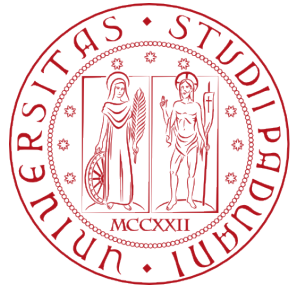
HFSP Kickoff meeting

Initial meeting, Padova

Johannes Nauta

February 14, 2023



Università degli Studi di Padova

Origin story

- Born in **Lelystad** (1994)
  The Netherlands

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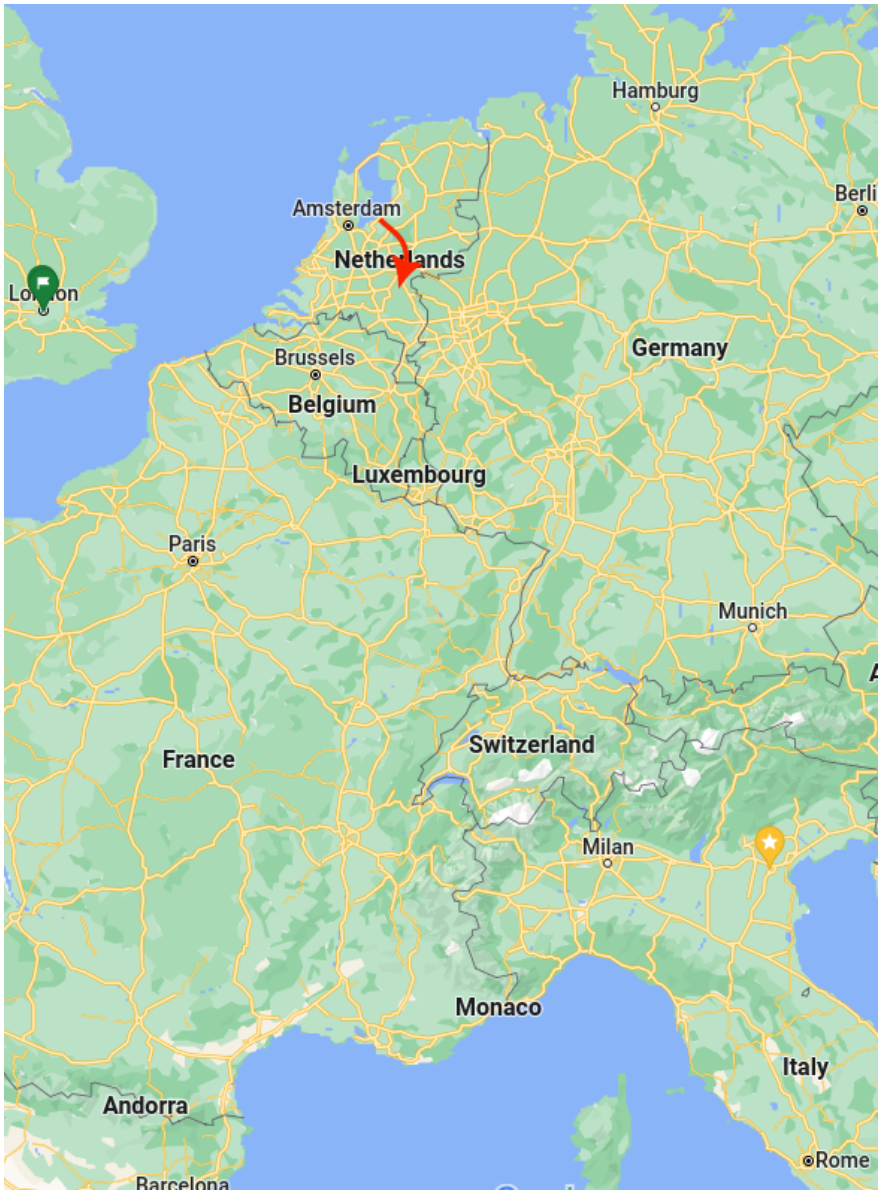

