LfL

Bavarian State Research Center
for Agriculture

Determination of cutting frequencies from SAR for estimation of crop yields and pollen flight

Institute for Crop Science and Plant Breeding

Stephan Hartmann & David Stäblein

Stages of our projects

Project period: 01.04.2014 – 31.03.2016
Founded: BMWi
Partners: GAF AG, CAU Kiel

SatGrünschnitt
Satellite-based estimation of cutting frequency with CSK & Sentinel SAR

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GeoCare
Satellite-based estimation of cutting and yield frequencies with Sentinel SAR

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Project period: 26.04.2016 - 30.09.2019 Founded: BMEL Partners: GAF AG, CAU Kiel, DWD	**GeoCare** Satellite-based estimation of cutting and yield frequencies with Sentinel SAR
Project period: 01.01.2020 – 30.06.2022 Founded: StMELF Partners: GAF AG, DWD, Association of Machinery Pools (MR)	**Mastergras** Automatic Satellite-based estimation of cutting and yield frequencies with Sentinel SAR via ANN

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Implication in secondary projects

Klimapollen
Effects of climate change & cutting frequencies on pollen flights

Project period: 01.01.2018 – 31.12.2020
Founded: StMUV
Partners: ZAUM, TUM Munich, HMGU, University Augsburg

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Potential projects for the future

Creation of connected grassland belts

Pre- typification of grassland composition

State of the Art:

A detection of vegetation harvest and cutting frequency is possible to detect (see Baghdadi et al. (2009); Voormansik et al. (2013); Tamm et al. (2016)

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Questions:

Creation of an **cost- and time-efficient method** for recording

A) cutting dates of grassland and

B) yield estimations

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Questions:

Creation of an **cost- and time-efficient method** for recording

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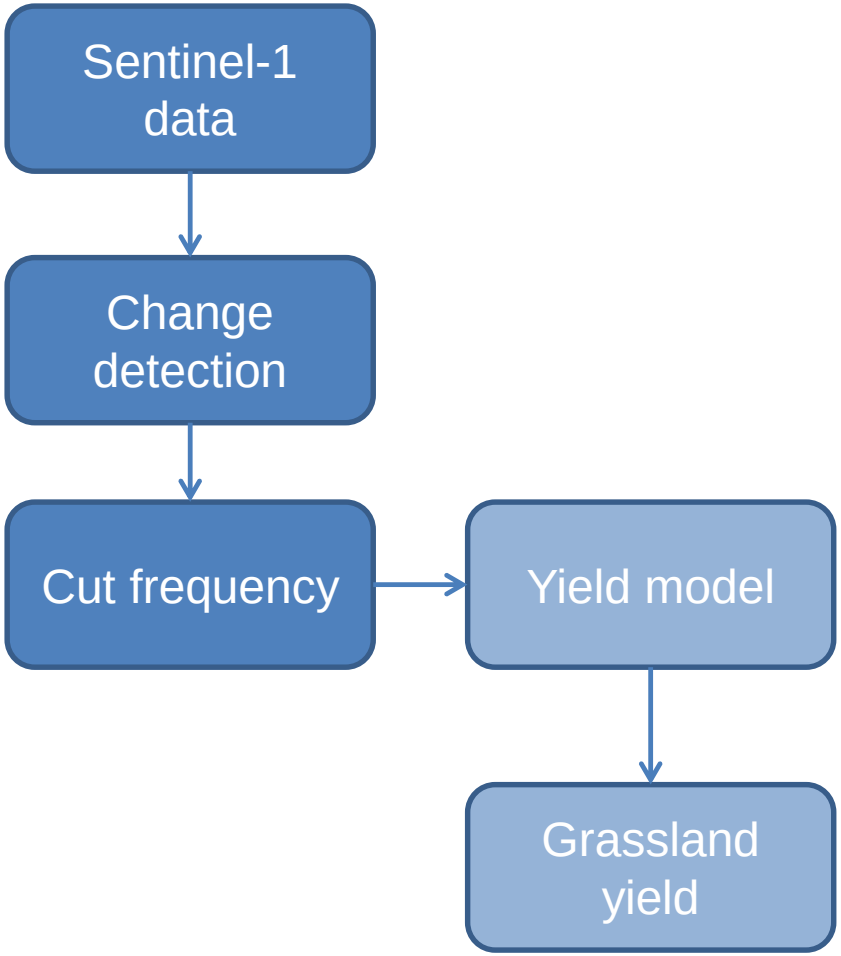
Goals:

