Do ecological interactions impact geographic distributions of species?

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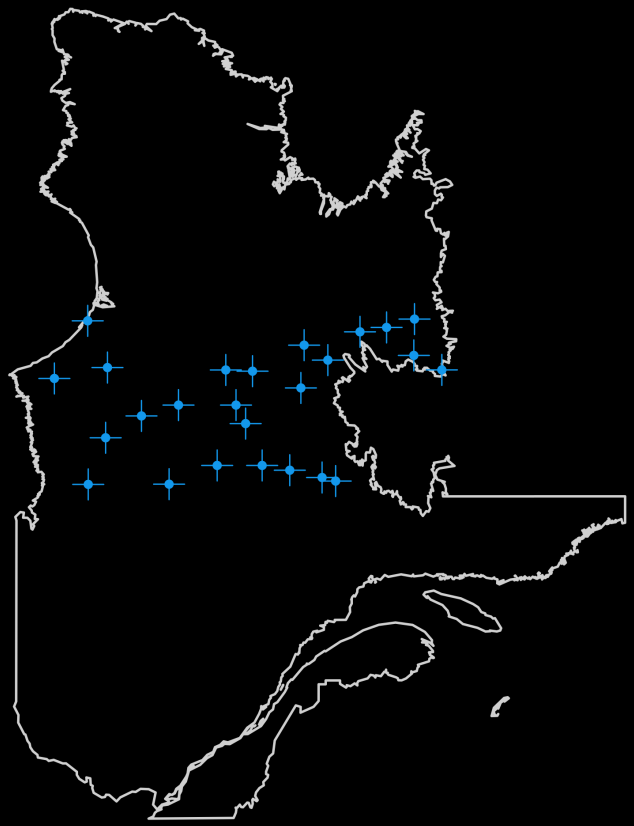
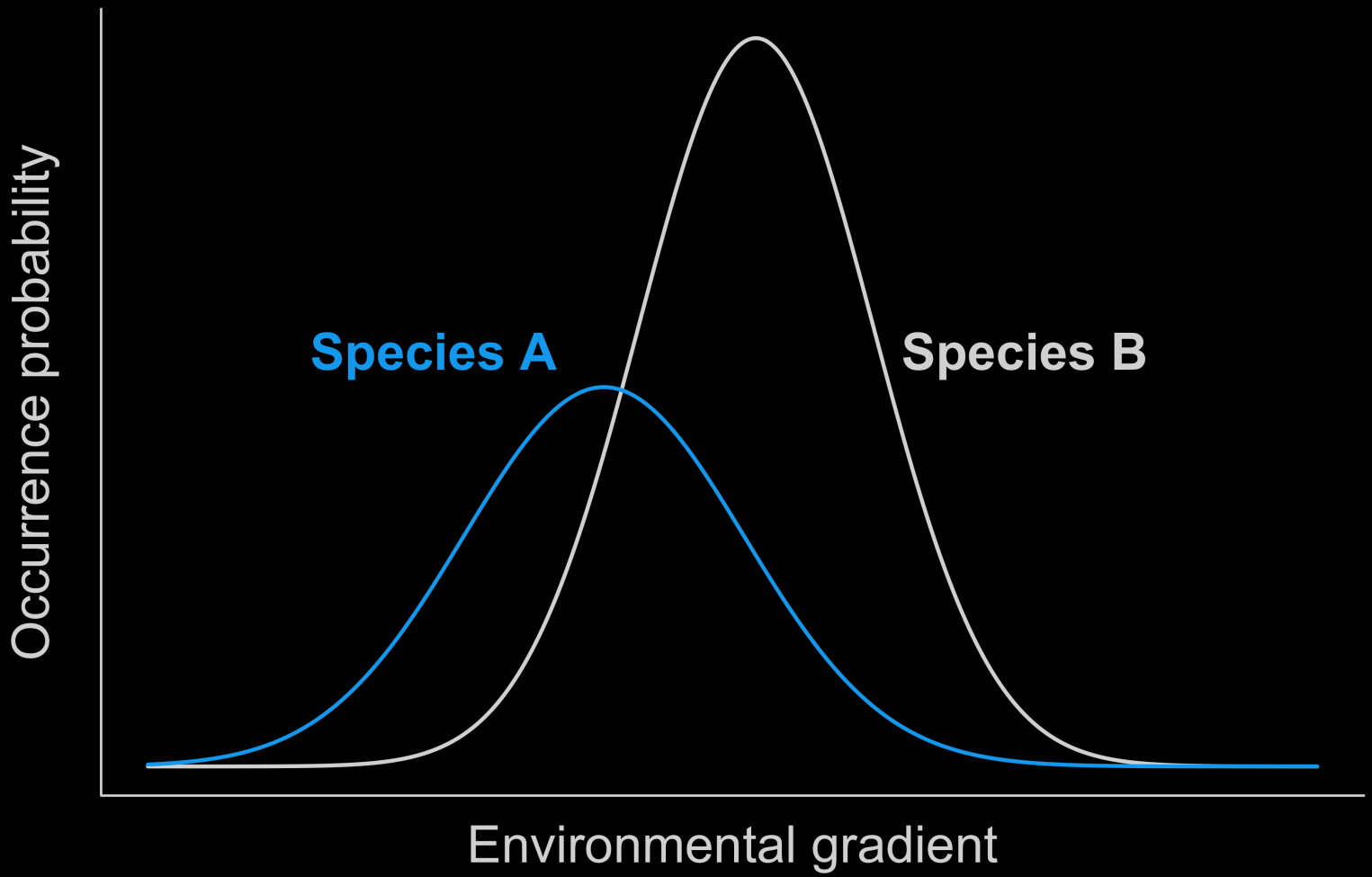
2. Institut des Sciences de L'Evolution de Montpellier, Université de Montpellier