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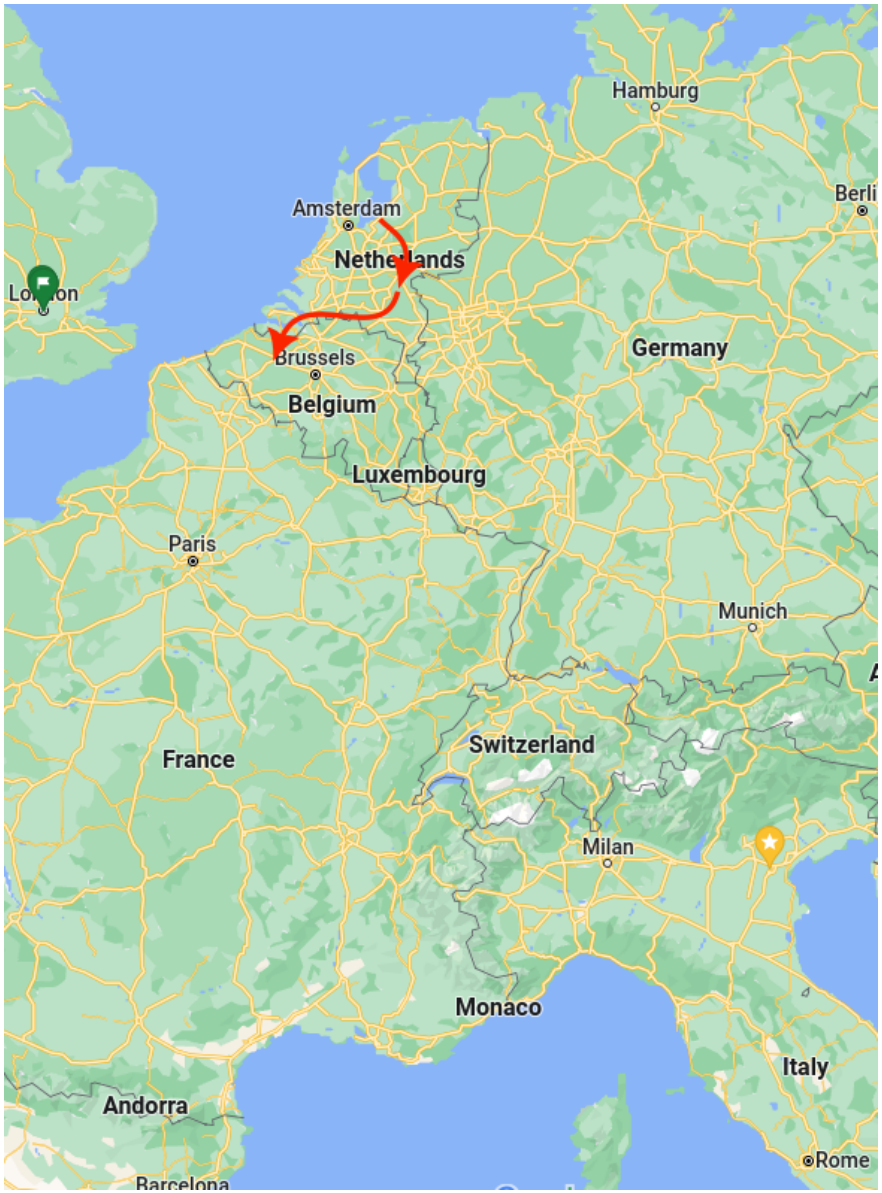

