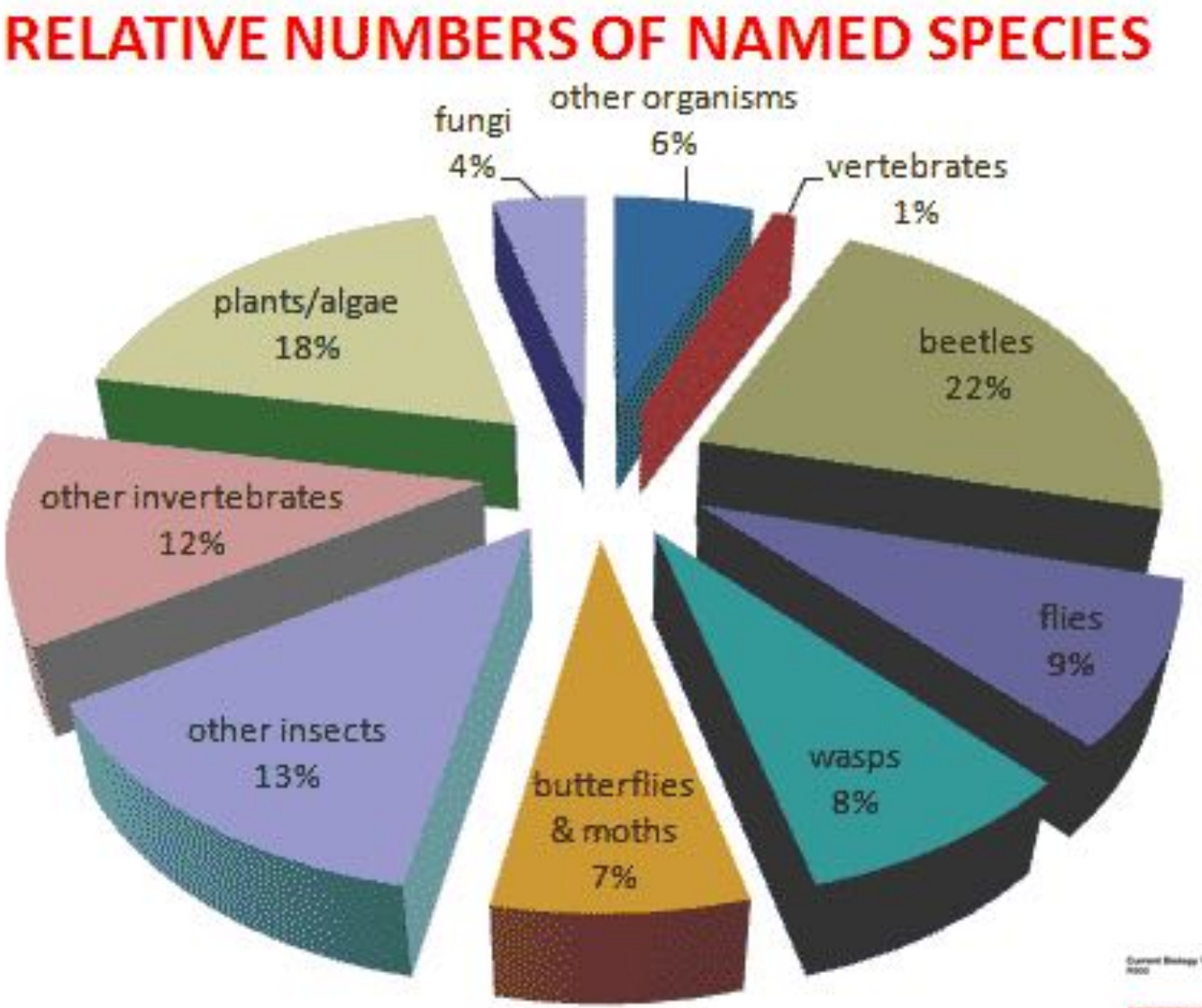
Predicting microbial biodiversity with image spectroscopy and eDNA

- A.K.Skidmore, A. Siegenthaler, D. Adiningrat, Y.Duan, M. Lock, M. Rousseau, A. Torres-Rodriguez, R. Darvish, E. Neinavaz, T.Wang, A. de Groot