Species A



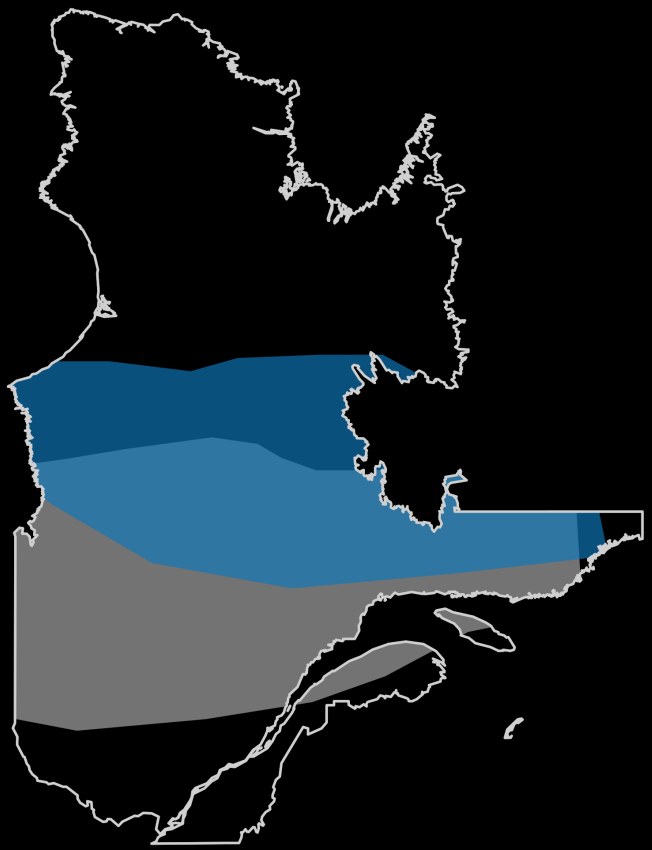
Species B

Ecological niche

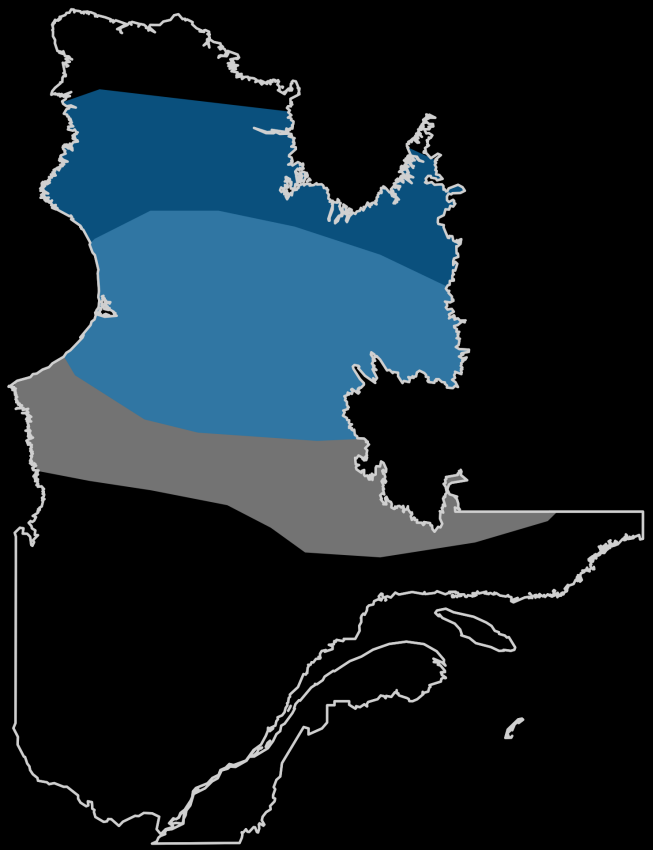


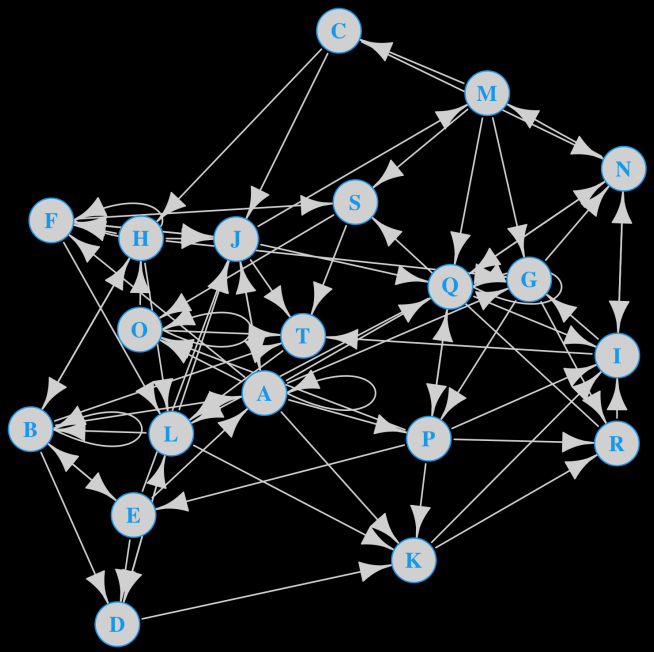
Species distributions forecasts

Today



Tomorrow





Tomorrow

- What have we done ?

- Occurrence: $P_i = \mathbb{P}(X_i)$,

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- Ratio $P_{i,j}/P_{i,j;IND}$ vs Network properties.