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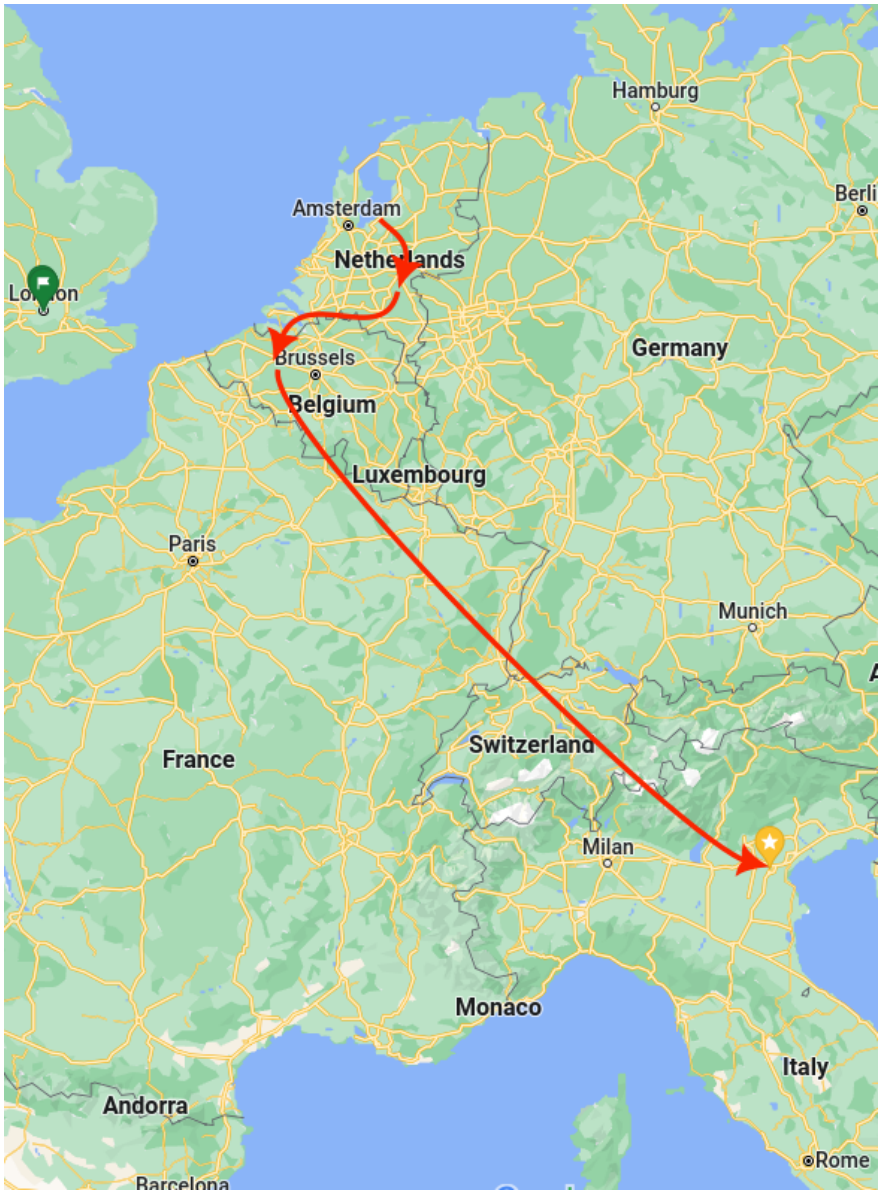

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  Belgium
- Postdoc at (2023 - . . .)
  University of Padova
  Italy

Foraging

How do animals find food?
What do they optimize?