A) A detection of grassland cutting frequency

B) Integration of grassland yield models

C) Permanent service & policy consulting

General workflow I



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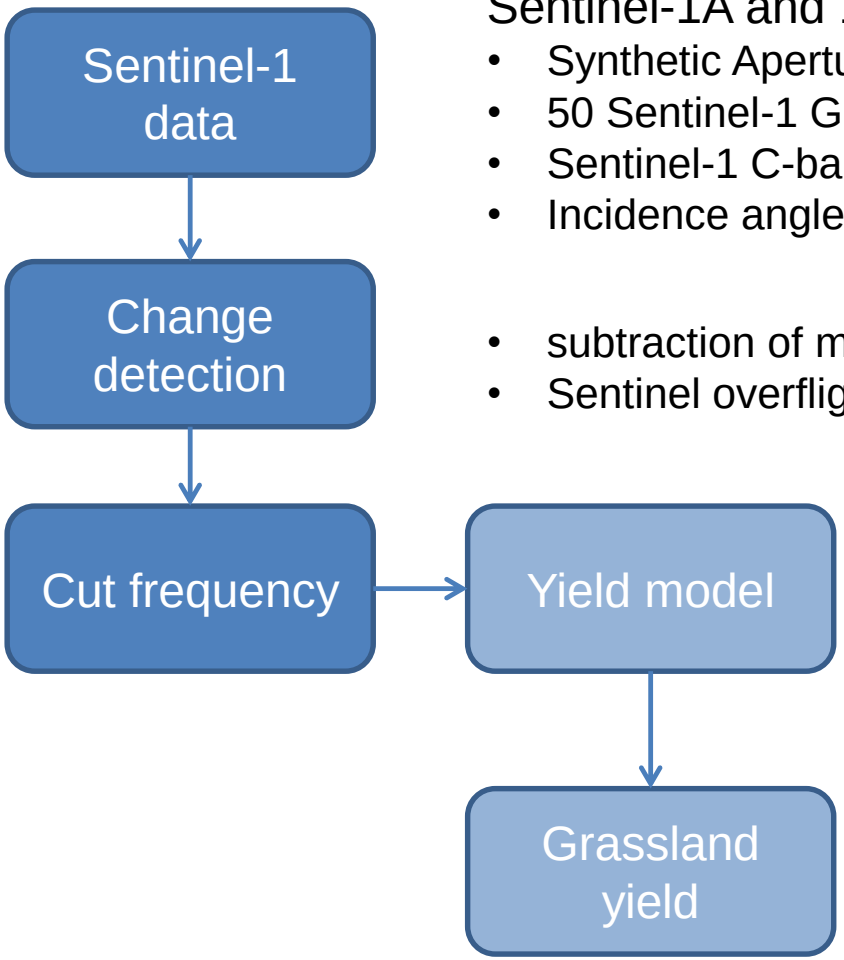


