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Estimating agricultural production using satellite remote sensing and in-situ data

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Remote sensing in the statistics of agriculture

- High resolution satellite imagery collected by „Copernicus program“ of European Commission and EU
- Remotely sensed data contain relevant information for official statistics
- For agricultural statistics, the use of remote sensing-based yield estimation offers a variety of potentials

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Potentials of satellite data

- Qualitatively improved results of yield estimation
- Expansion of the statistical product portfolio, e.g. regionally breakdown
- Increased timeliness
- Reduced reporting efforts for farmers and agricultural enterprises that are obliged to provide information

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FLF JKI

Statistisches Amt für Hamburg und Schleswig-Holstein
Der Norden zählt

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LSN Landesamt für Statistik Niedersachsen

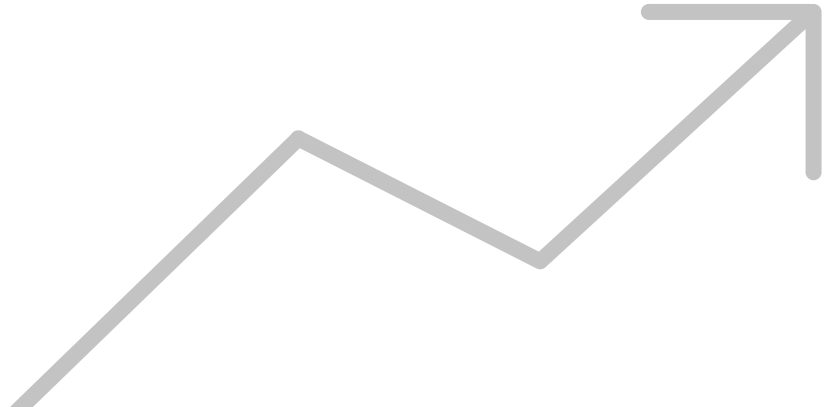
Information und Technik Nordrhein-Westfalen

