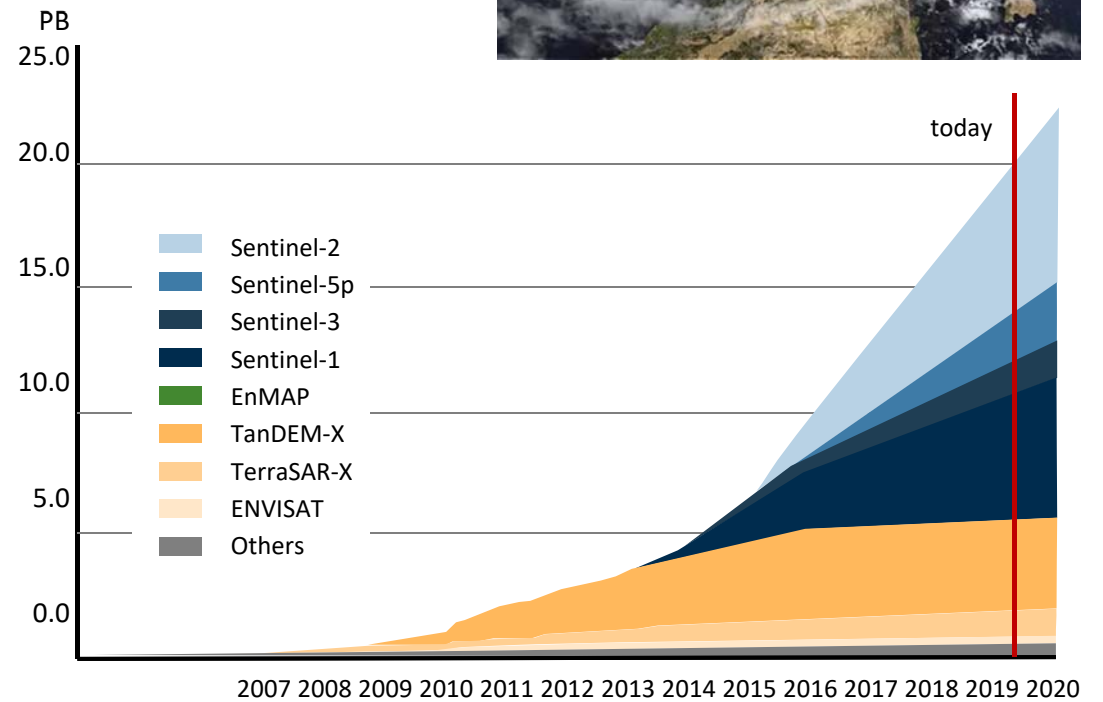
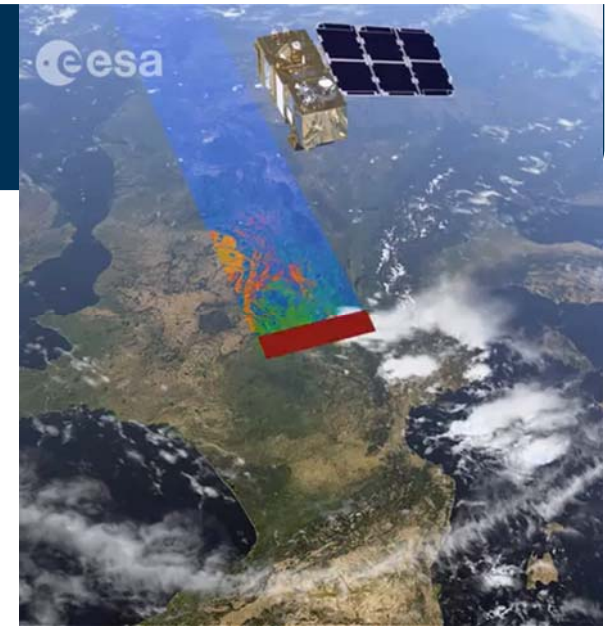
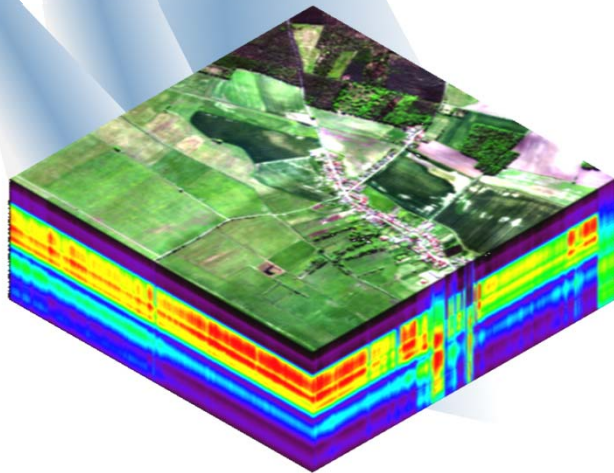
e.g. Sentinel-1
Sentinel-2
EnMAP
Landsat 8



Aircraft



UAV



(source: DLR-DFD)

DEMMIN – METHOD DEVELOPMENT + VALIDATION



TERENO
TERRESTRIAL ENVIRONMENTAL OBSERVATORIES

TERENO Northeast Observatory



JECAM

Joint Experiment for Crop Assessment and Monitoring

CORINE Land Cover (BKG)

