



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

Maximilian H.K. Hesselbarth

Coastal Ecology and Conservation Lab
University of Michigan (EEB)



mhessel@umich.edu



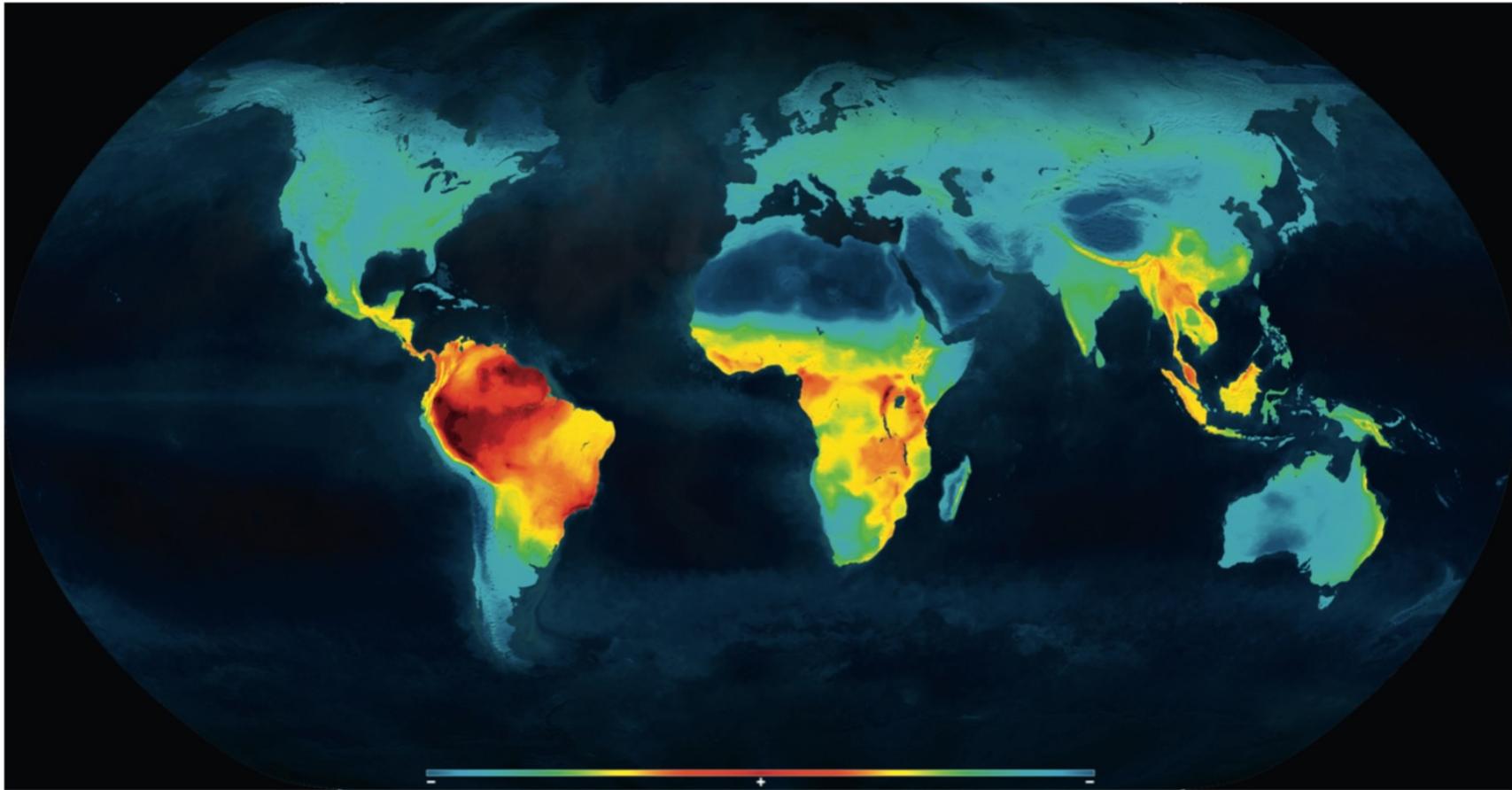
<https://mhesselbarth.rbind.io>



<https://github.com/mhesselbarth>