Primer

Biodiversity in water and on land

Species are central to our concept of biodiversity

nature ecology & evolution

PERSPECTIVE

Priority list of biodiversity metrics to observe from space

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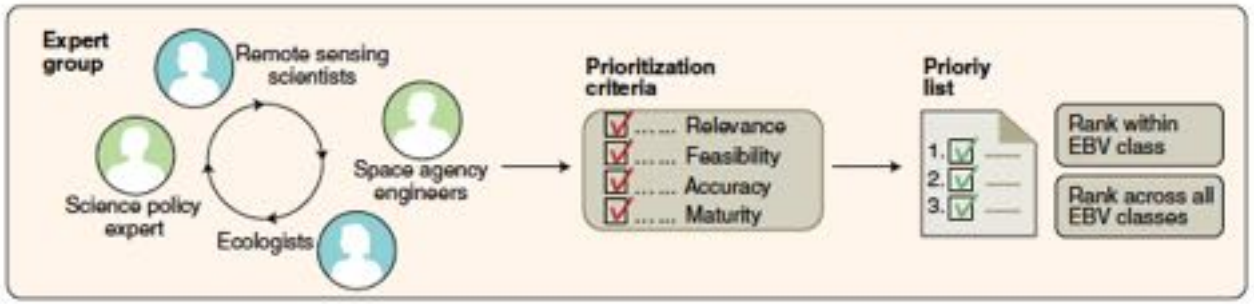
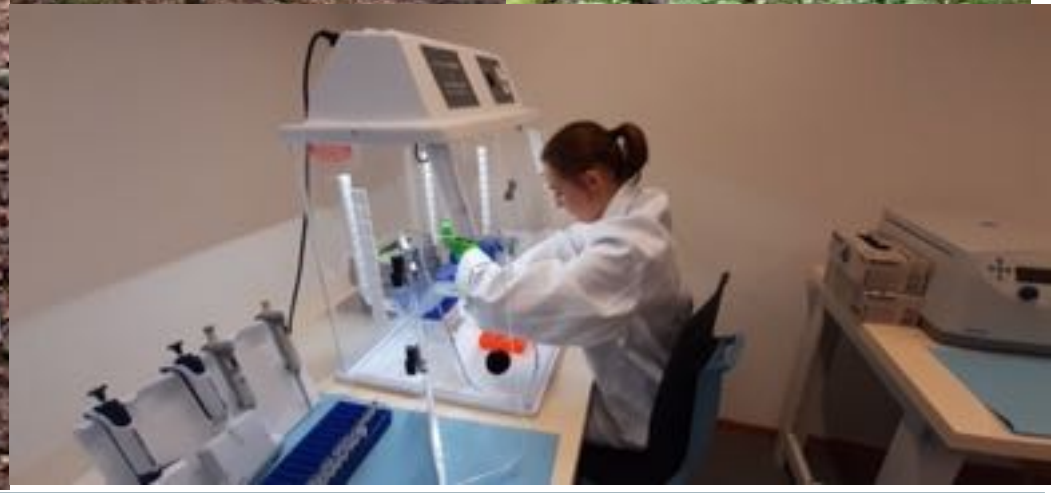


