



Spatial patterns in ecology and what we (hopefully) can learn from them

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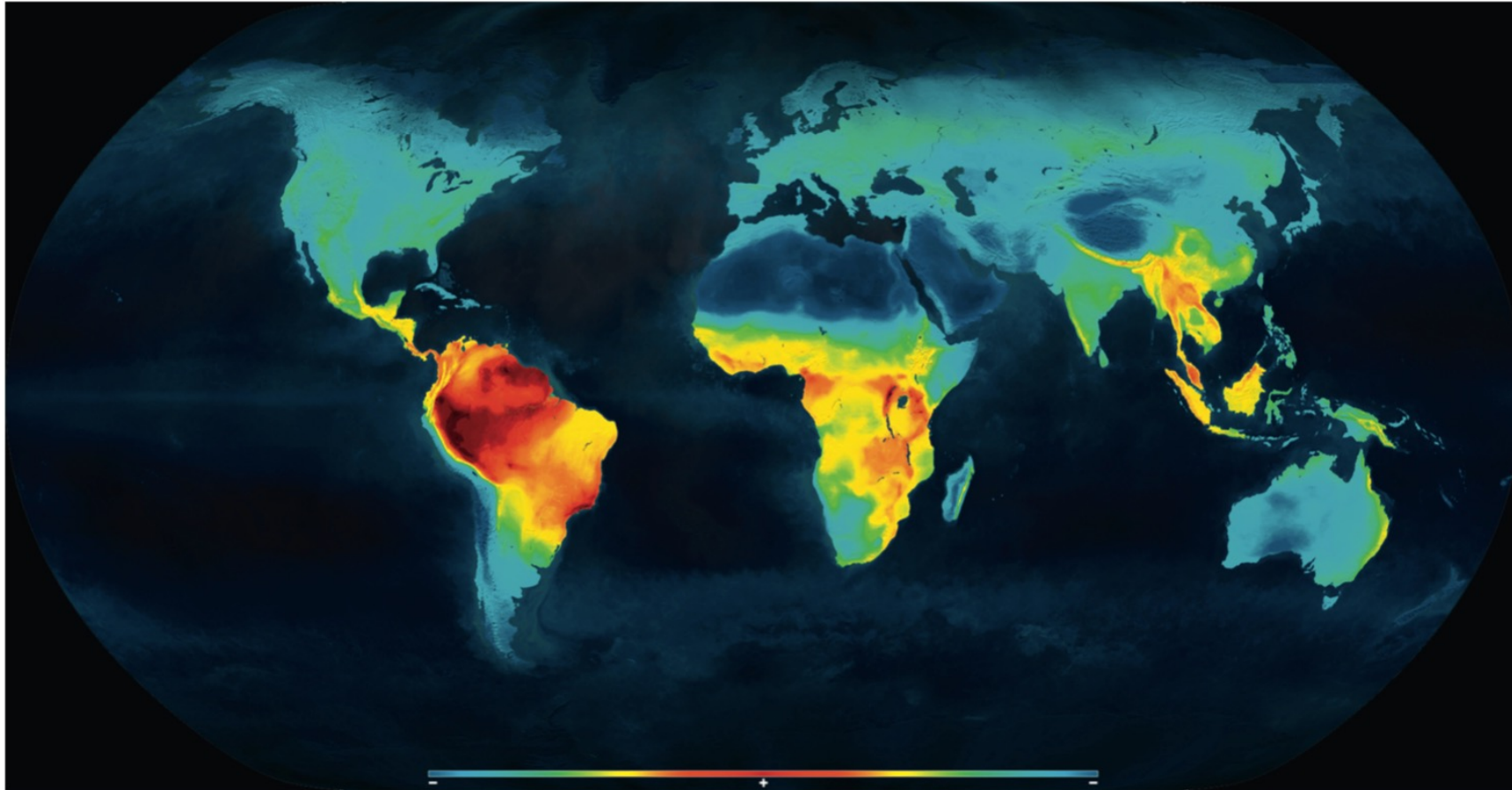
<https://mhesselbarth.rbind.io>