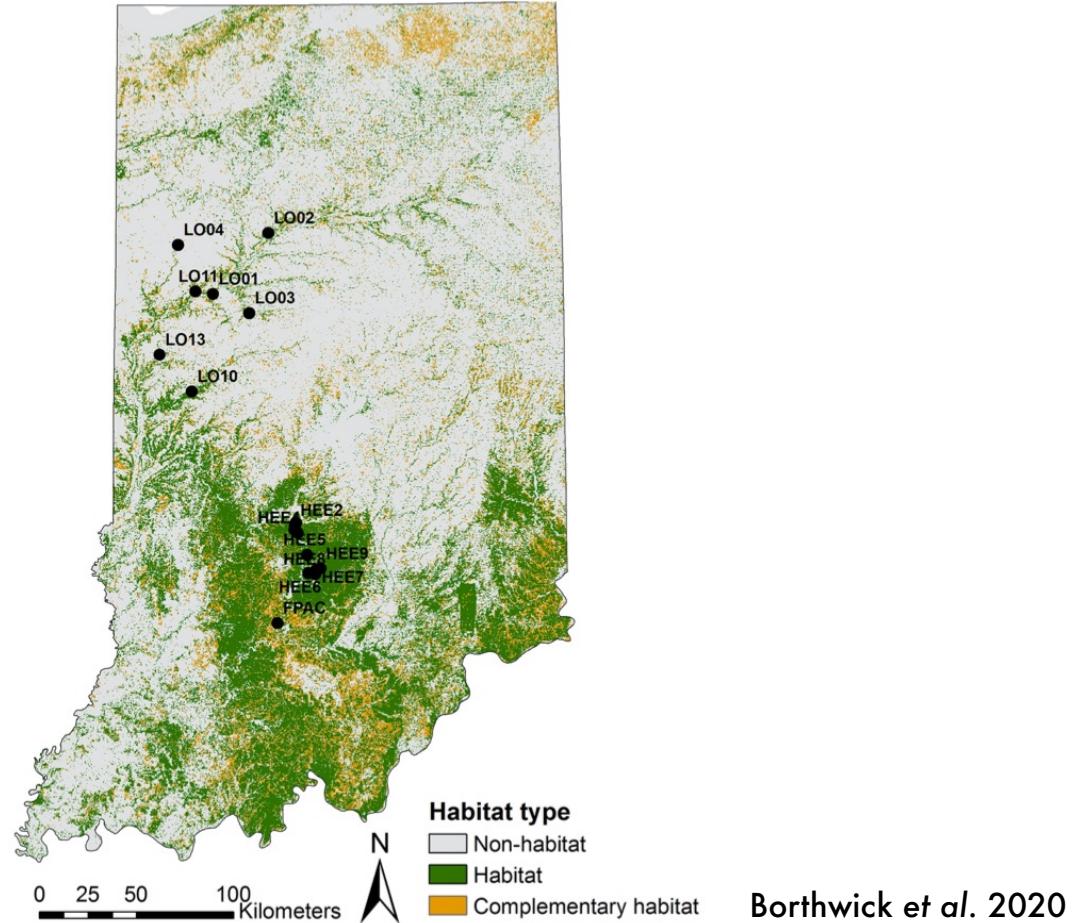
Spatial patterns in ecology

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Mannion et al. 2014

Spatial patterns in ecology



Spatial patterns in ecology

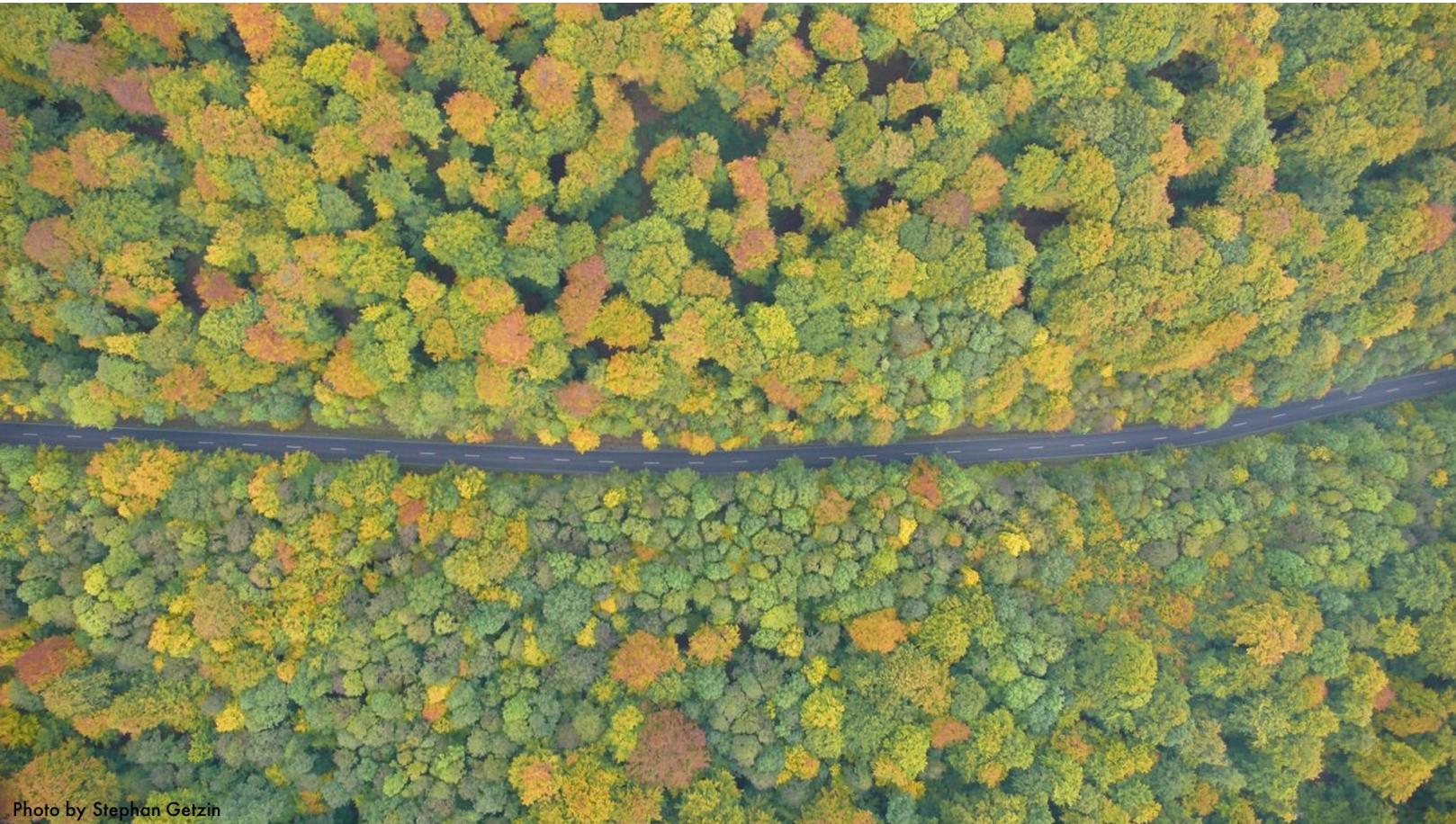
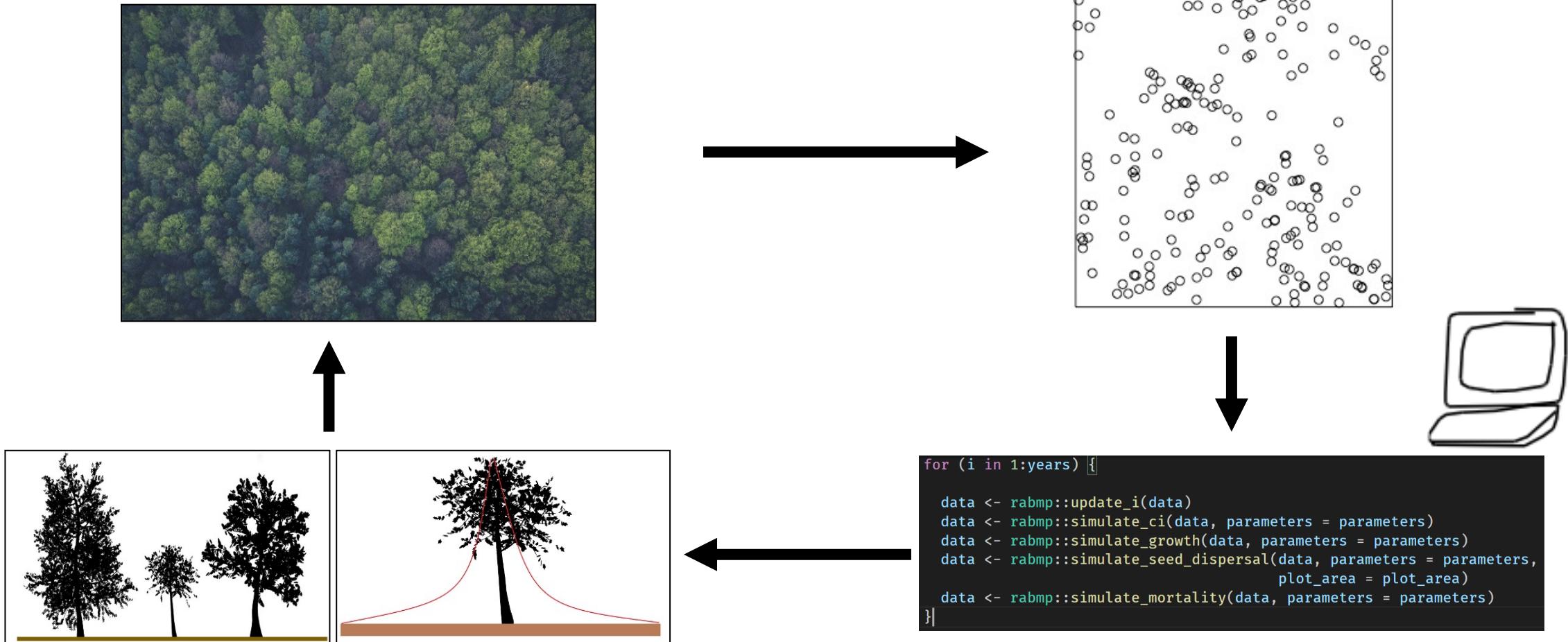