- Species abundance ranked 28
- Relative species abundance ranked number 29

Field and laboratory work



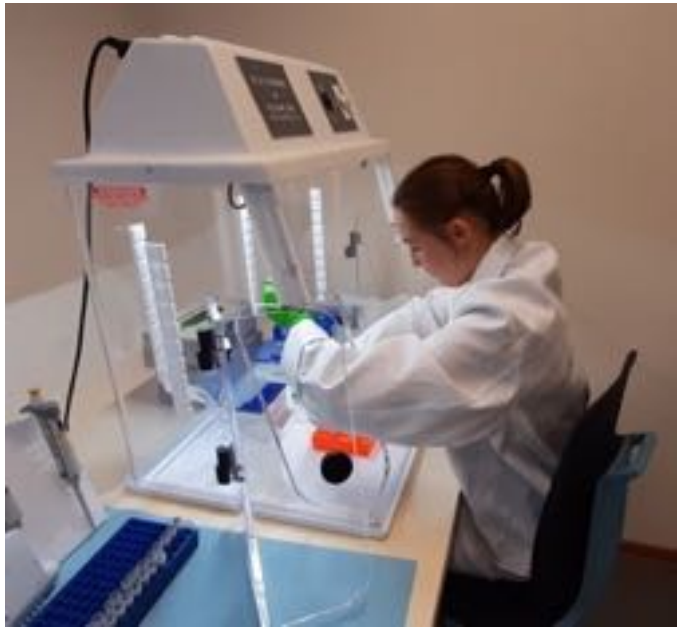


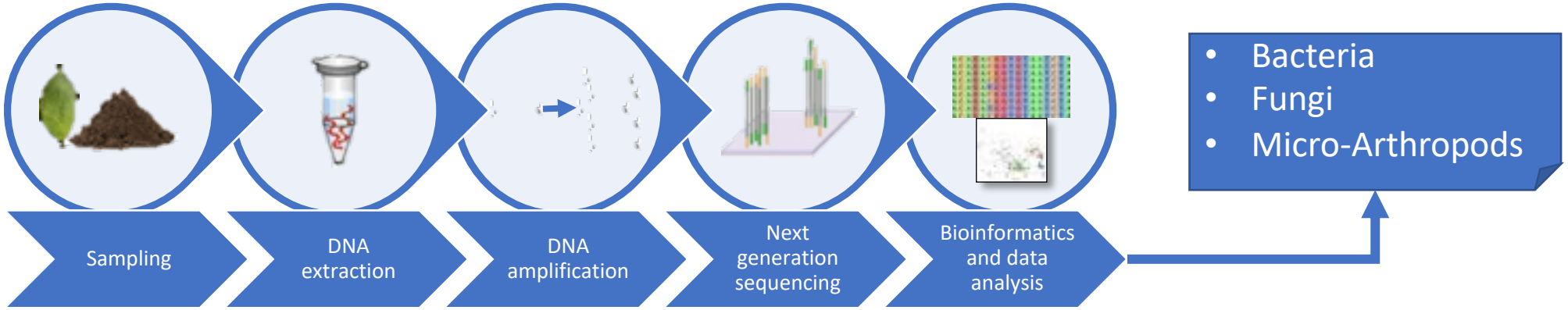



Biophysical data

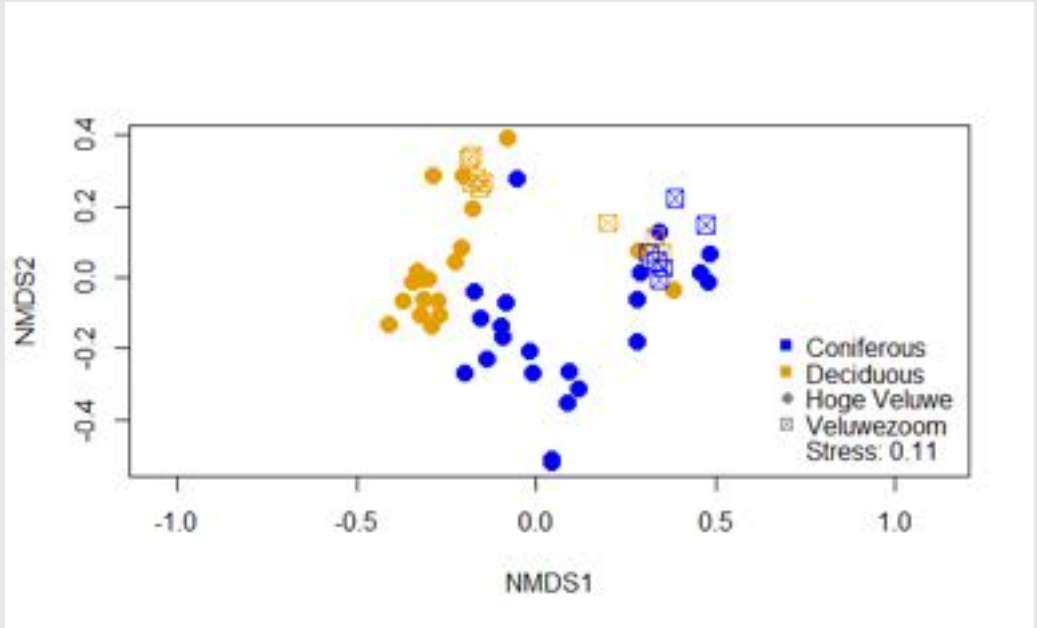
Variable	Abbreviation	Mean	SD	
Leaf Chlorophyll	chl	55.00	11.01	%
Leaf Carotenoids	Car	9.98	2.14	%
Leaf Carbon	C-LF	50.30	0.81	%
Leaf Nitrogen	N-LF	2.13	0.43	%
Leaf water content	H2O-LF	0.53	0.02	%
Specific leaf area	SLA	8.47	3.59	mm^{-2}
Vegetation species richness	GV	1.40	1.14	Per 9 m^{-2}
DBH	DBH	35.65	11.53	cm
Tree height	Height	20.00	4.05	m
Stand Density	Density	418.55	296.33	stand/Ha
LAI	LAI	2.76	1.19	
Soil pH	pH	3.26	0.12	

METHODS BIOSPACE ENVIRONMENTAL DNA (eDNA)