Bayerisches Landesamt für Statistik

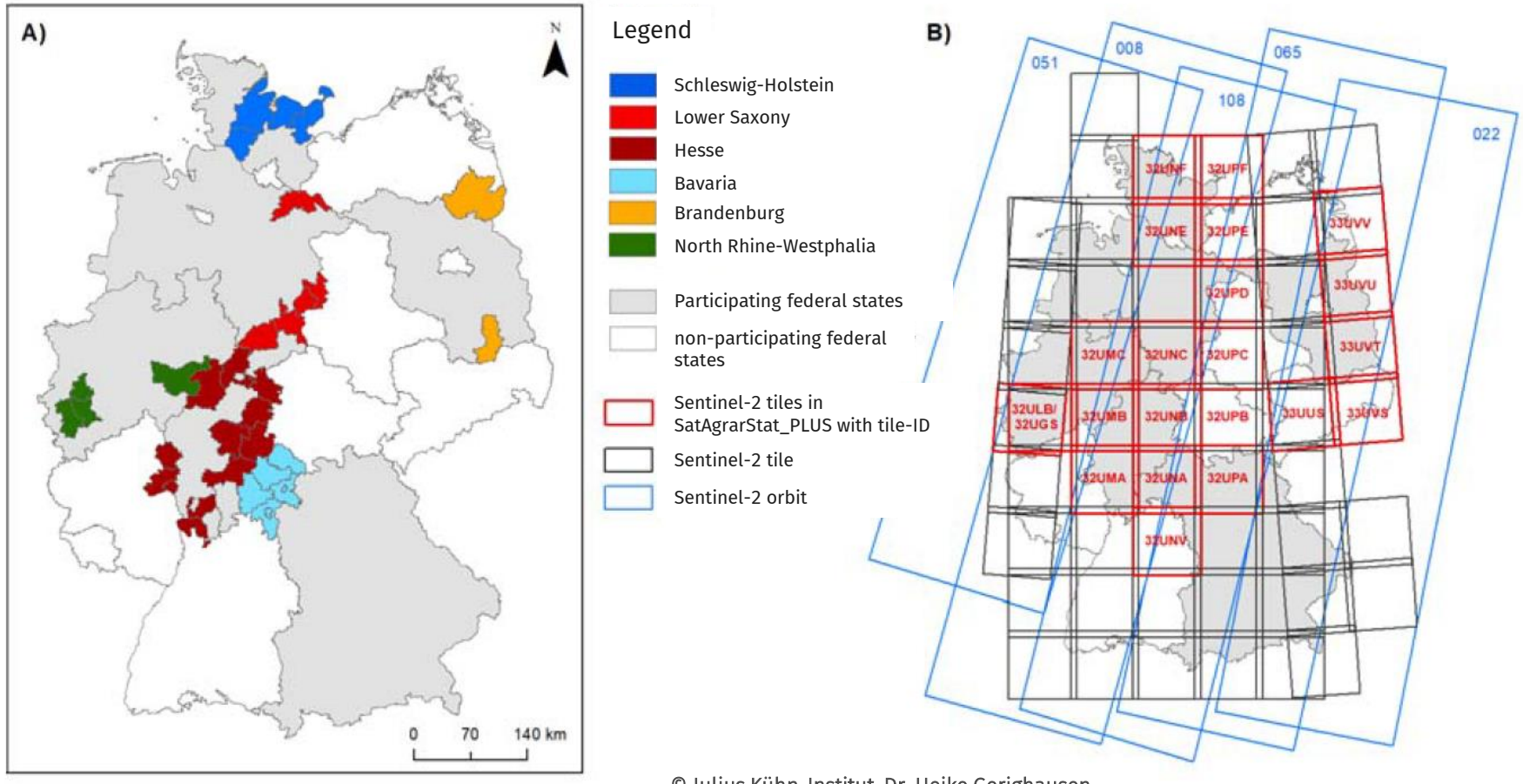
statistik Berlin Brandenburg

SatAgrarStat

Satellite-based crop yield estimation to support the official agricultural statistics (2018-2023)



