Sveriges lantbruksuniversitet
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Ignorance scores

Where and when is data enough?

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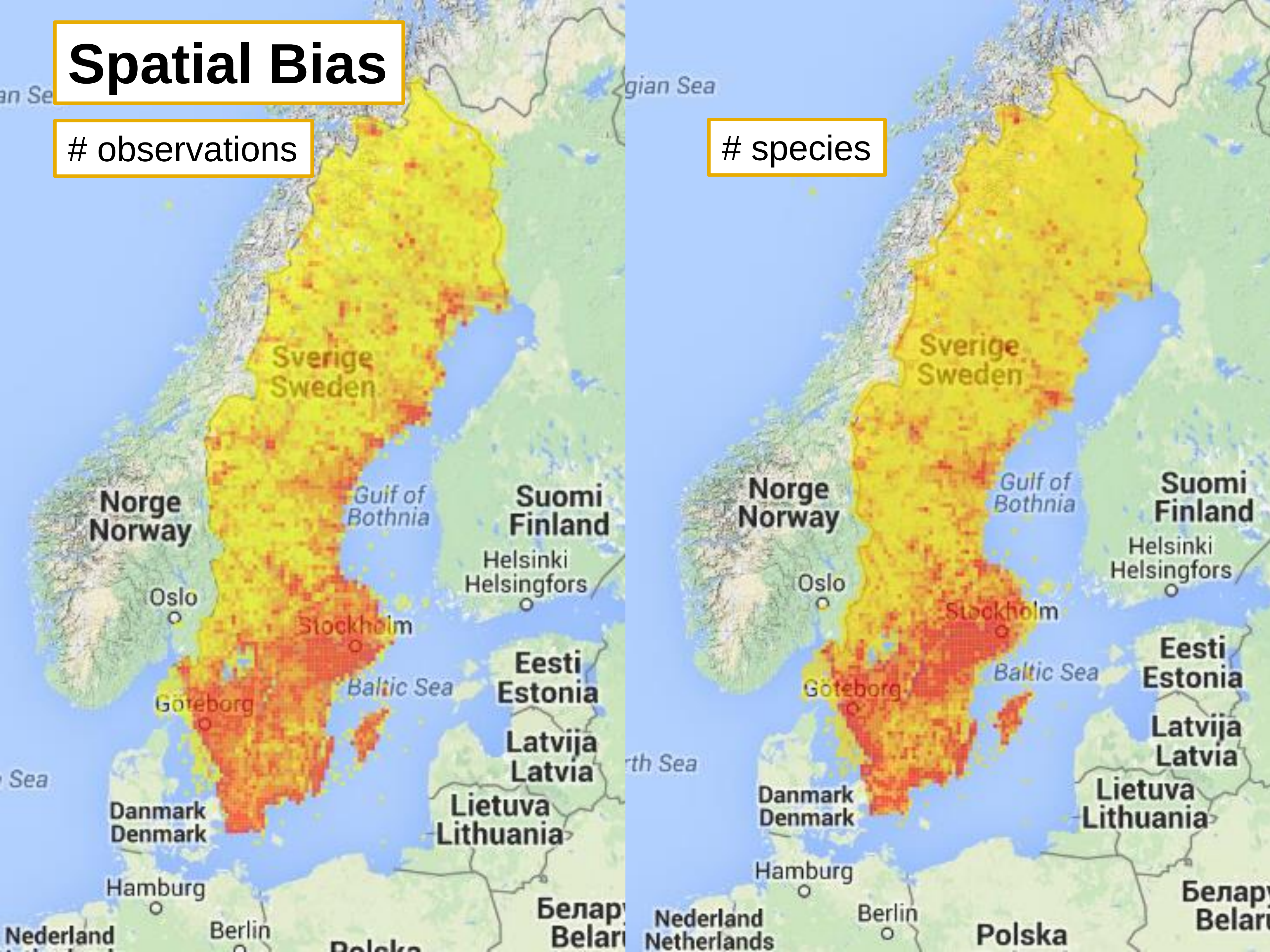
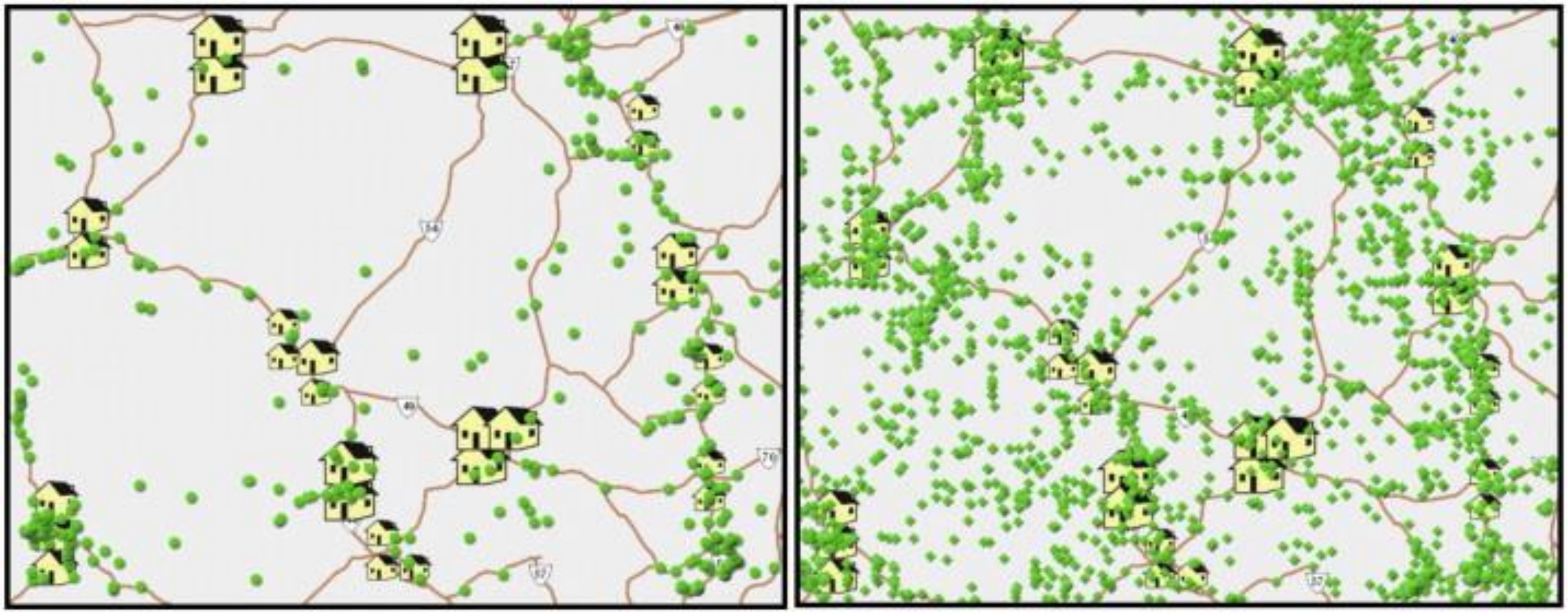
"The greatest enemy of knowledge
is not IGNORANCE;
it is the illusion of knowledge"