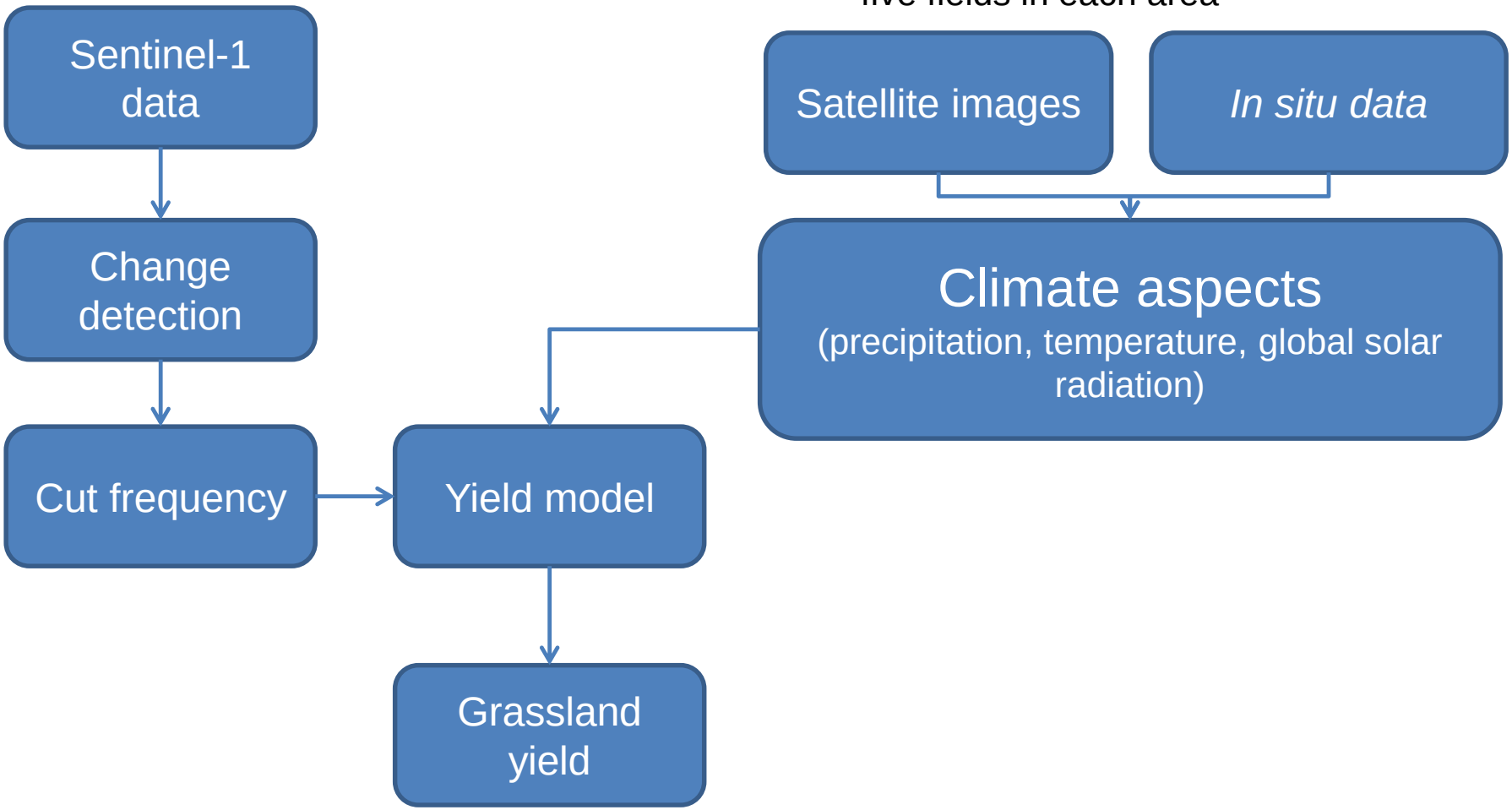
Sentinel-1A and 1B

- Synthetic Aperture Radar (SAR)
- 50 Sentinel-1 Ground Range Detected (GRD)
- Sentinel-1 C-band
- Incidence angle 35.18-37.27°

- subtraction of mean amplitude and coherence (dB unit)
- Sentinel overflight every 6-9 day