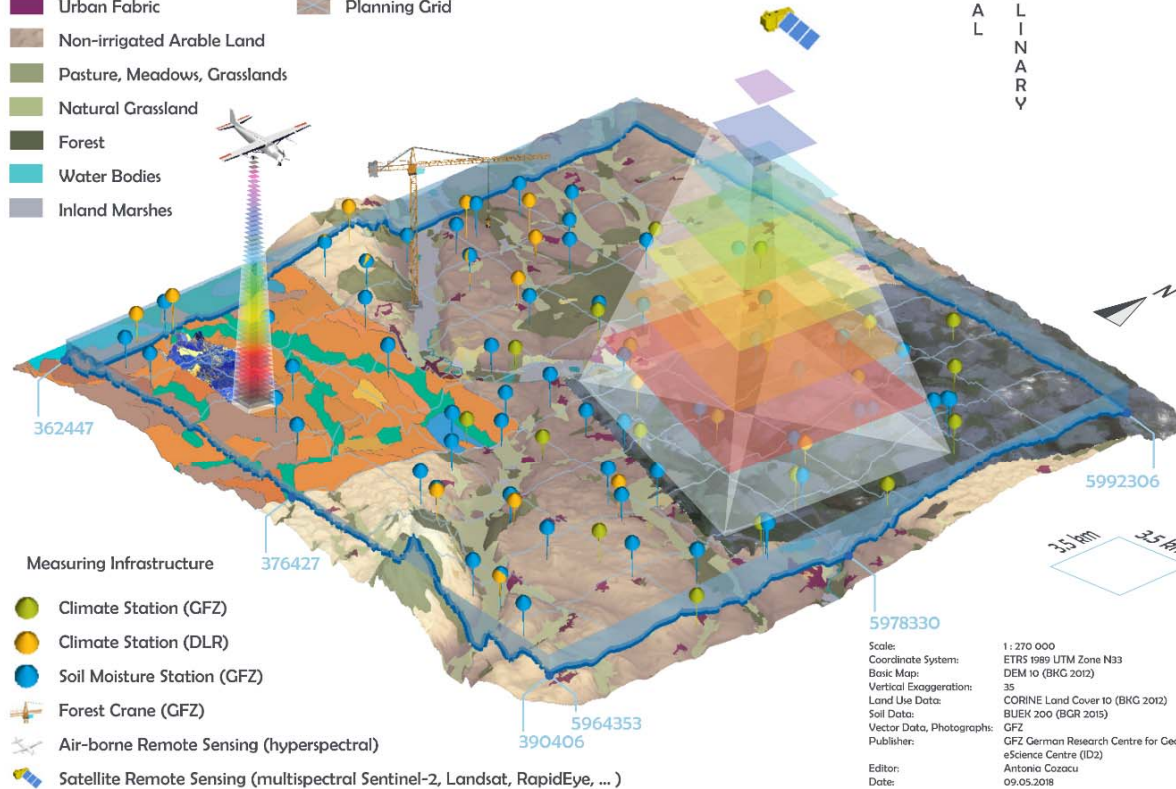
- Agricultural Farms
- Urban Fabric
- Non-irrigated Arable Land
- Pasture, Meadows, Grasslands
- Natural Grassland
- Forest
- Water Bodies
- Inland Marshes

TERENO Project Area

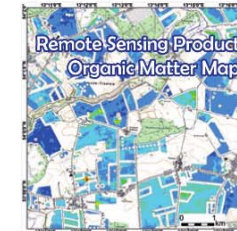
- Border
- Planning Grid

Generalised Soil Map (BGR)

- Soil Classes (BUEK 200)



D U R A B L E
 E N V I R O N M E N T A L
 M O N I T O R I N G
 I N F O R M A T I O N
 N E T W O R K



3RD PARTY FUNDING FOR GFZ (WG TERENO) USING TERENO INFRASTRUCTURE AT DEMMIN

- Since GFZ is part of TERENO at DEMMIN → 9, 3rd party funded projects
 - 3 national projects ~ 0.75 Mio €
 - 5 EU / H2020 projects ~ 0.85 Mio €
 - 1 contract research ~ 0.40 Mio €
- Based on DLR+TERENO network data → unique data source
- DLR published archive data → going back to 2006, via TERENO Data Portal
- DEMMIN is contributing to international initiatives

Challenges

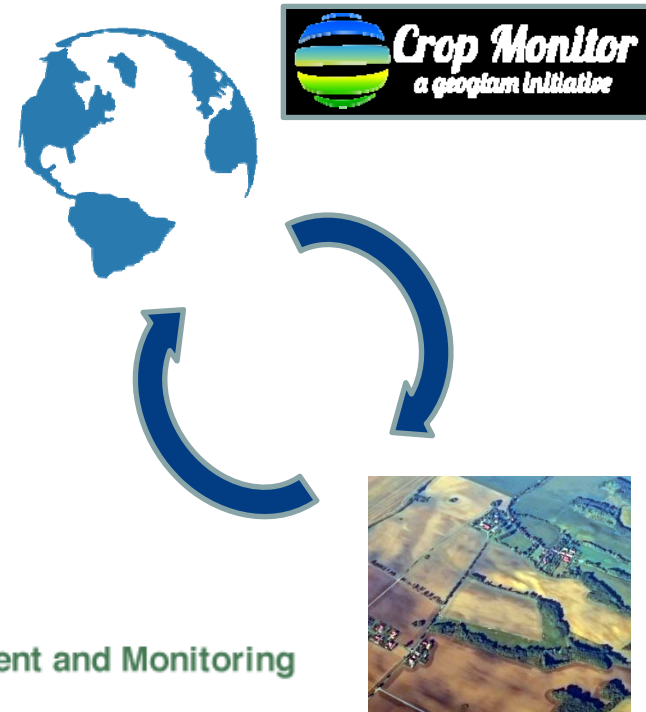
- Most projects are application-oriented
- Balancing TERENO objectives and project-specific objectives

