



# Characterizing peatland vegetation at multiple scales – from field spectroscopy to spaceborne imaging spectroscopy

Christina Hellmann, Bernd Bobertz, Amelie Lucks, Arasumani Muthusamy, Gerit Neuenschwander,  
Carla Prüfer, Manuel Reese, Björn Waske, Marcel Schwieder, Sebastian van der Linden



# Motivation



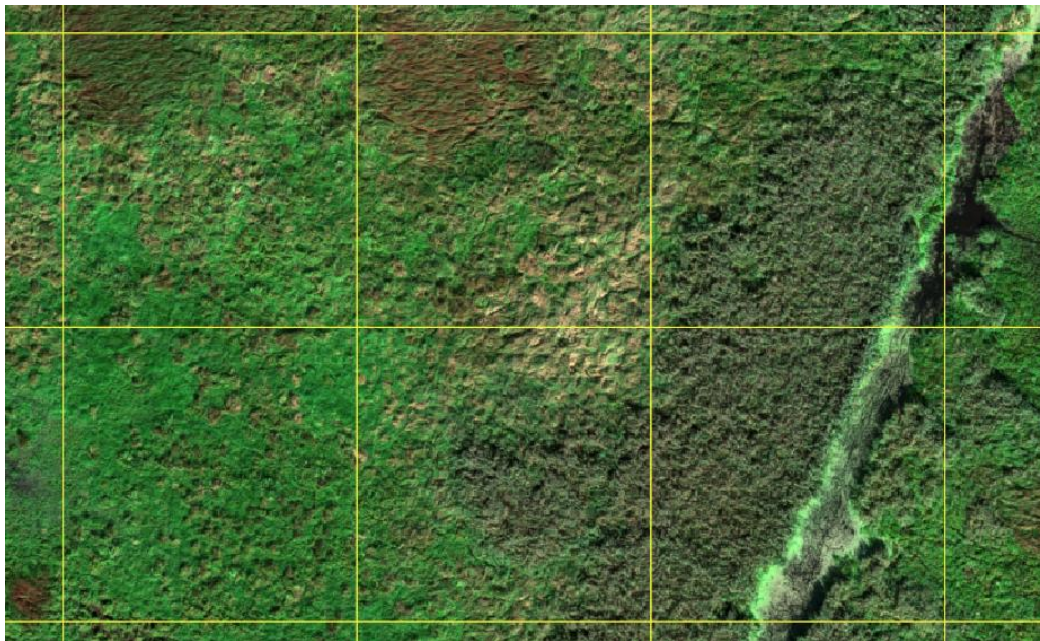
Aim: Assess rewetting success depending on vegetation cover

Focus:

- Understand spatio-temporal gradients of reflection from peatland vegetation or grassland
- Investigate the influence of scale