<https://github.com/mhesselbarth>

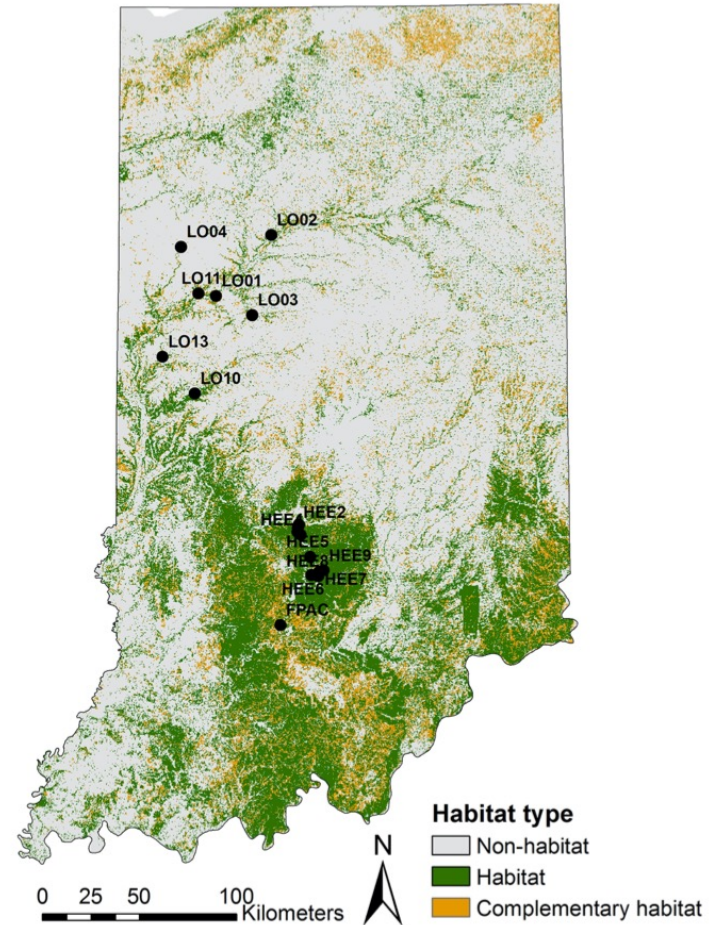
Spatial patterns in ecology

Spatial patterns in ecology



Mannion et al. 2014

Spatial patterns in ecology



Borthwick *et al.* 2020

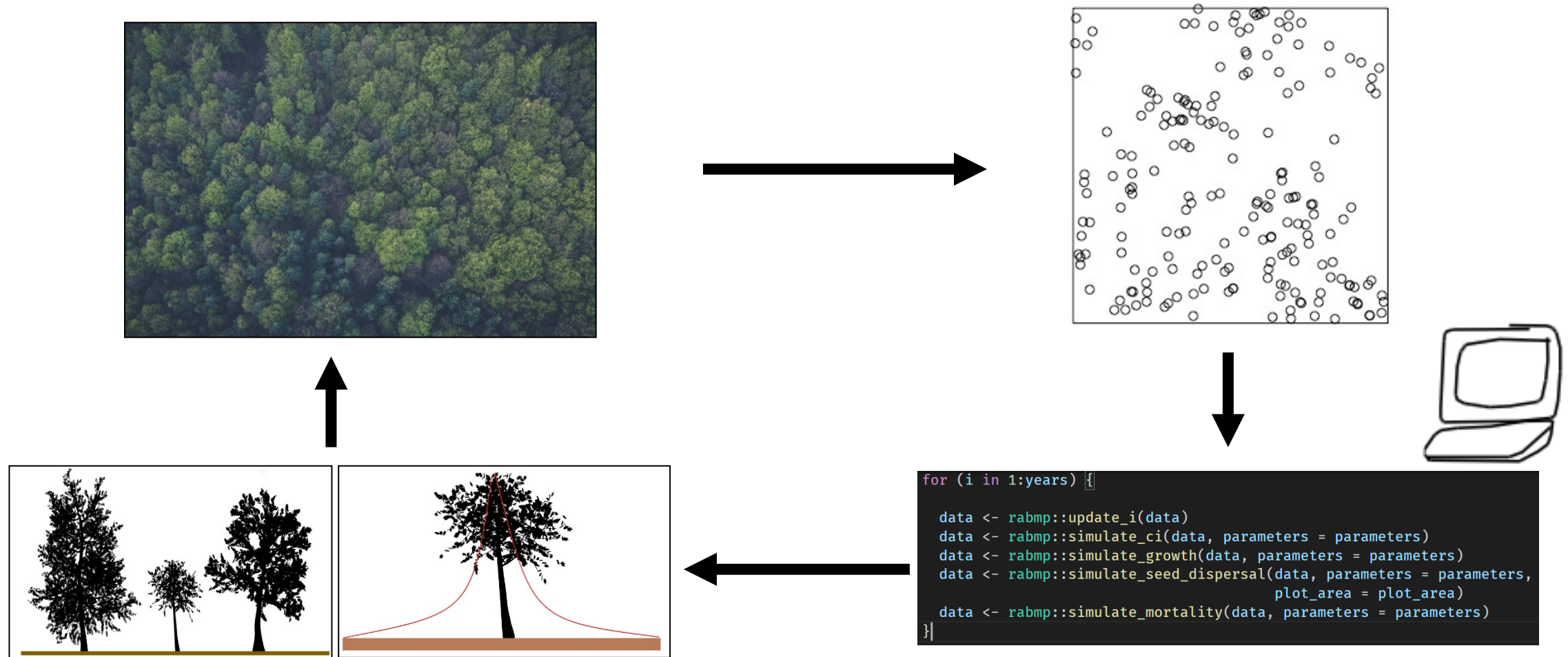
Spatial patterns in ecology



Photo by Stephan Getzin

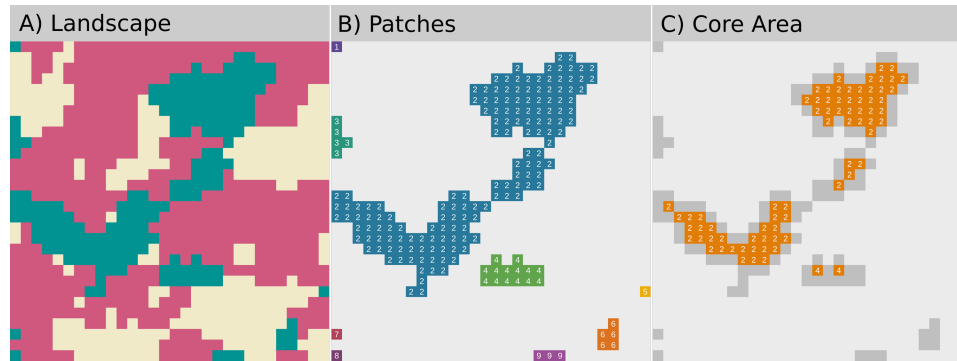
Photo by Stephan Getzin

Spatial patterns in ecology



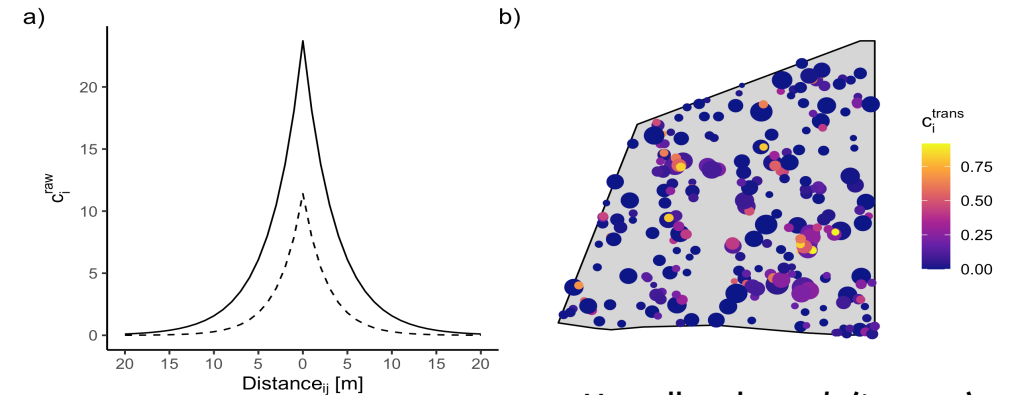
Methods overview

Landscape metrics



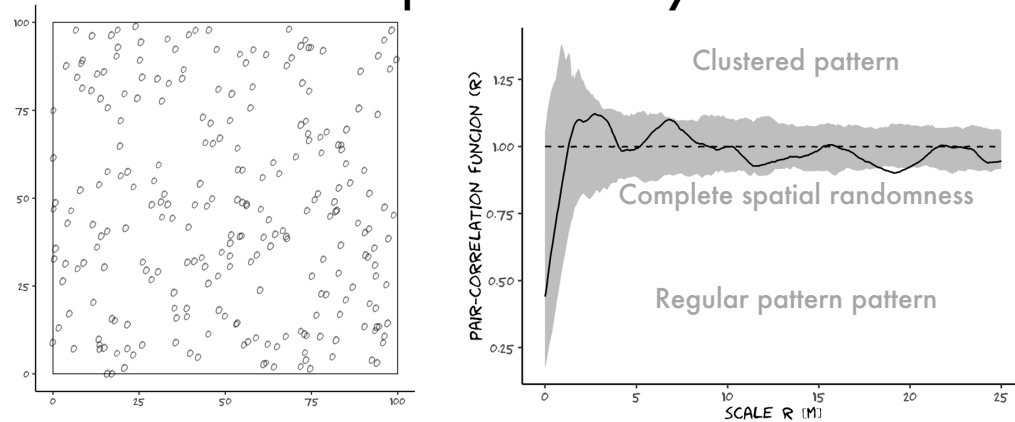
Hesselbarth *et al.* 2019

Individual-based simulation modelling (IBM)



Hesselbarth *et al.* (in prep)