DEMMIN IN INTERNATIONAL INITIATIVES



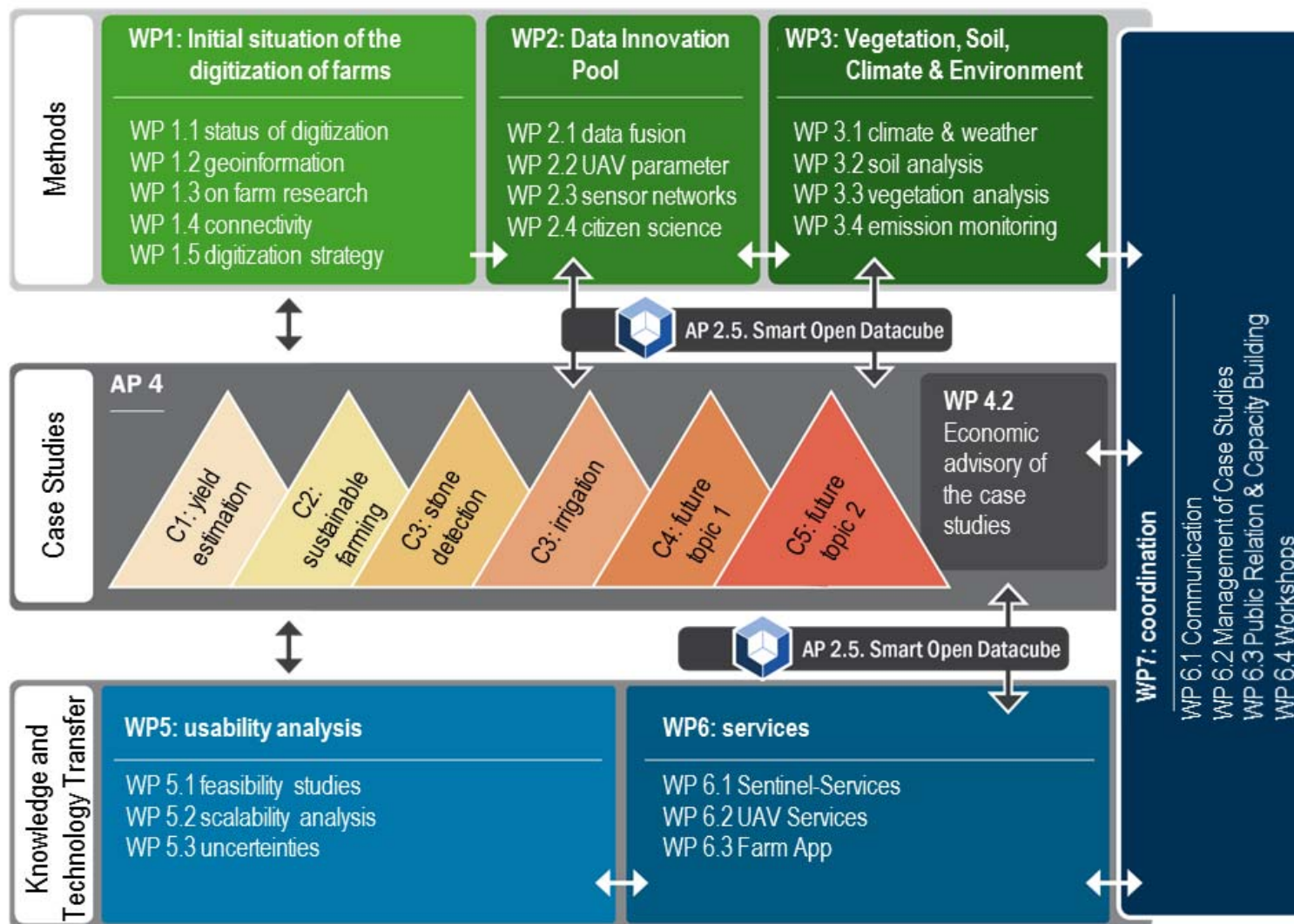
Objective

- Strengthen the global agricultural monitoring,
 - By using remote sensing technologies
 - Estimation of crop production
 - Improving weather forecast



- development of monitoring and reporting protocols and best practices
- for a variety of global agricultural systems.