Daniel J. Boorstin

Spatial Bias



Non-homogeneous sampling



Presence-only data for butterflies (left) and mammals (right), central Mexico.

Fernández & Nakamura. **Estimation of spatial sampling effort based on presence-only data and accessibility**

Ecological Modelling, Volume 299, 2015, 147–155. http://dx.doi.org/10.1016/j.ecolmodel.2014.12.017

Ignorance Maps

One solution (out of many)

alejandroruete.github.io/IgnoranceMaps

Biodiversity Data Journal 3: e5361 (2015)

DEVPOST Jobs NYC The Commit Hackathons

Exploring ignorance in space and time

Where and when is data enough? A simple algorithm for fast implementations and comparable results.

Liked 6 | Comment

STORY UPDATES

Ignorance of GBIF data on European Amphibians summarized per ecoregion

Edit project

SUBMITTED TO

2016 GBIF Ebbe Nielsen Challenge

WINNER First Prize

CREATED BY

Describe your contribution

E.g., I worked on the backend and cleaned up

Save Cancel

Alejandro Ruete

Conservation biologist and Population ecologist. Analyst. Passionate photographer.

Approach

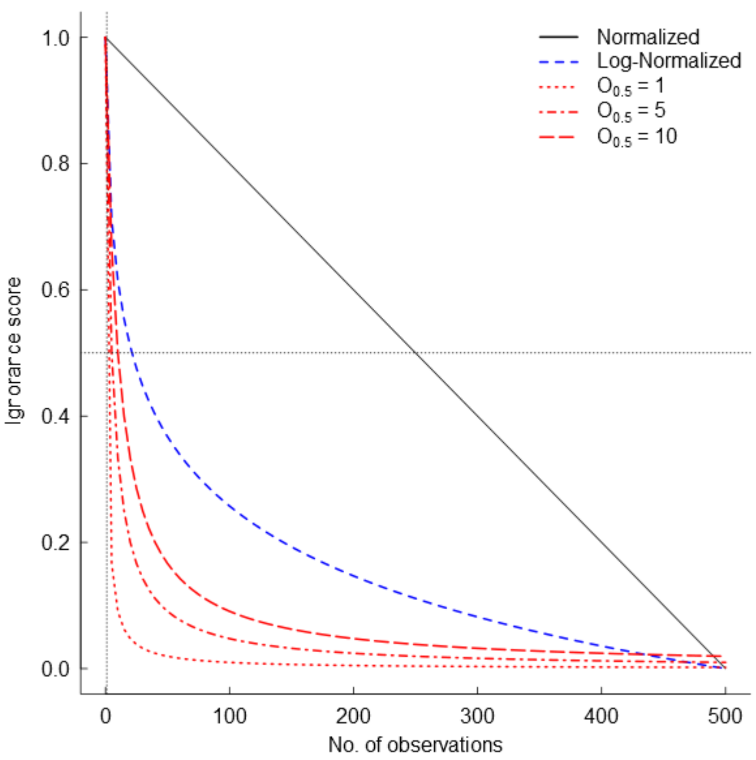
- Based “mainly” on presence-only data
- It is not a model, it is a TRANSFORMATION
- Report of the spatial distribution of sampling effort (or lack of it)
- Least possible number of assumptions
- Generality: inform users to analyse raw data
- Scalability
- Comparability
- Low computational requisites