Photo by Stephan Getzin

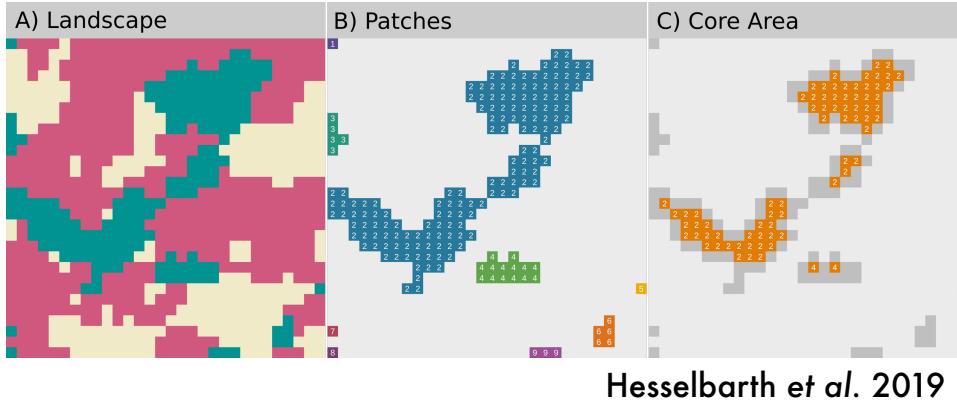
Photo by Stephan Getzin

Spatial patterns in ecology

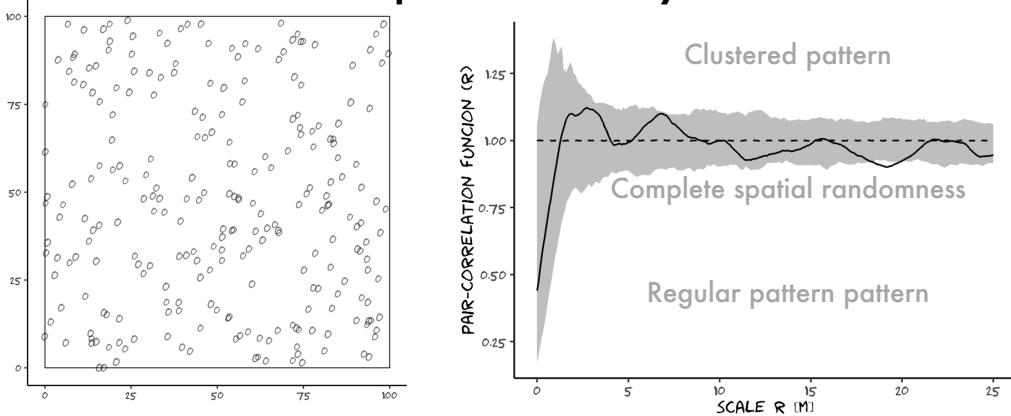


Methods overview

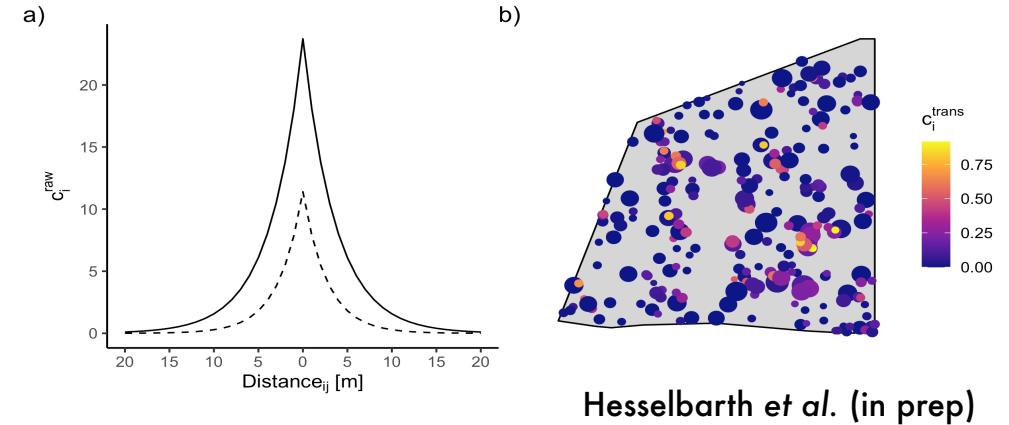
Landscape metrics



Point pattern analysis



Individual-based simulation modelling (IBM)

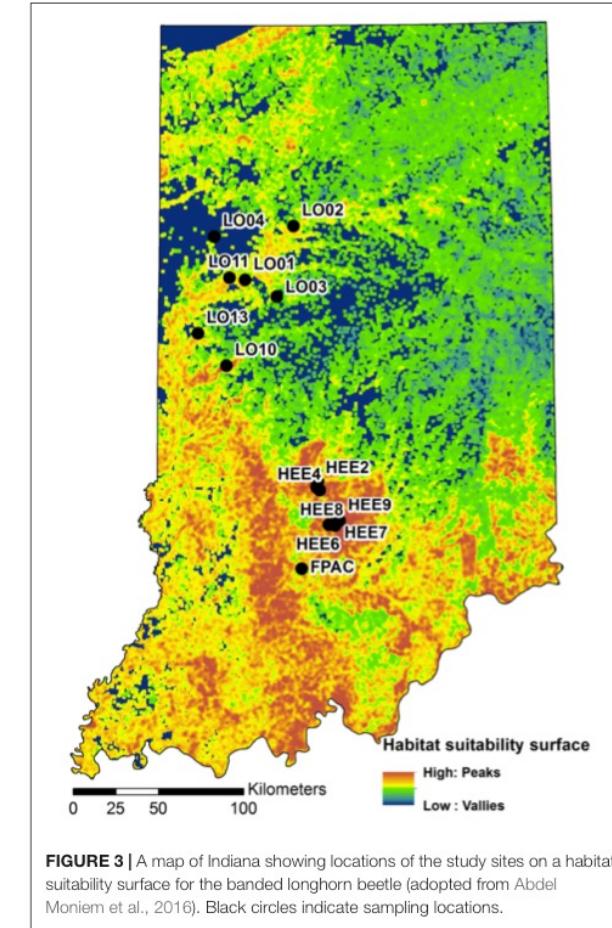
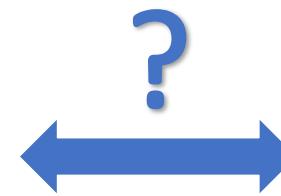
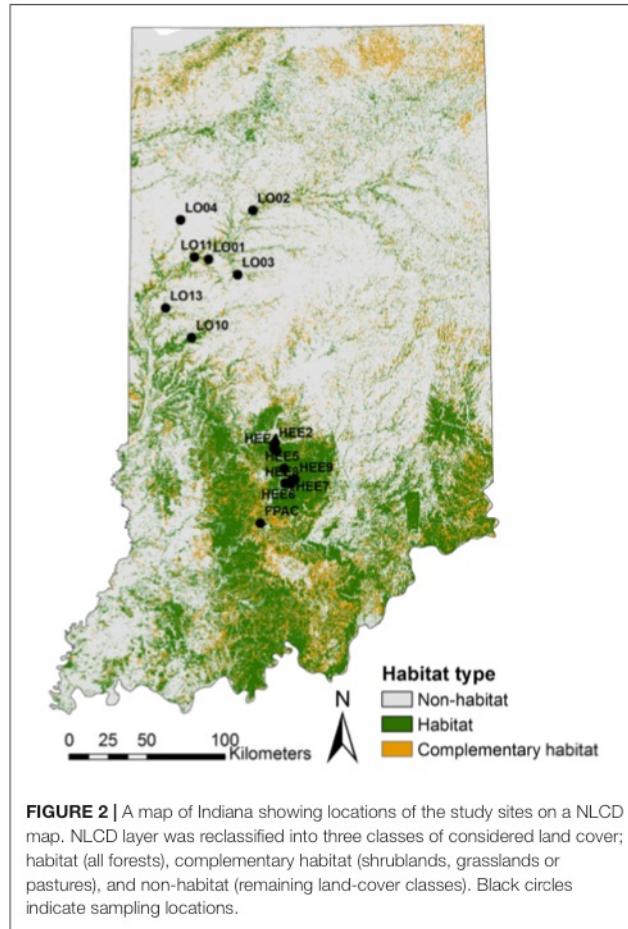


Hesselbarth et al. (in prep)