AGRISENS DEMMIN 4.0 - CONCEPT

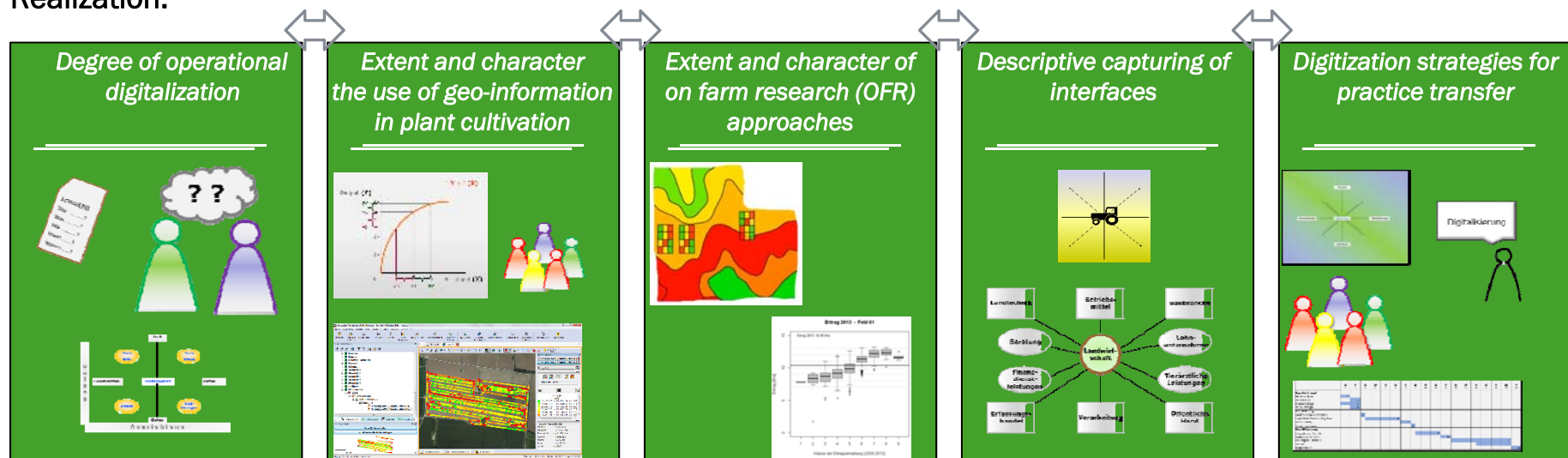


ASSESSMENT OF THE INITIAL STATUS OF THE DIGITIZATION OF FARMS

Objectives: Assessment of the initial status of the digitization of the farms cooperating with AgriSens DEMMIN 4.0

- Motivation:**
- Status to be captured for experimental field
 - **Definition of main topics for the experimental field**
 - "listening" to farmers' problems
 - Establishment/deepening of bilateral contacts

Realization:



- Surveys, bilateral talks
- OFR tests
- Establishment/deepening of bilateral contacts

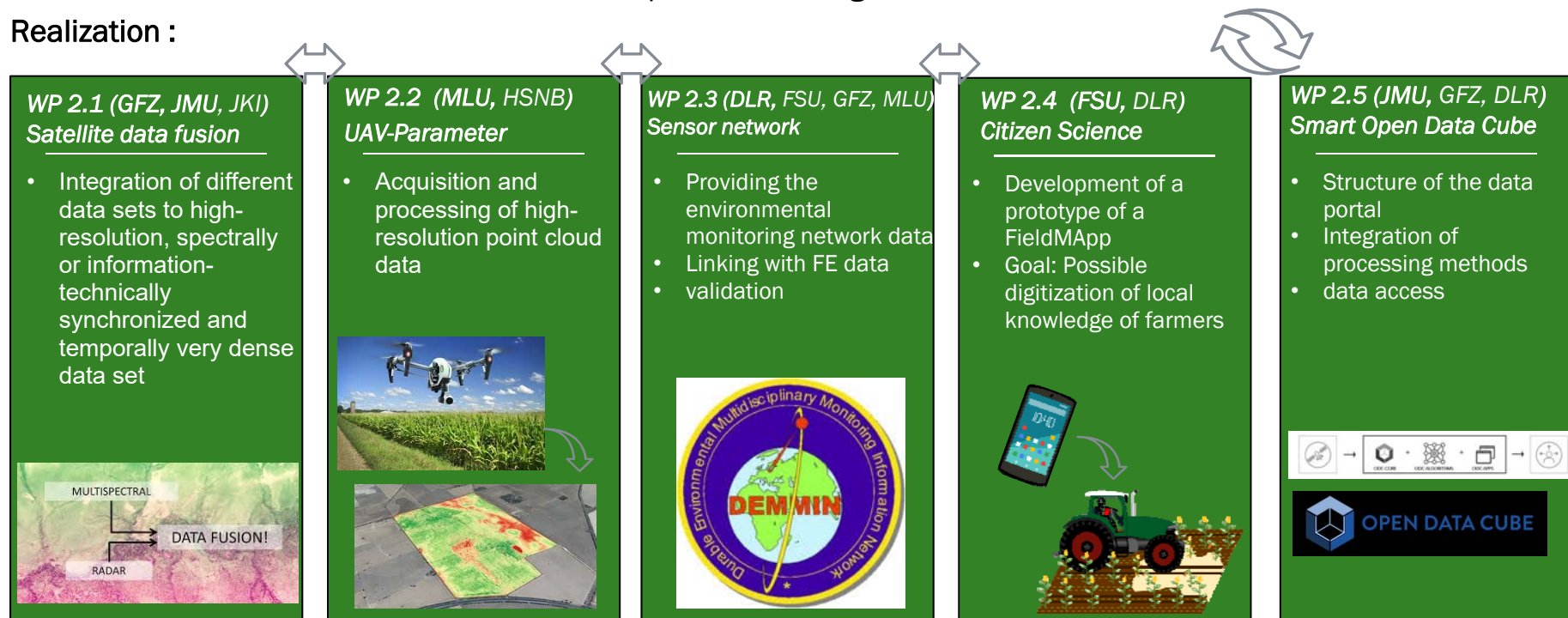
Innovation transfer: Workshops, training material, publications