- Niche Model (Williams et Martinez, 2000) to build realistic networks,

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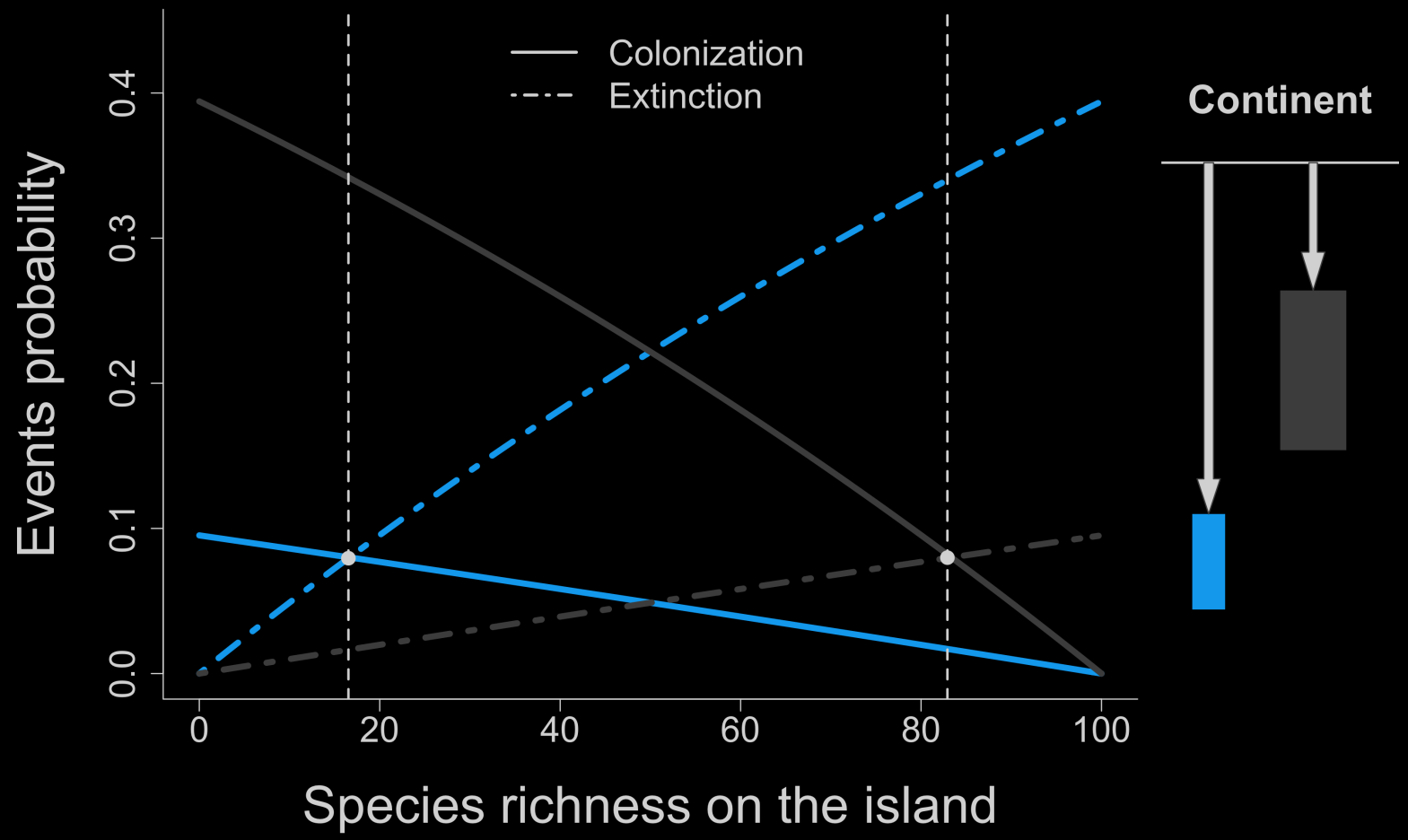
- Trophic Theory of Island Biogeography (Gravel *et al.*, 2011) as a theoretical distribution.

Theory of Island Biogeography



Two additionnal rules:

- Island without preys, predator cannot colonize,

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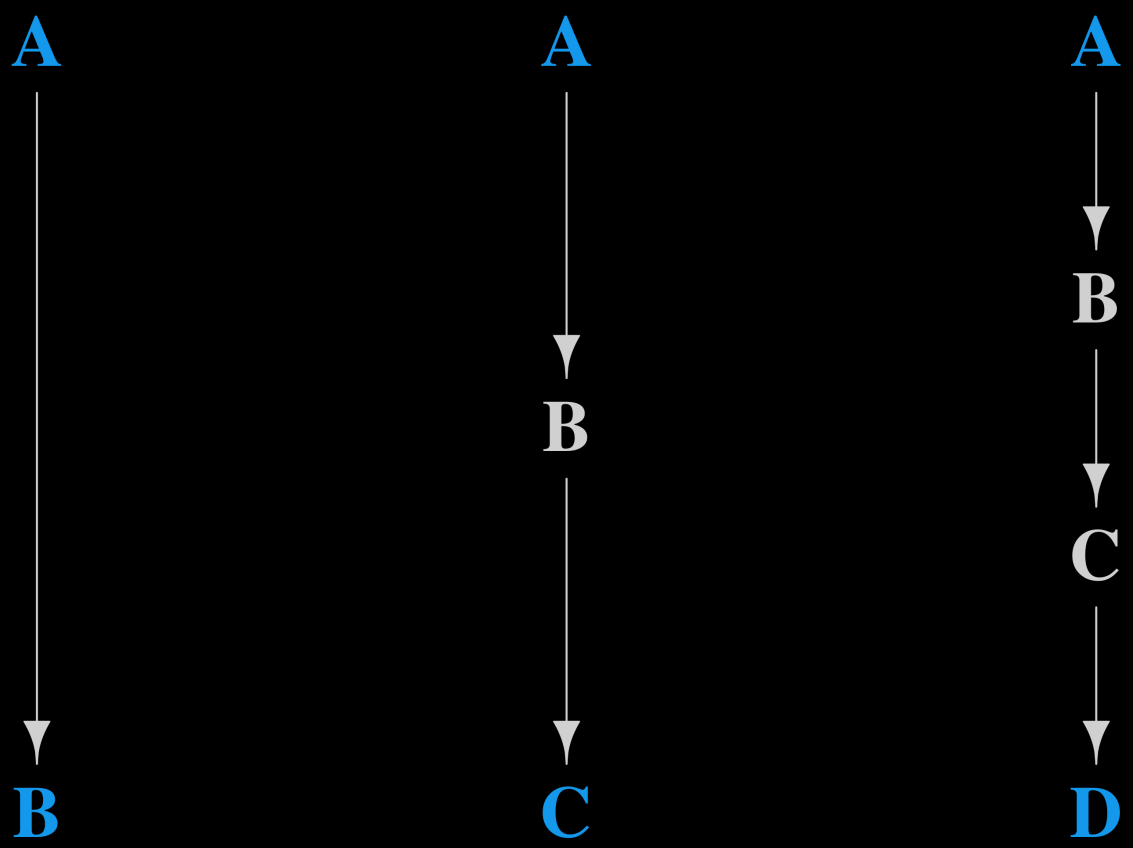
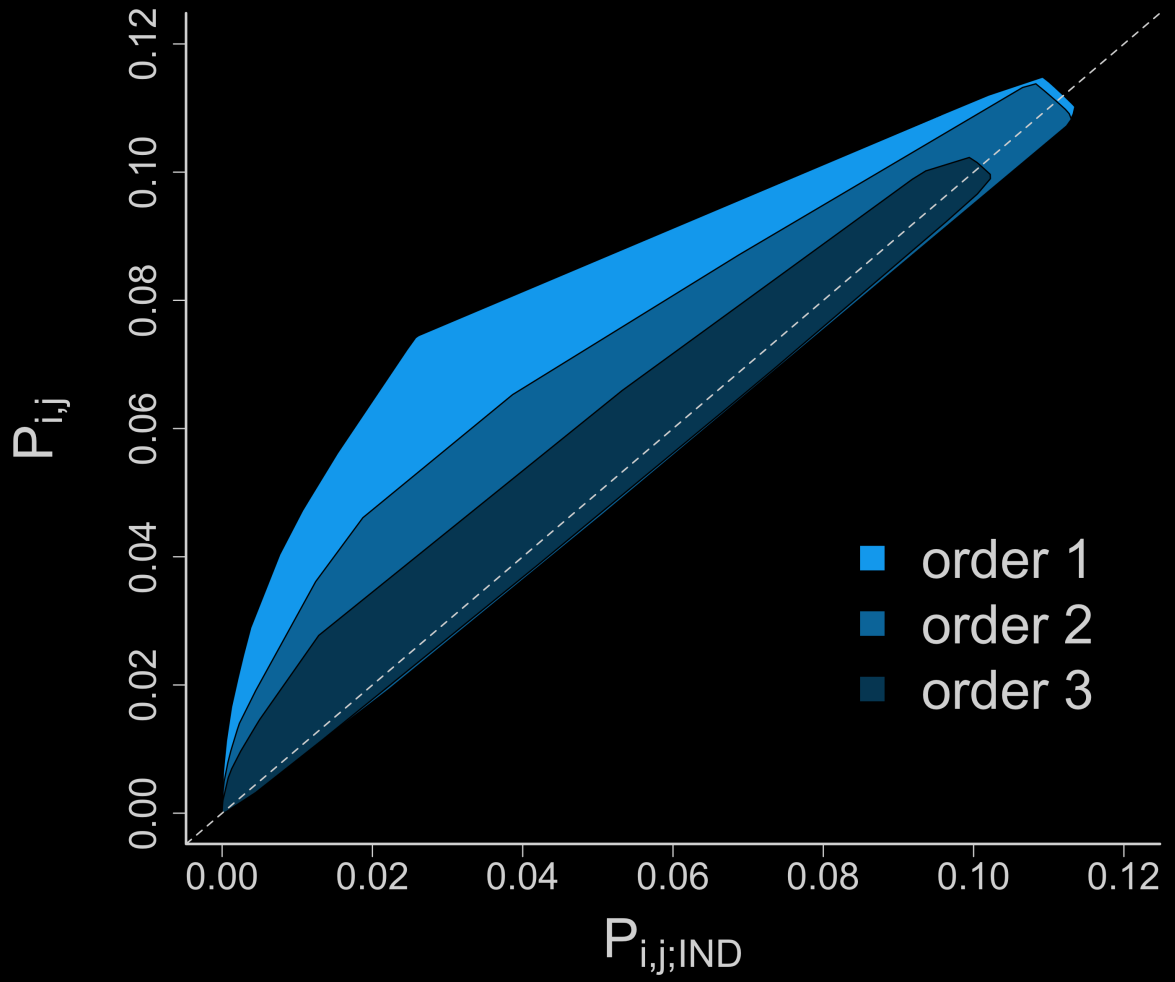
- Extinction of the last preys, predator goes extinct too.


A
B
A
B
C
A
B
C
D

Shortest path and association strength



A

B

C

D

Cazelles *et al.*, 2015, *Theoretical Ecology*

- Environmemental gradients ?