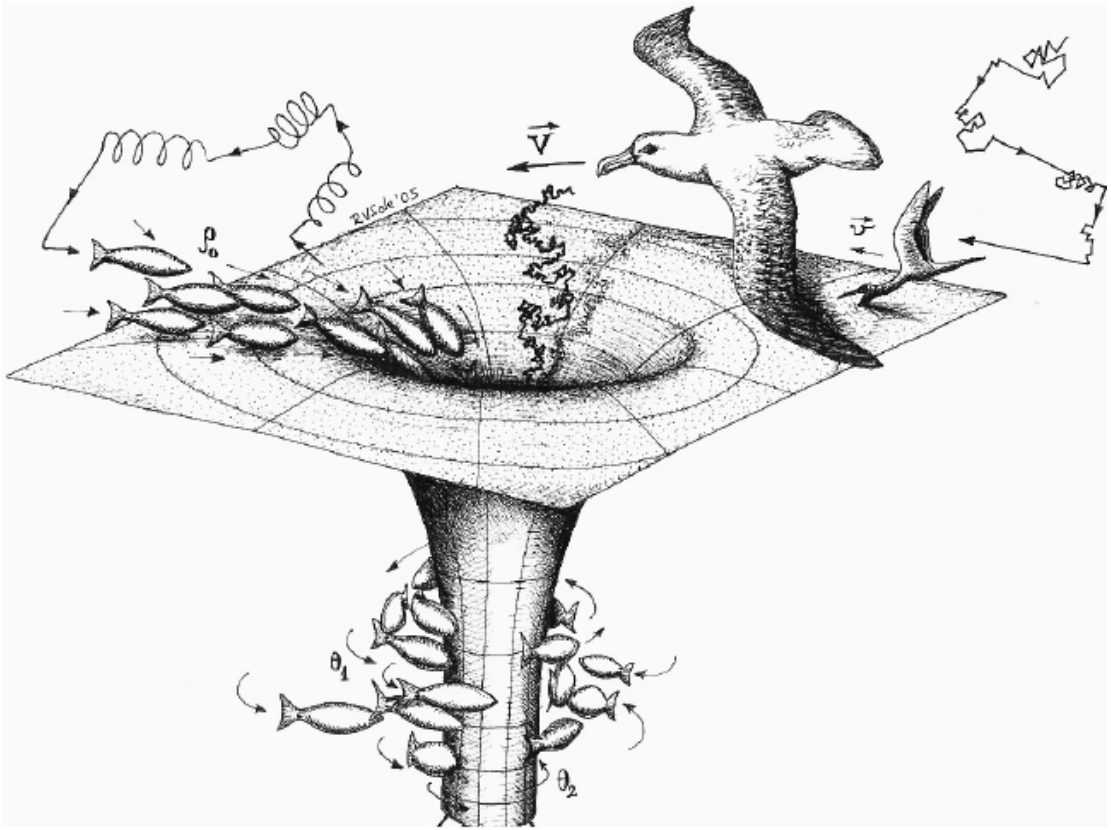
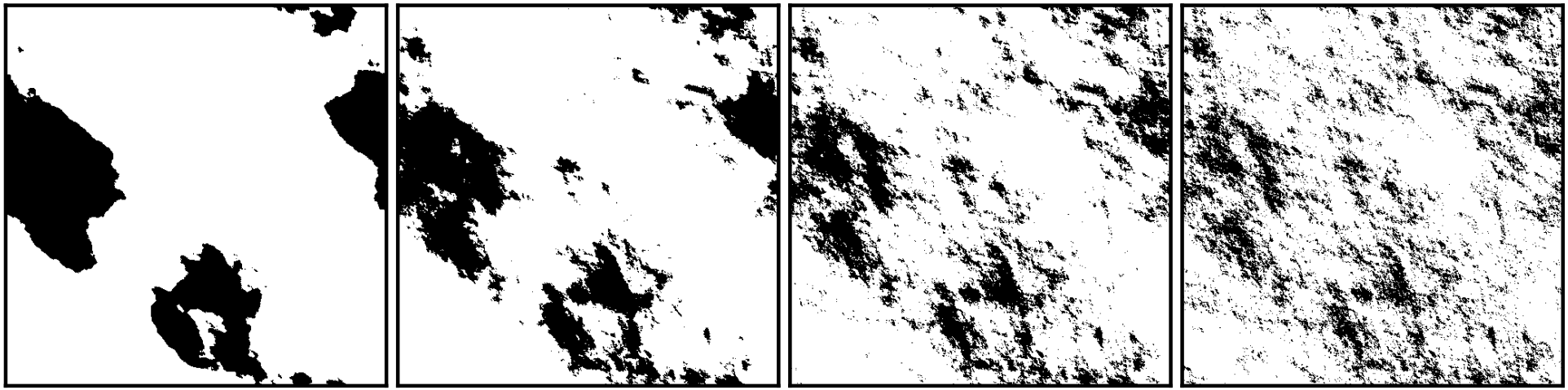


Figure: Drawing by Ricard Solé, from Bartumeus (2007)

