

# From phreatophyte species to groundwater-dependent vegetation in the Mediterranean

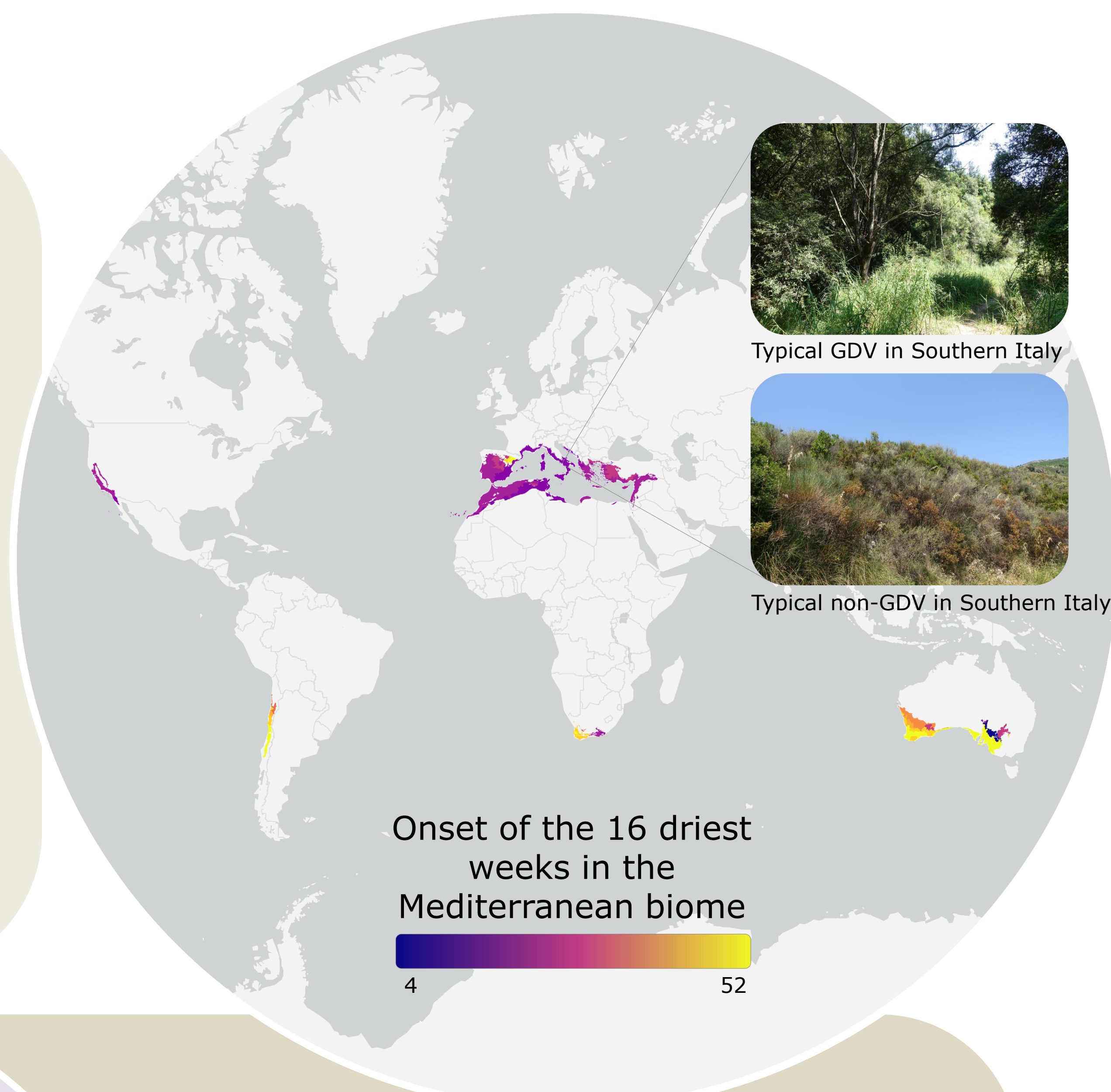
Léonard El-Hokayem, Gabriella Damasceno, Helge Bruehlheide, Francesco Maria Sabatini, Christopher Conrad