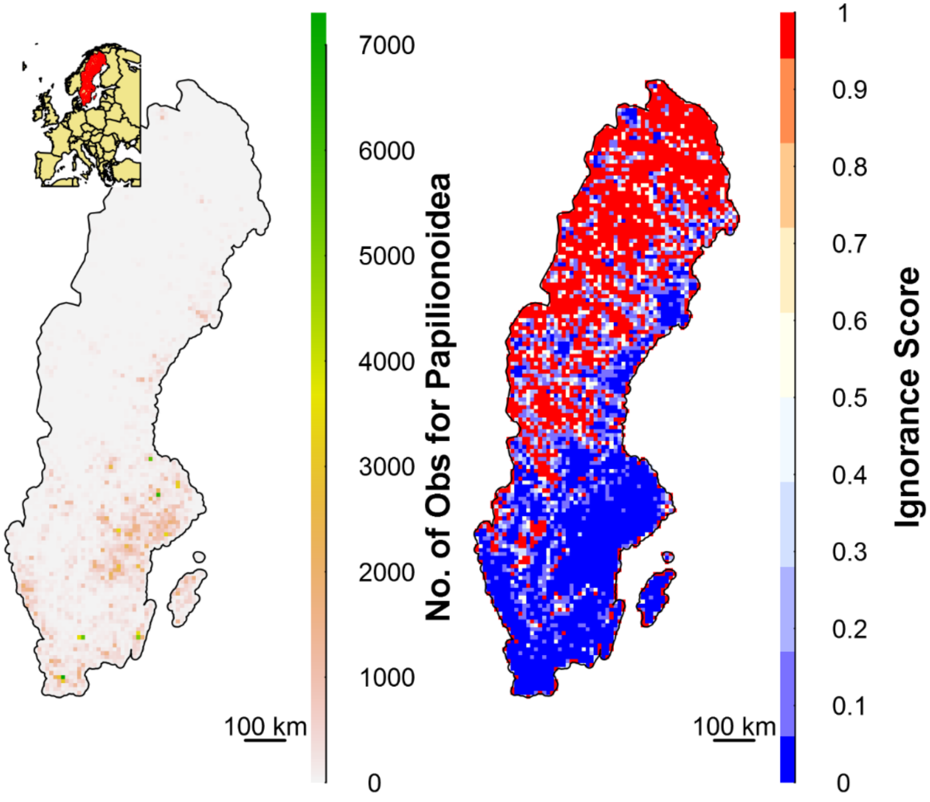
A few assumptions are needed

- Observers are assumed to be fond of or specialist on one or more taxonomic groups (e.g. family, order) and follow roughly the same methods
- REFERENCE TAXONOMIC GROUPS will share similar bias, and are surrogate for sampling effort (Phillips et al. 2009, Ponder et al. 2001).
- The lack of reports of any species from the RTG at a particular location is likely due to a lack of observers, rather than to the total absence of species.

Algorithms

Transformation of the number of observations (N) per space-time unit into a scale of knowledge