Study Areas – survey year 2020



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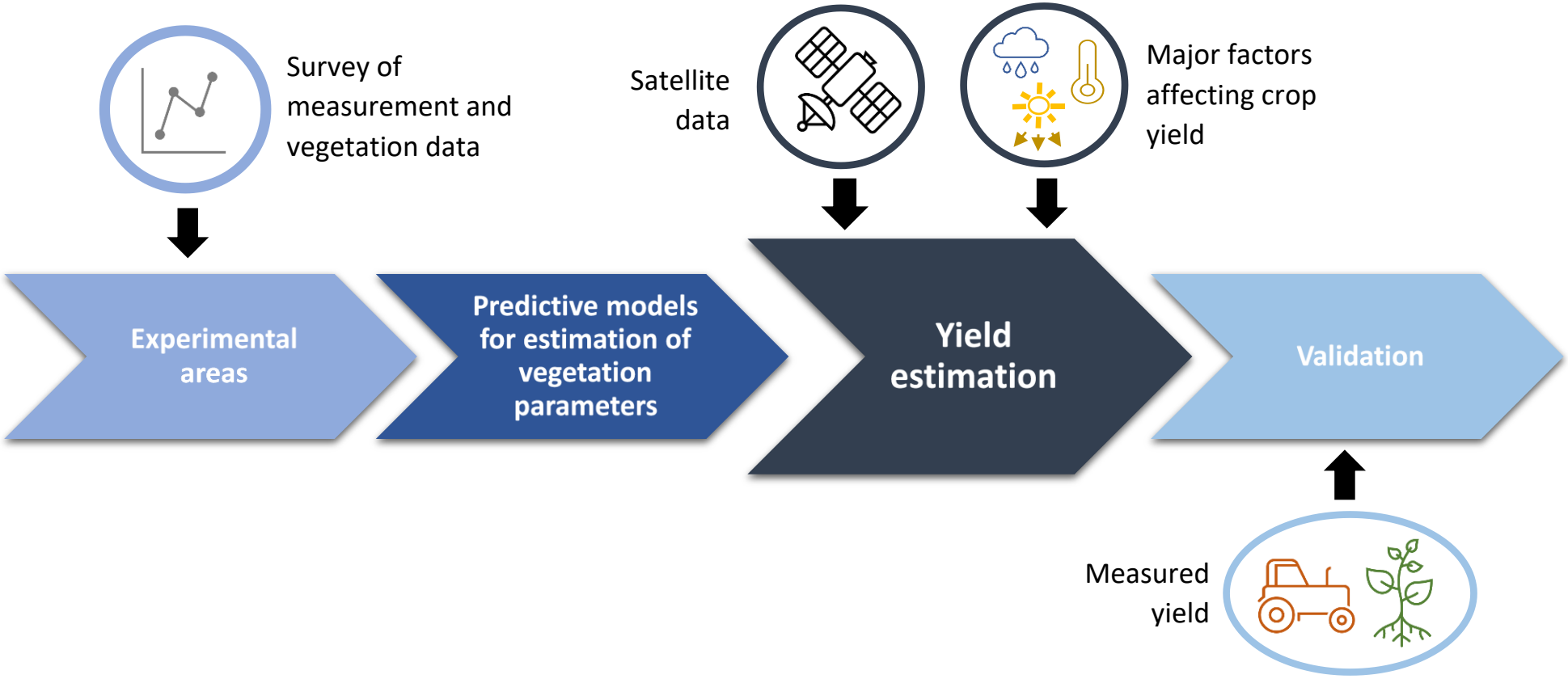
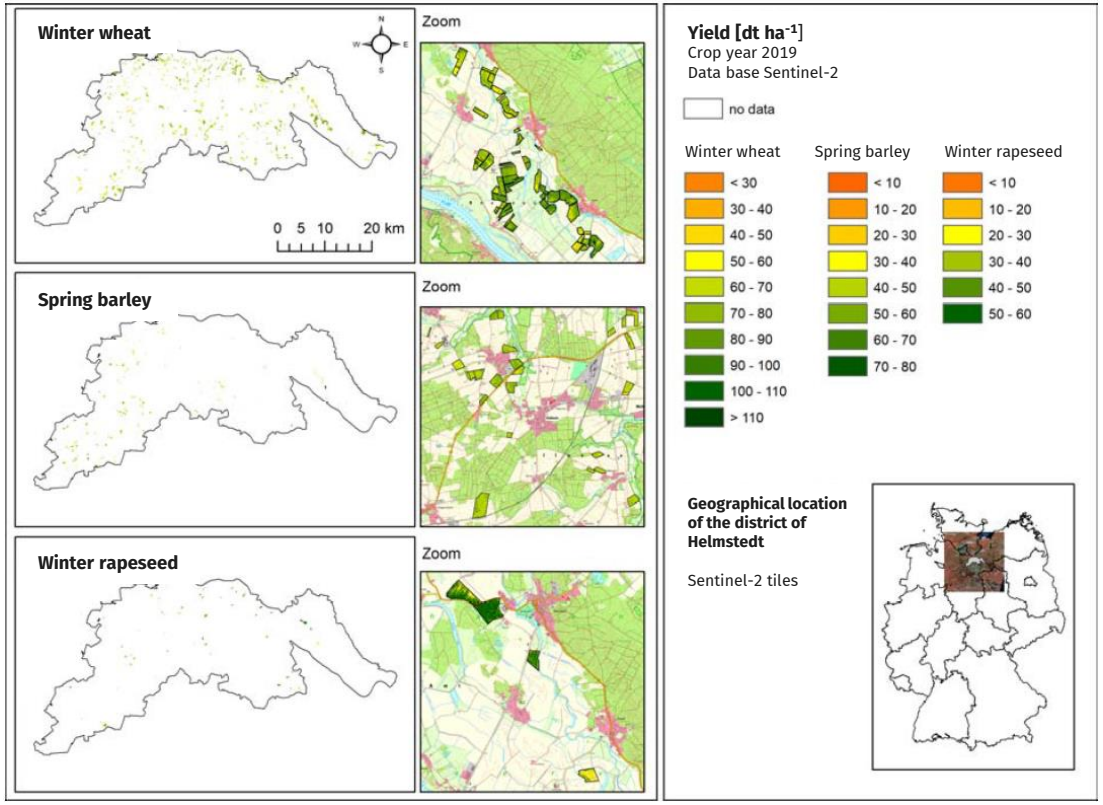
Methodology



Results of the project years 2018-2019

Yield estimation at regional level (districts).



Satellite-based yield estimates show an **average deviation > 10 dt/ha** with the applied procedural approach.