## Motivation

- Groundwater-dependent vegetation (GDV) is regionally critical for biodiversity and ecosystem services
- In the Mediterranean biome, 31% of the vegetation have a high potential to be GDV<sup>1</sup>
- Climate and land use change threaten GDV<sup>2</sup>

## Objectives

- Integration of plant community data and remote sensing to identify both species and communities, indicative for GDV in the Mediterranean
- Species lists can support field identification of GDV
- A detailed map helps to protect GDV



## Concept

### I Species Level

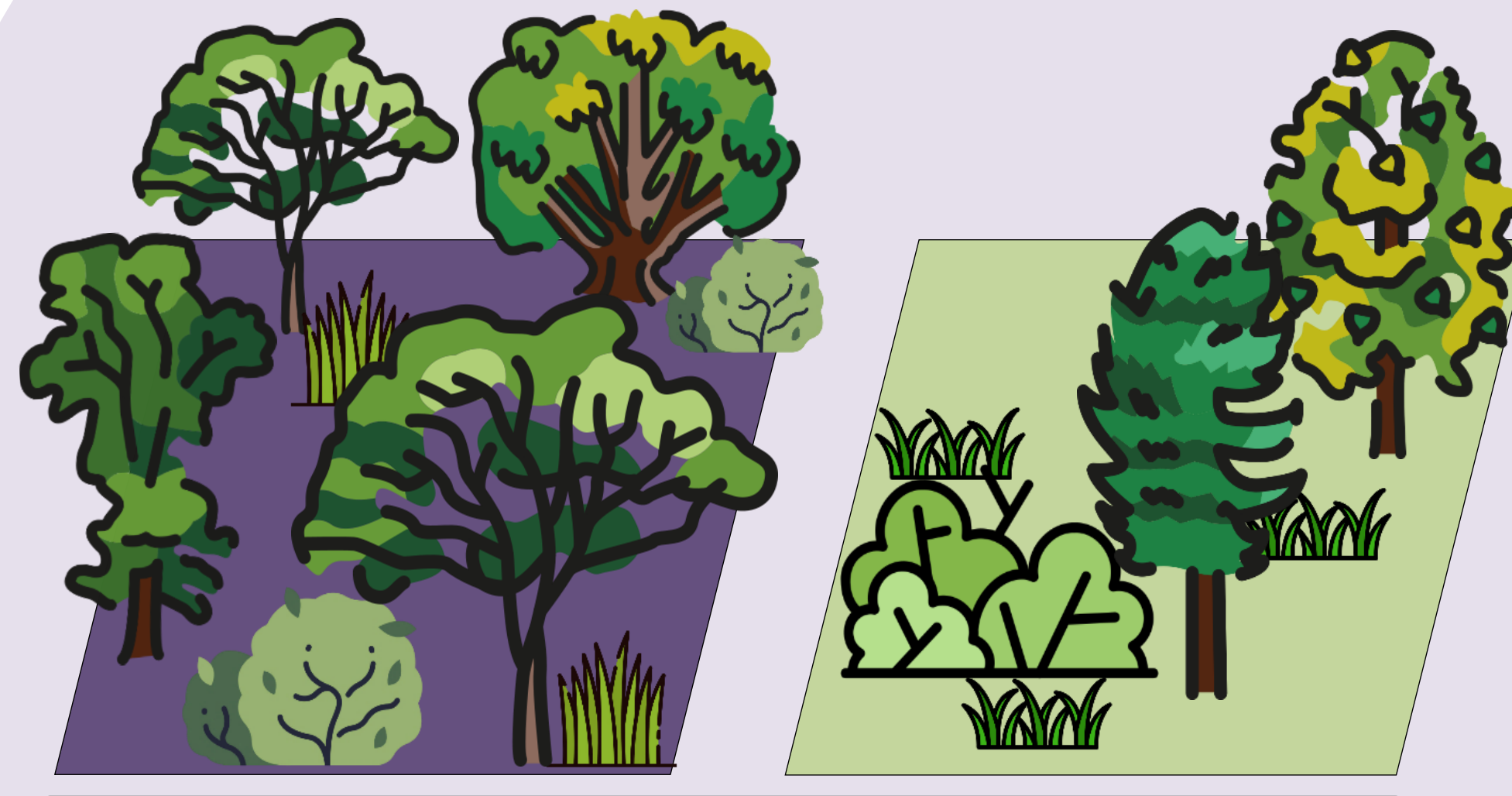


GBIF

Phreatophytes

Fidelity  
Co-occurrence

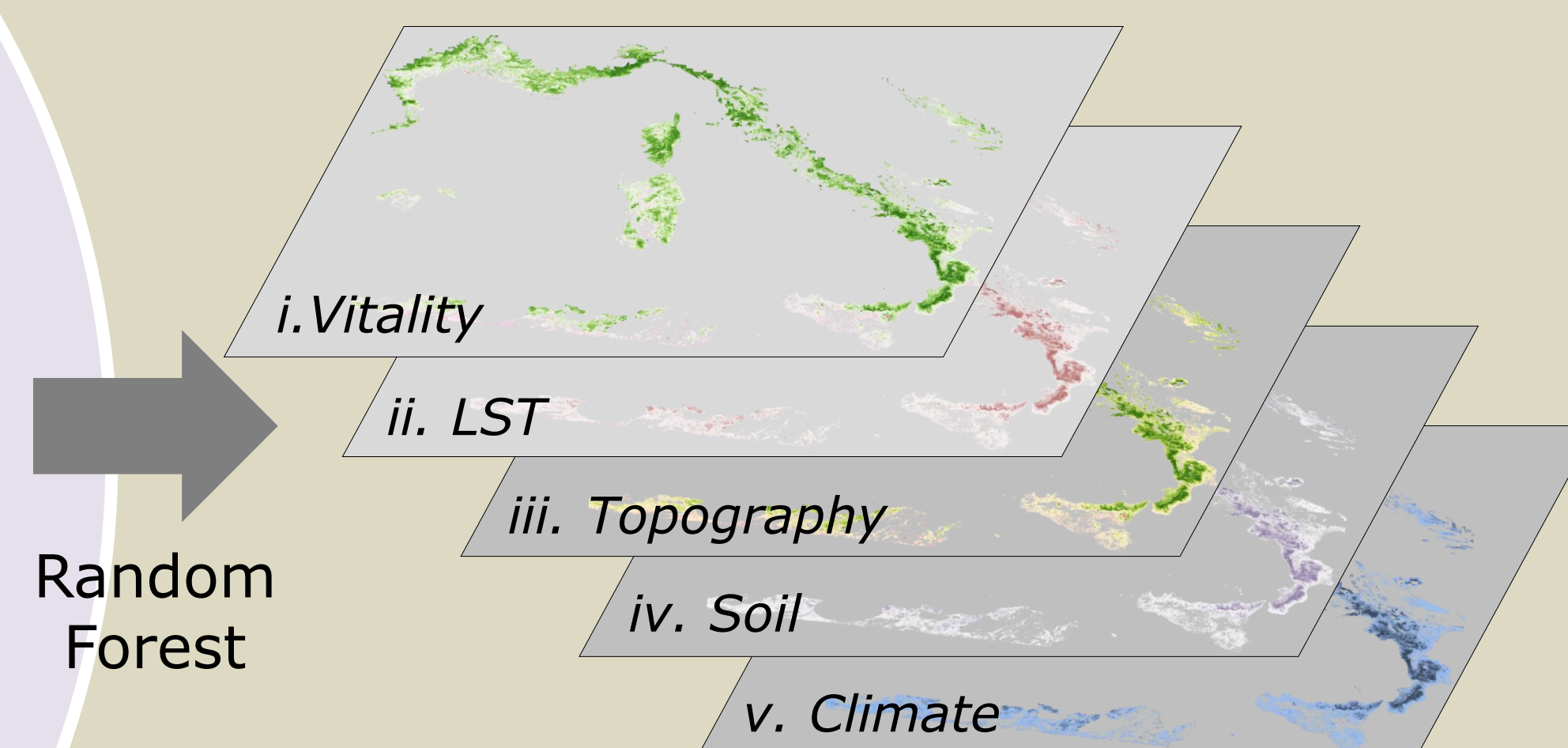