DATA INFRASTRUCTURE AGRISSENS DEMMIN 4.0

Objectives: Providing methodological and technical prerequisites for efficient data processing

- Motivation:**
- Easy data access for all partners of the experimental field
 - Development of methodological foundations
 - Development of a data infrastructure for AgriSens DEMMIN 4.0
 - Connection to external data platforms → e.g. TERENO TEODOOR

Realization :



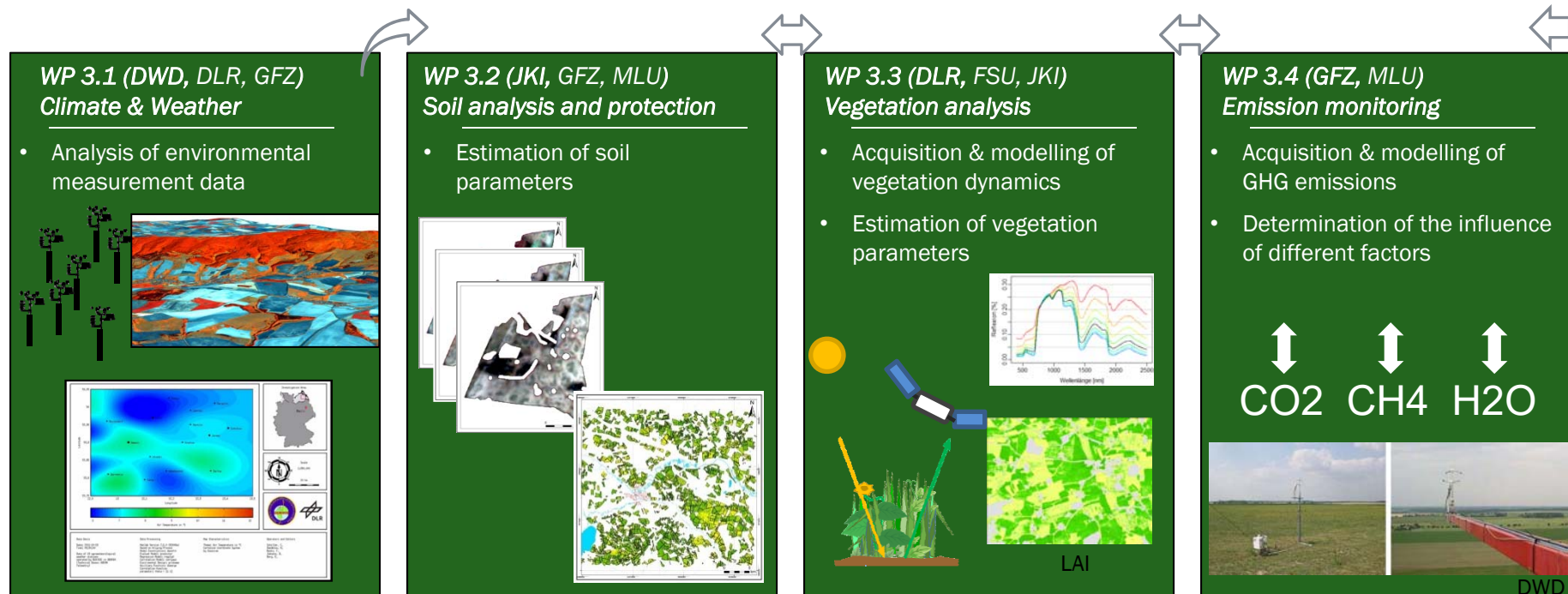
Innovation transfer: Workshops, conferences, publications

VEGETATION, SOIL, CLIMATE & ENVIRONMENT

Objectives: Derivation of agricultural parameters from climate and remote sensing data

- Motivation:**
- Development / further development of methods for the derivation of parameters
 - Providing extensive data as a basis for the fields of application

Realization :



Innovation transfer: Workshops, conferences, publications



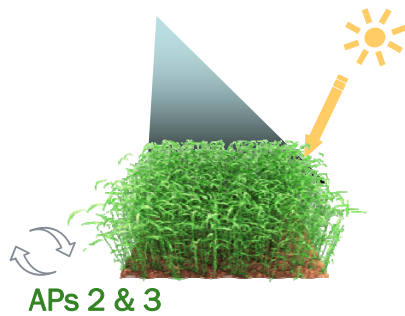
CASE STUDY 1: YIELD ESTIMATION

Objectives: Development of an information product "yield estimation"

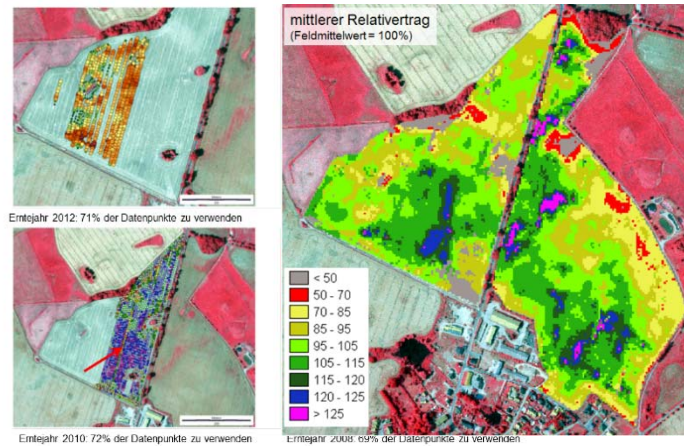
- Motivation:**
- Yield as a key target for agriculture
 - Optimum acquisition of site-specific conditions
 - Building on previous projects (e.g. AgriFusion)