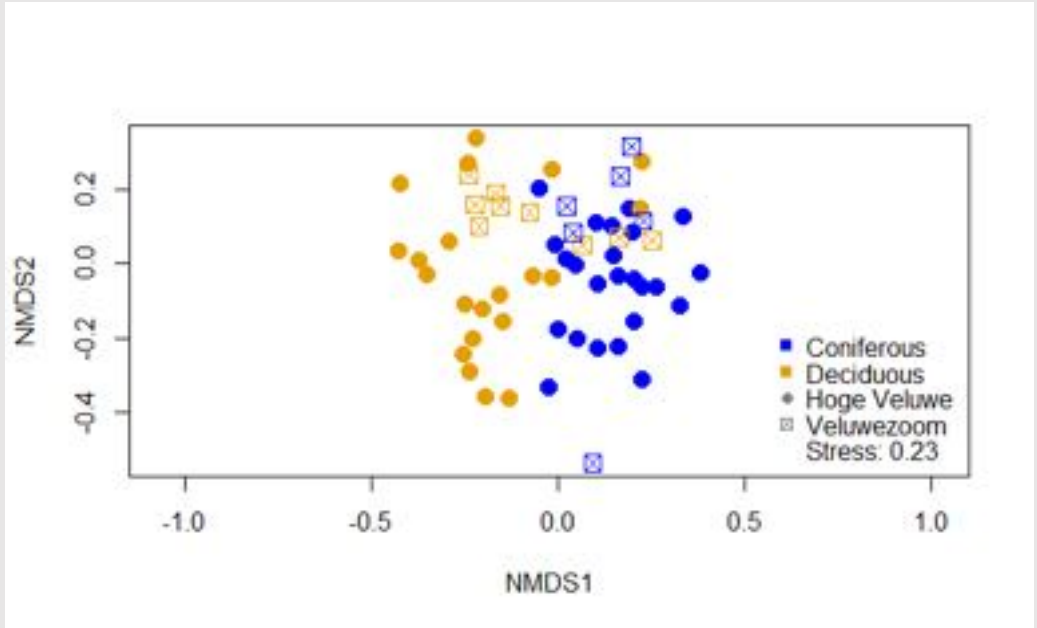




EXAMPLE: FUNGAL COMMUNITY STRUCTURE, VELUWE



Phyllosphere samples

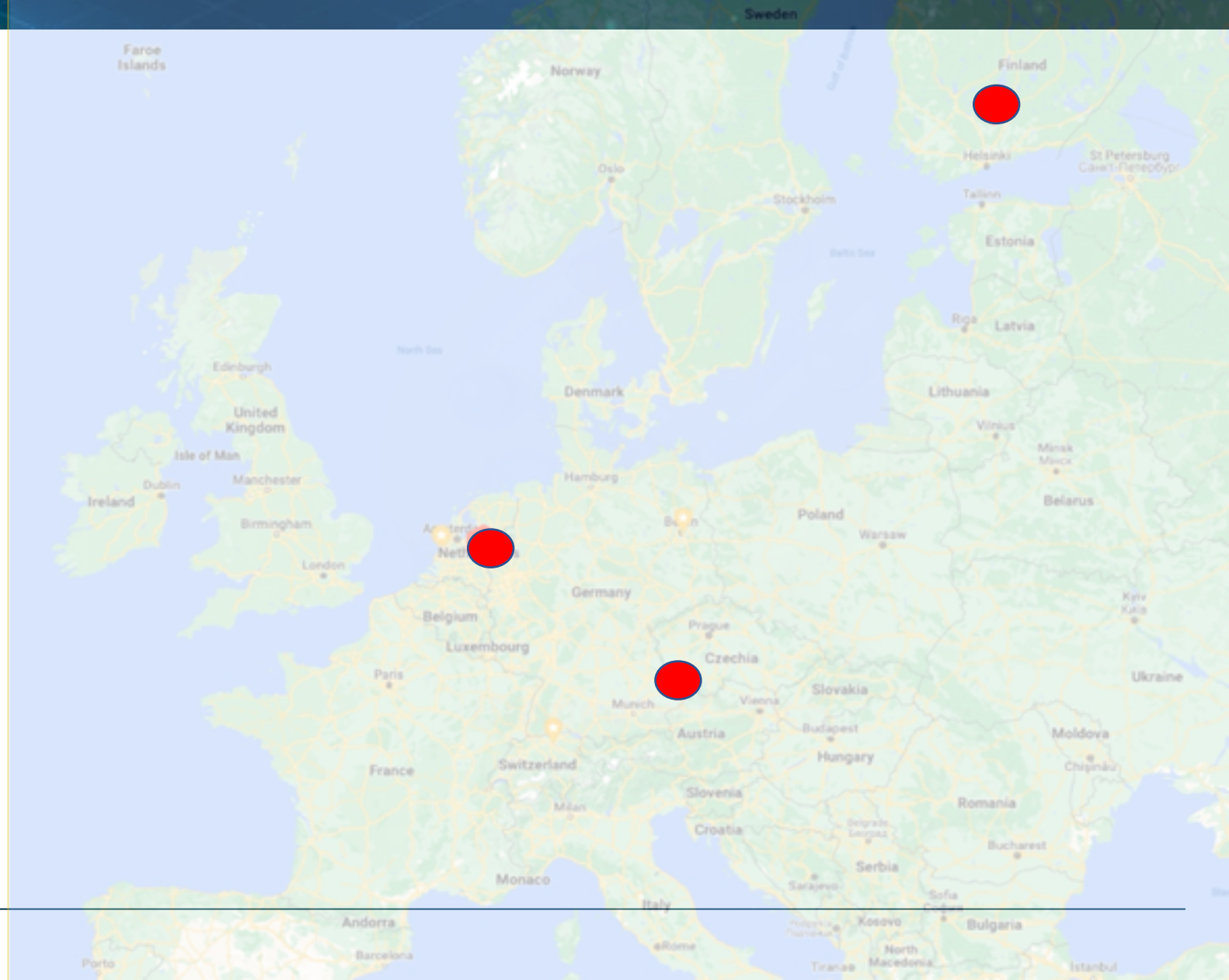


Soil samples

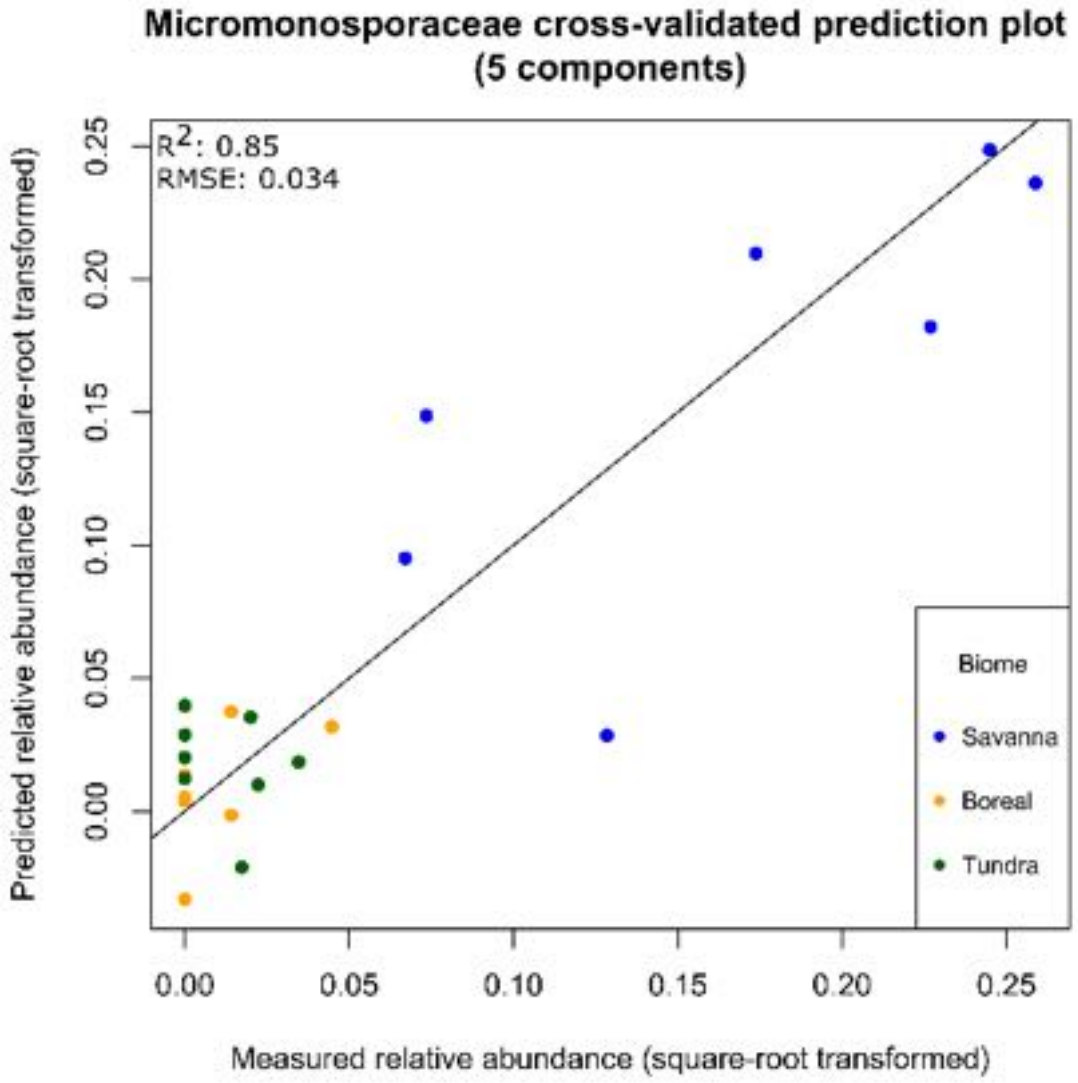
Remote Sensing imagery

3 proving grounds across EU

1. Handheld spectrometer multitemporal
2. Airborne multitemporal
   - Air photographs
   - Image spectroscopy
   - LiDAR
3. Satellite multitemporal
   - Sentinels and Landsat
   - Image spectroscopy (DESIS, PRISMA)
   - High resolution imagery (airborne)