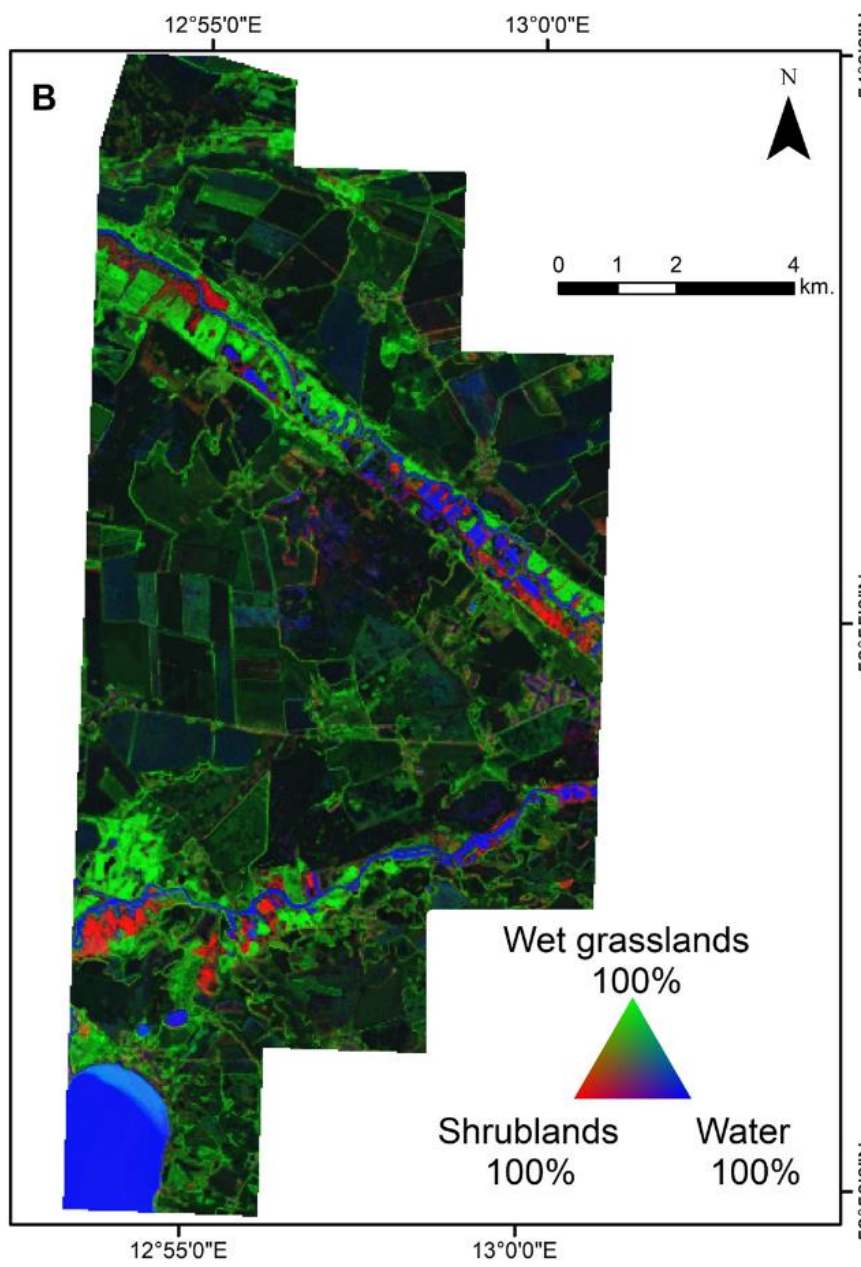
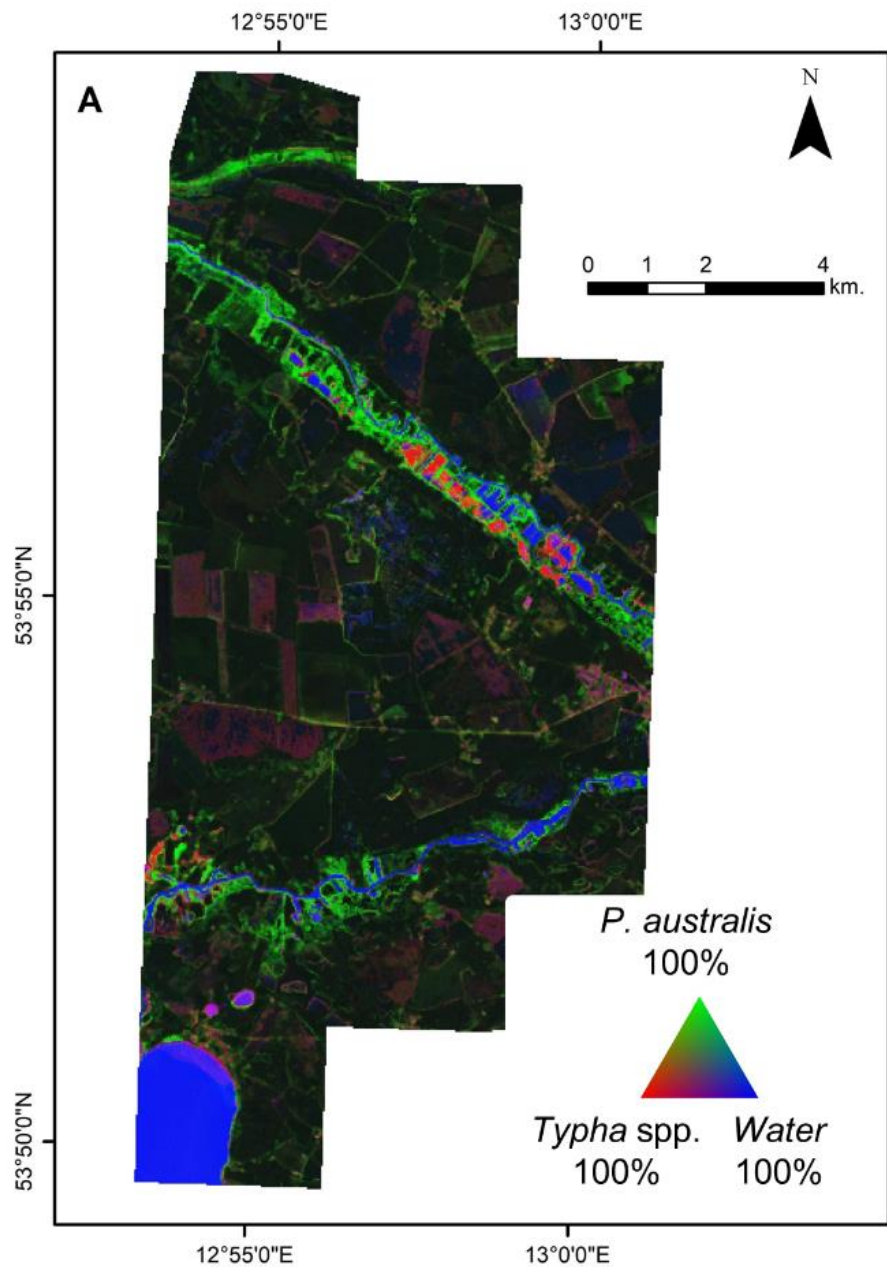