General workflow II

- Cutting time: May-October
- five fields in each area



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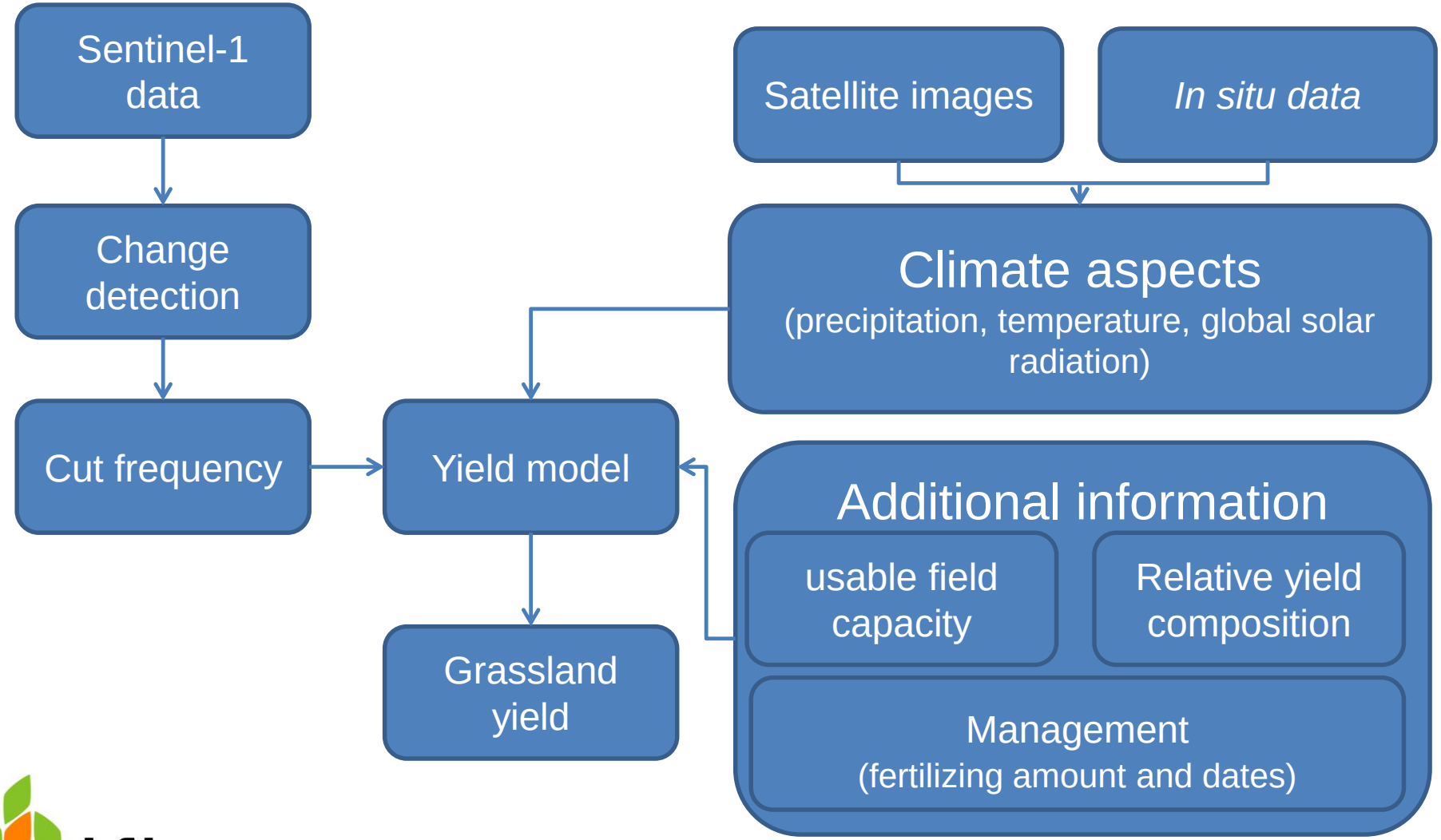