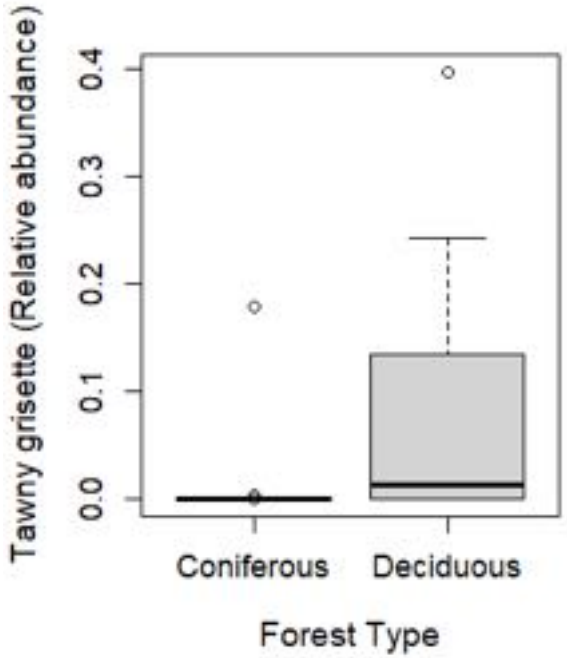


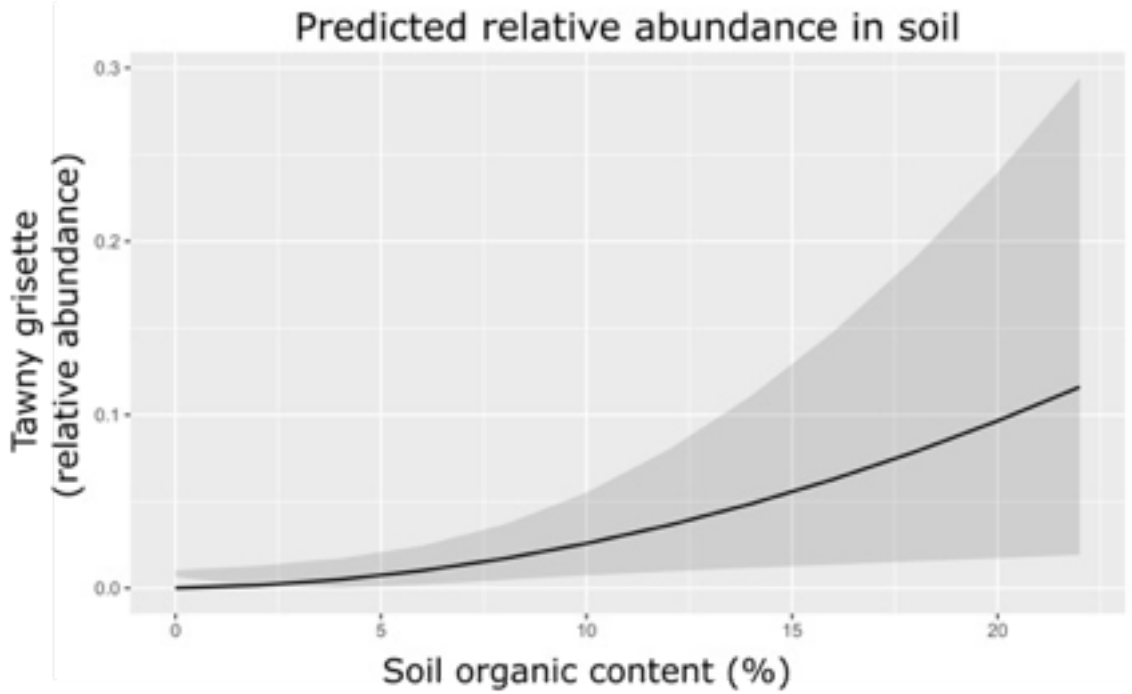
Remote sensing – Develop model

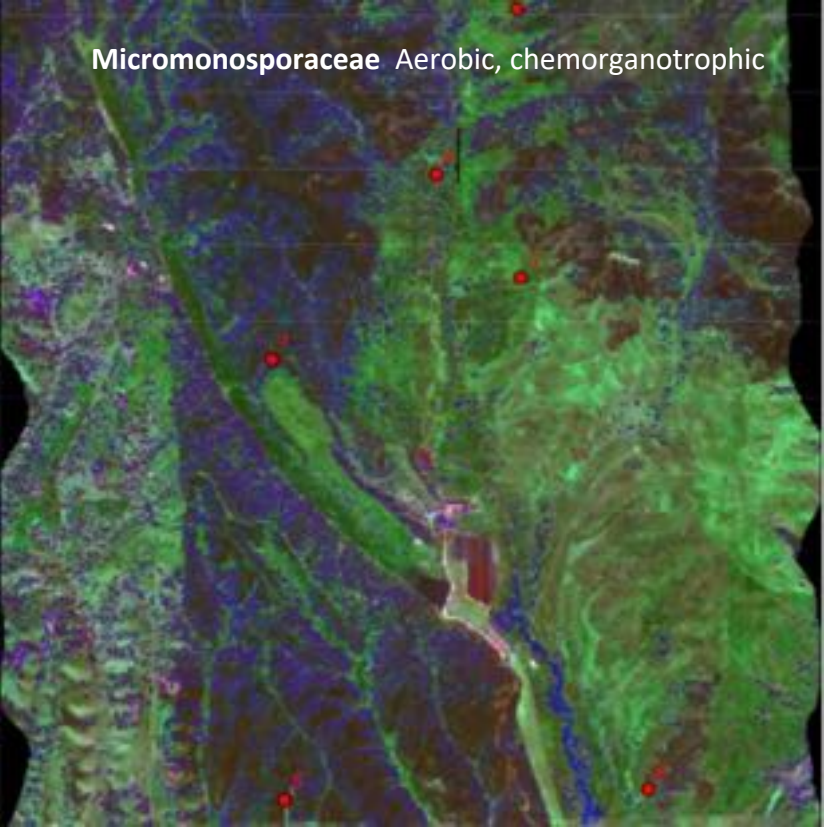


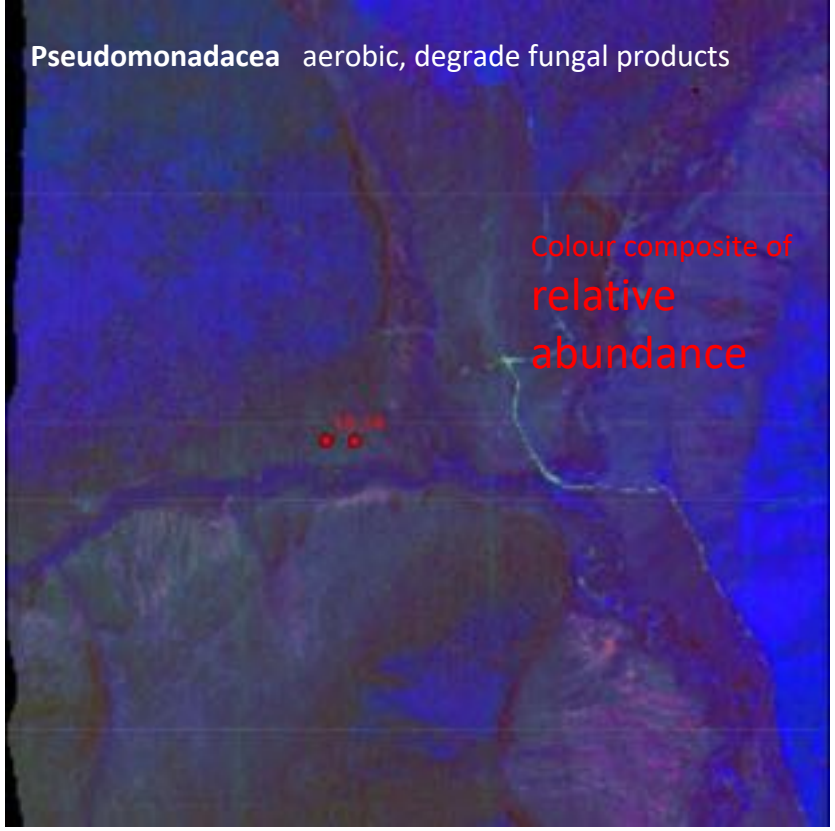
EXAMPLE: TAWNY GRISETTE (*Amanita fulva*) DISTRIBUTION