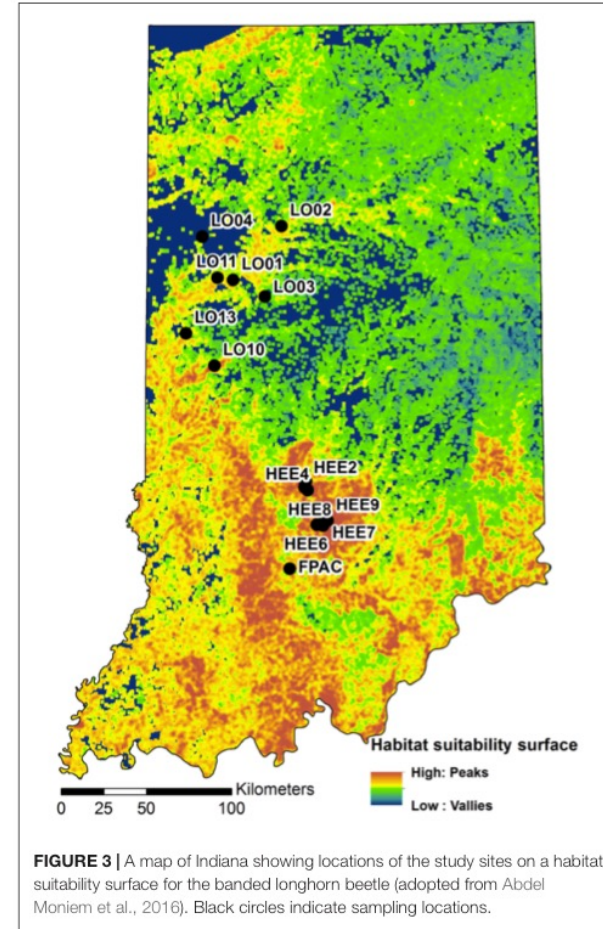
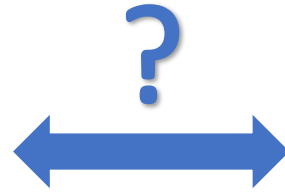
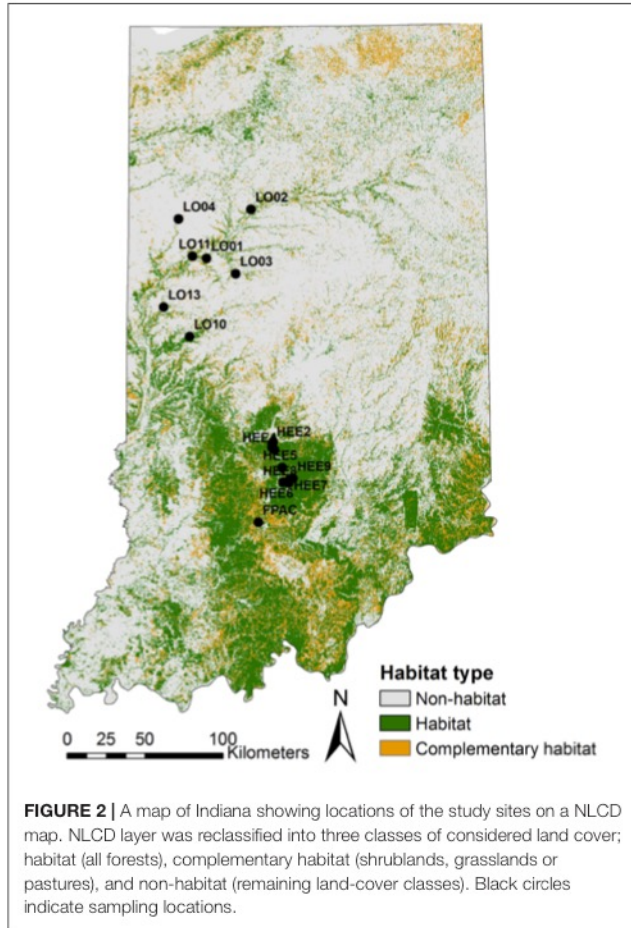
Point pattern analysis





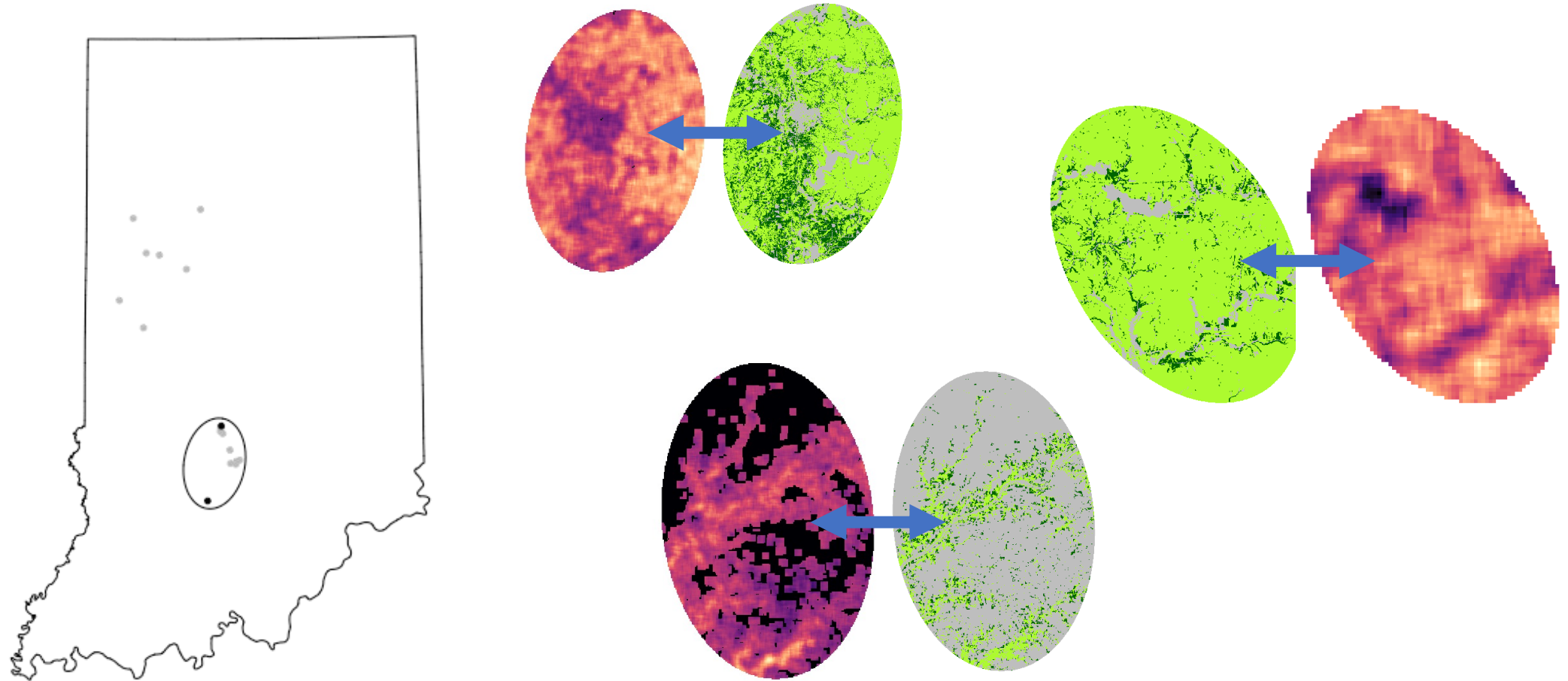
Quantifying landscape patterns

Quantifying landscape patterns



Borthwick *et al.* 2020

Quantifying landscape patterns

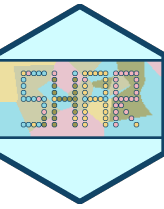


Borthwick *et al.* 2020

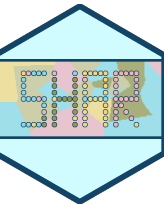
Quantifying landscape patterns

- **Gradient surface metrics were the most effective at explaining pairwise genetic distances between study sites**
- **Landscape metrics only performed slightly worse with advantages of easier interpretation**

Borthwick *et al.* 2020

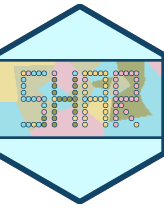


Species-habitat associations of forest trees



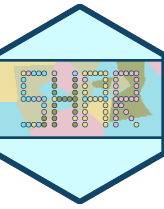
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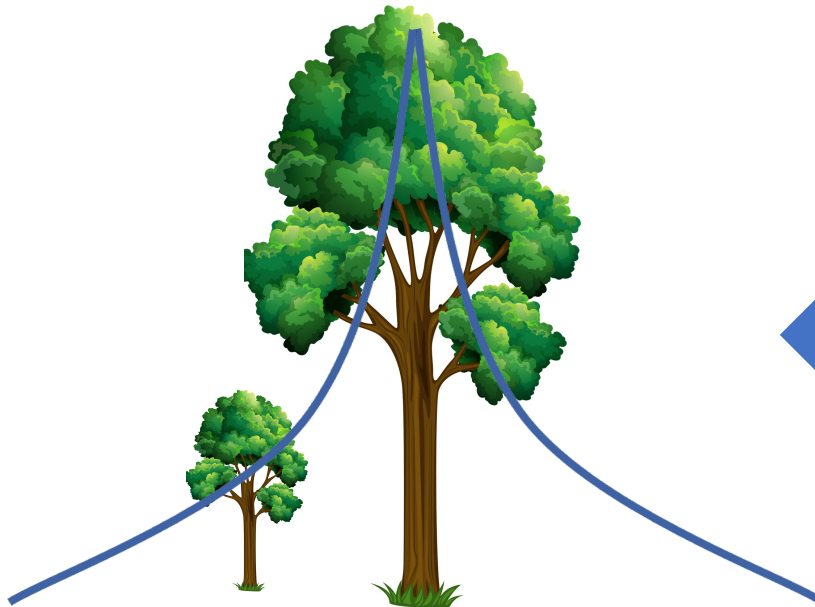
Species-habitat associations of forest trees