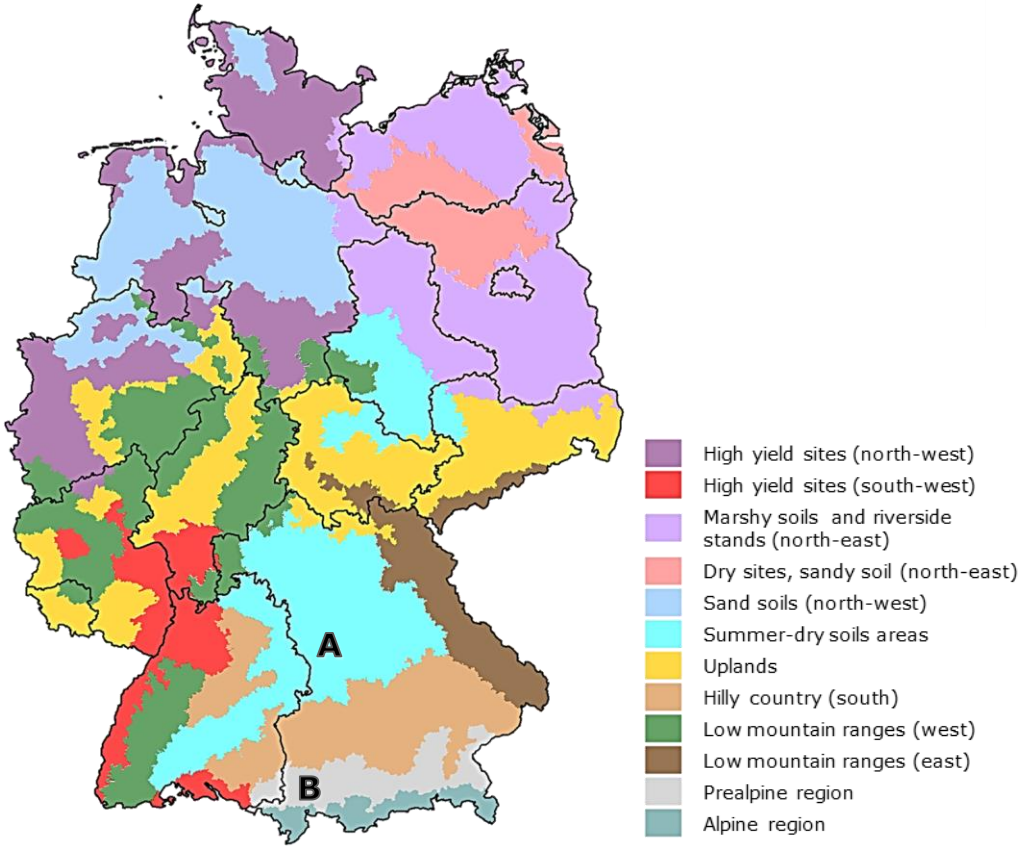
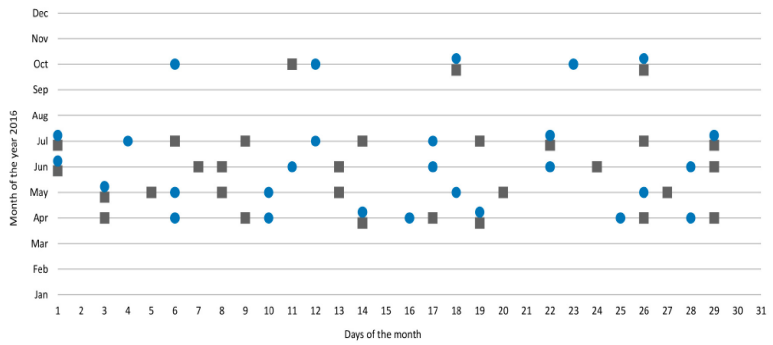
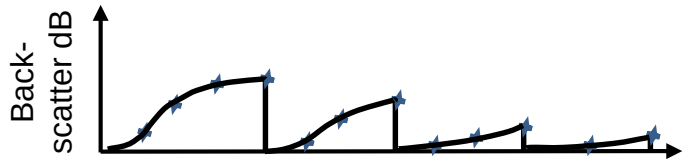
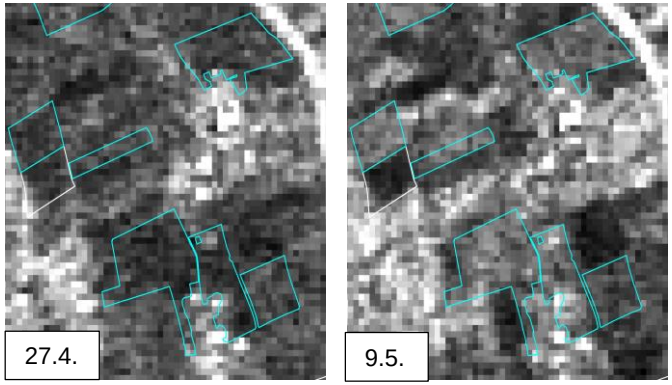