Research focus: spatiotemporal models

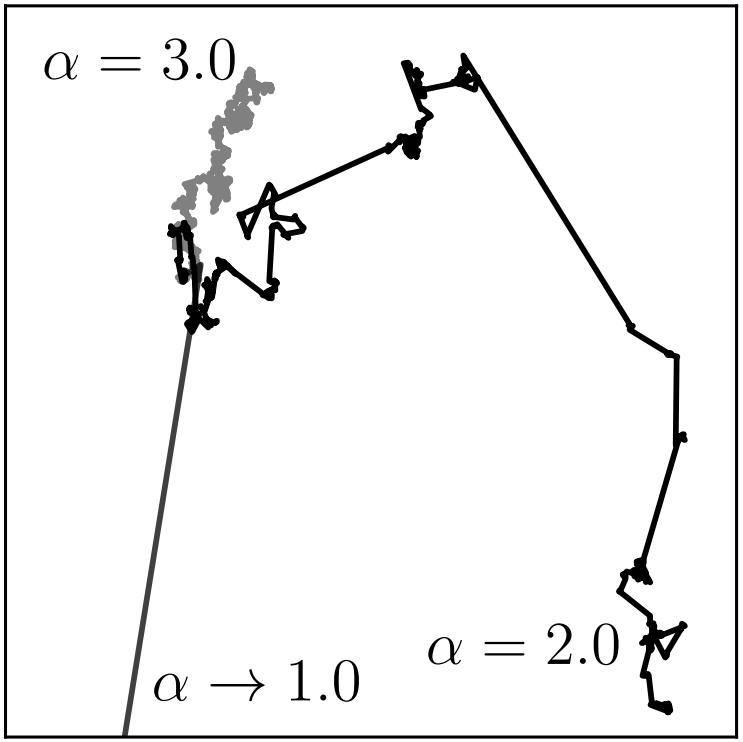
Spatial aspects: resource distribution



Research focus: spatiotemporal models

Temporal aspects:

dispersal



Research focus: spatiotemporal models

Temporal aspects:

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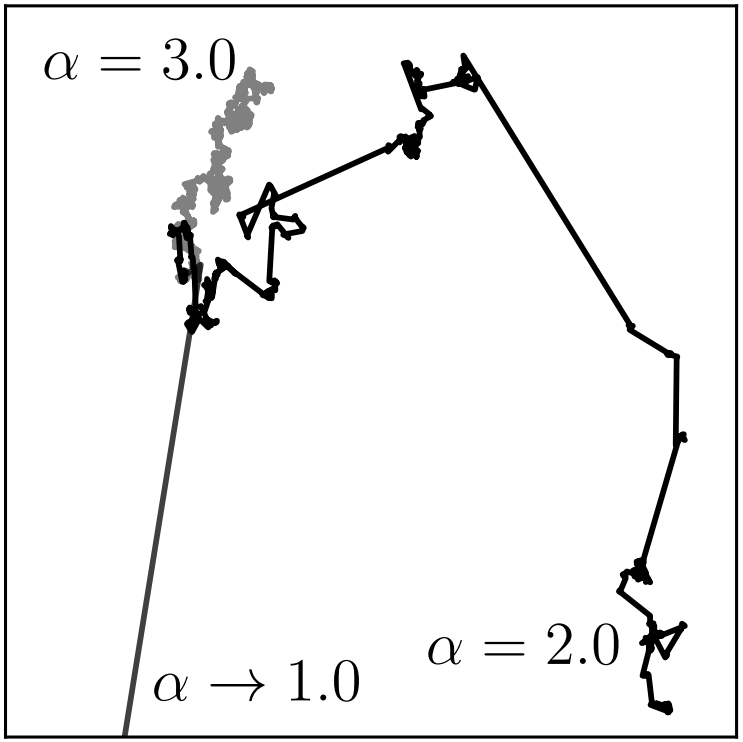
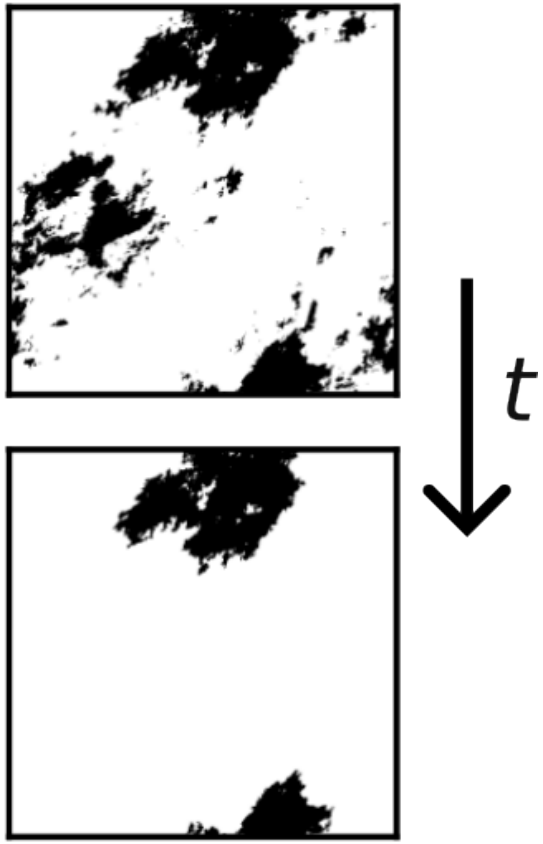


demographic events



Research focus: spatiotemporal models

INTERFACE

royalsocietypublishing.org/journal/rsif

Research

Check for updates

Cite this article: Nauta J, Simoens P, Khaluf Y, Martinez-Garcia R. 2022 Foraging behaviour and patch size distribution jointly determine population dynamics in fragmented landscapes. *J. R. Soc. Interface* **19**: 20220103.