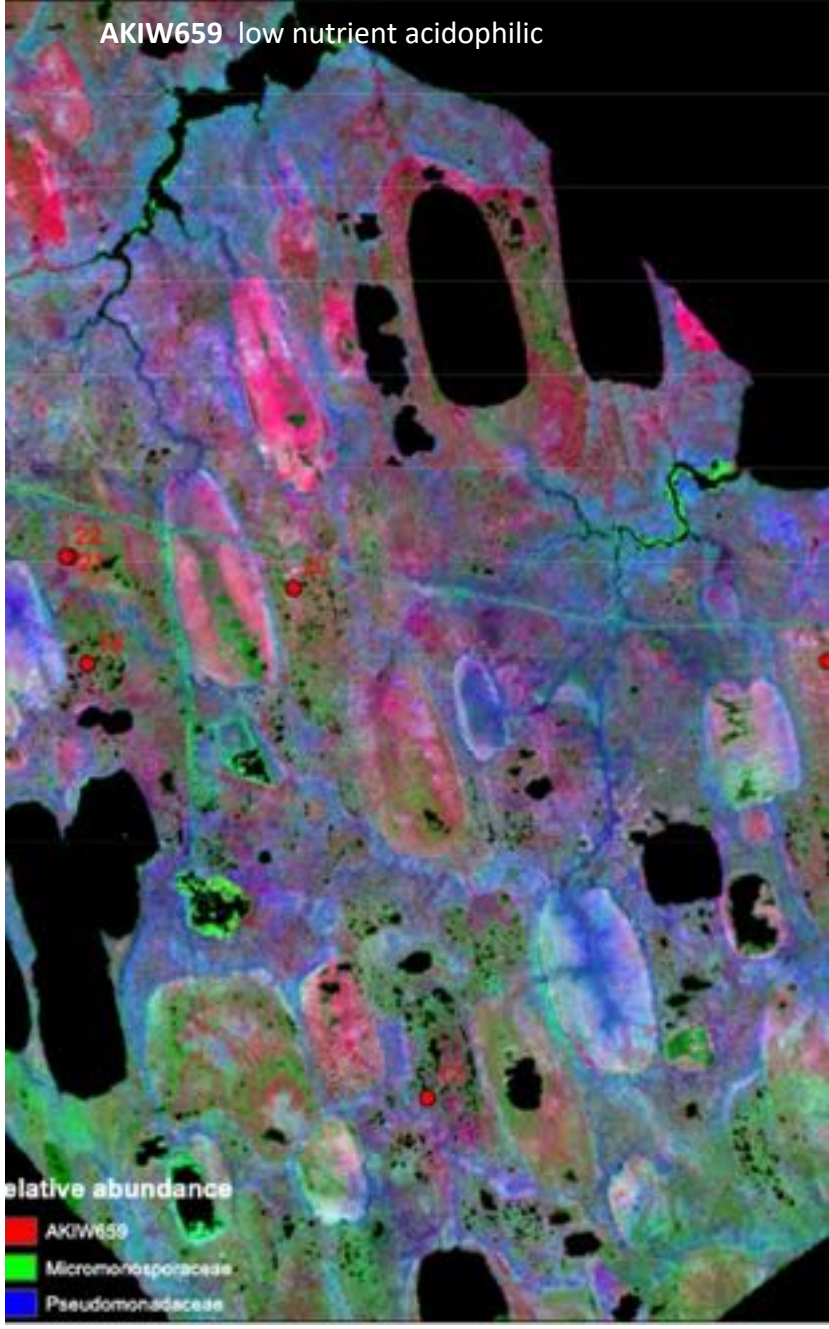
Species: *Amanita fulva*
EN: Tawny grisette
NL: Roodbruine slanke amaniet