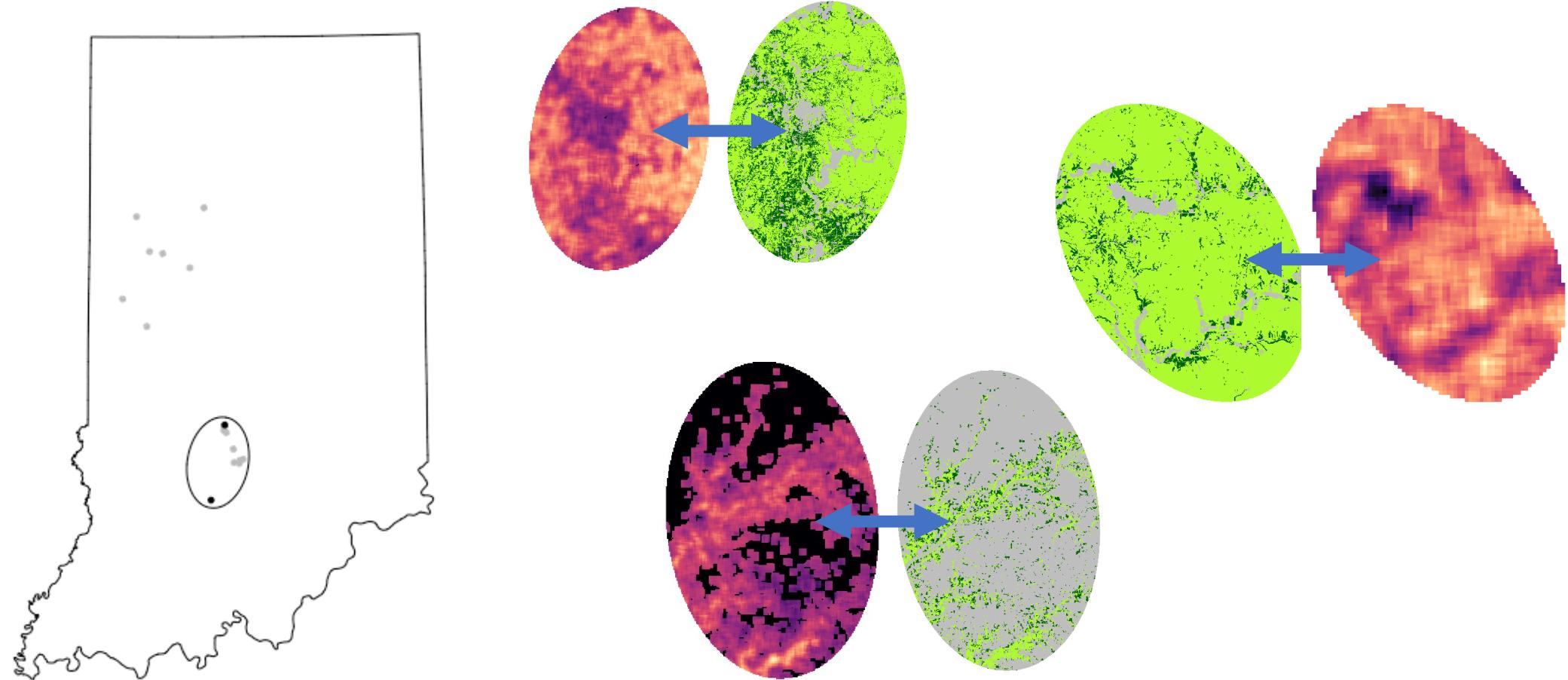
Quantifying landscape patterns

Quantifying landscape patterns



Borthwick et al. 2020

Quantifying landscape patterns



Borthwick et al. 2020

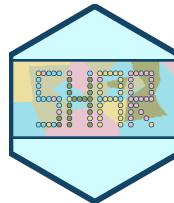
Quantifying landscape patterns

- 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

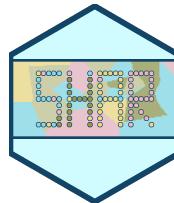


Species-habitat associations of forest trees



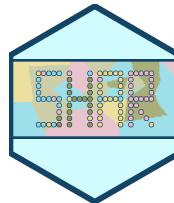
Species-habitat associations of forest trees





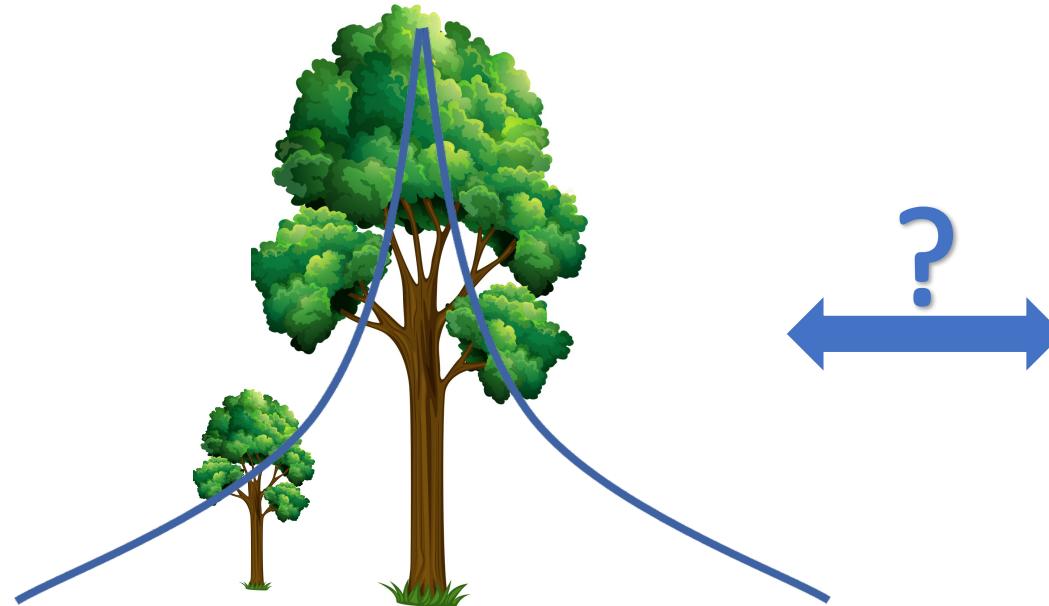
Species-habitat associations of forest trees





Species-habitat associations of forest trees

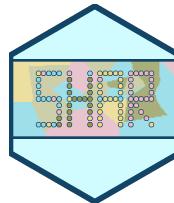
Biotic processes



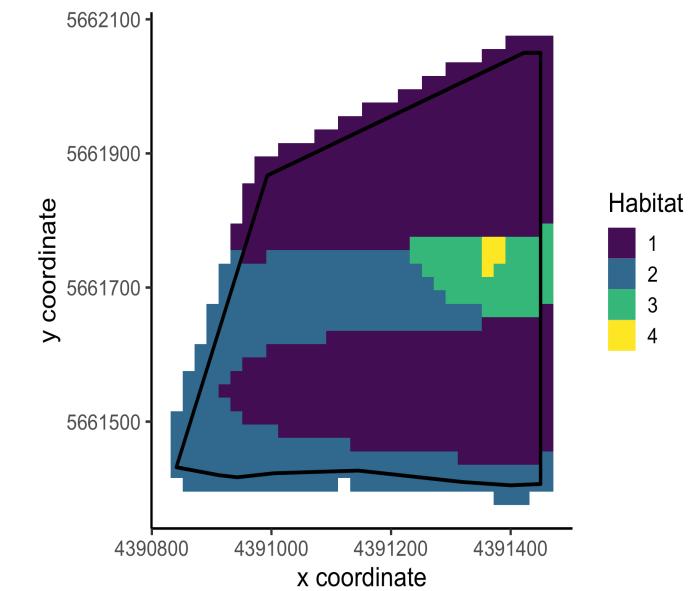
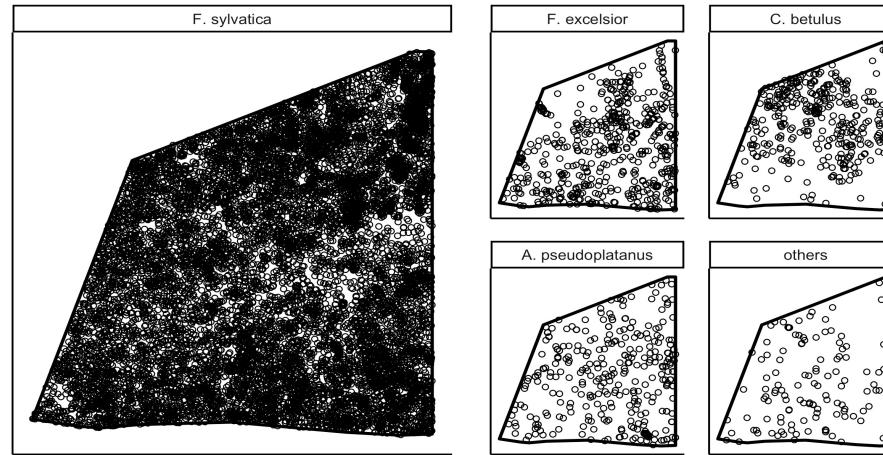
Abiotic processes



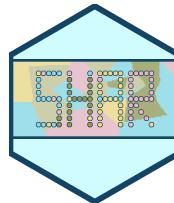
Hesselbarth & Wiegand (in review)



Species-habitat associations of forest trees

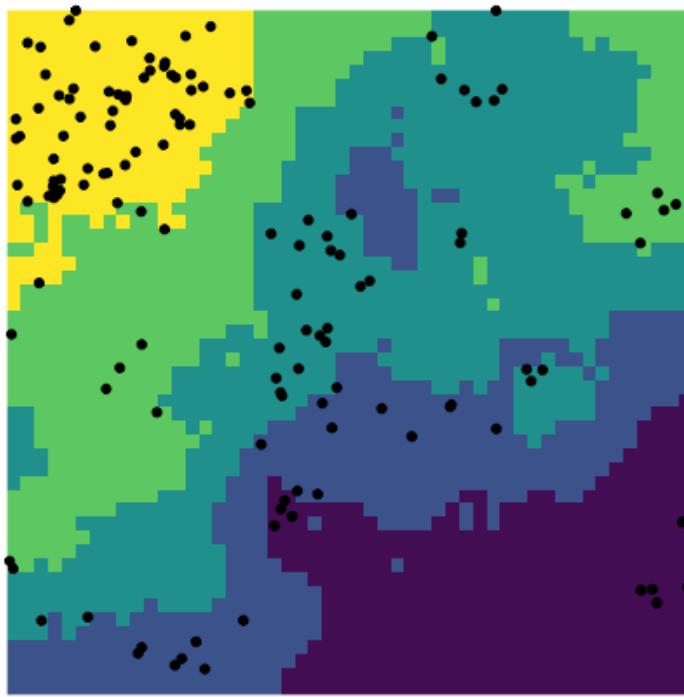


Hesselbarth & Wiegand (in review)