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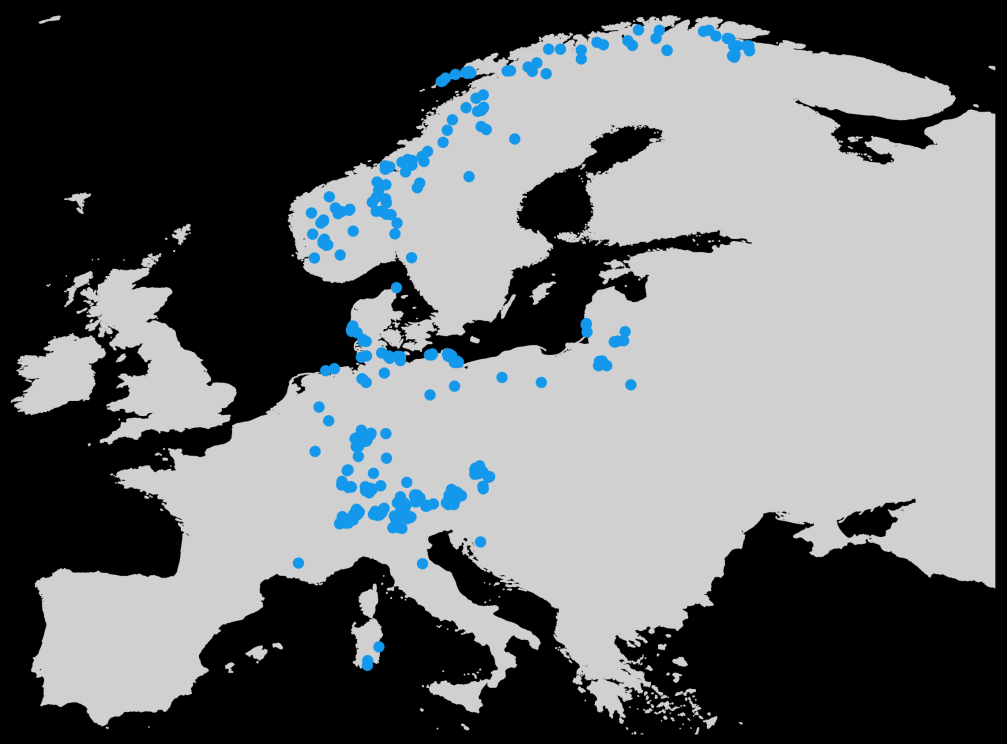
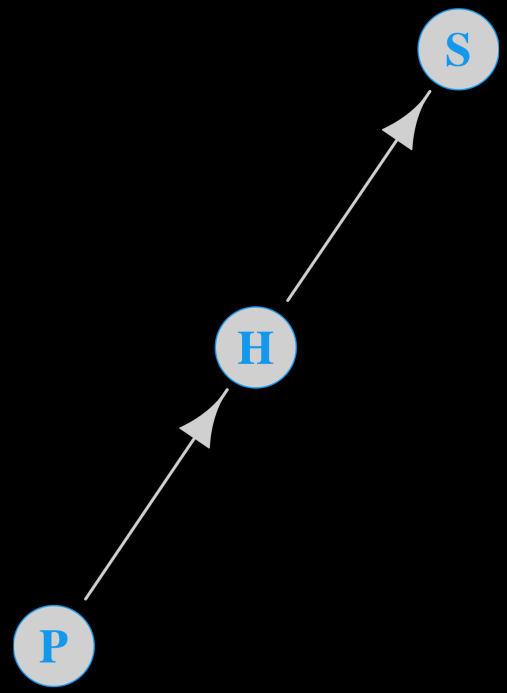
- Empirical data ?

