



Species Distribution Model using Remote-Sensed Dynamic Habitat Index

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Species Distribution Model using Remote-Sensed Dynamic Habitat Index

Maïri Souza Oliveira, Clémentine Préau, Samuel Alleaume
Maxime Lenormand & Sandra Luque

UMR TETIS, INRAE, France

IUFRO 2023 | Evora, Portugal

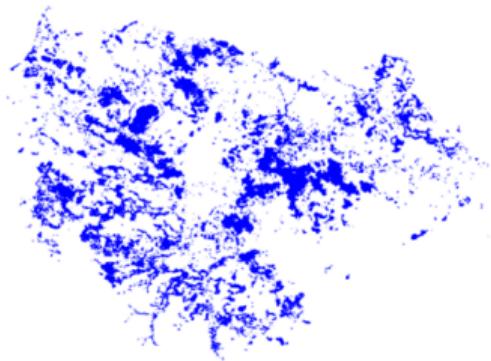
Tuesday, 24 October 2023



Motivation



Presence data



Predicted suitable habitat

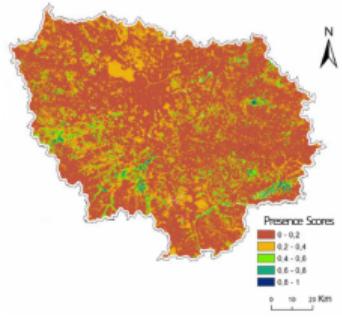
**Predict (and explain) species suitable habitat
using remote sensing data**

Species Distribution Models

Presence data

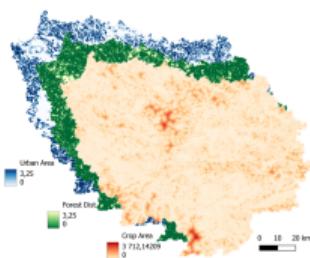
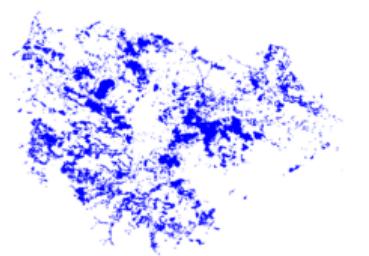


Suitability map



Threshold

Suitable habitat



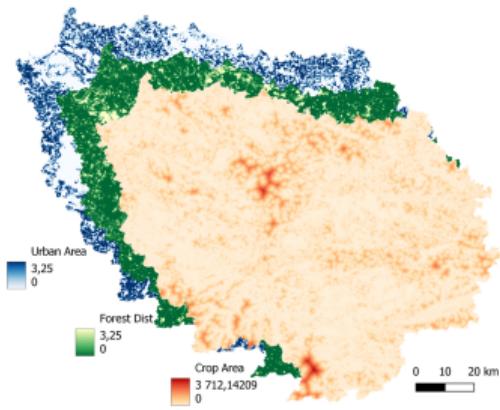
Environmental variables

Package 'biomod2'
Thuiller et al. (2023)

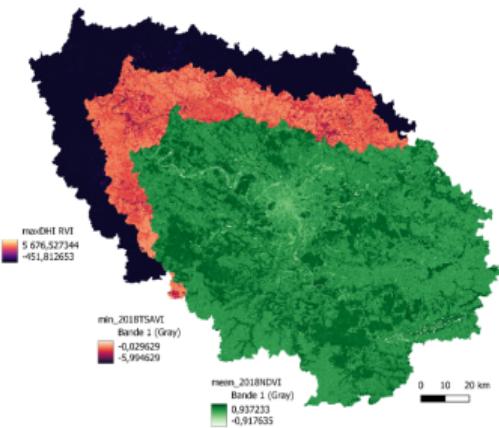


Environmental Predictors

Land Use (LU)



Remote Sensing (RS)

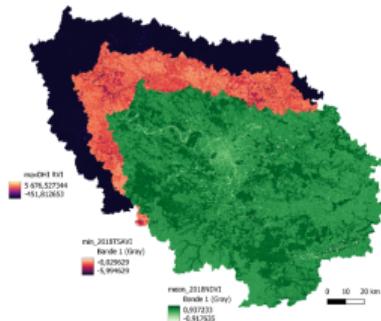
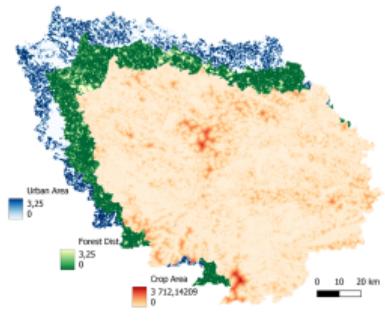


- ▶ Data preprocessing ('expert knowledge')
- ▶ Categorized data
- ▶ Morphological information
 - └─ Distance to the closest...
 - └─ Area...