Foraging behaviour and patch size distribution jointly determine population dynamics in fragmented landscapes

Johannes Nauta[1], Pieter Simoens[1], Yara Khaluf[2] and Ricardo Martinez-Garcia[3]

[1]Department of Information Technology–IDLab, Ghent University-IMEC, Technologiepark Zwijnaarde 126, 9052 Ghent, Belgium

[2]Wageningen University and Research, Department of Social Sciences–Information Technology Group, Hollandseweg 1, 6706KN Wageningen, The Netherlands

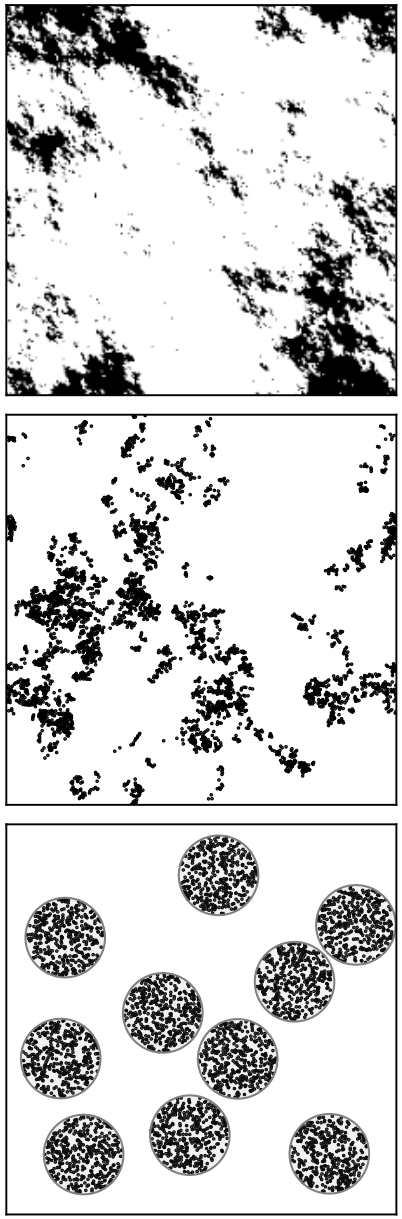
[3]ICTP South American Institute for Fundamental Research and Instituto de Física Teórica, Universidade Estadual Paulista–UNESP, Rua Dr Bento Teobaldo Ferraz 271, Bloco 2 – Barra Funda, 01140-070 São Paulo, Brazil

JN, 0000-0002-5859-2729; PS, 0000-0002-9569-9373; YK, 0000-0002-5590-9321; RM, 0000-0003-2765-8147

Expertise

- Spatial patterns

  resource distribution, dispersal



Expertise

- Spatial patterns
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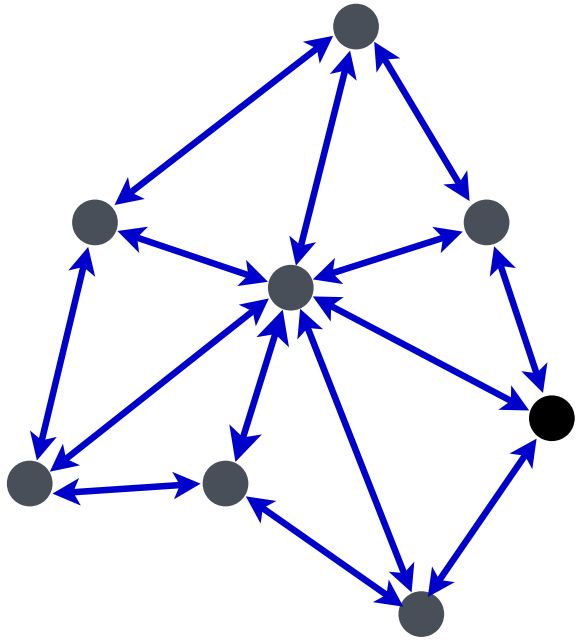
- Agent-based modeling
  adaptive behavior