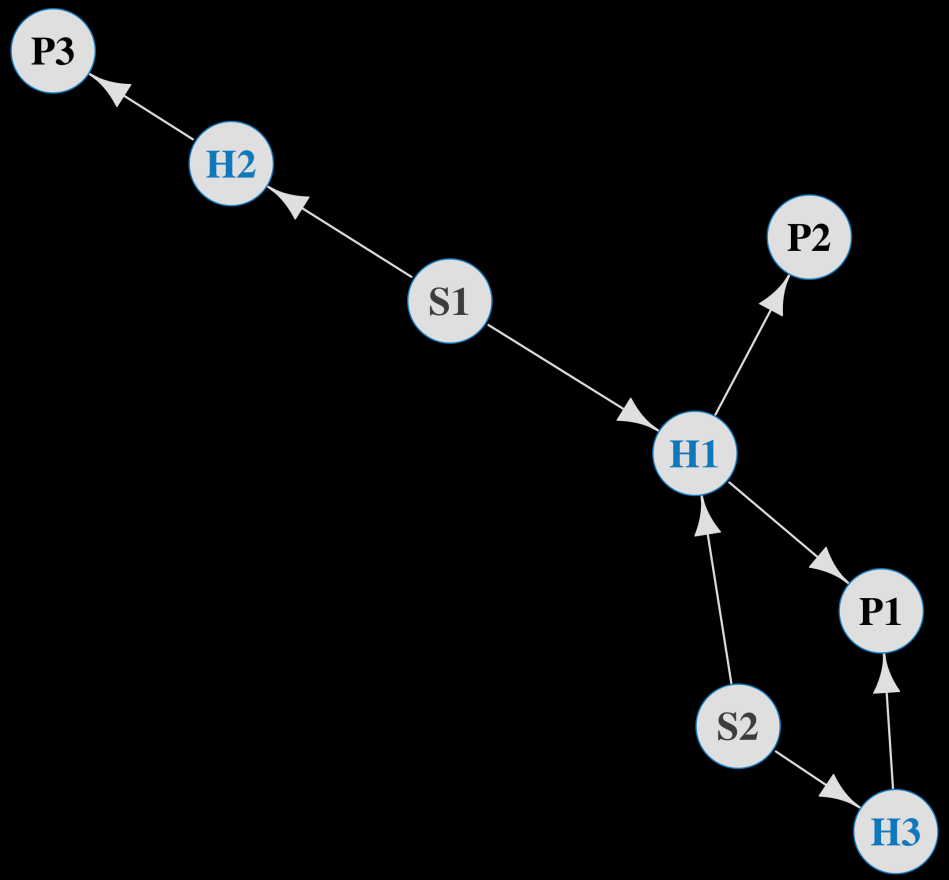
Empirical dataset





S: Salix H: Herbivore P: Parasitoid

Shortest path and association strength



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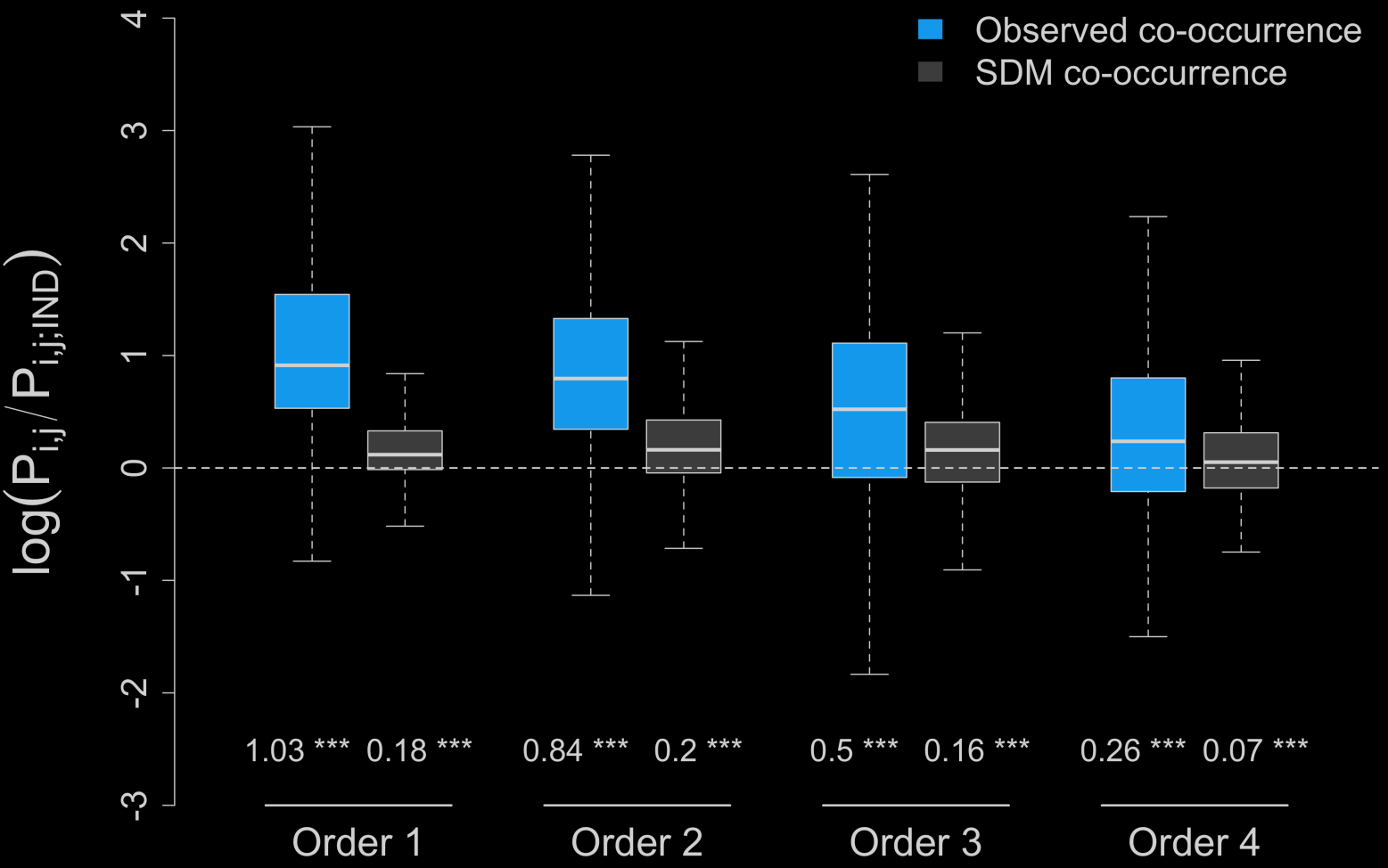

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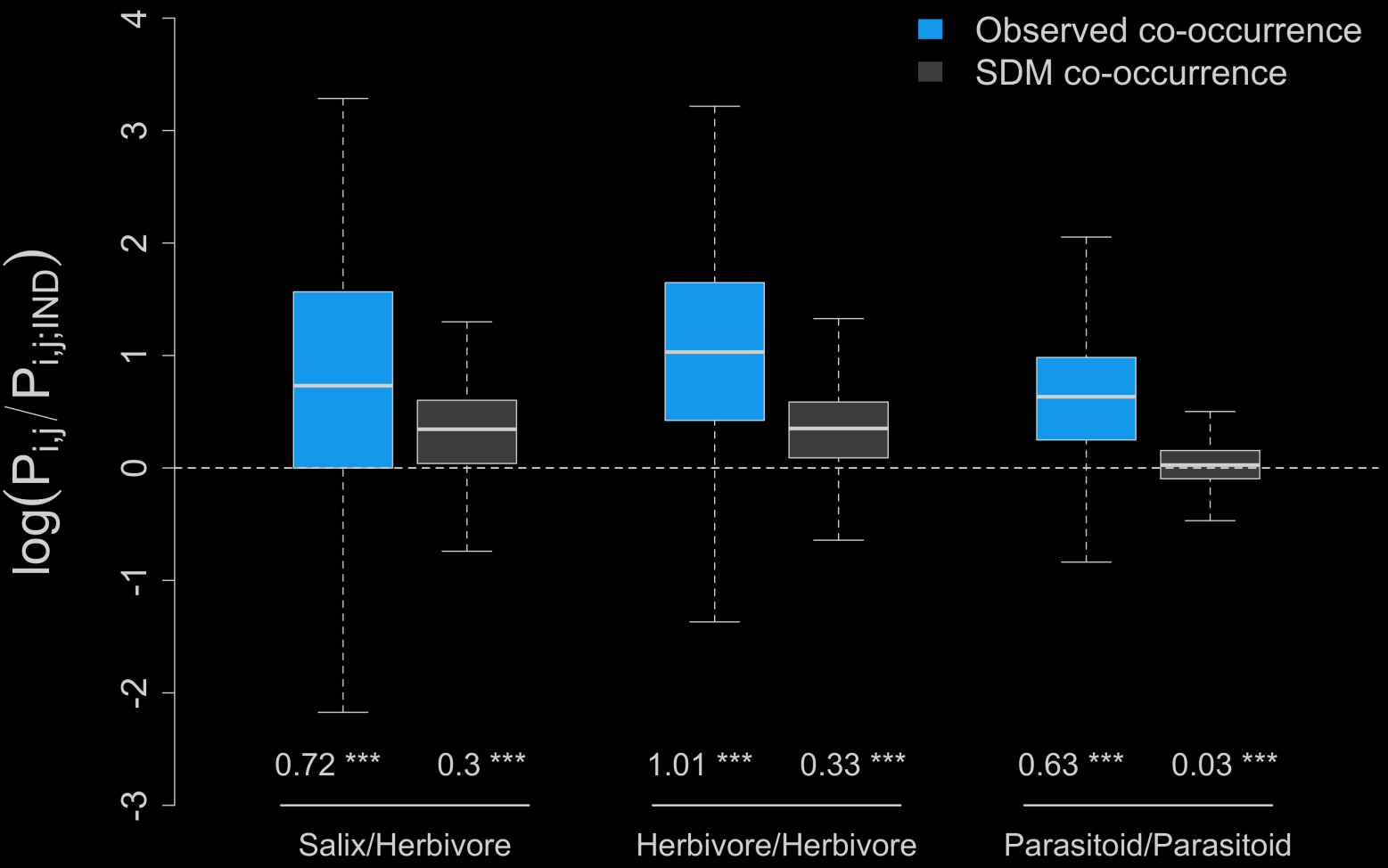