Realization:

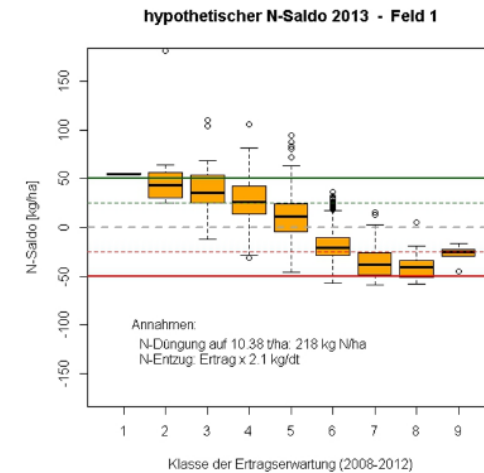
Vegetation monitoring /
vegetation modelling



Recording of site-specific differentiation
yield potential



Multitemp. yield expectation /
hypothetical N balance



Farm companies: Daberkower Landhof AG, Görminer Landwirtschaftsbetrieb "Peenetal,, ...

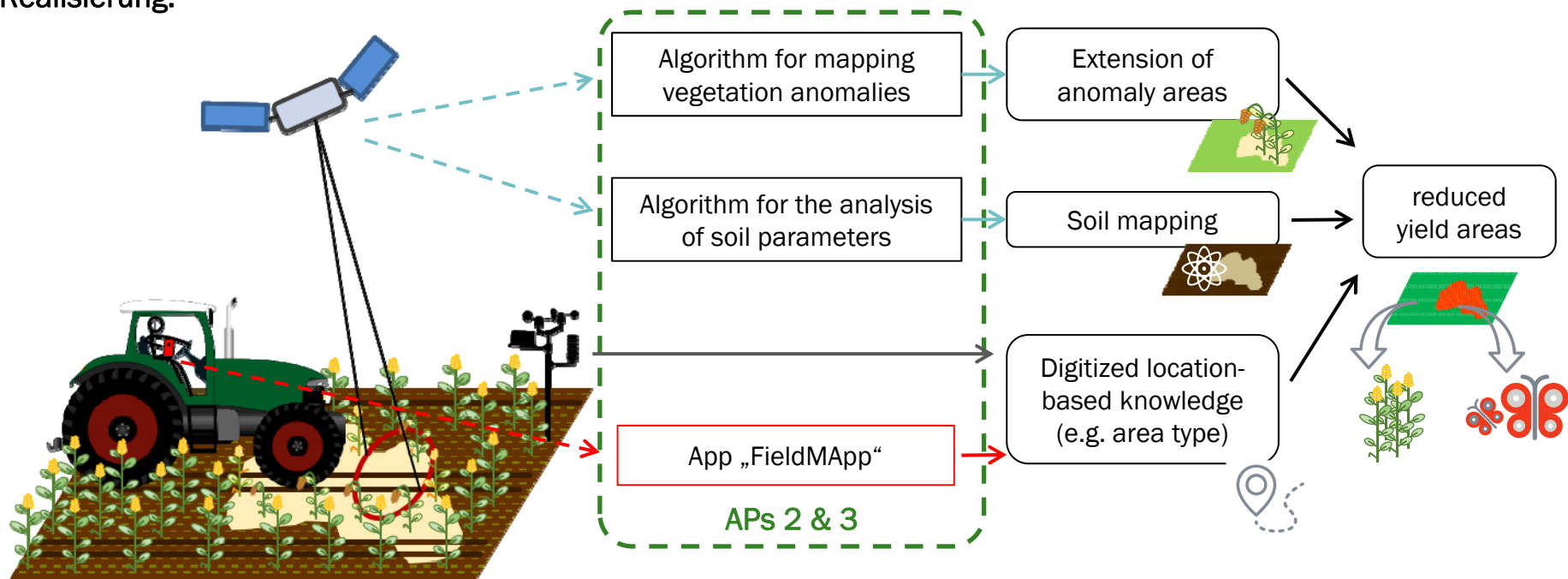
Innovation transfer: Workshops

CASE STUDY 2: SUSTAINABLE FIELD MANAGEMENT

Objectives: Development of an information product "reduced yield areas"

- Motivation:**
- Compensation for lack of qualified staff
 - Yield stabilisation through demand-oriented use of resources
 - Reduction of NH3 and NOx concentration, improvement of groundwater quality
 - Support for the Common Agricultural Policy (CAP) after 2020.