Reed (*Phragmites australis*) at 12 May 2023 (top) and 19 June 2023 (bottom) frontal (left) and nadir perspective (right)



MS drone data (RGB) with the EnMAP-30x30m raster grid



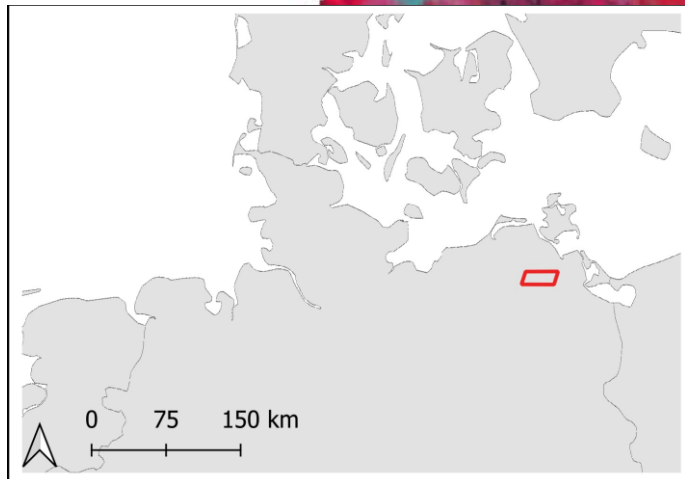


Fraction maps  
 April and June PRISMA data  
 Arasumani et al. 2023

Fraction maps based on the April-June PRISMA data for A) *P. australis*, *Typha* spp., and water, and B) shrublands, wet grasslands, and water.



# Study area



Rustow Randow

Zarnekow


EnMAP scene at 02 June 2023, bands 75, 46, 29




# Remote sensing data



EnMAP Scene from 02 June 2023.  
RGB: 863nm, 653 nm, 555nm.