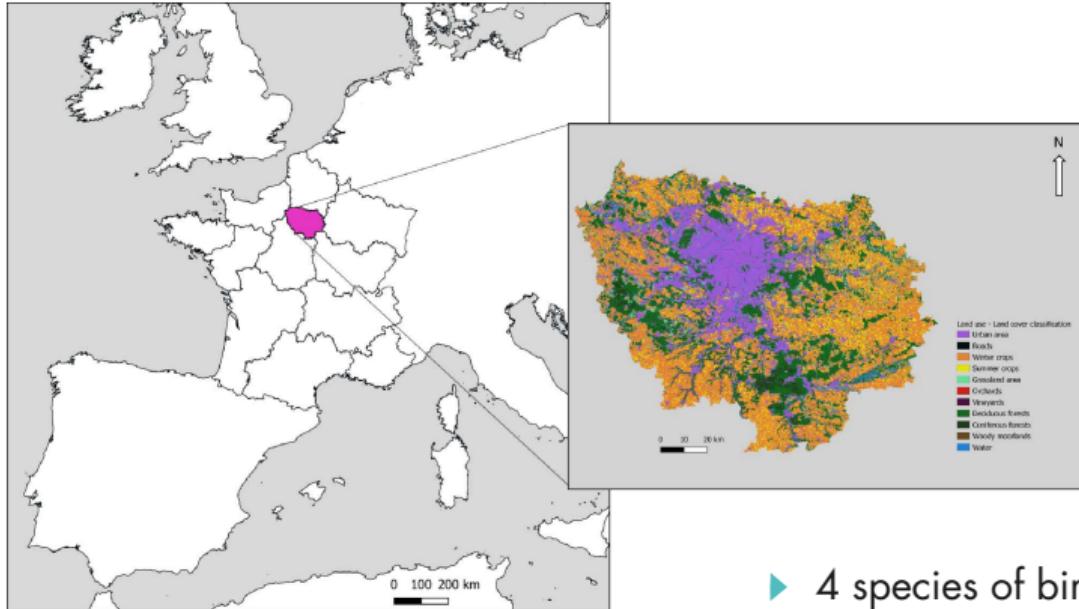
- ▶ 'Raw' data
- ▶ Continuous radiometric indices of vegetation
- ▶ Temporal information
 - └─ Annual statistics...
 - └─ Seasonality...

Research question

Can we retrieve a similar information
from both data sources?



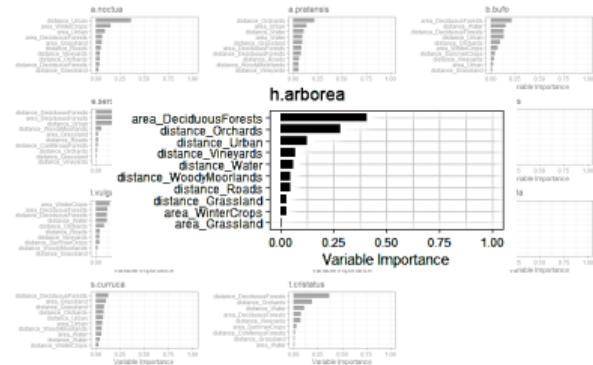
Case Study Site



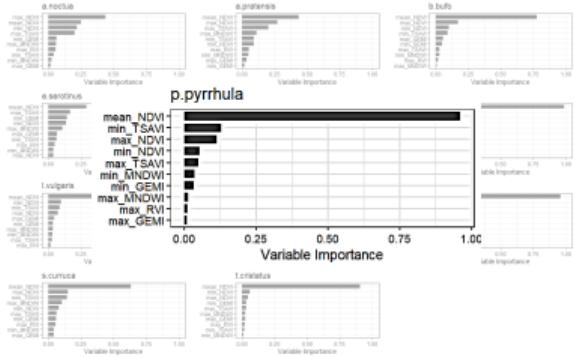
- ▶ 4 species of birds
- ▶ 5 amphibians
- ▶ 2 mammals