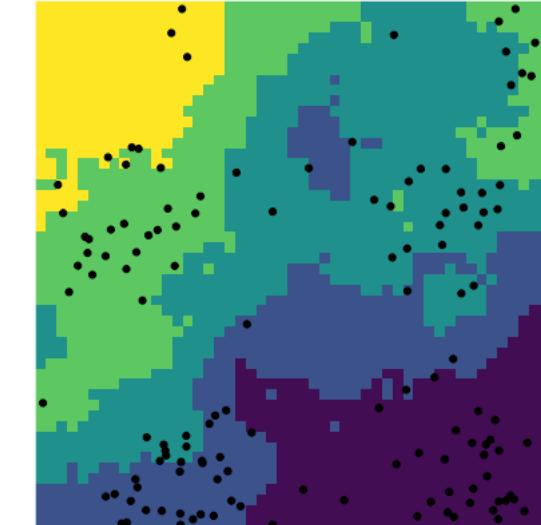
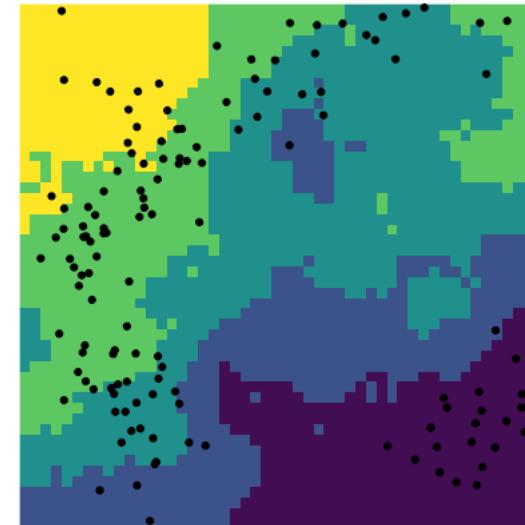


Species-habitat associations of forest trees

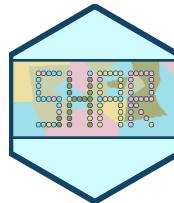
Observed data



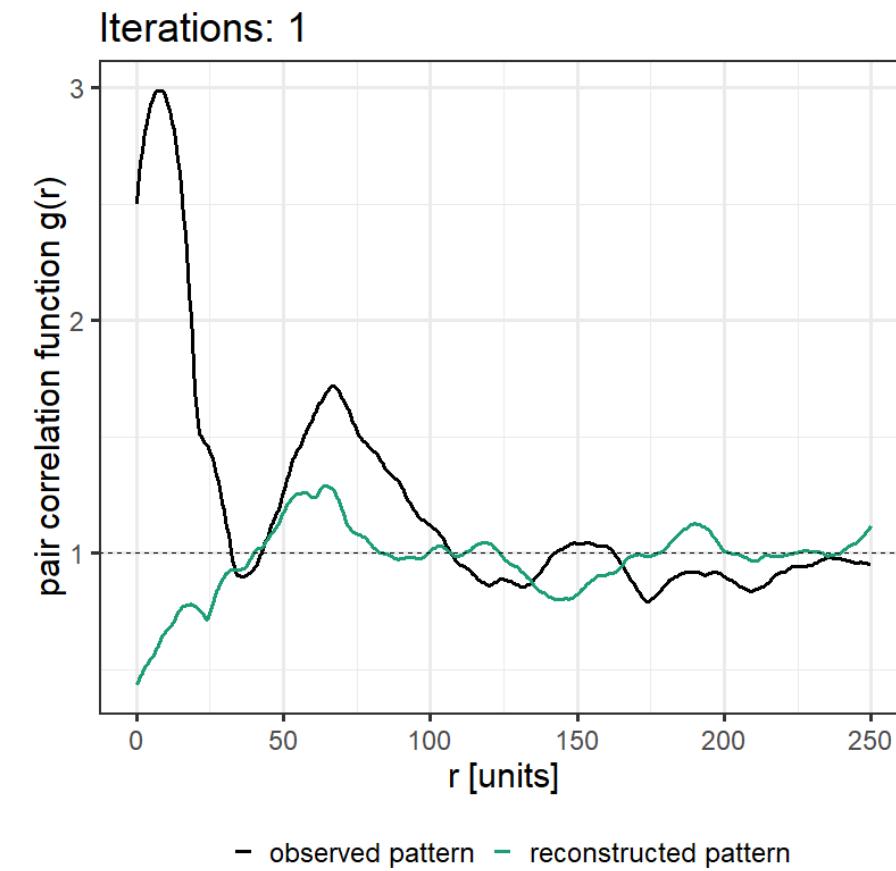
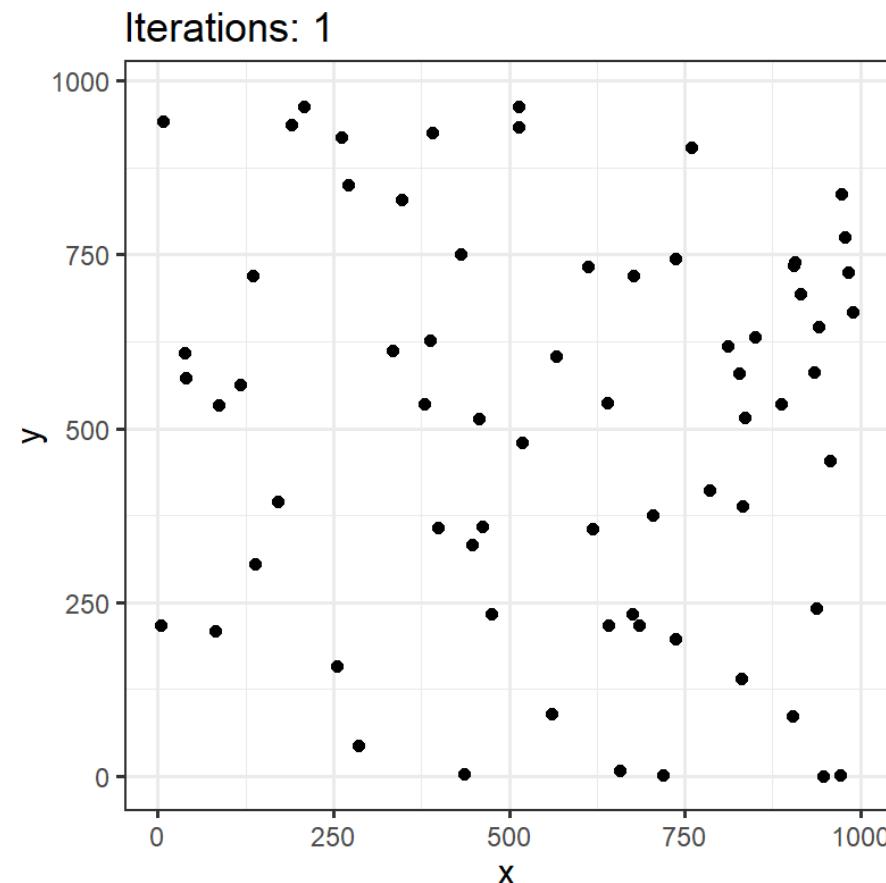
Randomized data 1...n

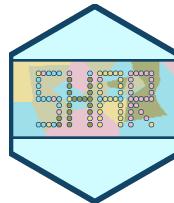


Hesselbarth & Wiegand (in review)