### II Plot Level



sPlot

Phreatophyte cover  
GDV / non-GDV plots

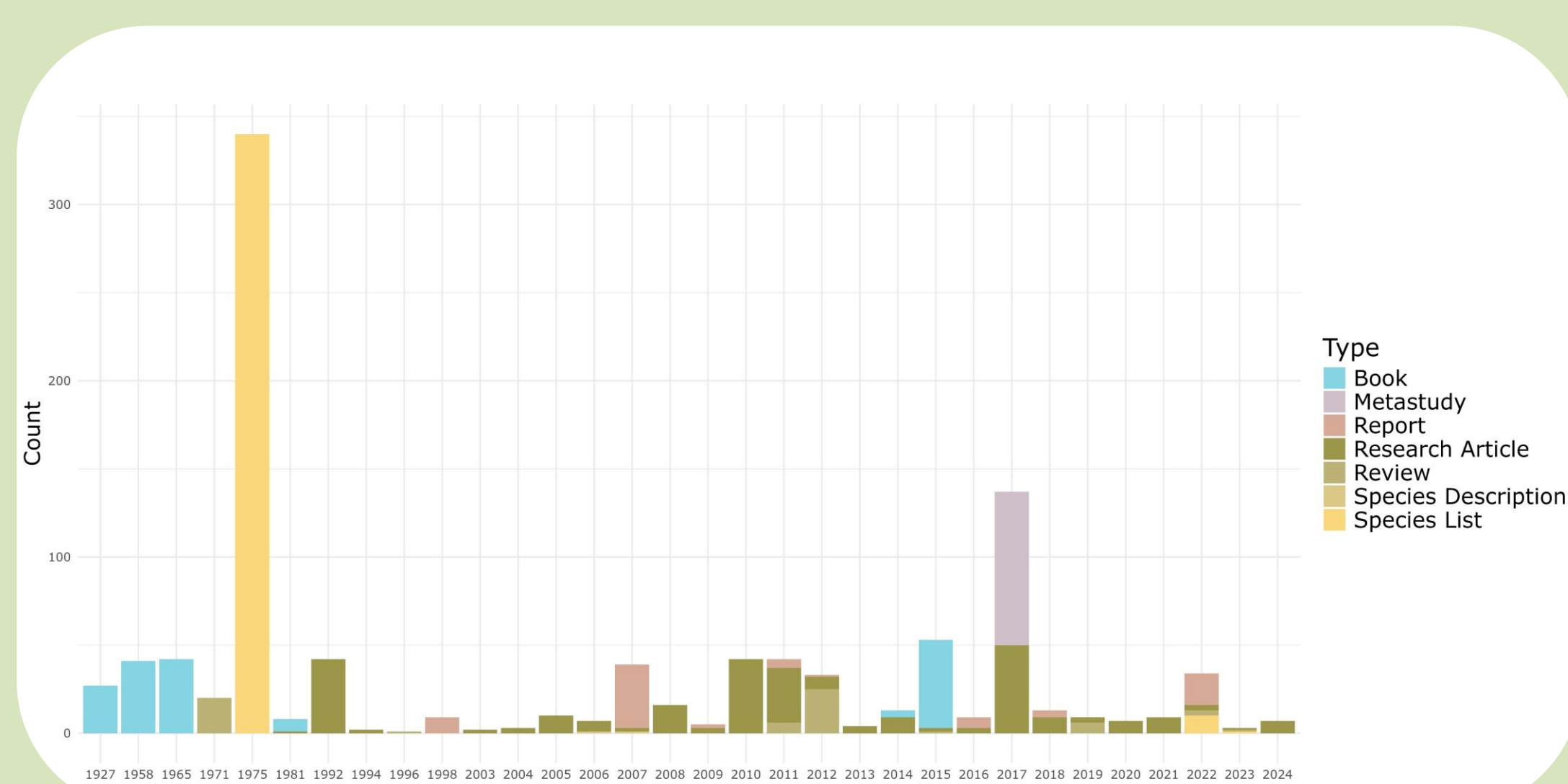
### III Biome Level



Random Forest

Remote Sensing

## Preliminary results



Species Level: Overview of publications indicating phreatophyte species

- 270 obligate
- 752 facultative
- 6 genus
- 48 species based on Phi
- 12 co-occurring