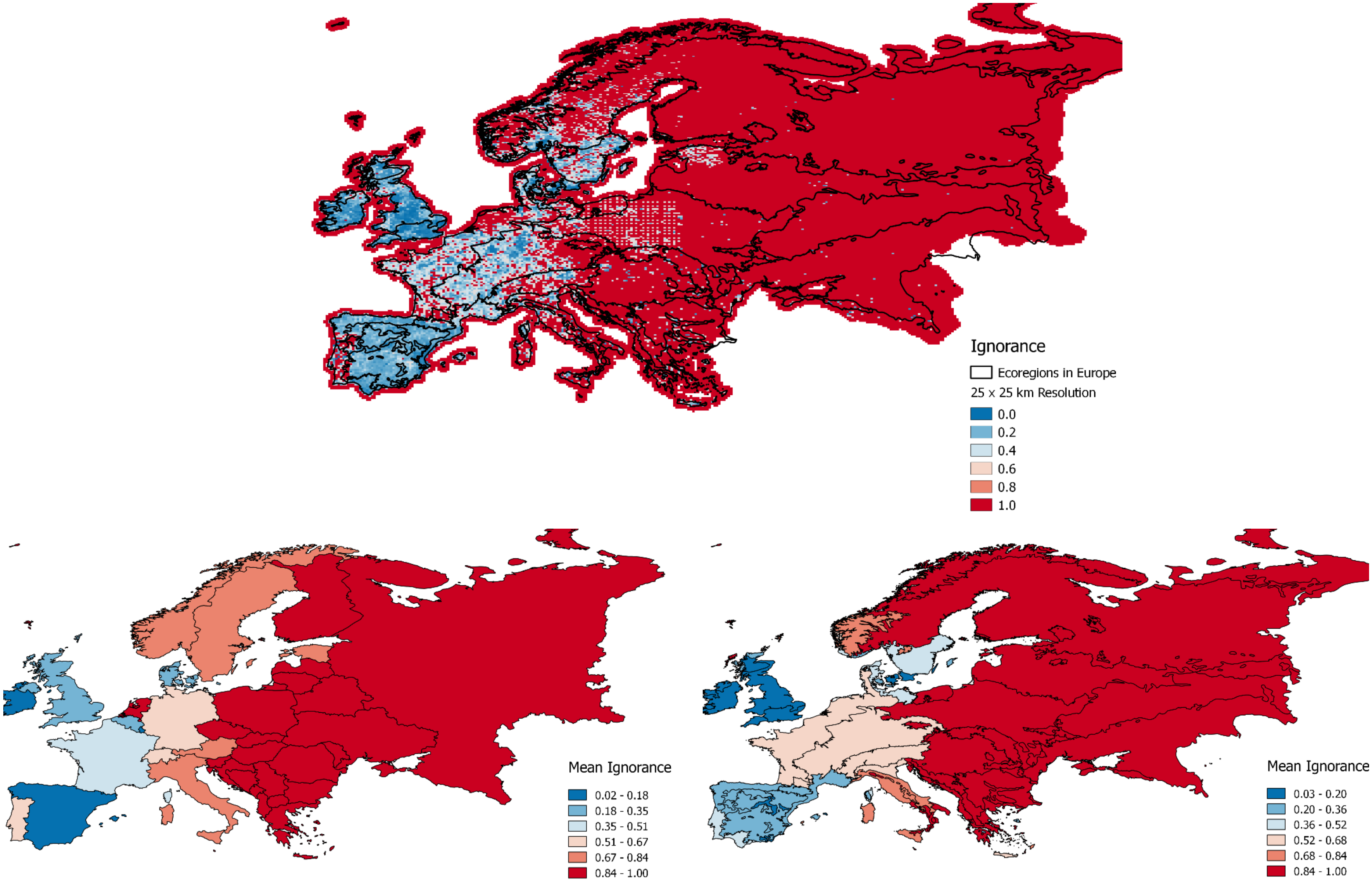


Half-ignorance algorithm

$$I_i = \frac{O_{0.5}}{N_i + O_{0.5}}$$

Let's take a look

Let’s take another look

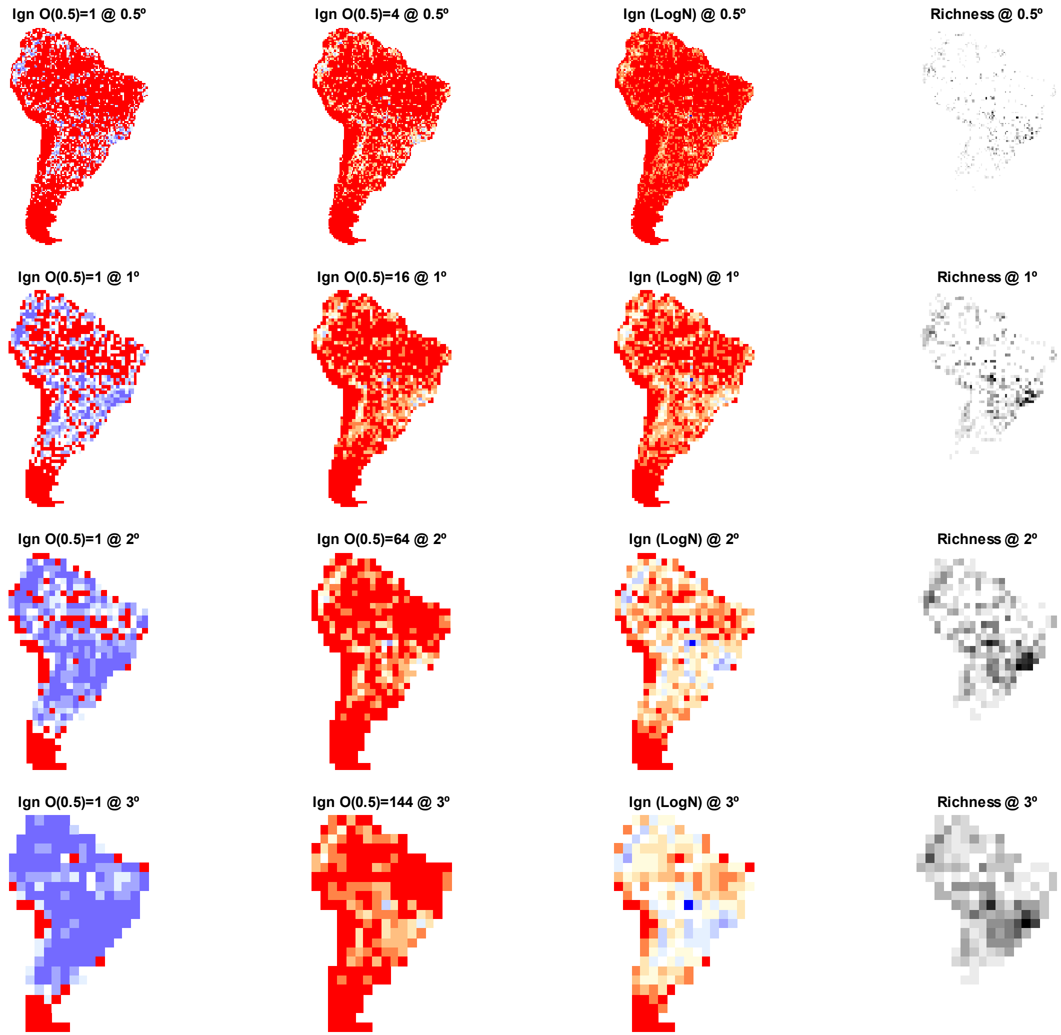

Ignorance
Ecoregions in Europe
25 x 25 km Resolution
0.0
0.2
0.4
0.6
0.8
1.0
Mean Ignorance
0.02 - 0.18
0.18 - 0.35
0.35 - 0.51
0.51 - 0.67
0.67 - 0.84
0.84 - 1.00
Mean Ignorance
0.03 - 0.20
0.20 - 0.36
0.36 - 0.52
0.52 - 0.68
0.68 - 0.84
0.84 - 1.00

Why this approach?

- Quick. There are several approaches* but too computationally intensive.
- E.g. approaches like completeness are best at estimating how much is left to be observed. However, it requires identifying inventories.
- Independent of any expectation on richness.

* e.g. Hill 2012, Jeppsson et al. 2010, Ponder et al. 2001, Prendergast et al. 1993, Schulman et al. 2007, Snäll et al. 2011, Sousa-Baena et al. 2014, Stropp et al. 2016