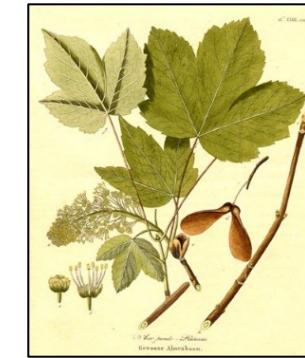


Pattern reconstruction





Species-habitat associations of forest trees



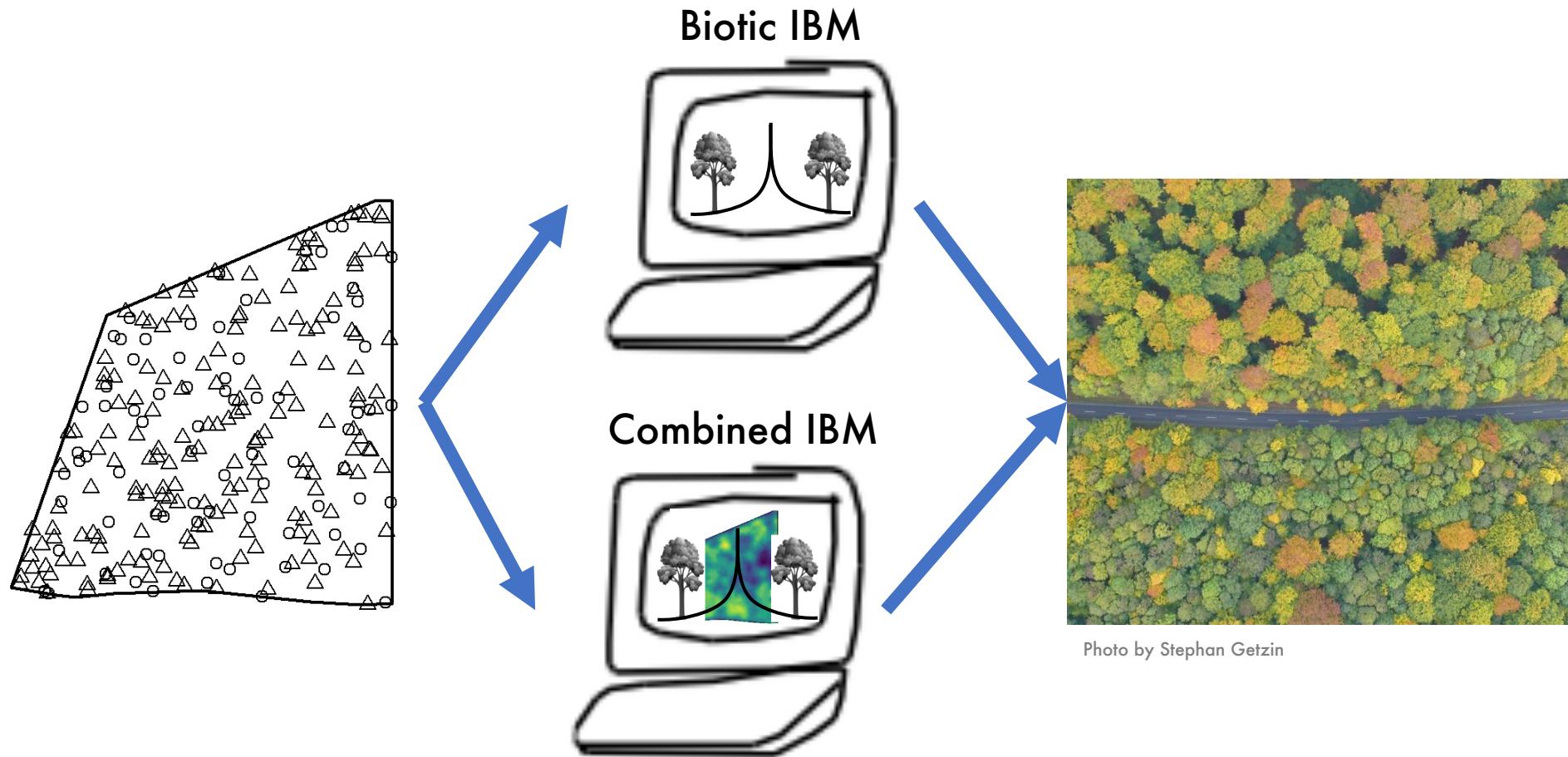
Thomé, O.W., 1885. Flora von Deutschland, Österreich und der Schweiz, Gera, Germany, www.BioLib.de

	<i>Fagus sylvatica</i> (European beech)	<i>Fraxinus excelsior</i> (European ash)	<i>Carpinus betulus</i> (Common Hornbeam)	<i>Acer pseudoplatanus</i> (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)