Species-habitat associations of forest trees

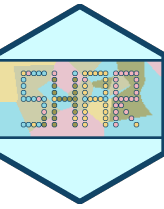
Biotic processes



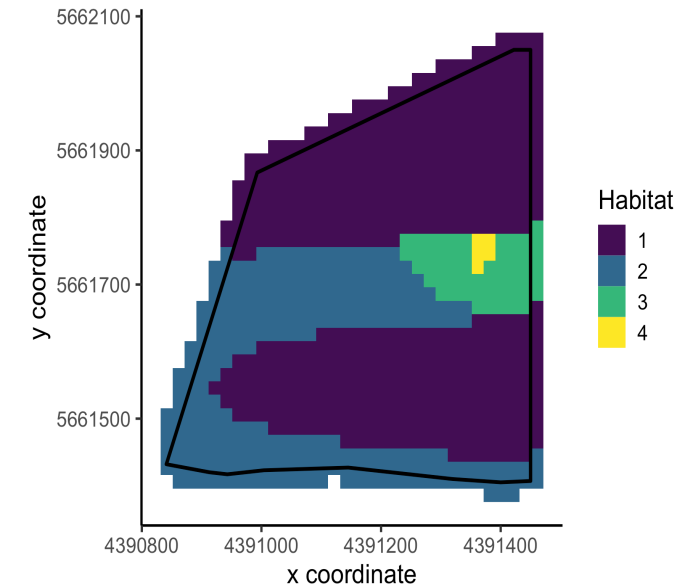
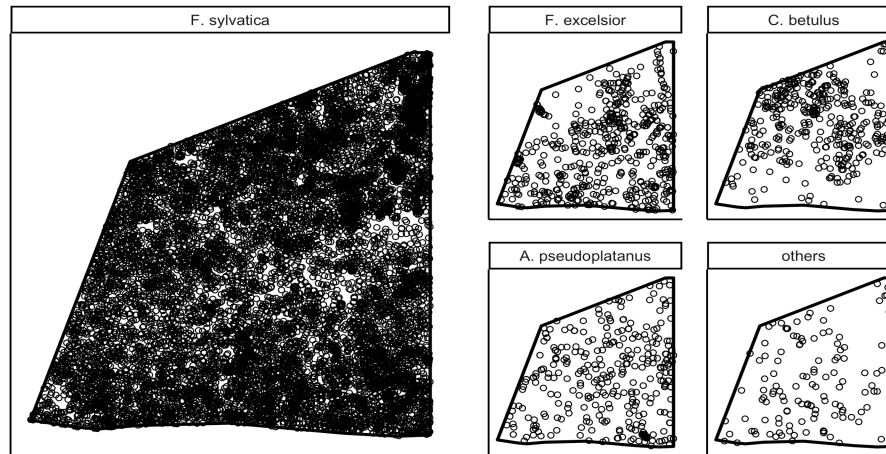
Abiotic processes



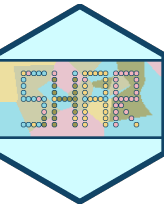
Hesselbarth & Wiegand (in review)



Species-habitat associations of forest trees

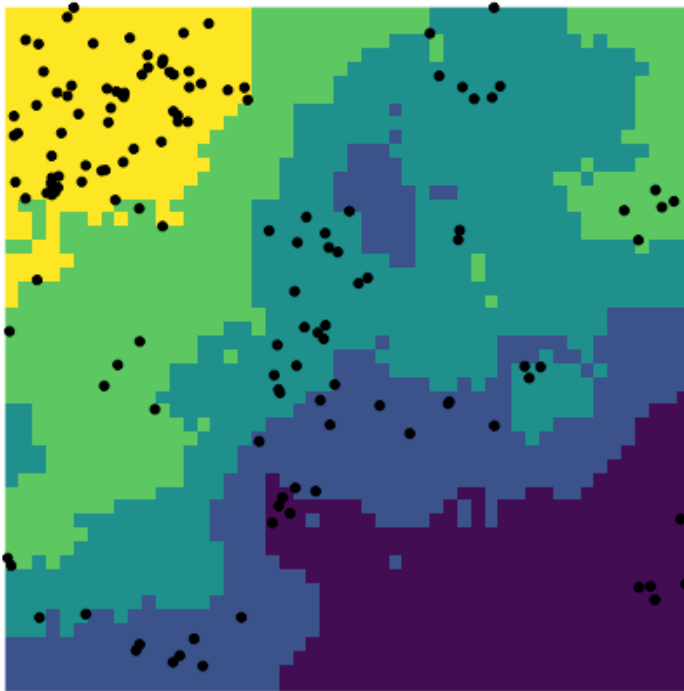


Hesselbarth & Wiegand (in review)