Expertise

- Spatial patterns
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- Agent-based modeling
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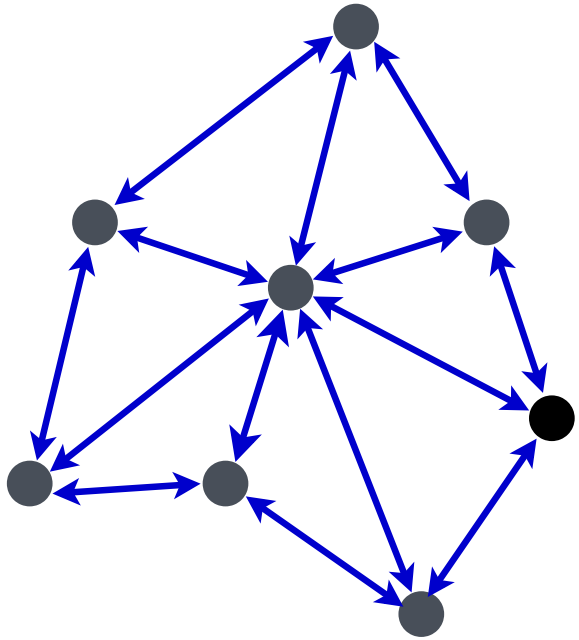
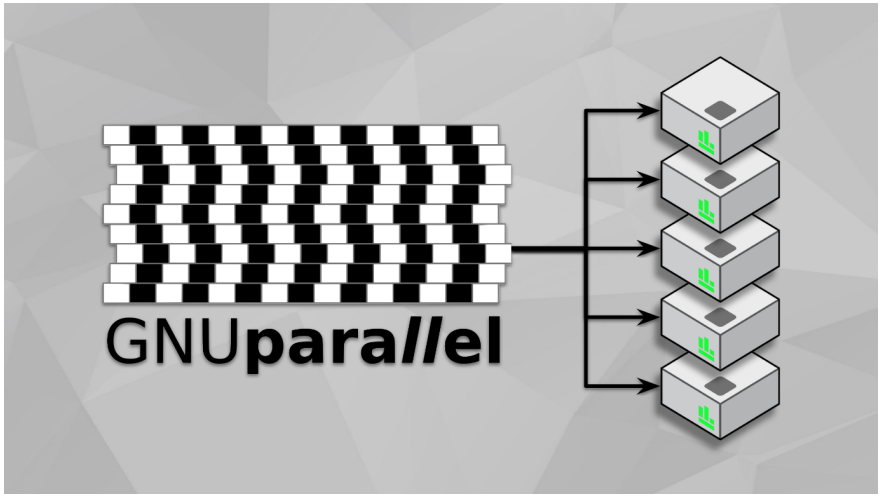
- Collective systems
  interaction graphs, collective behavior



Expertise

- Spatial patterns
  resource distribution, dispersal
- Agent-based modeling
  adaptive behavior
- Collective systems
  interaction graphs, collective behavior
- Numerical approaches
  large-scale parallel computation using
  `Julia`, `Python` and `bash`



Aims and expectations

Goals:

1. Extract relevant components

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   - How does the environment influence community evolution? $g(t)$

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2. Accurately model population dynamics of microbial communities

$$\frac{dN_i}{dt} = N_i r_i \left(1 - \sum_{j=1}^{S} a_{ij}(z) N_j\right) + m_i$$

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Expectations

1. Advance understanding of microbial communities

Aims and expectations

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Expectations

1. Advance understanding of microbial communities
2. Advance understanding of multiscale influence of HGT

Aims and expectations

Goals:

1. Extract relevant components
   - How does the environment influence community evolution? $g(t)$
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   - How does the competition network influence HGT? $H_{ij}(t)$
2. Accurately model population dynamics of microbial communities

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Expectations

1. Advance understanding of microbial communities
2. Advance understanding of multiscale influence of HGT
3. Make predictions about more complex (*non-microbial?*) communities

Thank you