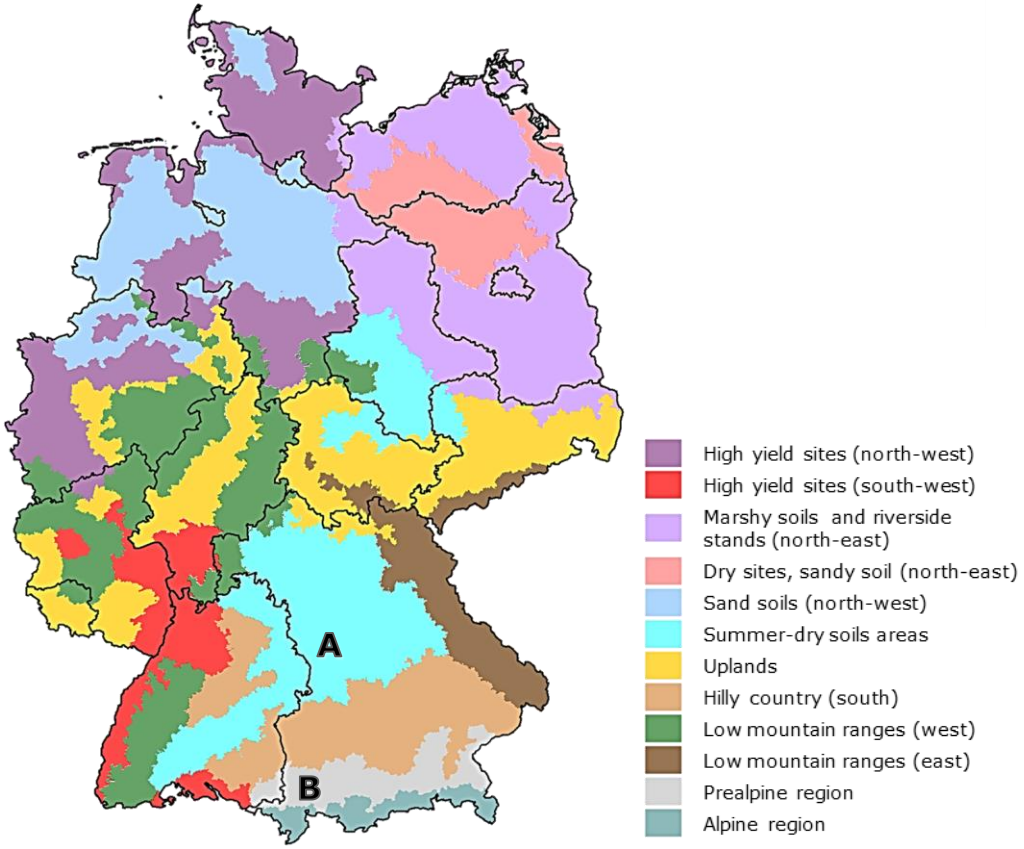


Test area
A) Triesdorf (8,3°C, 751mm, summer-dry soil, Cfb)
B) Kempten (7,6°C, 1.261mm, prealpine area, Cfb)









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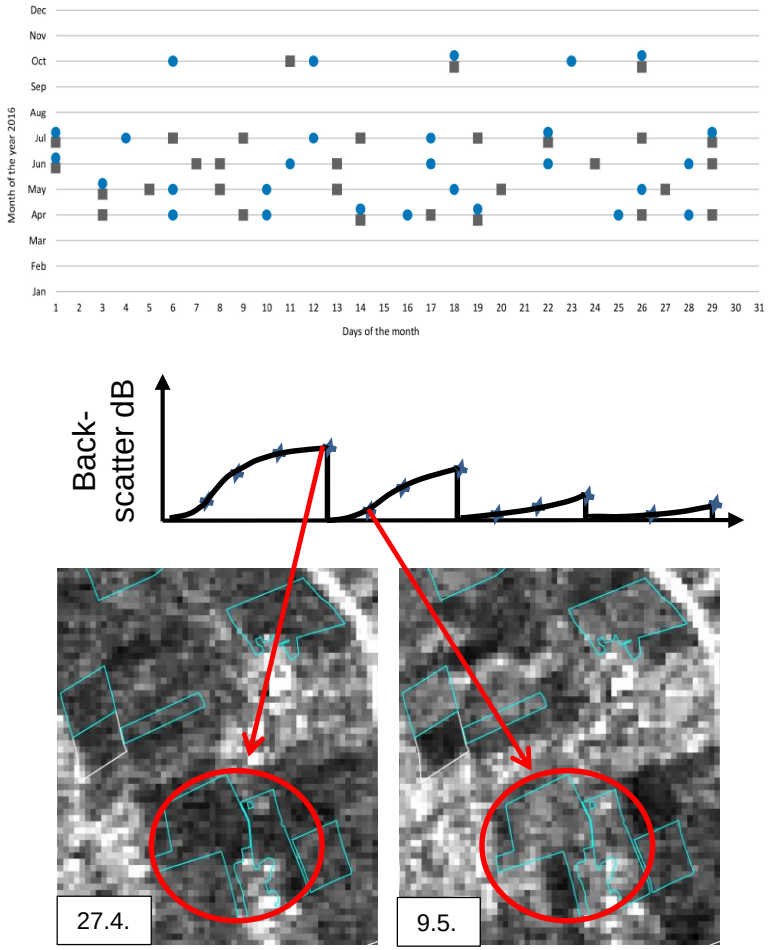

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Mowing or other managed grasslands producing less flowering heads and pollen