Realisierung:



Farm companies: Daberkower Landhof AG, Görminer Landwirtschaftsbetrieb "Peenetal"

Innovation transfer: Workshops

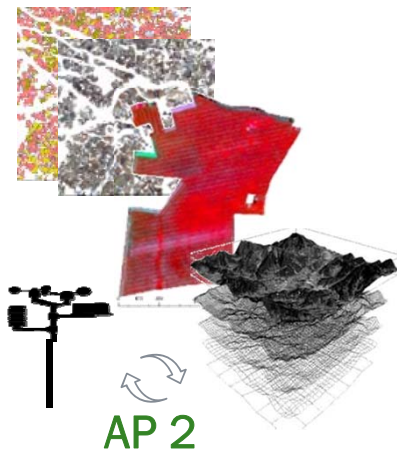
CASE STUDY 4: IRRIGATION

Objectives: Providing maps for site specific irrigation

- Motivation:**
- Request for optimization/ automatization of irrigation
 - Resource efficient use of water
 - **Optimizing yield**

Realization:

Data fusion



Method development

- Mapping vegetation anomalies
- Soi water modelling
- Implementation of weather forecast
- Implementation of „smart“ sensor networks
- Link to irrigtaion software products

Test / Validation

- Test / Validation
- Economic analysis

Farm companies: : Bentziner Ackerbau GmbH

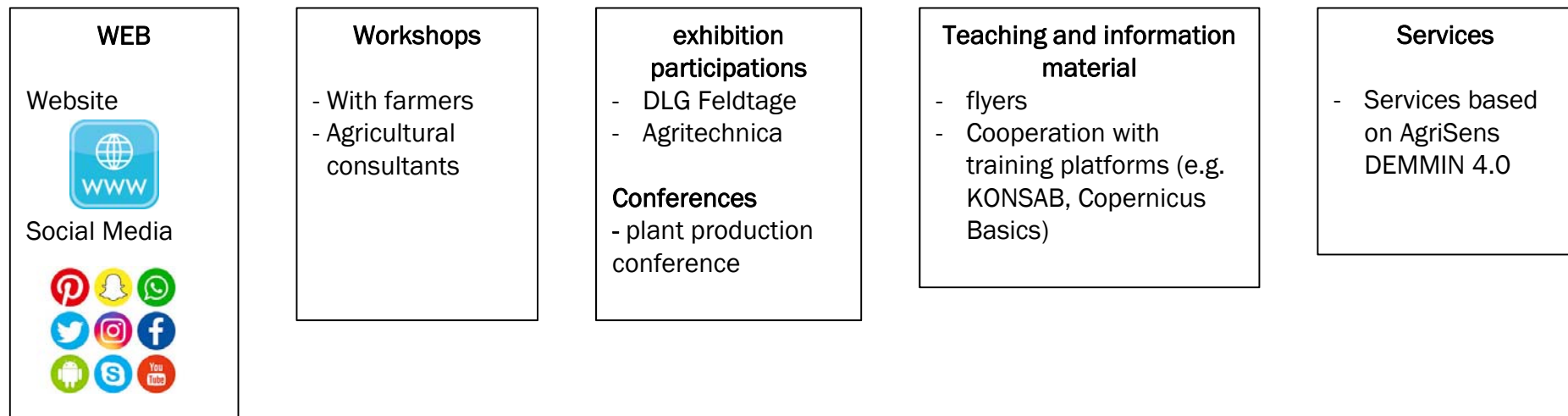
Innovation transfer: Workshops, information products, technology partner

DISSIMINATION AND TECHNOLOGY TRANSFER

Objectives: dissemination of the knowledge and technologies developed in AgriSens DEMMIN 4.0

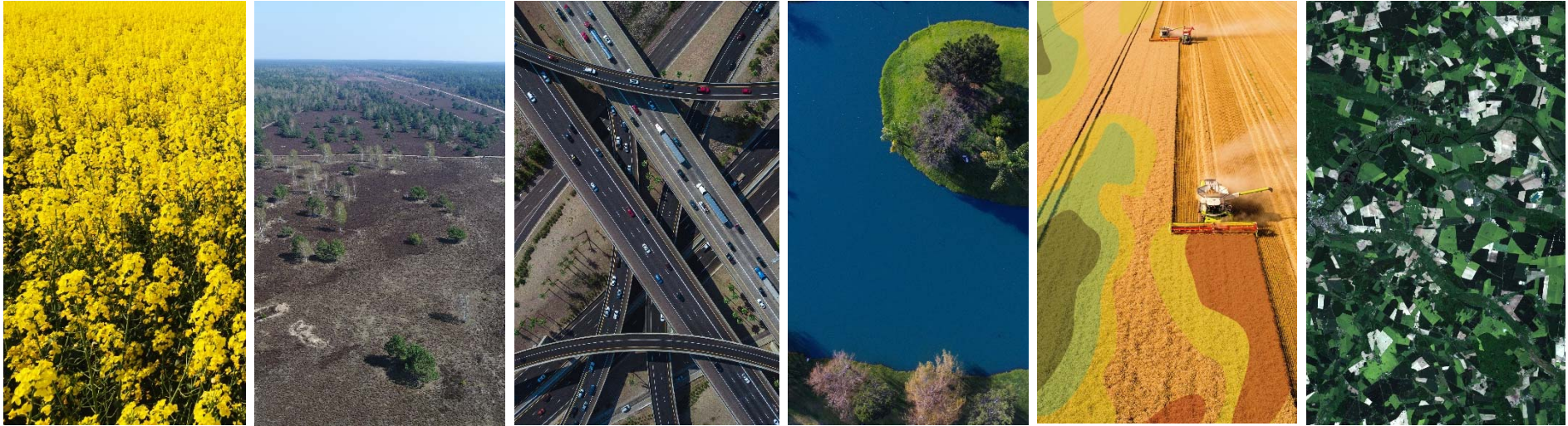
- Motivation:**
- Making knowledge / technologies accessible
 - Identifying the potential for optimised geodata use
 - Feedback from practice on the further development of the experimental field

Realization:



Innovation transfer: Workshops, information materials

EDUCATION IN REMOTE SENSING



Knowledge & Technology Transfer Projects

SAPIENS

KONSAB

WEBINARS & EVENTS

EDUCATION IN REMOTE SENSING

SAPIENS

Agriculture
Planning
Nature conservation
Industry
Energy
administration
state offices
ministries
decision maker
NGOs
journalists

WHAT?