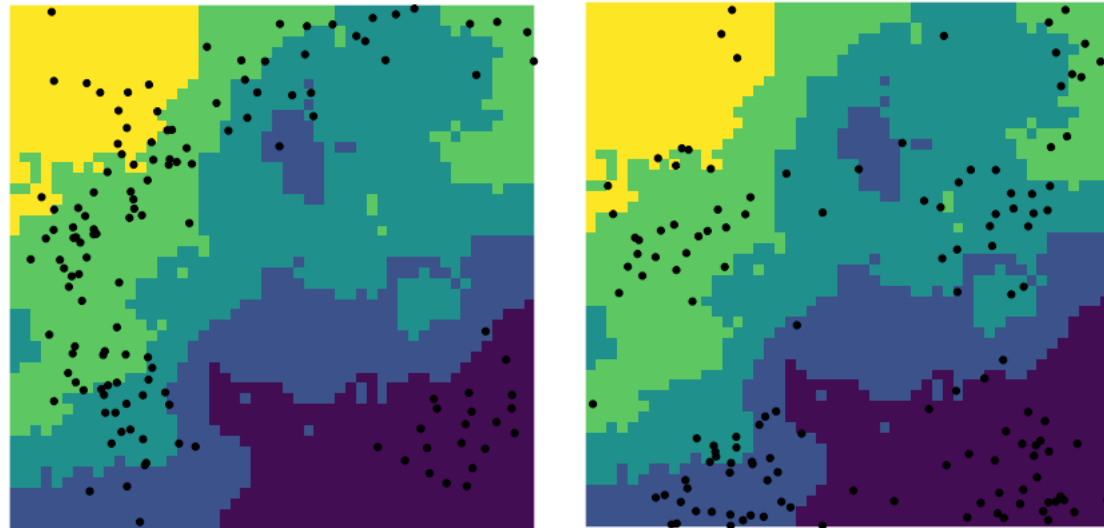


Species-habitat associations of forest trees

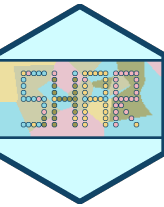
Observed data



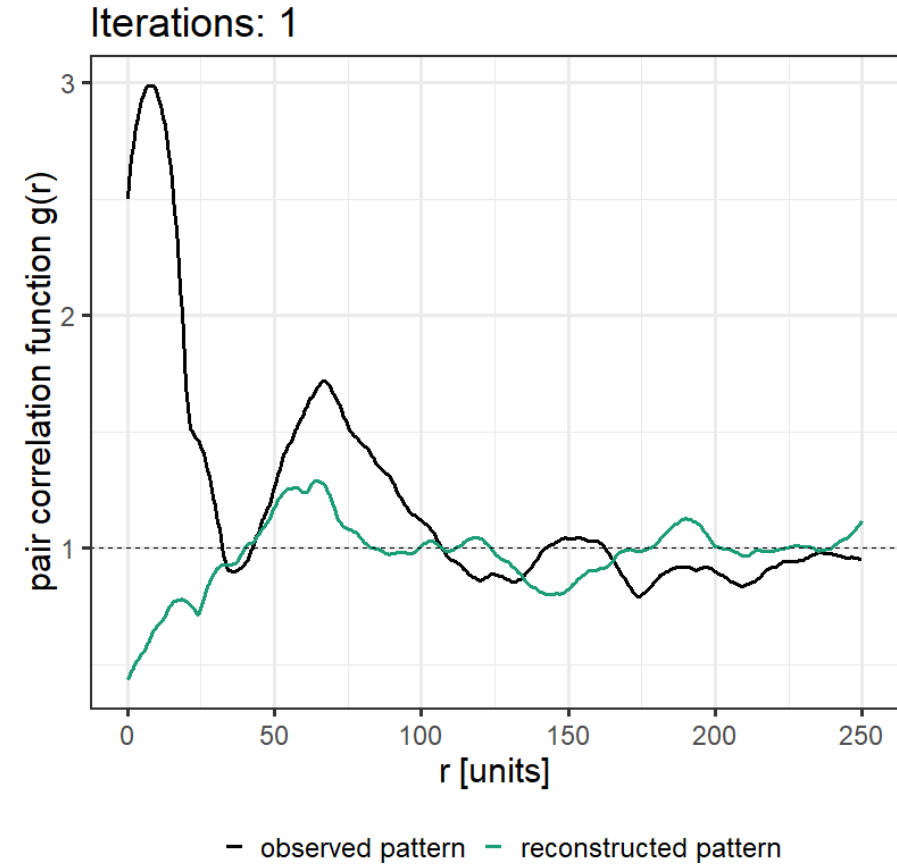
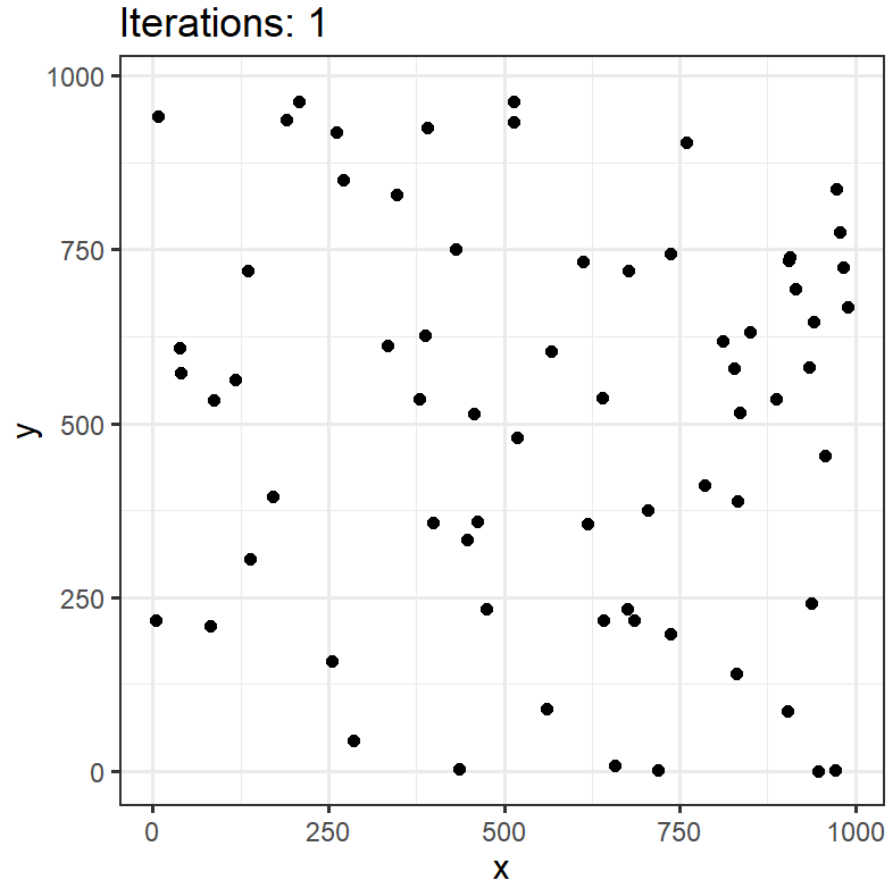
Randomized data 1...n

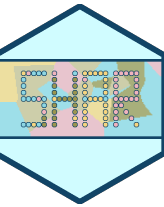


Hesselbarth & Wiegand (in review)

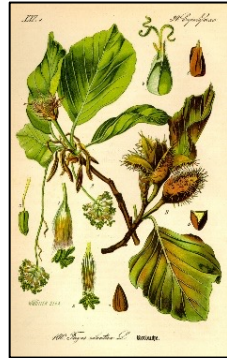


Pattern reconstruction





Species-habitat associations of forest trees



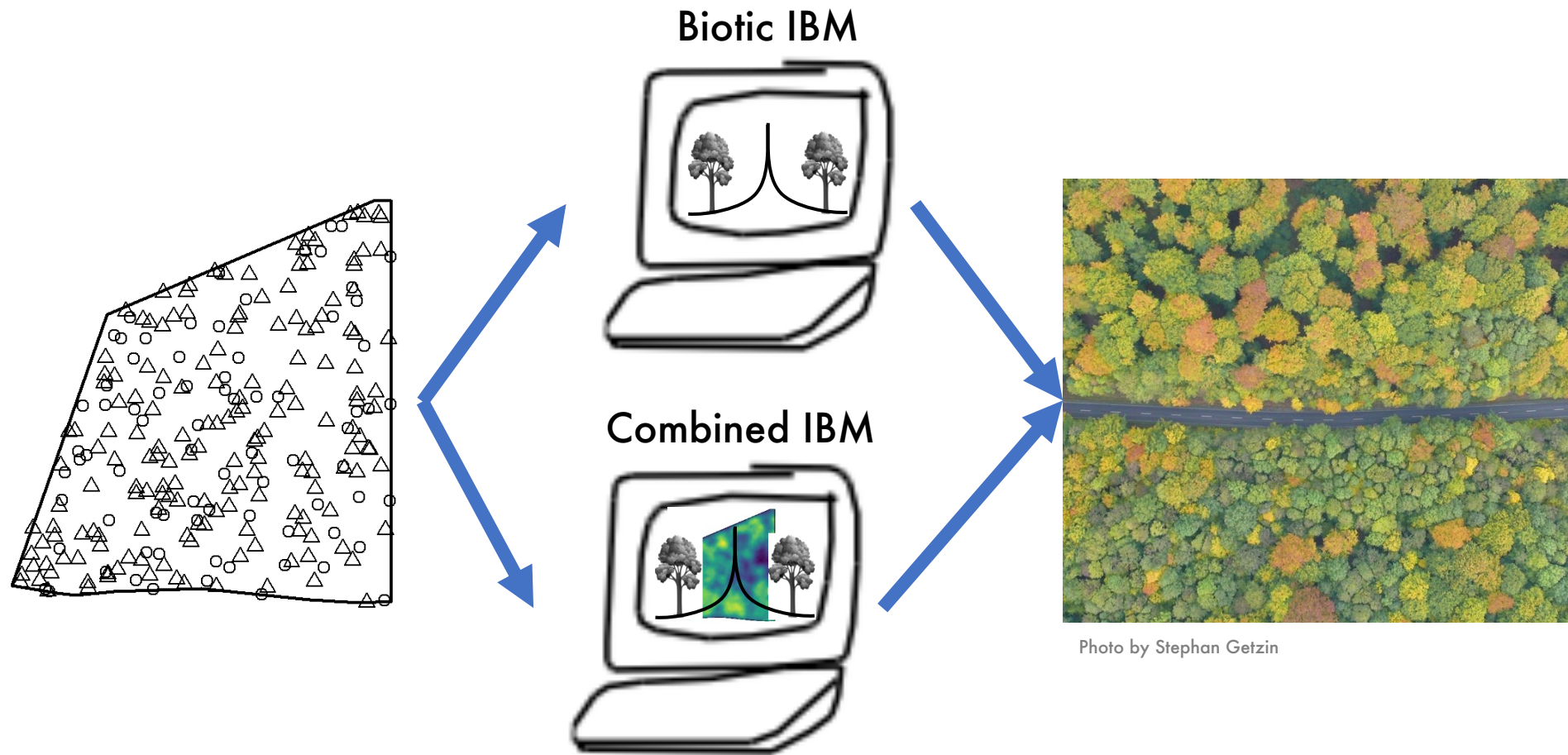
Thomé, O.W., 1885. *Flora von Deutschland, Österreich und der Schweiz*, Gera, Germany, www.BioLib.de