 Rustow Randow

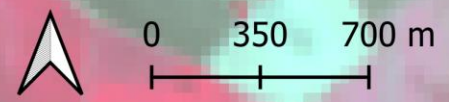
 0 350 700 m



# Remote sensing data



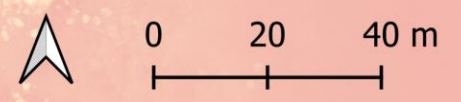
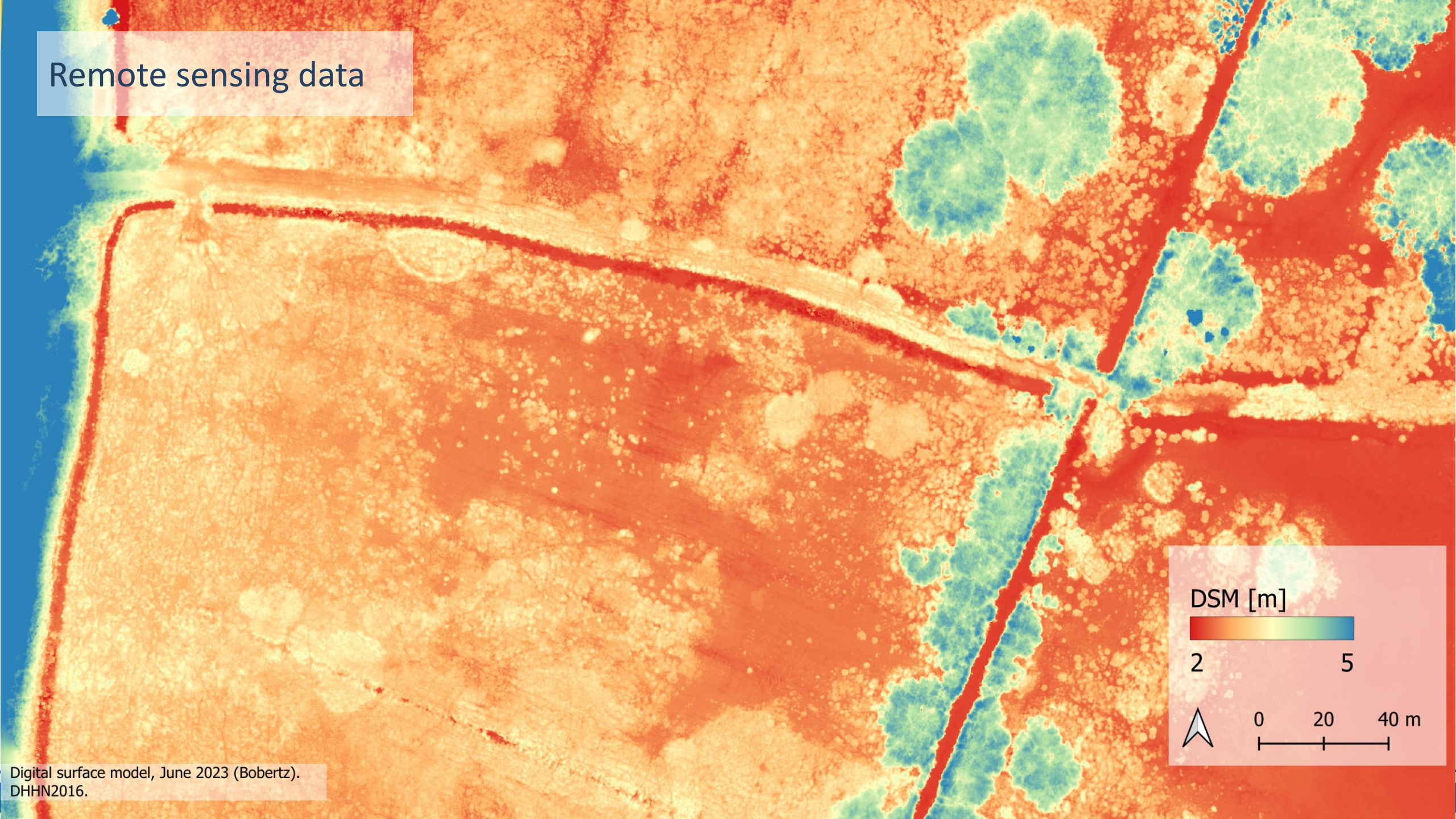
□ Rustow Randow



EnMAP Scene from 18 August 2023.  
RGB: 863nm, 653 nm, 555nm.



# Remote sensing data

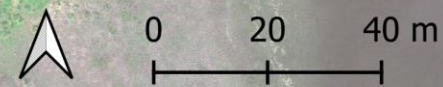


Digital surface model, June 2023 (Bobertz).  
DHHN2016.



# Remote sensing data

Multispectral drone imagery (right), June 2023  
(Bobertz). RGB: R,G,B.