WHO?

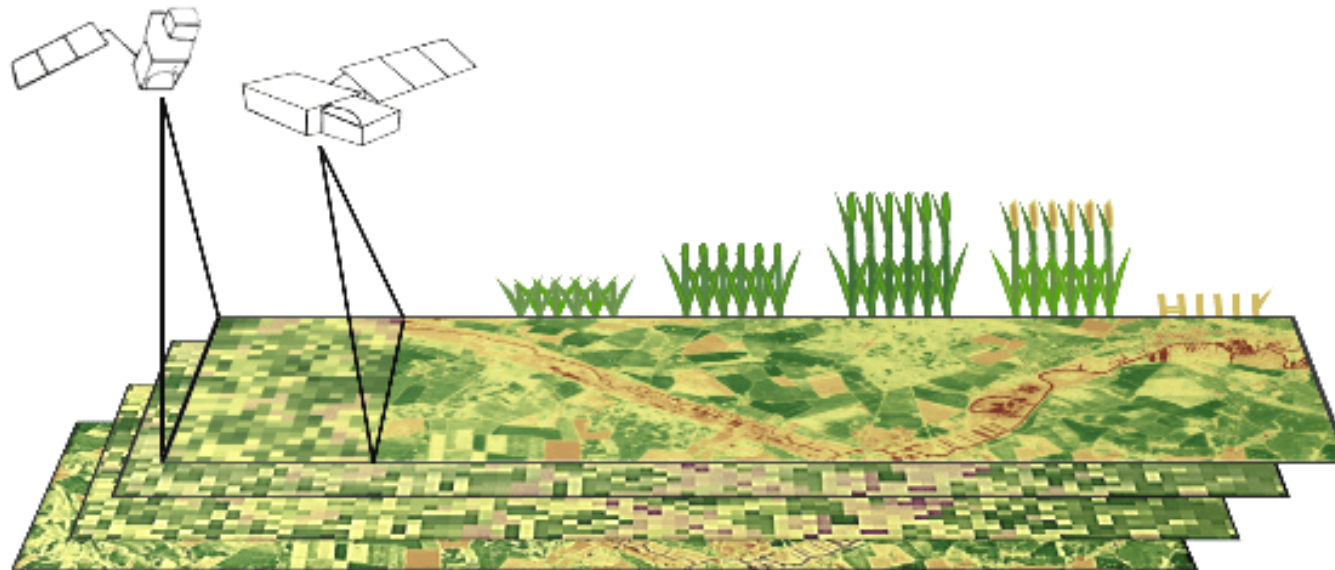
KONSAB

Agriculture
Smart farming
Forestry
Sustainable management
Farmer
forester
consulting companies

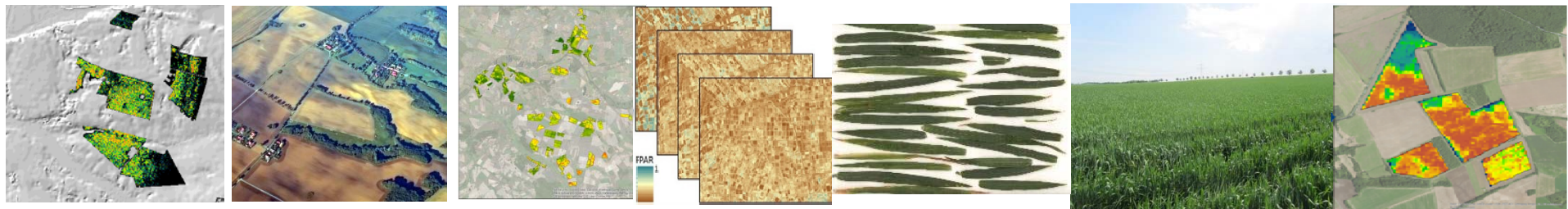
VISIONS FOR AGRISens DEMMIN 4.0

- Benefits of satellite data for users and present in society
- Structures for easy access to this information have been established
- New satellite systems and methods based on them continuously provide a wide range of information - e.g. on plants and soil.
- Establish links between in-situ measured data (DEMMIN/TERENO) with RS data
 - for method development
 - for validation
- Competences in handling FE data have found their way into agricultural practice
- Strengthen DEMMIN for new projects e.g. TERRA-LAB/TERENO 2.0

THANK YOU VERY MUCH!



EAGLE Team, Universität Würzburg



THANK YOU VERY MUCH

Contact:

Dr. Daniel Spengler

| daniel.spengler@gfz-potsdam.de

| 0331-288-1764



Deutscher Wetterdienst
Wetter und Klima aus einer Hand



LITERATUR

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