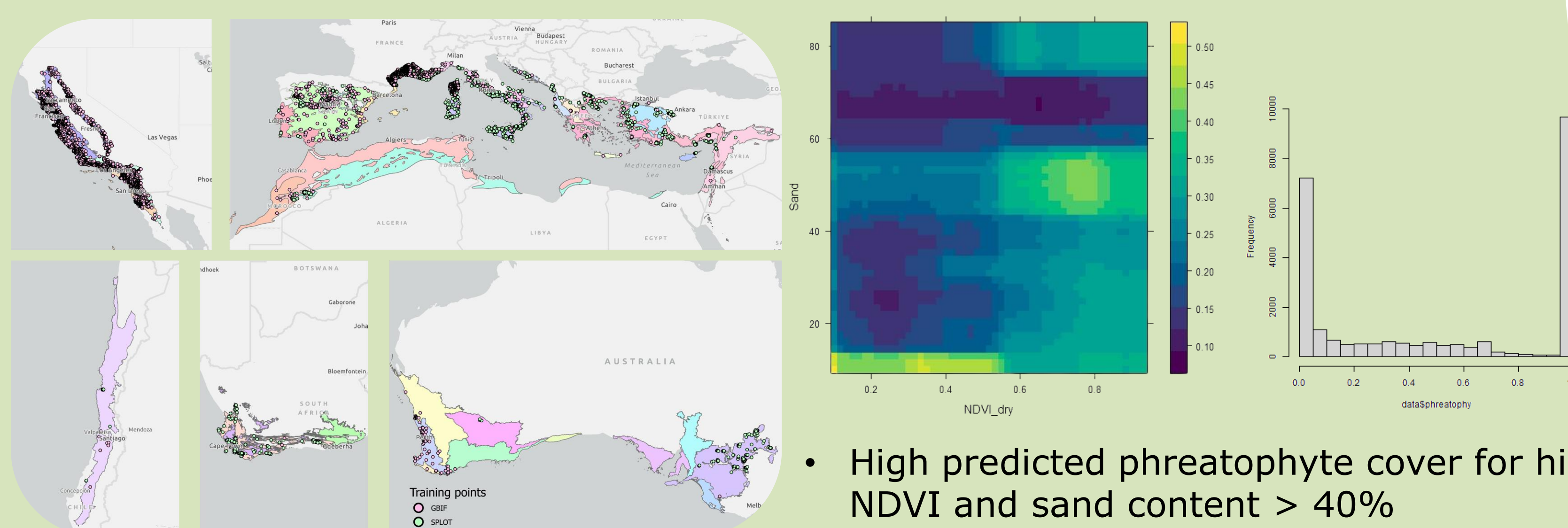
## Conclusion

### Species / Plot Level

- 1,082 phreatophyte species derived from literature review and vegetation analysis (574 in the Mediterranean)
- Most plots located in the Mediterranean Basin (62% terrestrial vegetation, 25% wetland, 12% riverine, 1% coastal)
- Extend training data using GBIF
- 50% plots are GDV / non-GDV

### Biome Level

- RF overall accuracy 0.83
- RVI\_dry, elevation and sand content are most important parameters for mapping GDV in the Mediterranean



Plot Level: Overview of plots per ecoregion, phreatophyte cover and dependency patterns

- High predicted phreatophyte cover for high NDVI and sand content > 40%
- Unexpected pattern for low NDVI and low sand content (dry rivers, wetlands)

<sup>2</sup>Pérez Hoyos, I.C., Krakauer, N.Y., Khanbilvardi, R. & Armstrong, R. A., 2016. A Review of Advances in the Identification and Characterization of Groundwater Dependent Ecosystems Using Geospatial Technologies. Geosciences, 6, 17.

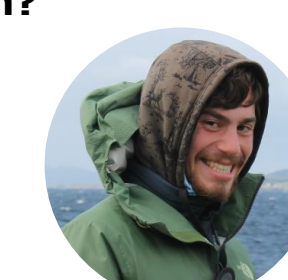
Icons: flaticon.com

Acknowledgment: The research was funded by the Federal State of Saxony-Anhalt via the MLU|BioDivFund.

Questions about our research or collaboration?

Please contact:  
Léonard El-Hokayem  
leonard.el-hokayem@geo.uni-halle.de

Institute of Geosciences and Geography  
Martin Luther University Halle-Wittenberg



<sup>1</sup>Check our latest publication in Science of the Total Environment