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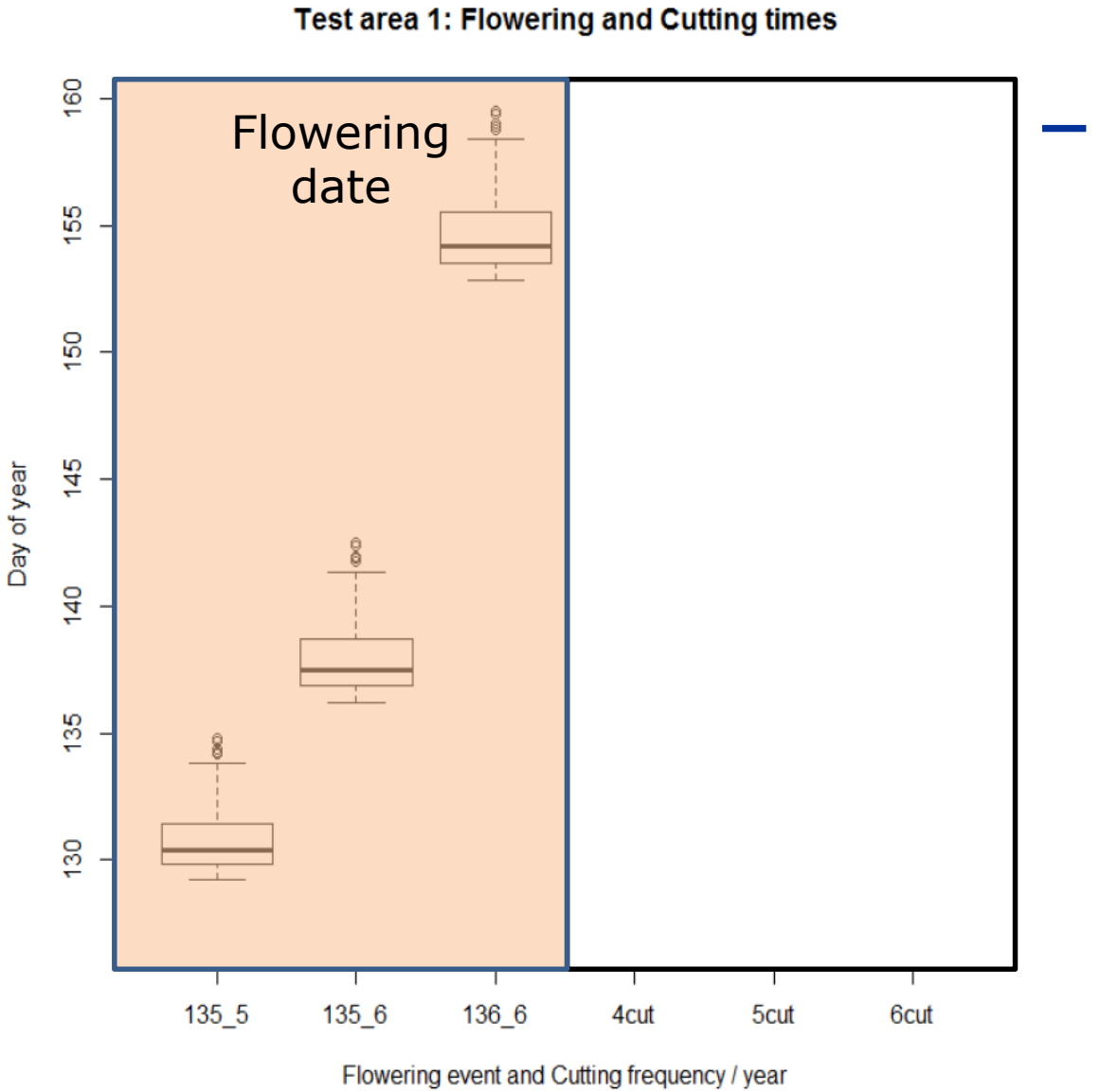
Goals:

A) Influence of the cutting dates

B) Reduction of pollen emissions through homogeneous cutting times possible

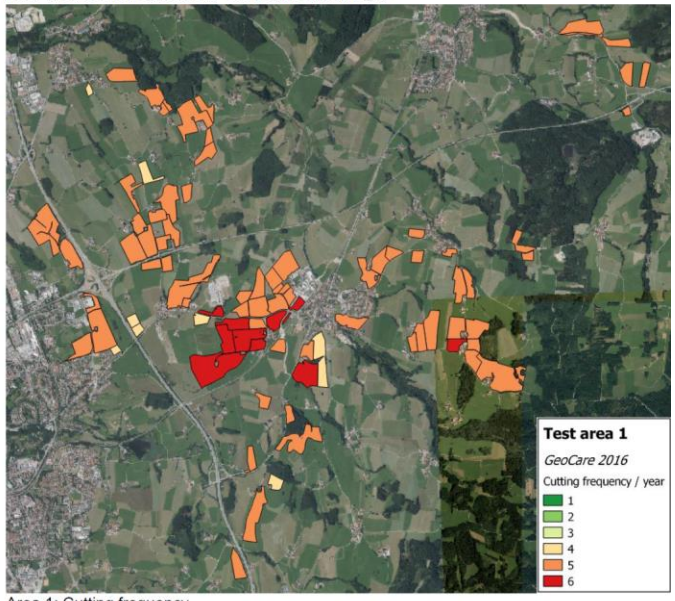
C) Share of utilized agricultural area at the pollen emission

Area 1: *Alopecurus pratensis*; Start of bloom; (135_5)