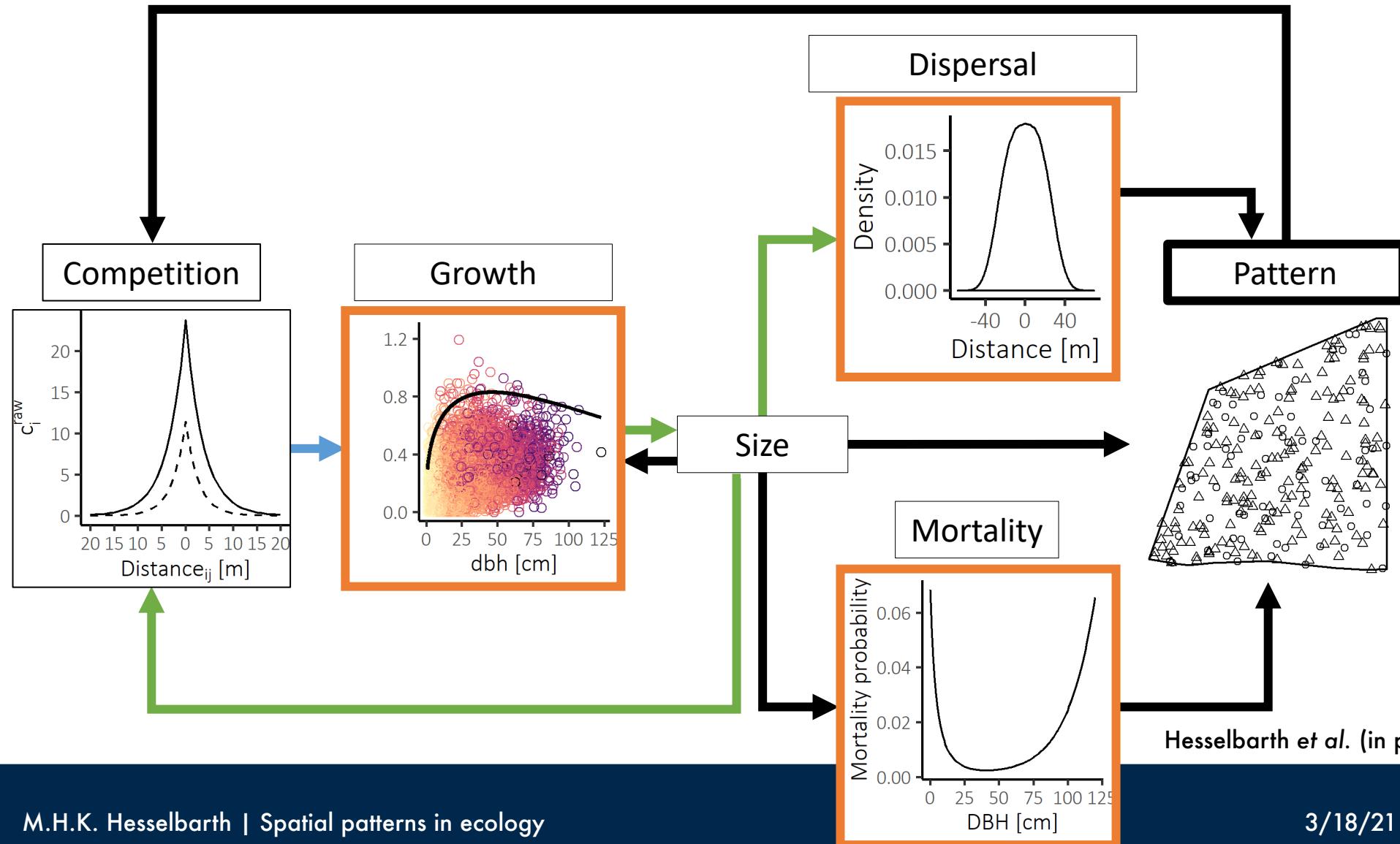


Using an IBM to explore processes further



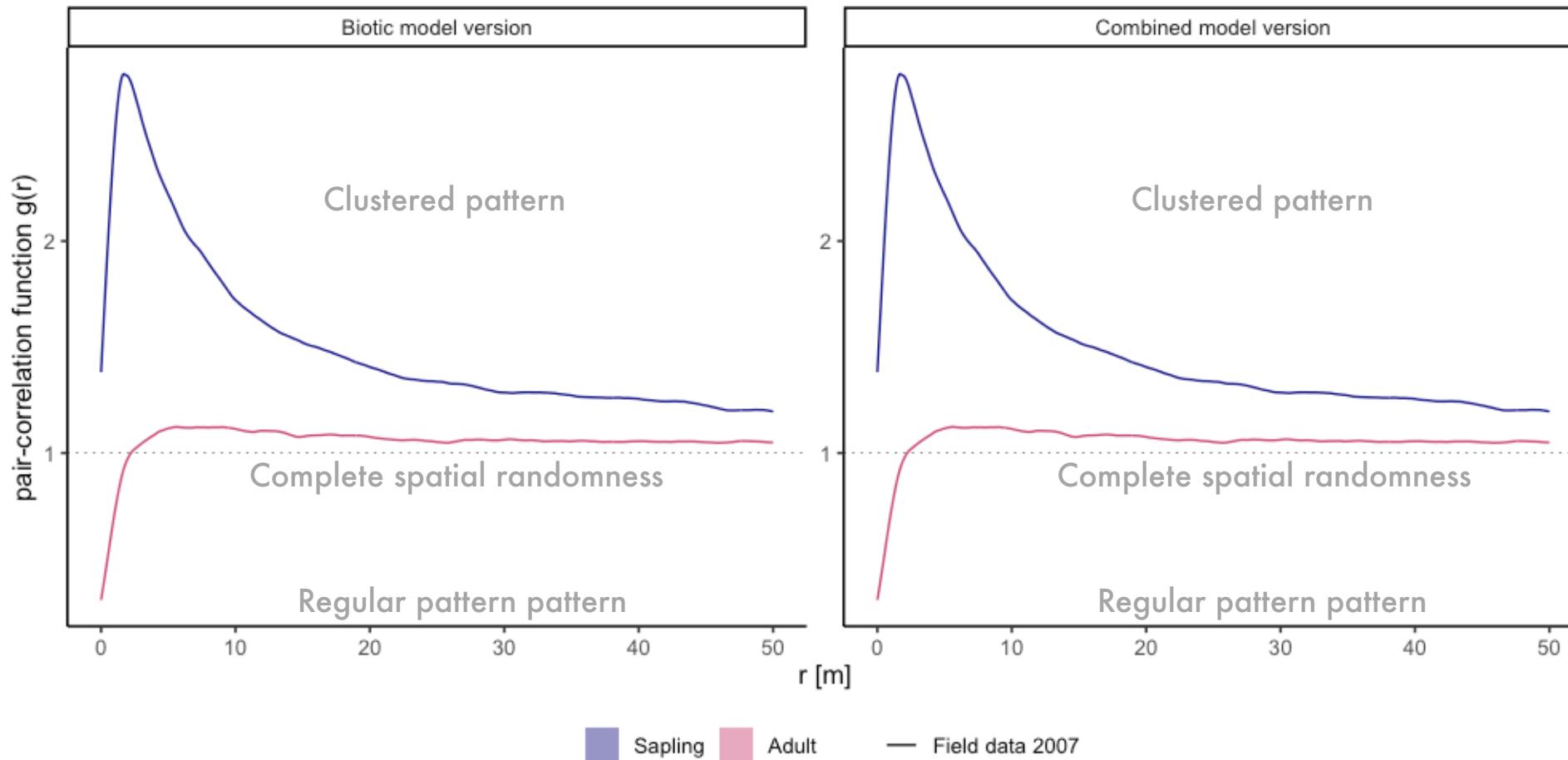


Using an IBM to explore processes further





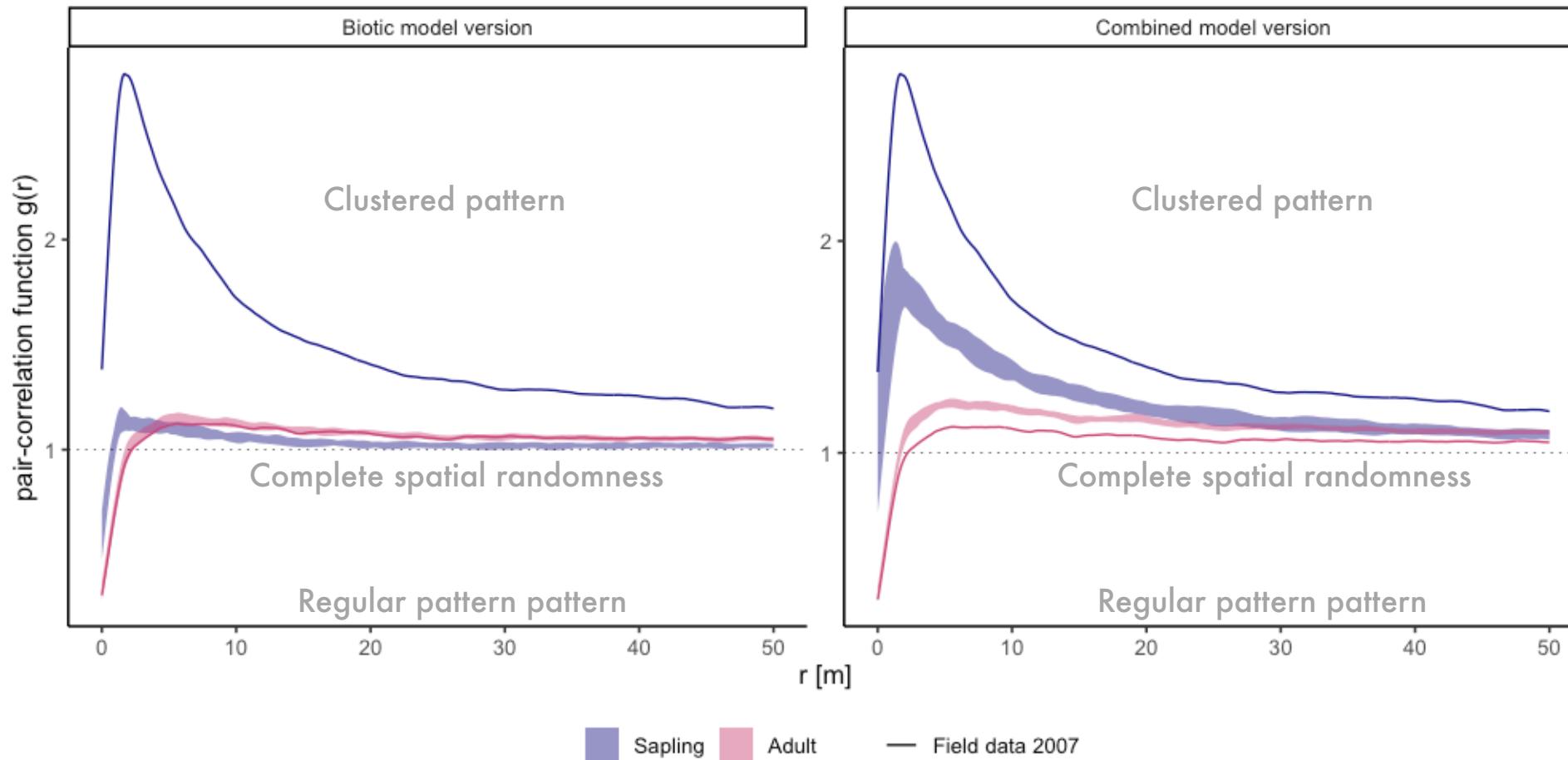
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Hesselbarth et al. (in prep)