- What is next ?

1. **Abiotic variables:** λ,

Biogeography: integrated theory

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Functionnal traits to go further...

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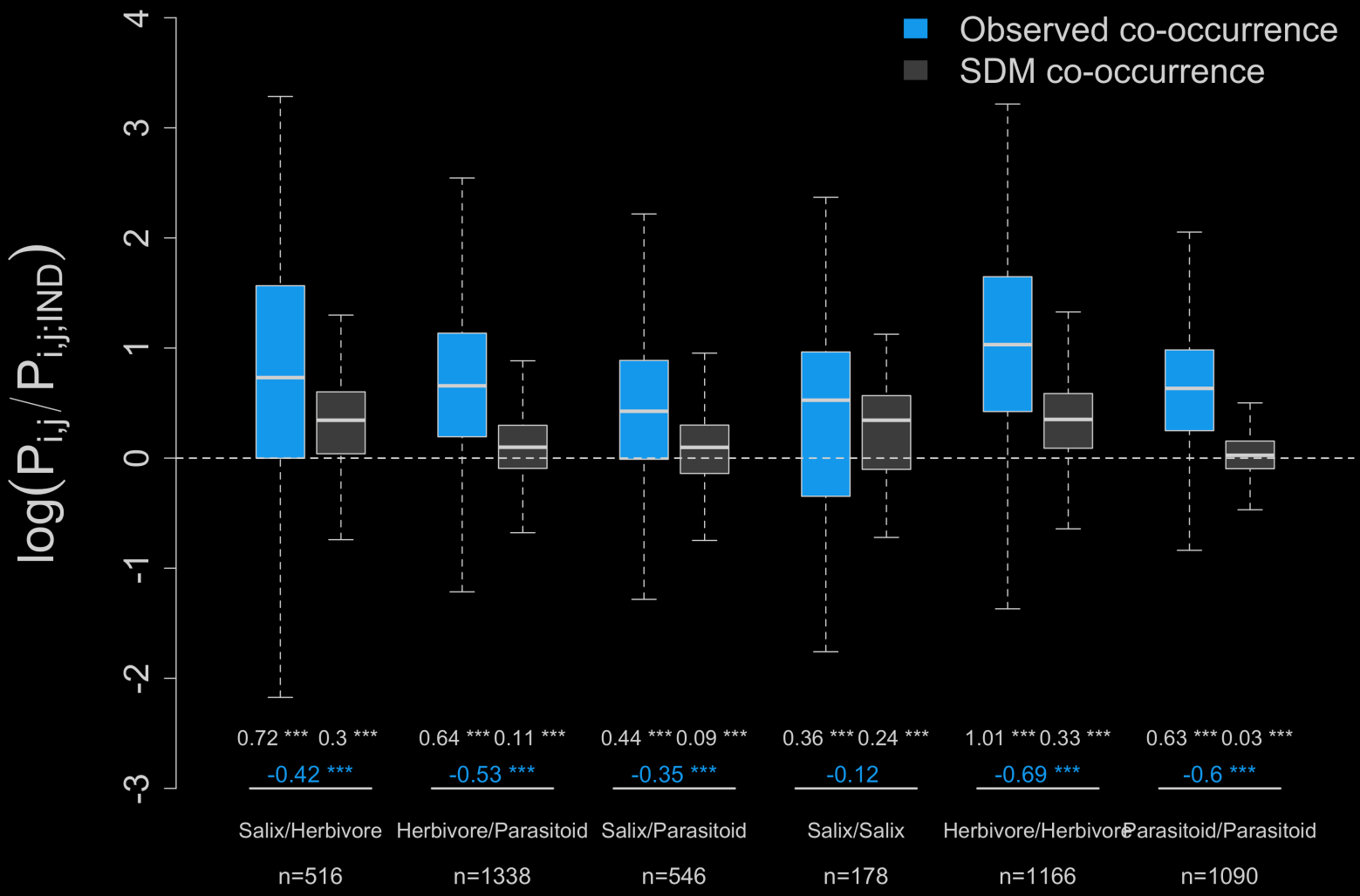
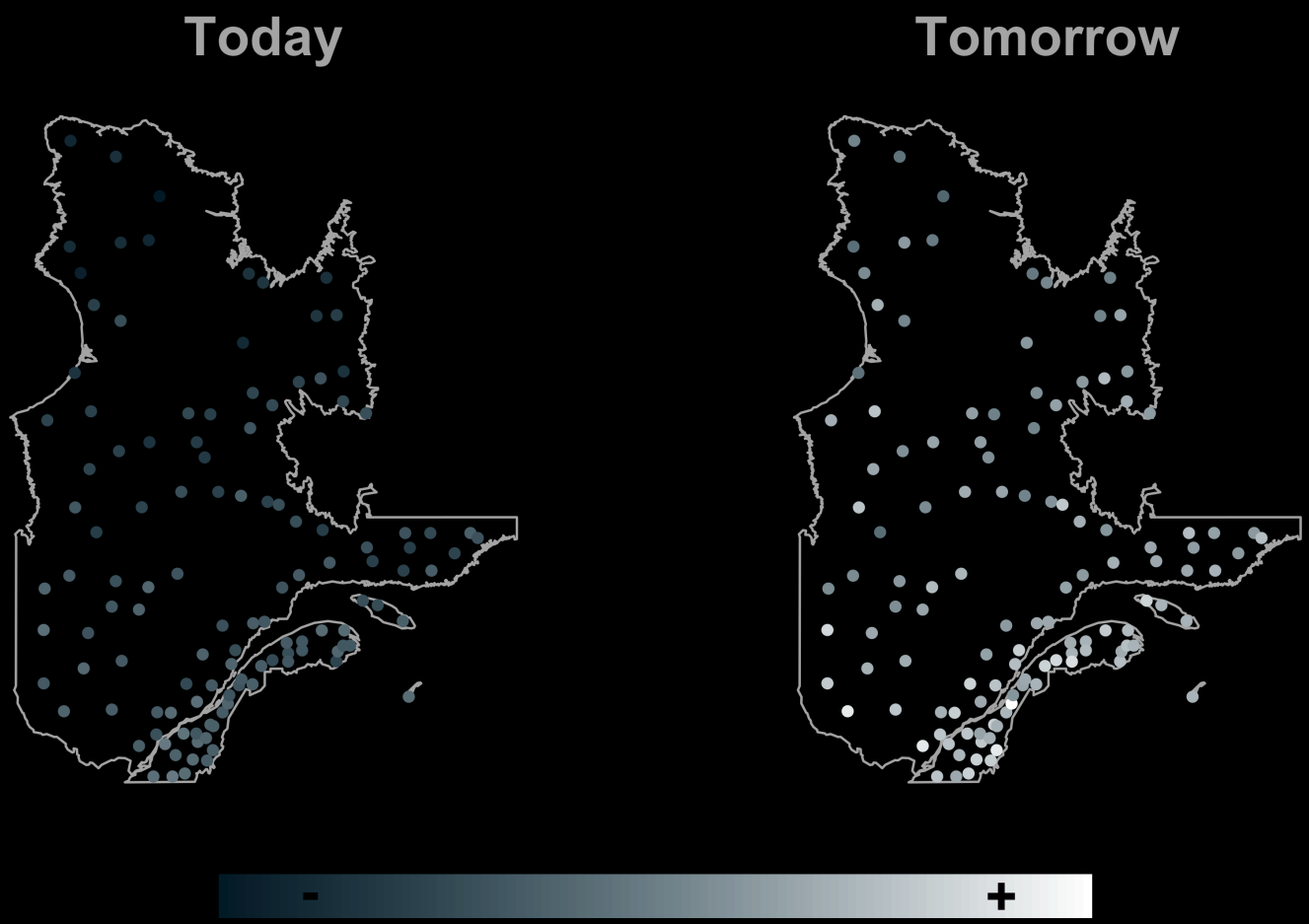
2. Species distributions are changing, new SDM approaches are required,
3. How can we develop suitable strategies for conservation at community scale ?