	Fagus sylvatica (European beech)	Fraxinus excelsior (European ash)	Carpinus betulus (Common Hornbeam)	Acer pseudoplatanus (Sycamore)	others
Habitat 1	Positive association	Negative association	No association	No association	No association
Habitat 2	No association	No association	No association	No association	No association
Habitat 3	No association	No association	No association	Positive association	No association
Habitat 4	Negative association	Positive association	No association	No association	No association

Hesselbarth & Wiegand (in review)

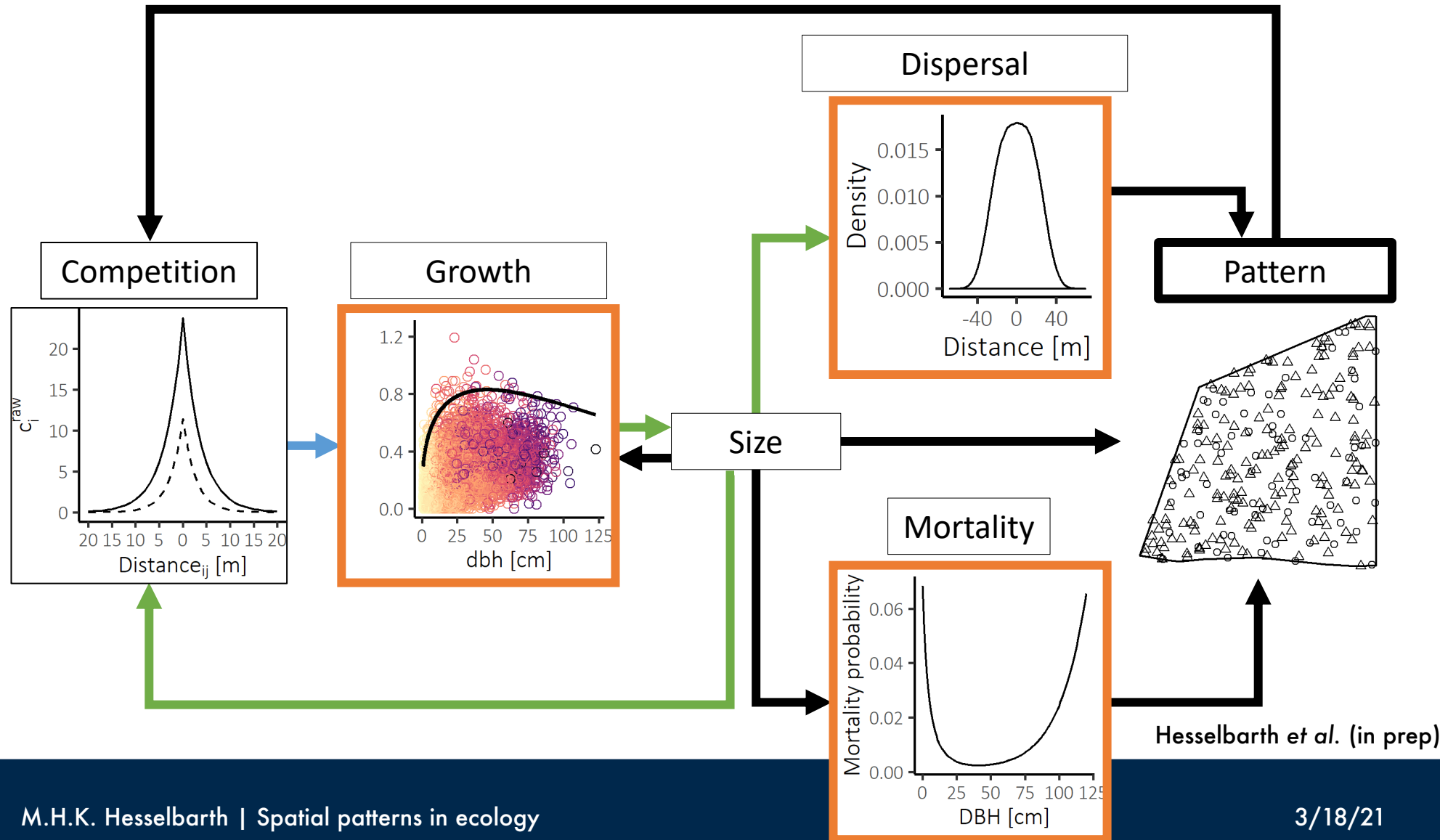


Using an IBM to explore processes further



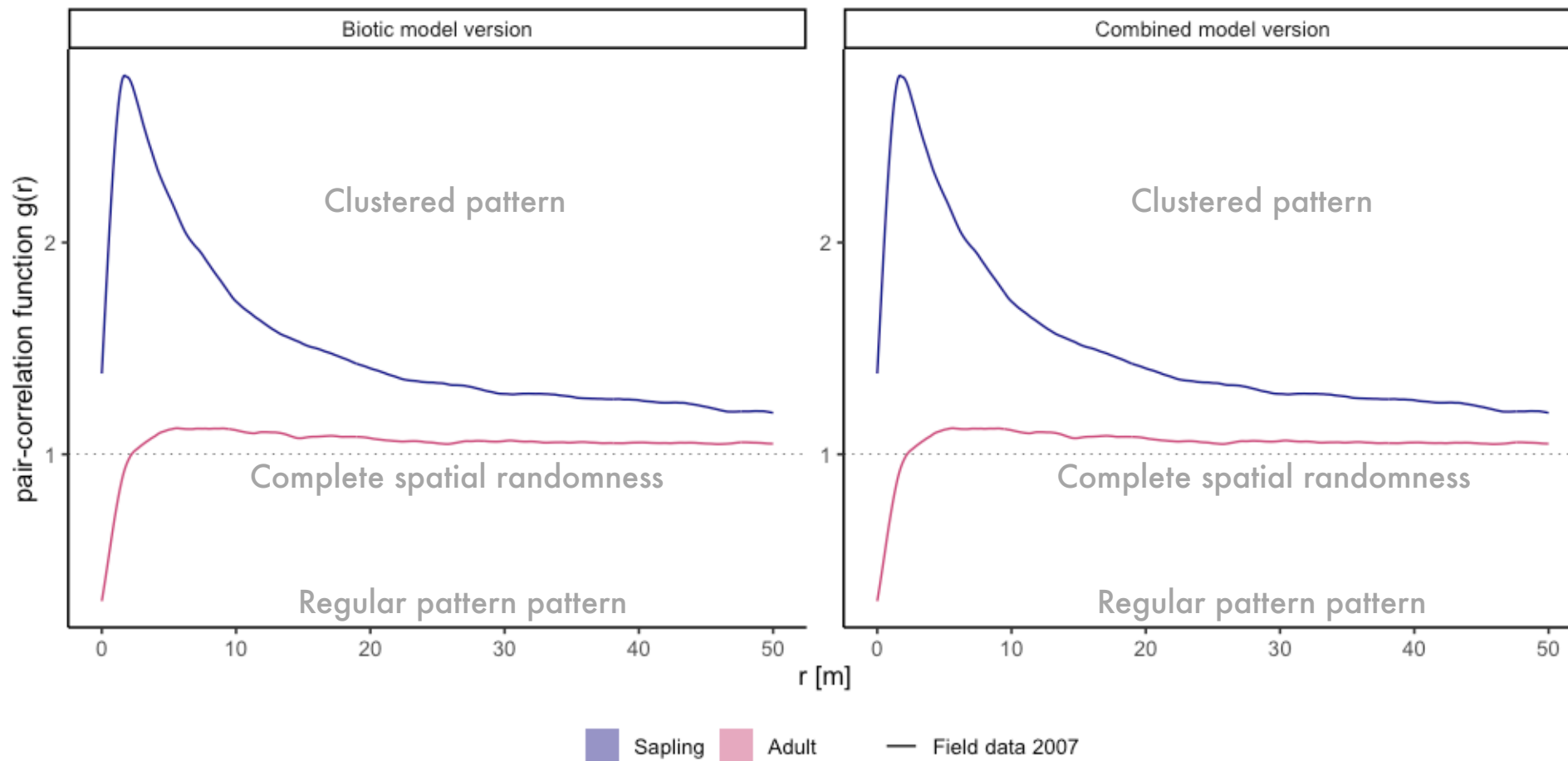


Using an IBM to explore processes further





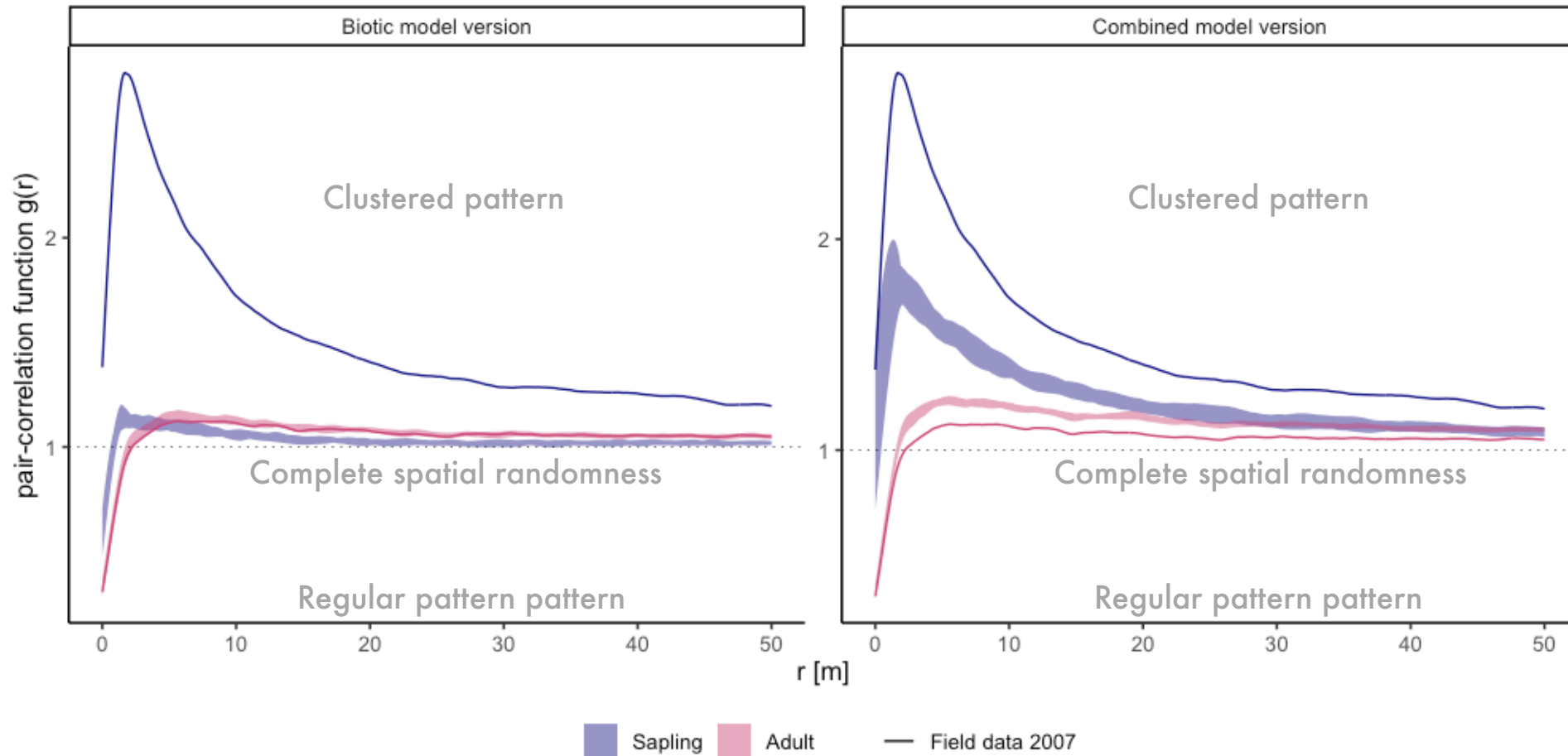
Using an IBM to explore processes further



Hesselbarth et al. (in prep)



Using an IBM to explore processes further



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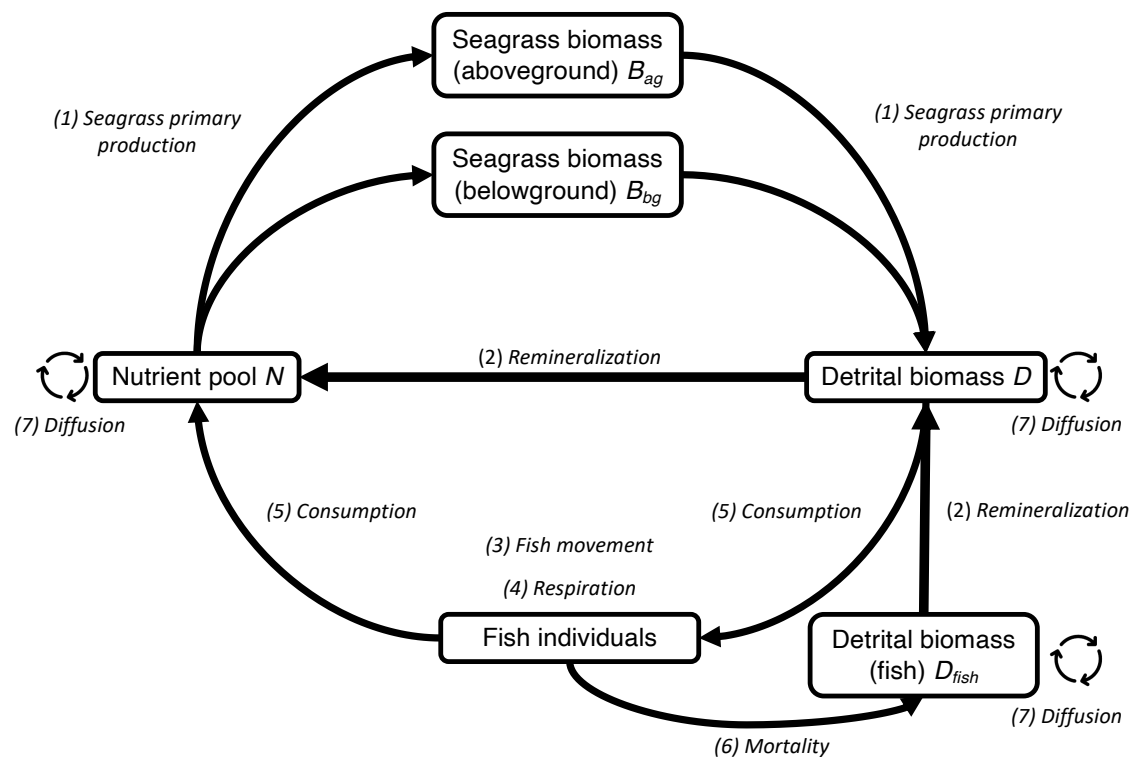