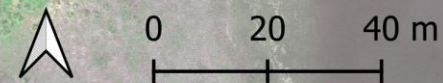




# Remote sensing data

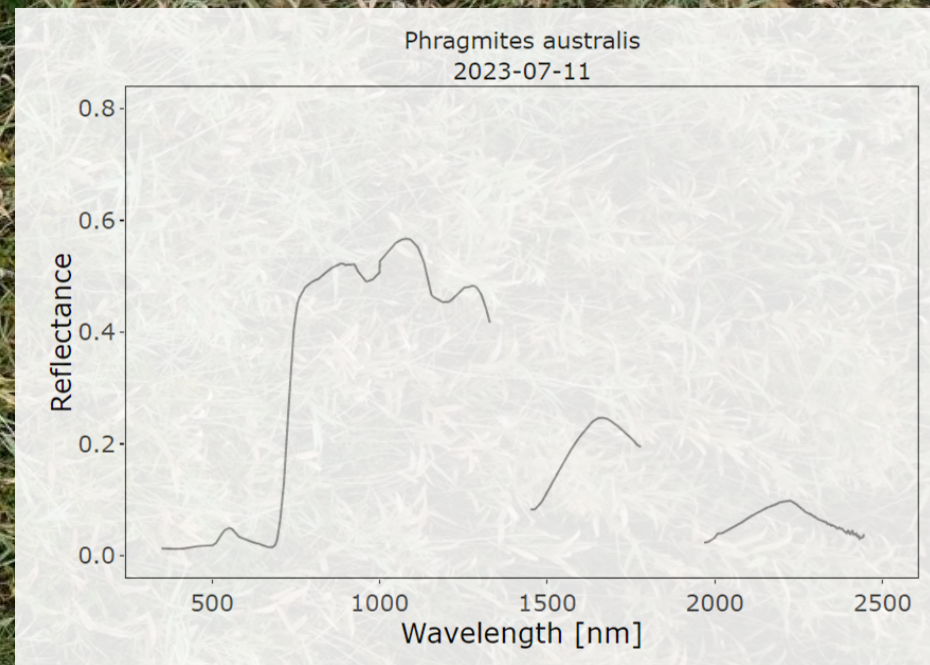


Multispectral drone imagery (right), June 2023  
(Bobertz). RGB: R,G,B.  
Hyperspectral drone imagery, June 2023 (Reese). RGB:  
645nm, 510nm, 440nm.





# Remote sensing data





## Vegetation data



2 field campaigns  
two weeks in June and September

### Plots:

66 plots, à 4m x 4m

60m grid

Fraction covers of water, soil, NPV, green  
vegetation

All species with respective cover





*Phragmites australis* – Reed, May



*Juncus effusus* - May



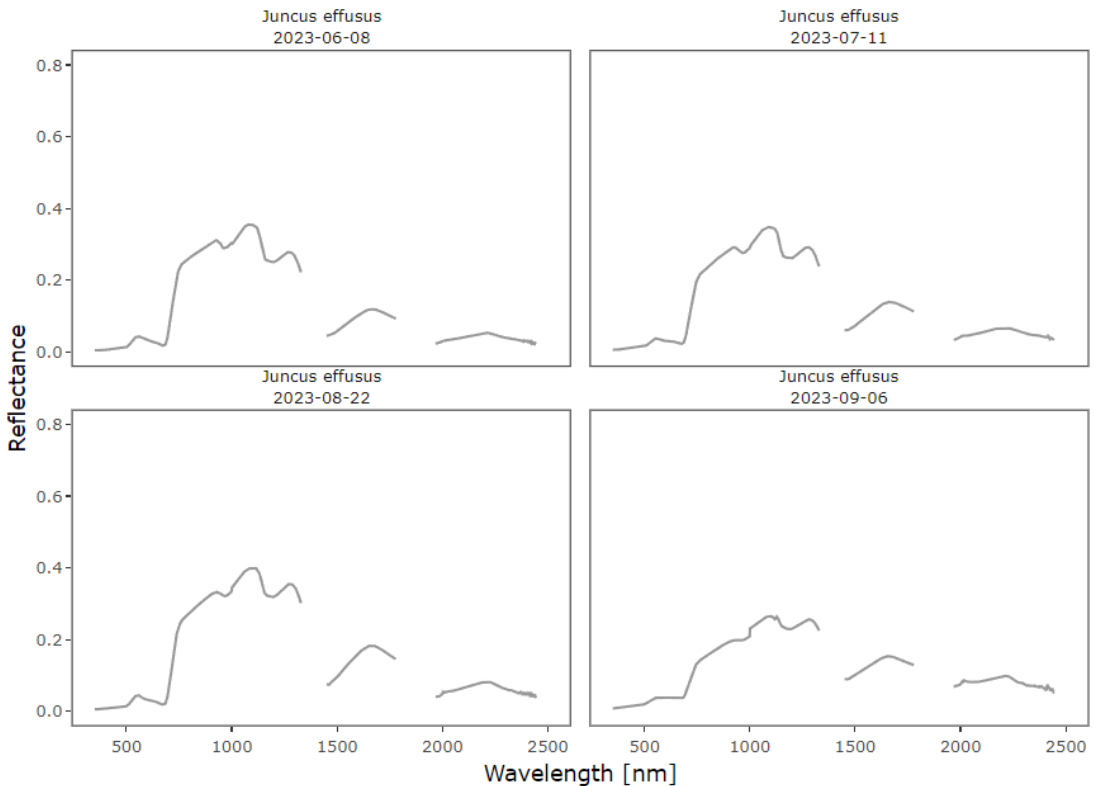
*Phalaris arundinacea* – Reed canarygrass, June