Scalability



586 beetle species

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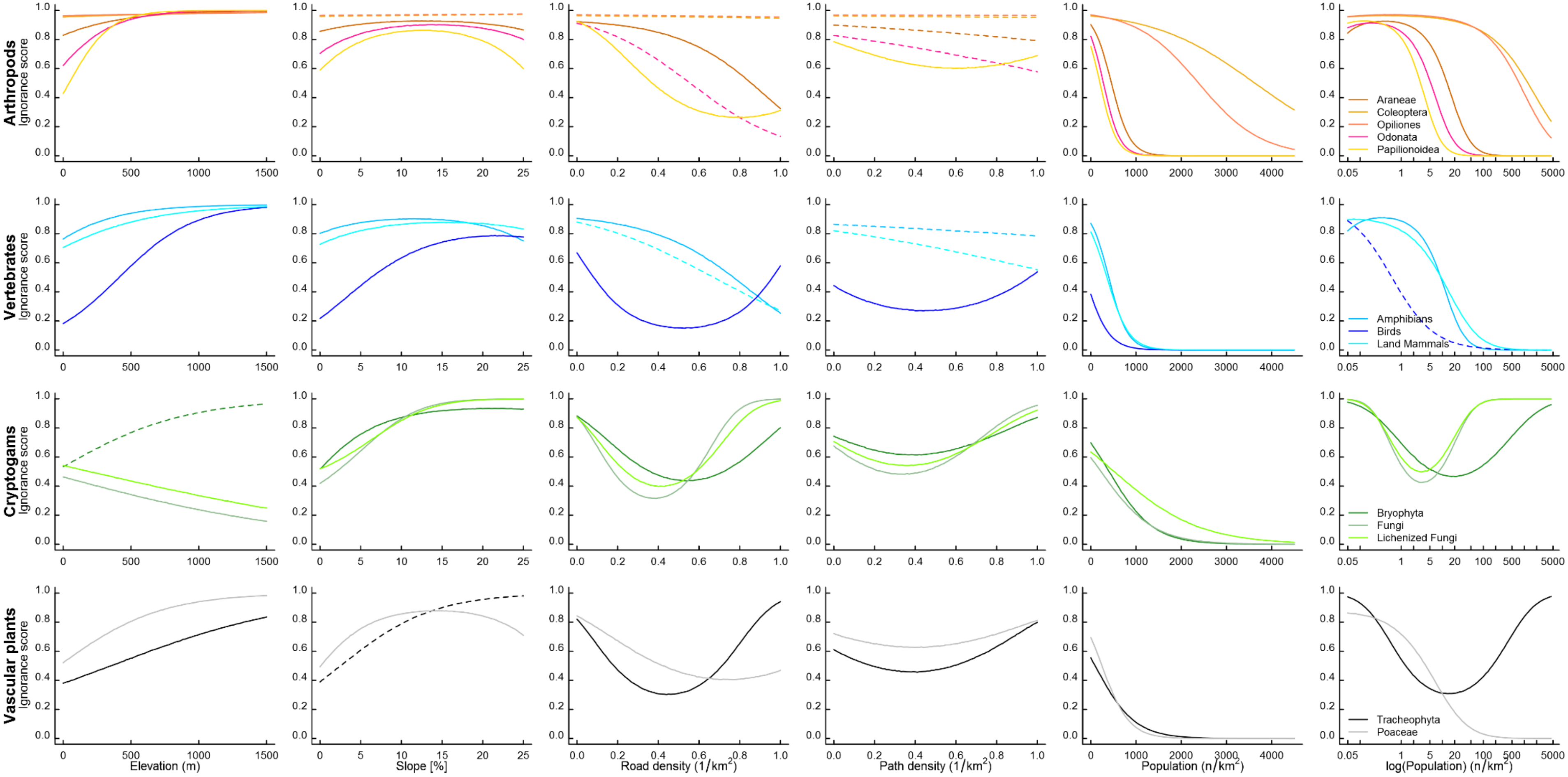
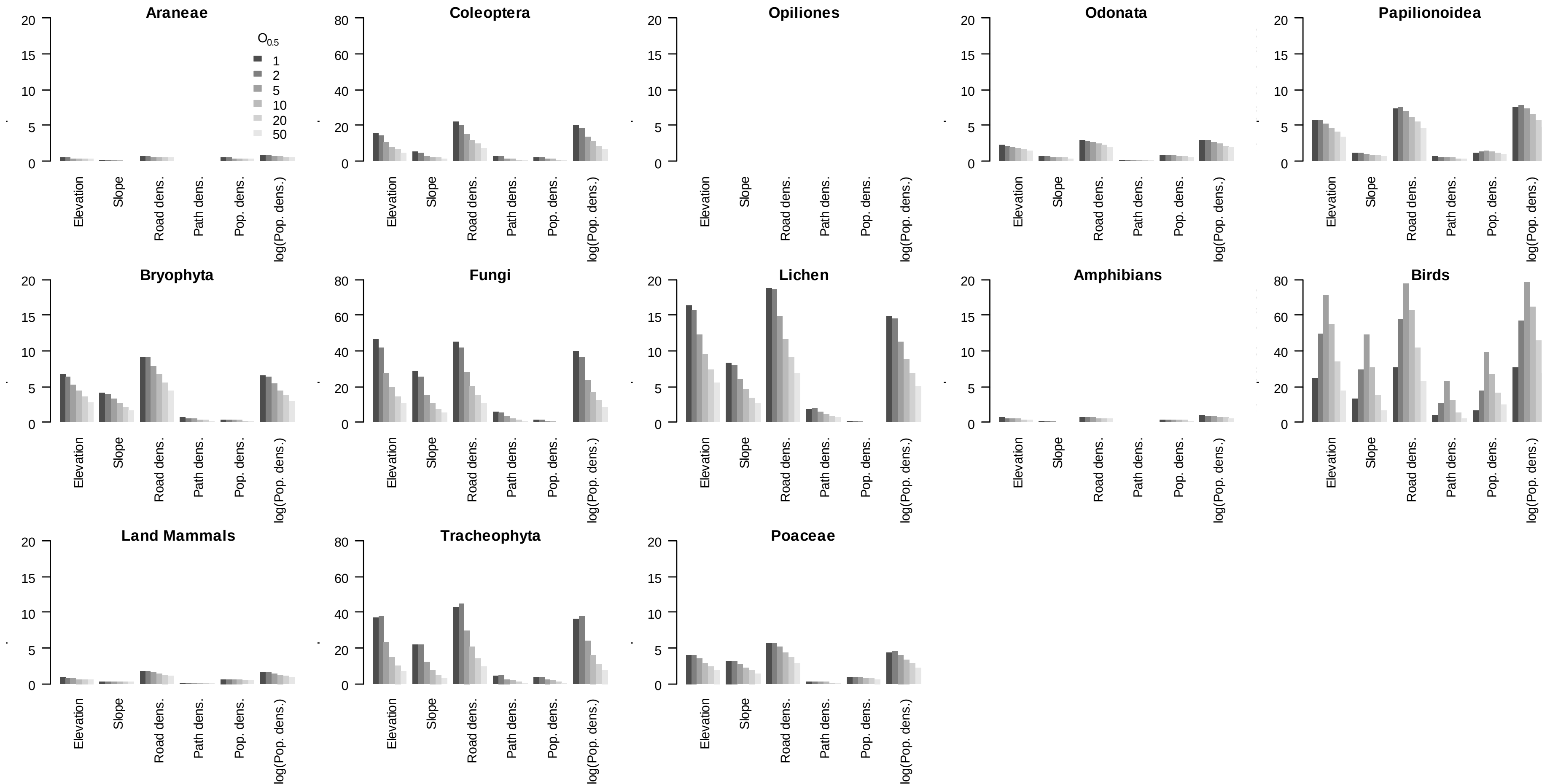
Universidade Federal de Mato Grosso.
Cuiabá/Mato Grosso/Brasil.

One layer to control them all



Mair & Ruete. 2016. **Explaining spatial variation in the recording effort of citizen science data across multiple taxa** PLoS ONE 11(1): e0147796.

Explained Deviance (%) per RTG per variable



Mair & Ruete. 2016. **Explaining spatial variation in the recording effort of citizen science data across multiple taxa** PLoS ONE 11(1): e0147796.

Applications

1. Consultants performing environmental impact assessments (e.g. ignorance maps as precautionary statements)

2. Observers (e.g. interested in under-sampled locations)

3. Researchers (this is the juicy part!)

Applications: Species distributions

- generate pseudo-absences
- mask out areas of high uncertainty from other raster layers derived from the raw data
- accurate assessment of species richness (ongoing work)
- ignorance maps as confidence or ”All-in-one” bias layers for background sampling (e.g. MaxEnt)

Knowing what you ignore you already know a lot

Thank you for your attention

Questions?

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