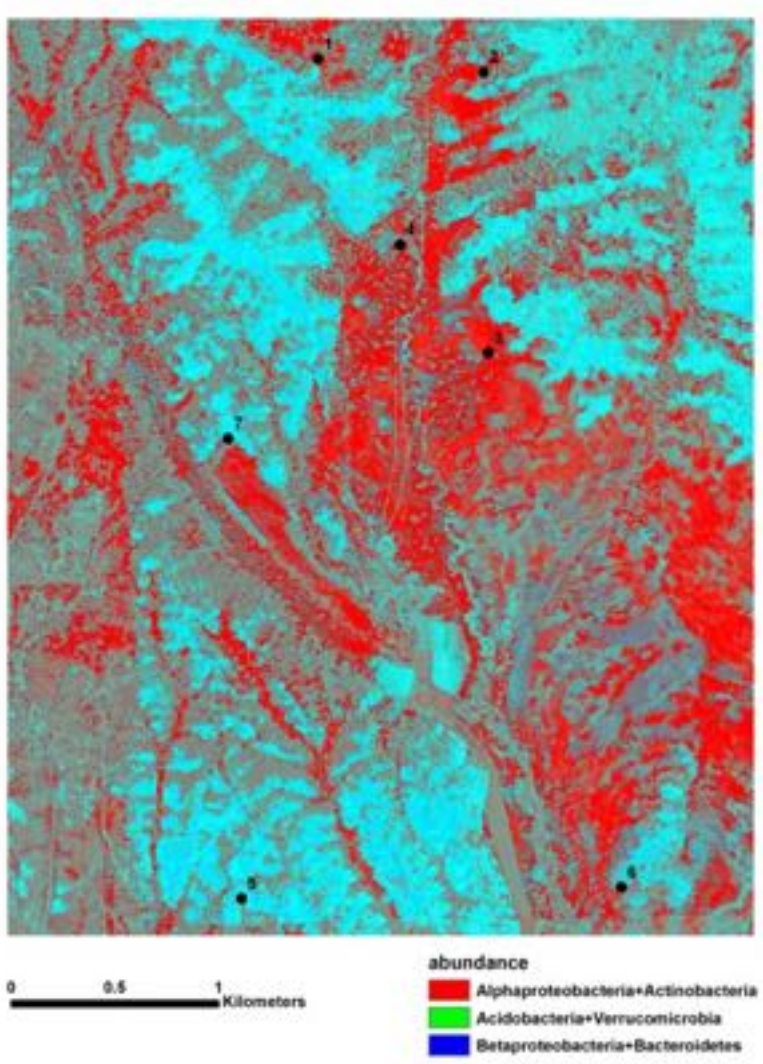


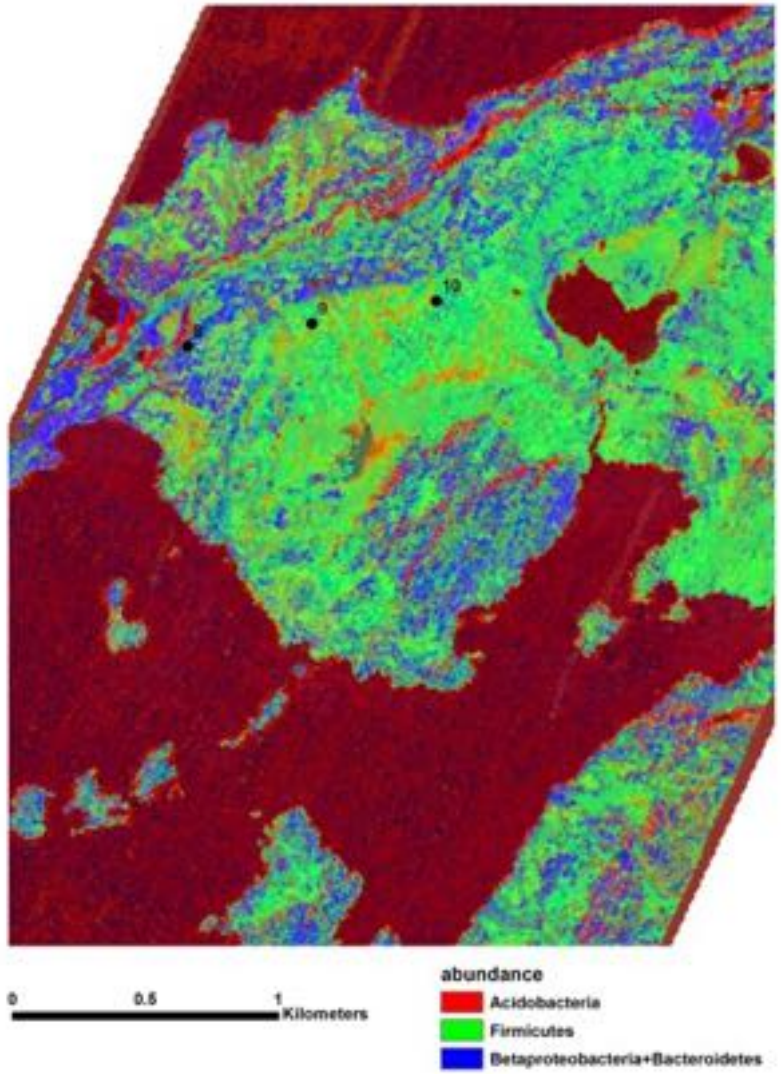


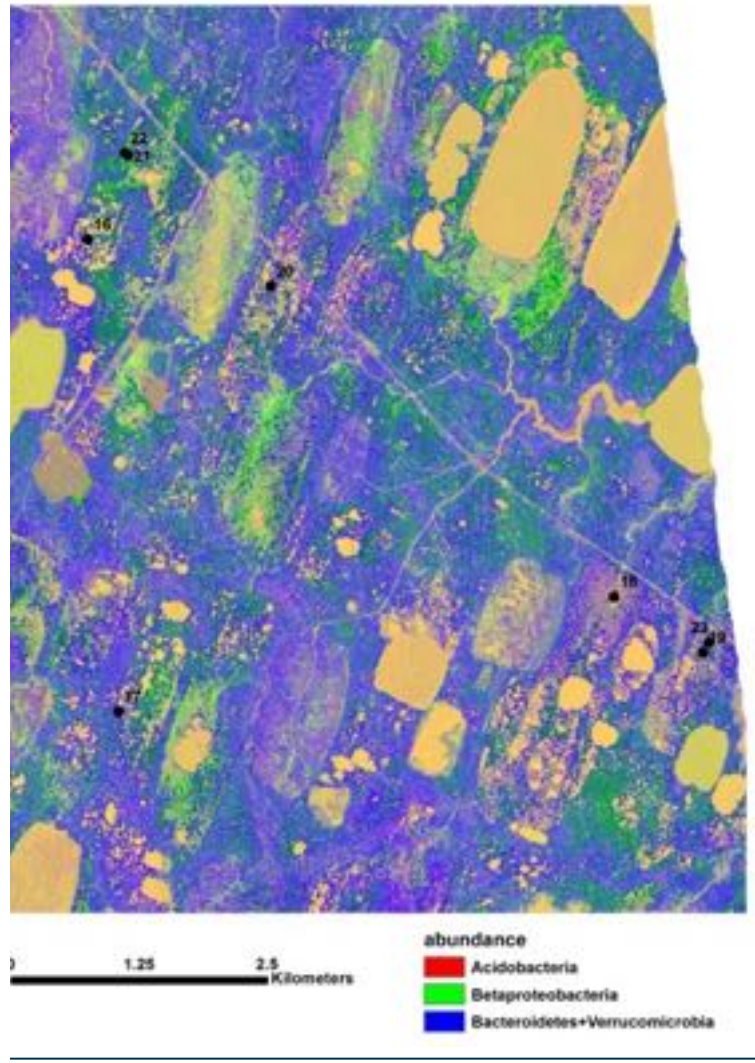
Invert model and map in time and space

- Mapping families across N. America

Invert model and map in time and space







Conclusions

- Filling the taxonomic gap (Linnean gap)
- Filling the spatial gap (Wallacean gap)
- Link to policy