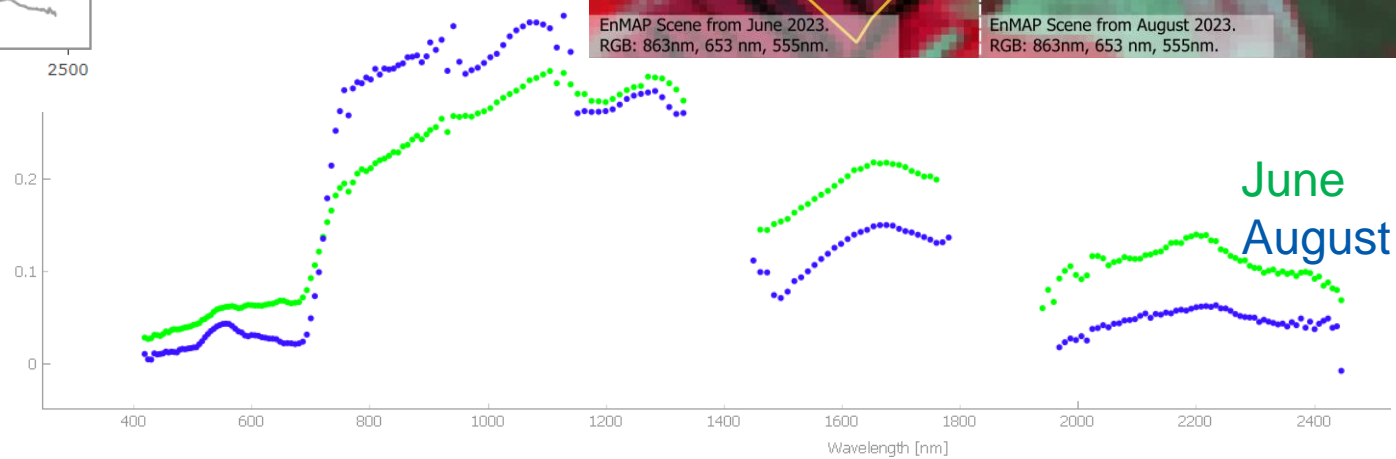
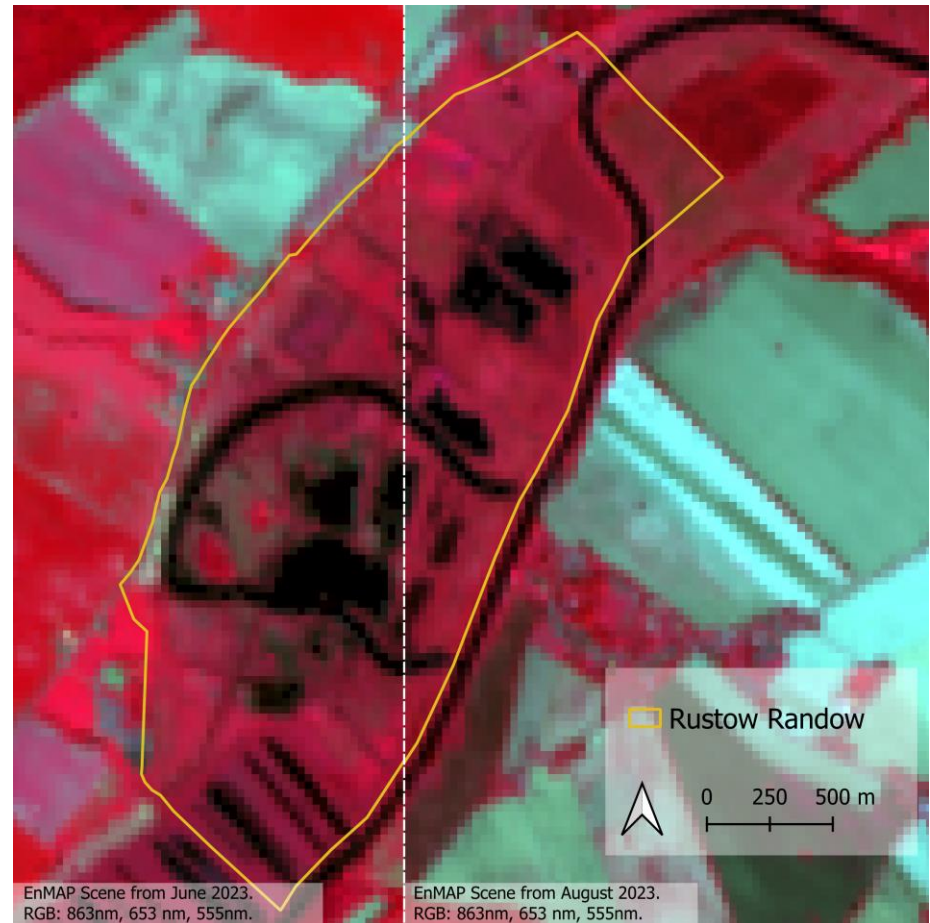
*Iris pseudacorus* - May