MERCI

Shortest path and association strength



Distributions of abiotic variables



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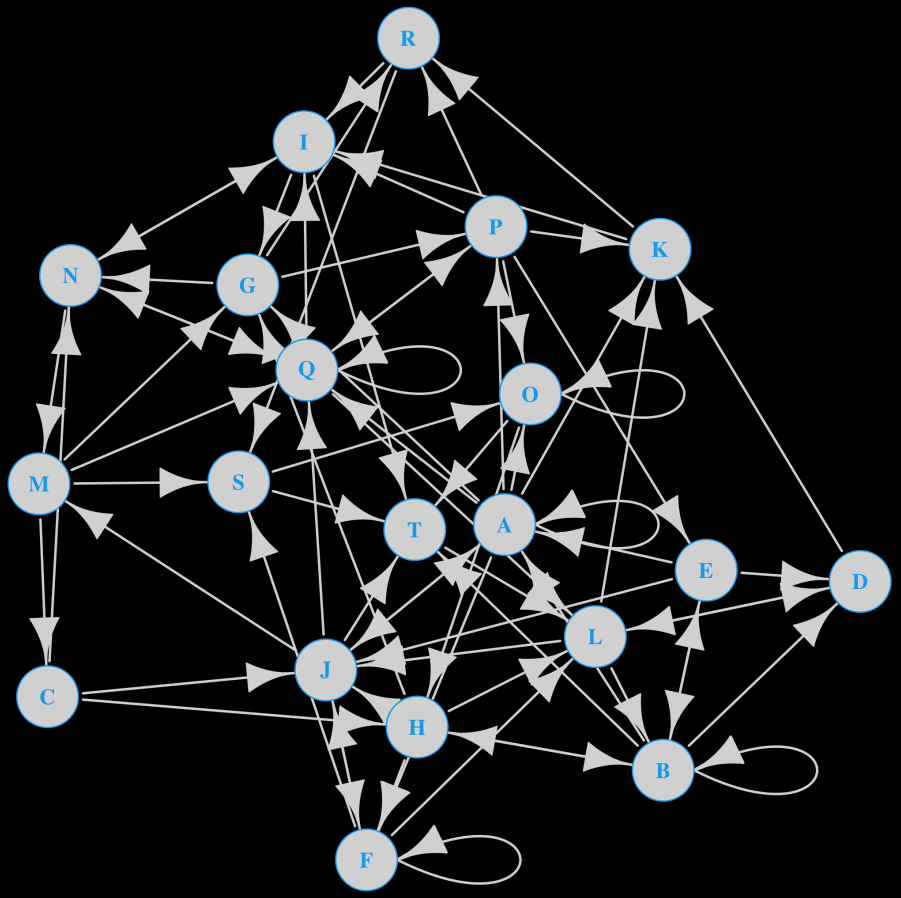

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Number of interactions per species and association strength