IBM of artificial reefs

ARTificial Reefs in R



Logo designed by Sammy Iliff



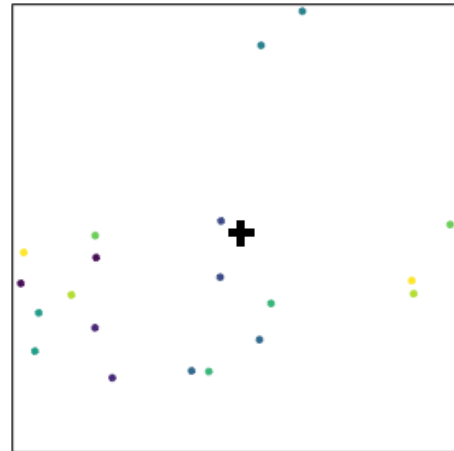
Esquivel et al. (in prep)



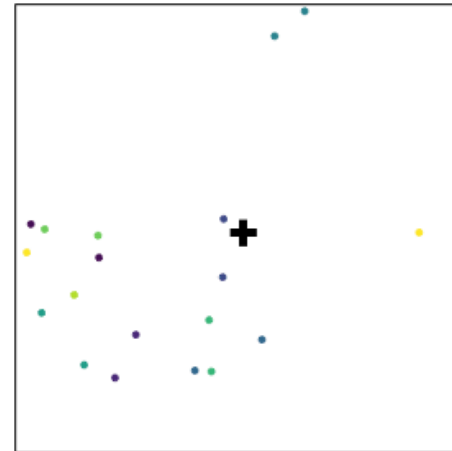
IBM of artificial reefs

Fish movement

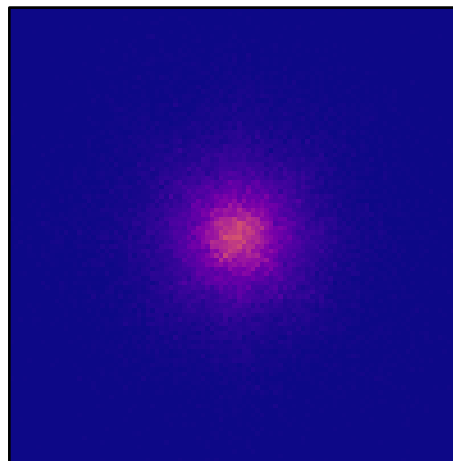
No influence of AR



Attraction towards AR

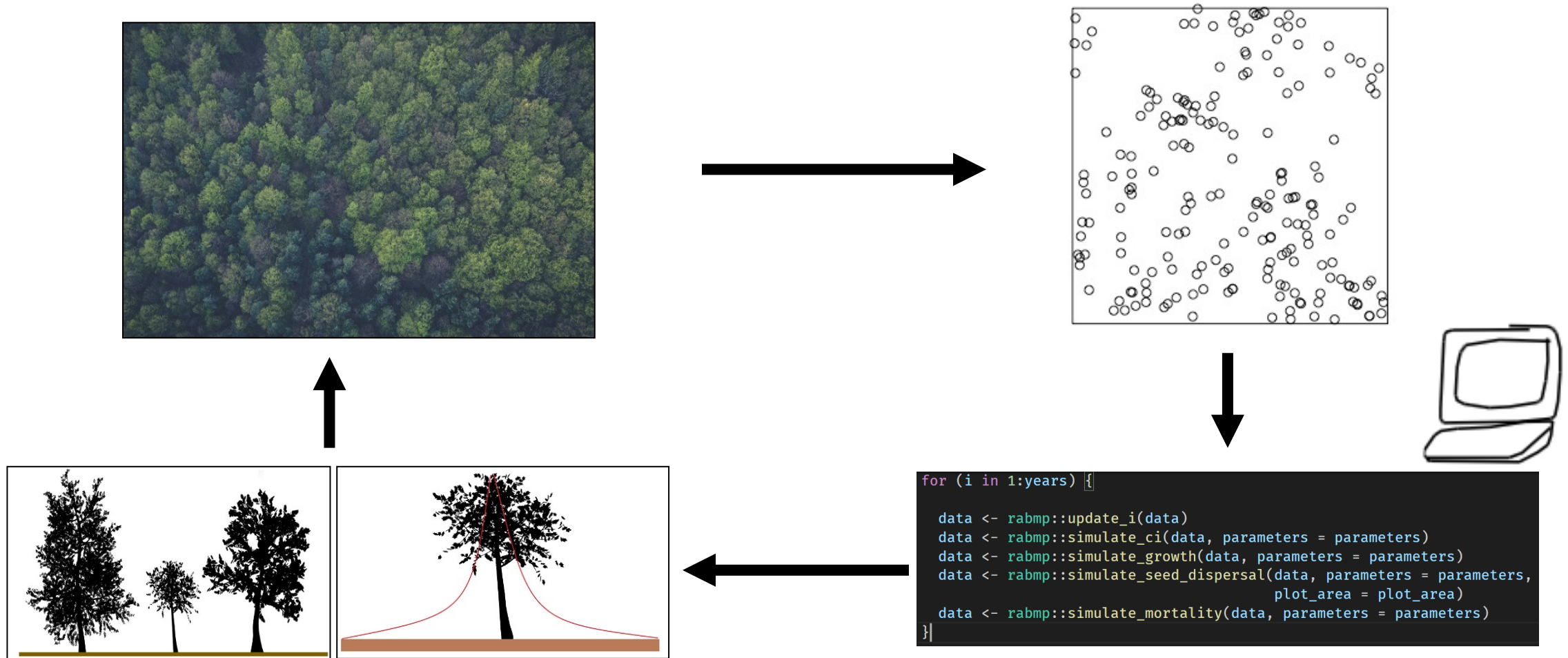


Water column nutrients

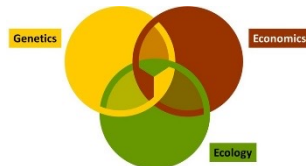
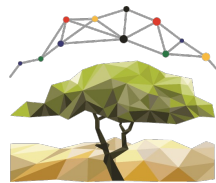


Esquivel *et al.* (in prep)

Spatial patterns in ecology



Acknowledgments



Nationalpark
Hainich





Thank you very much for your attention

Any questions?

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 <https://mhesselbarth.rbind.io>

 <https://github.com/mhesselbarth>

References

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- All icons from <https://fontawesome.com>