Interim summary 2018-2019

Remote sensing based yield estimation are possible with the chosen approach

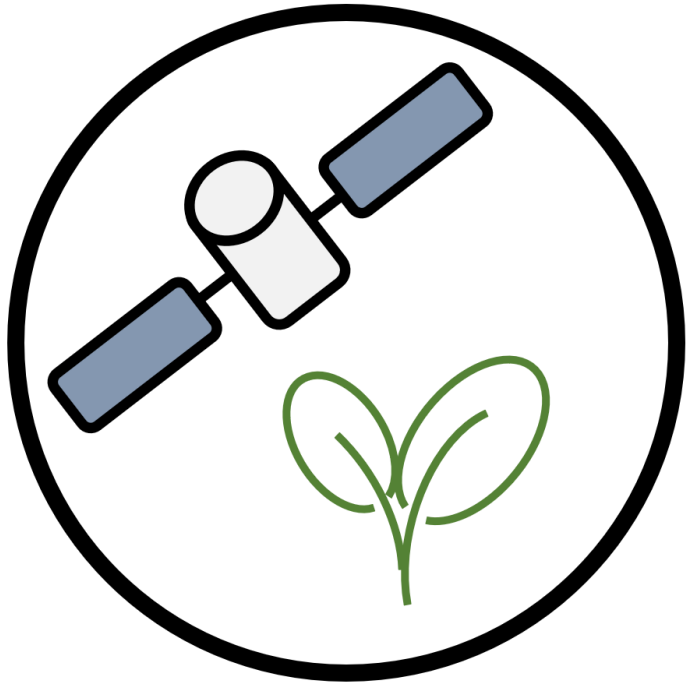
→

The yield estimates obtained do not yet meet the requirements of official statistics