# Temporal scale

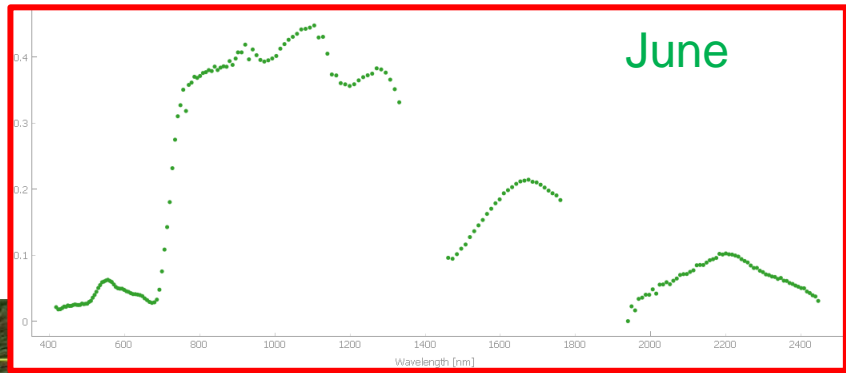


Nadir view, 8° FOV.





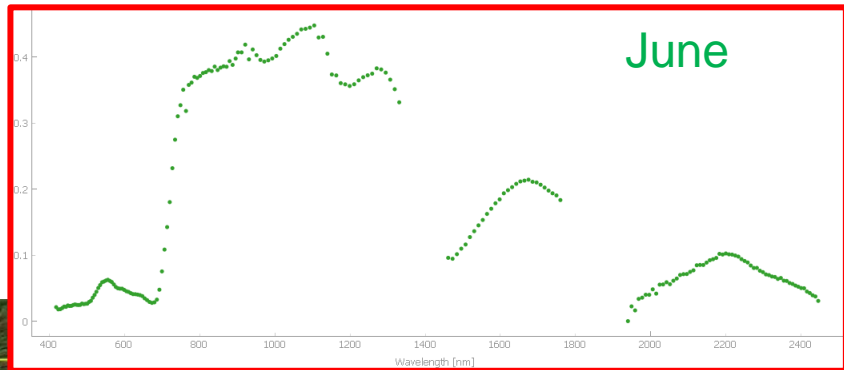
# Spatial scale



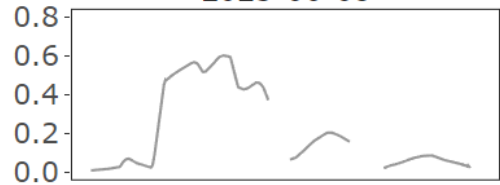
Nadir view, 8° FOV.