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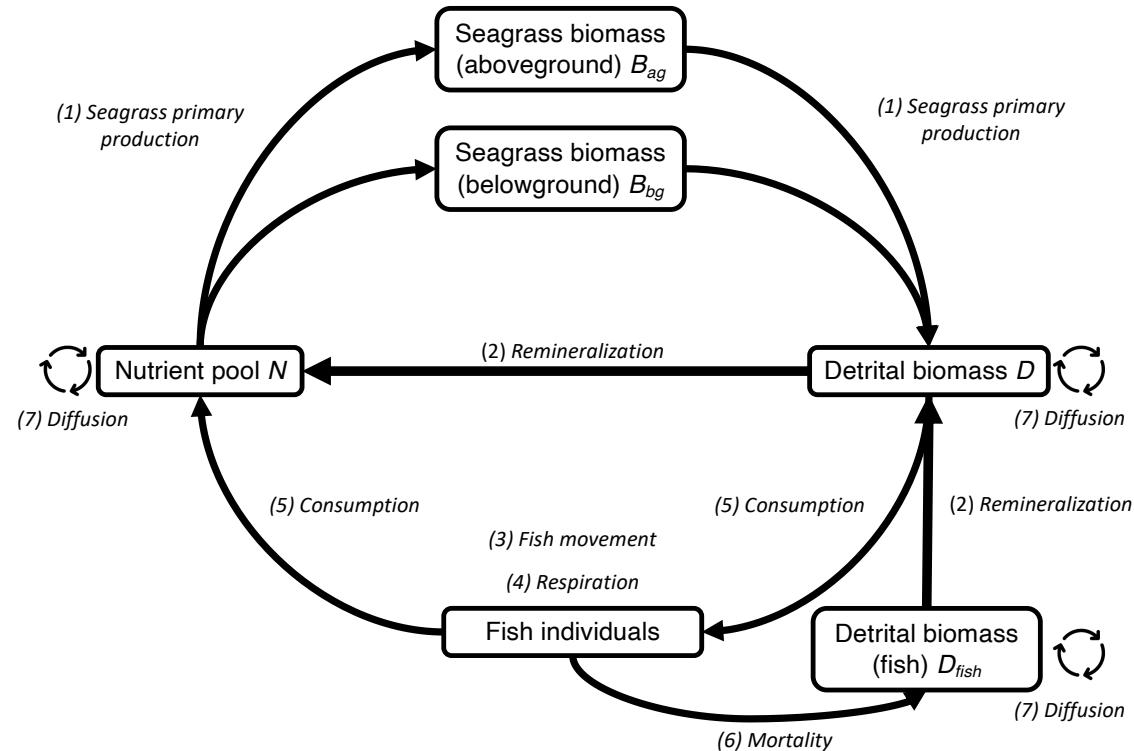


IBM of artificial reefs

ARTificial Reefs in R



Logo designed by Sammy Iliff



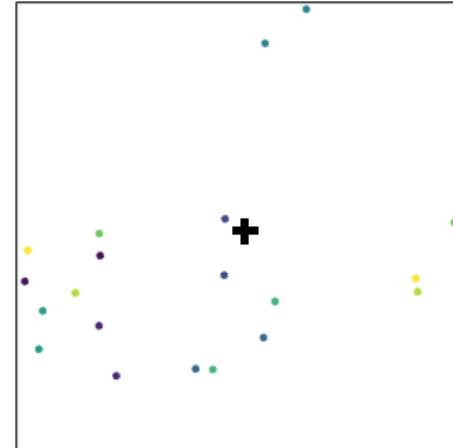
Esquivel et al. (in prep)



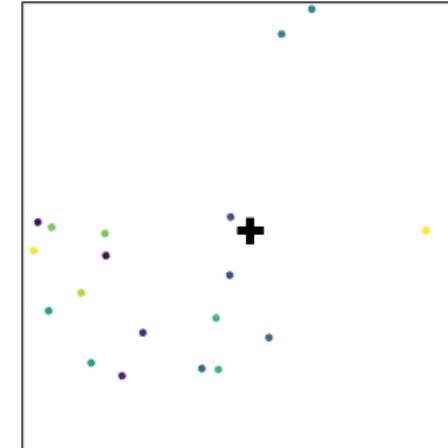
IBM of artificial reefs

Fish movement

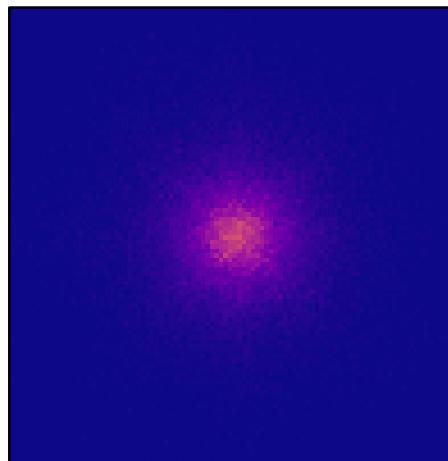
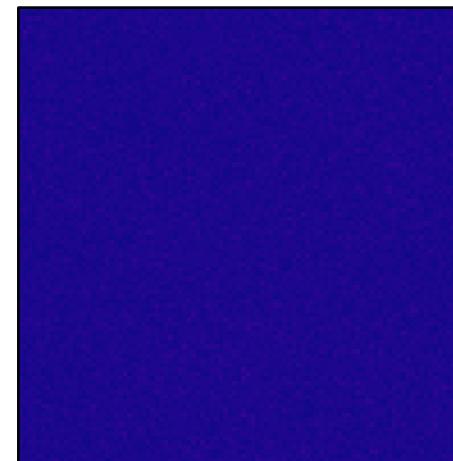
No influence of AR



Attraction towards AR

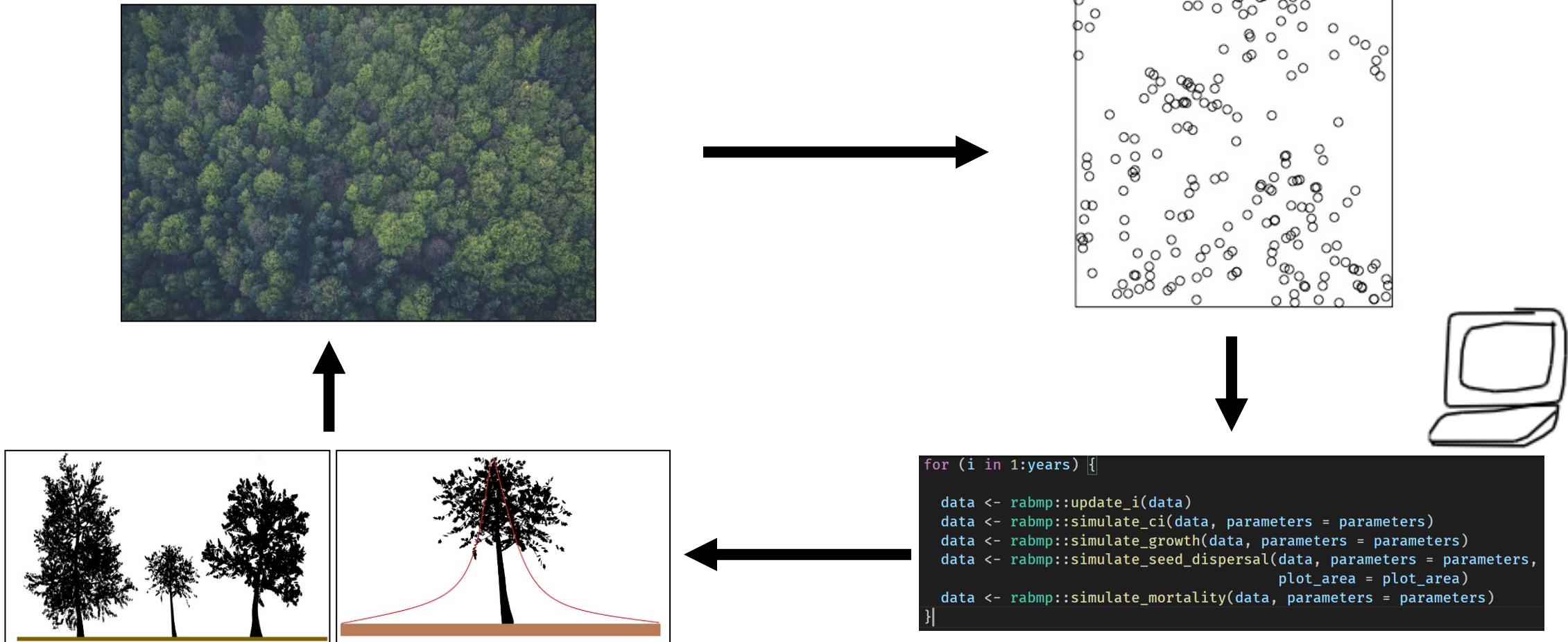


Water column nutrients

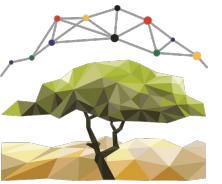


Esquivel et al. (in prep)

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Acknowledgments



Nationalpark
Hainich



DFG



Thank you very much for your attention

Any questions?



mhessel@umich.edu



<https://mhesselbarth.rbind.io>



<https://github.com/mhesselbarth>

References

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