→

Further investigations are required

SatAgrarStat_PLUS 2020 - 2022



FernEE

Remote sensing of crop yield for agricultural statistics

TECHNISCHE UNIVERSITÄT DARMSTADT

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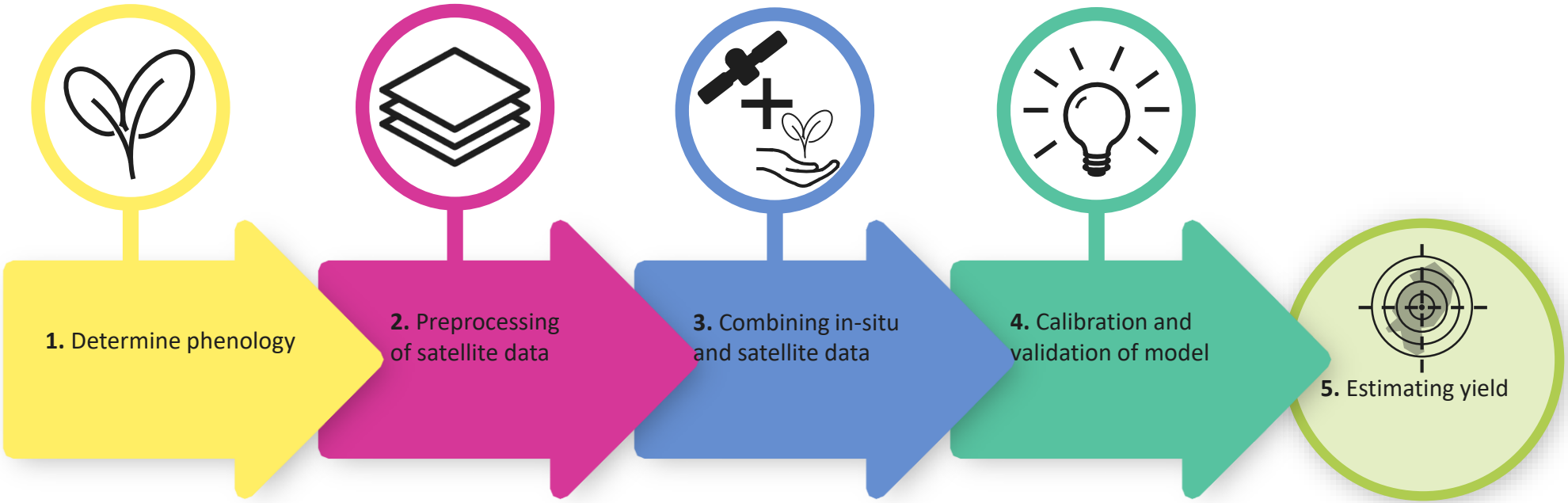
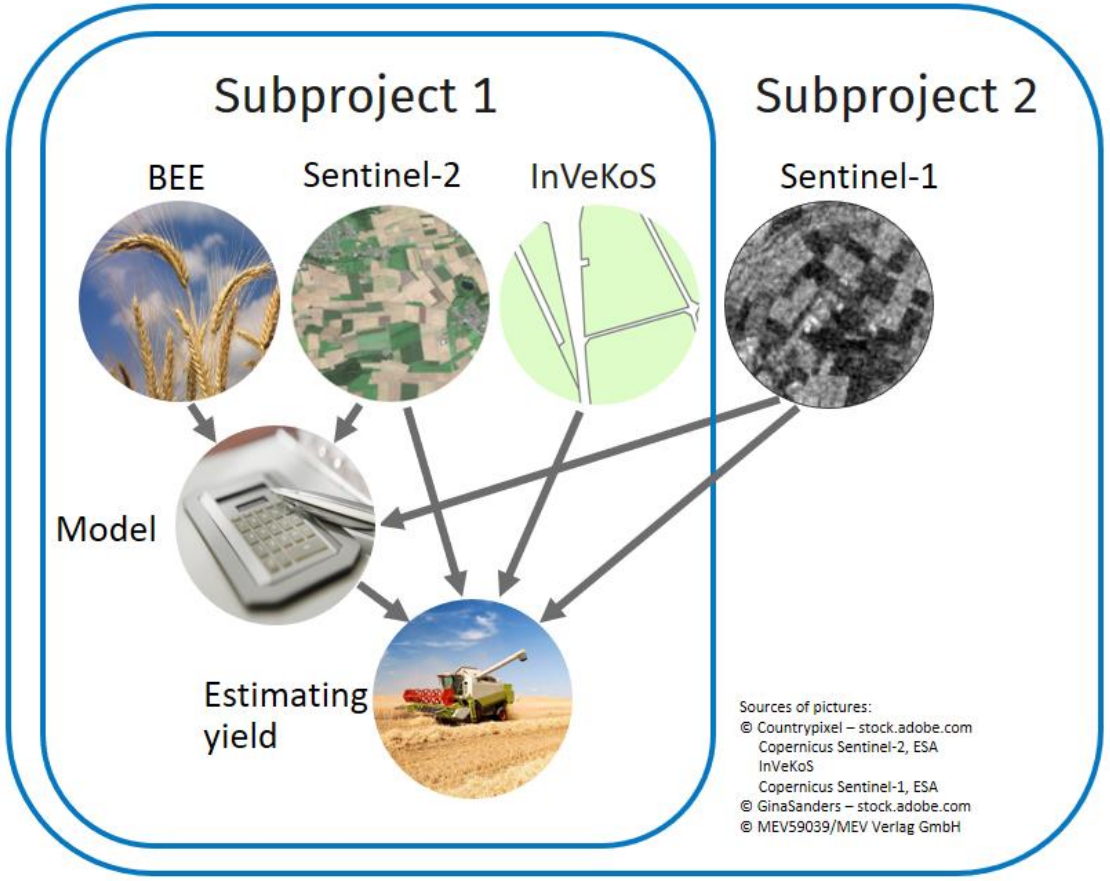
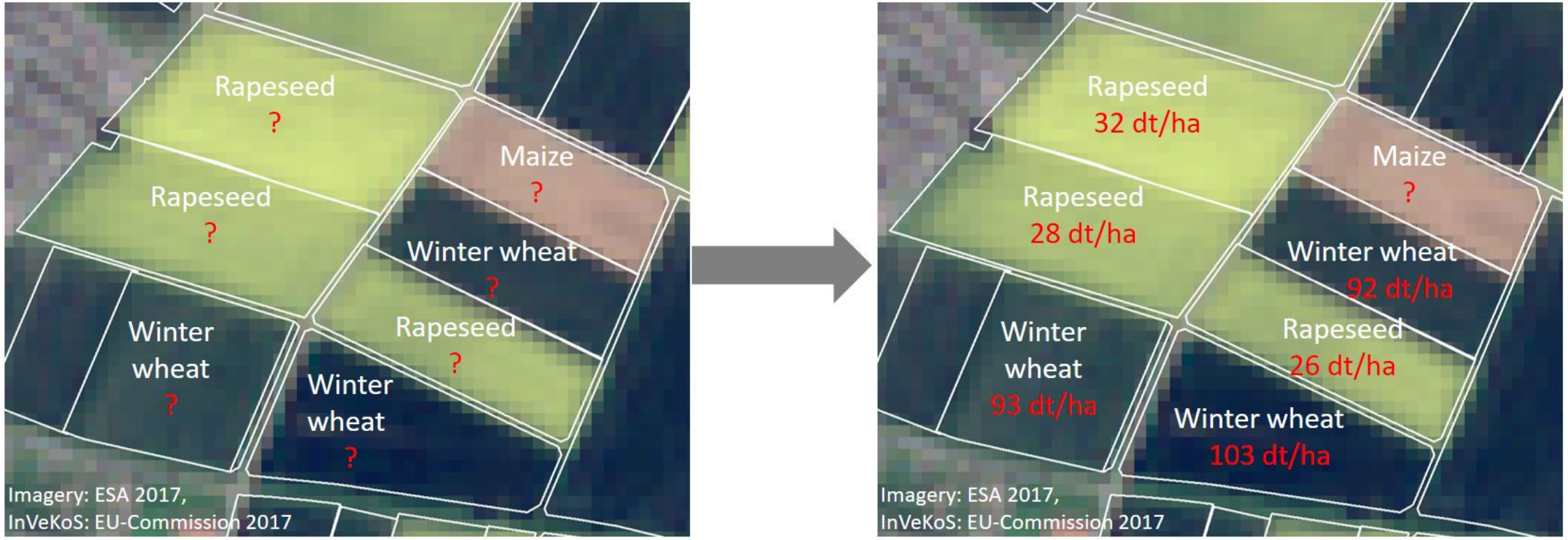
Workflow