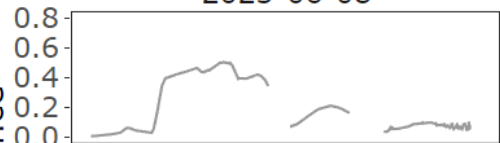
# Spatial scale



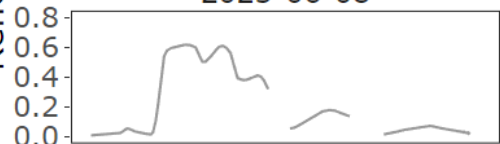
*Agrostis stolonifera*  
2023-06-08



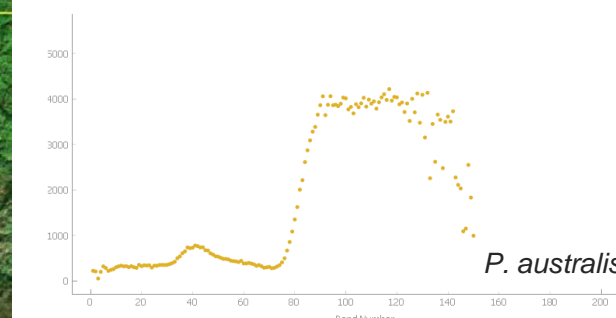
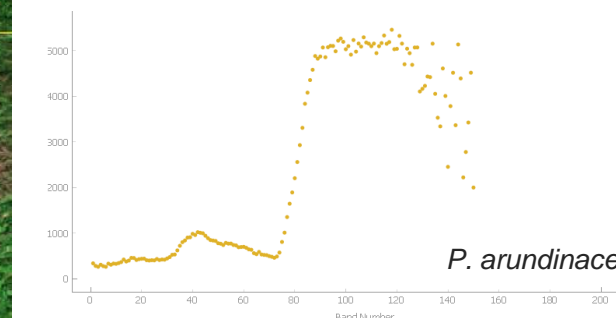
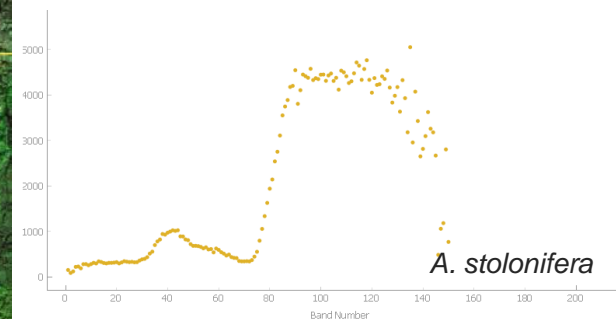
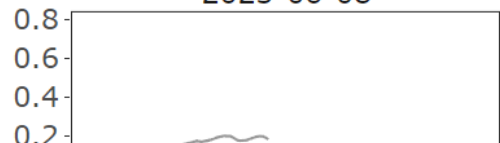
*Eleocharis palustris*  
2023-06-08



*Phalaris arundinacea*  
2023-06-08



*Phragmites australis*  
2023-06-08



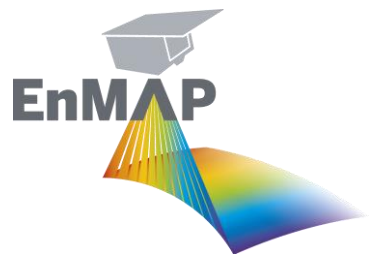
Nadir view, 8° FOV.



# Outlook

- Data collection: (multitemporal) spectral database, multi- and hyperspectral data
- *Multitemporal vegetation analysis*
- Quantitative mapping of peatland vegetation on rewetted peatlands
  - Spectral unmixing
  - Ordination analysis
- Synergies with S-1/S-2 time series analysis, CopGrün → Thünen Institute





Funded by



Bundesministerium  
für Wirtschaft  
und Klimaschutz