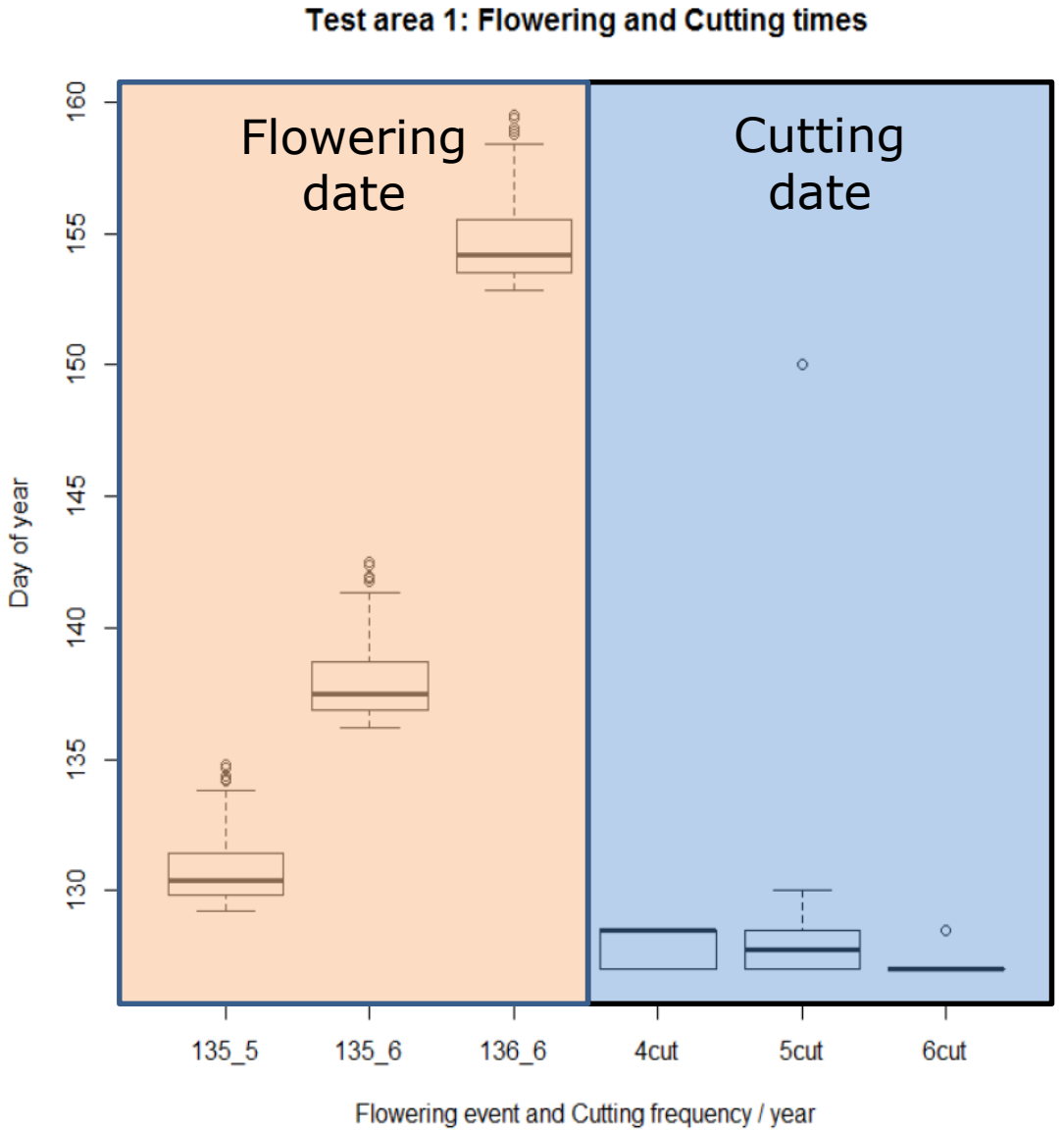


135_5: Start of bloom Meadow Foxtail (*Alopecurus pratensis*)
135_6: Full bloom Meadow Foxtail (*Alopecurus pratensis*)
136_6: Full bloom Cockfoot (*Dactylis Glomerata*)

Area 1: *Alopecurus pratensis*; Start of bloom; (135_5)



Area 1: Cutting frequency



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LfL Pflanzenbau

Thank your for your attention

more informations on:
https://www.lfl.bayern.de/ipz/gruenland/148995/index.php
https://www.lfl.bayern.de/ipz/gruenland/225791/index.php