1. Determine phenology
2. Preprocessing of satellite data
3. Combining in-situ and satellite data
4. Calibration and validation of model
5. Estimating yield

Data and workflow

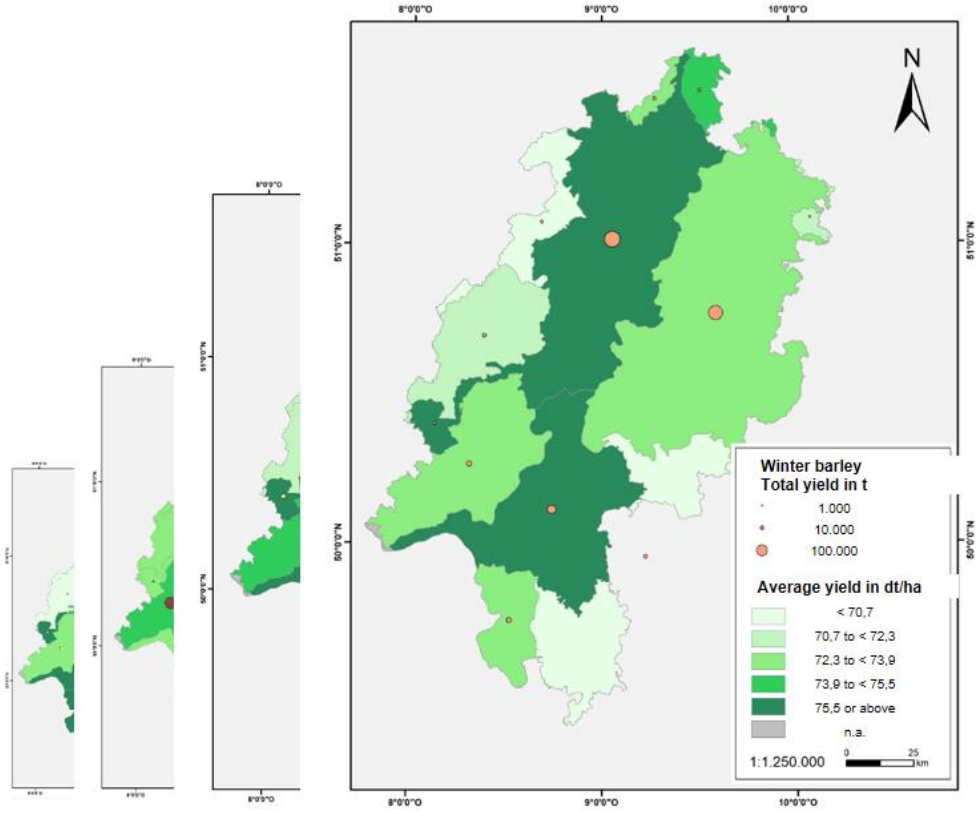


Results: Yield per pixel and field



Major results

- Sentinel-1 and -2 sensors provide valuable and highly resolved information for estimating crop yield
- Machine learning approaches are well-suited for this purpose
- For more details, please refer to paper (in German)
- Current and future work on applying the method for 2018-2020 to Hesse and other federal states



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Conclusions

- Remote sensing has the potential to sustainably improve the recording of agricultural yields in official statistics.
- It may help to reduce the number of in-situ measurements of crop yield for production of surveys. Nevertheless, in-situ data for validation and calibration will still be needed in the future.
- Possible limitation due to cloud cover.
- Remote sensing as an important element of the strategy for official statistics (Big Data and use of AI).
- Further follow-up to intensify the international collaboration and knowledge exchange.
- Examination of the legal implementation at national level.

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