Results - Variable importance

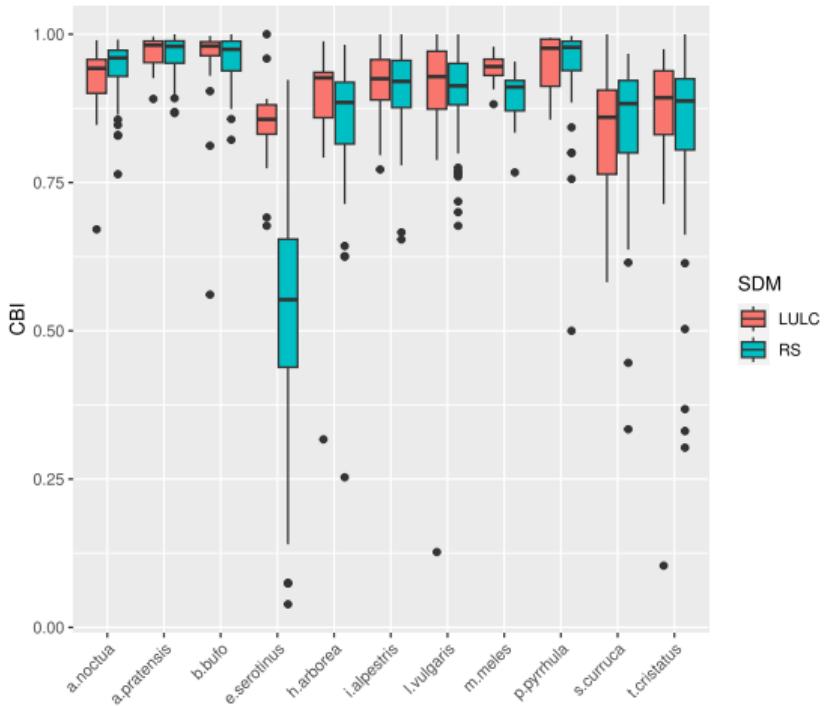
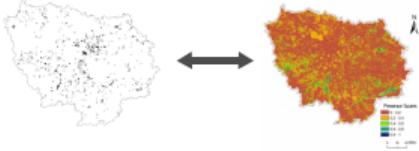
Land Use (LU)



Remote Sensing (RS)



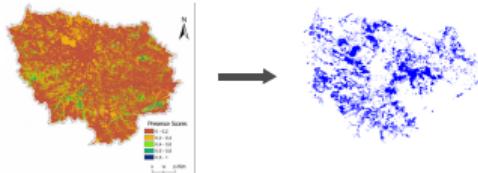
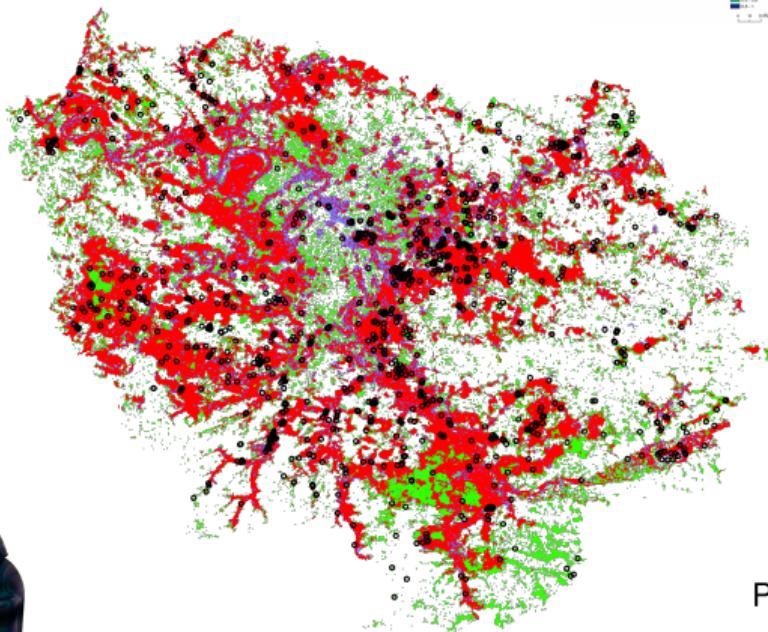
Results - Garbage in, garbage out?



Results - Overlaps

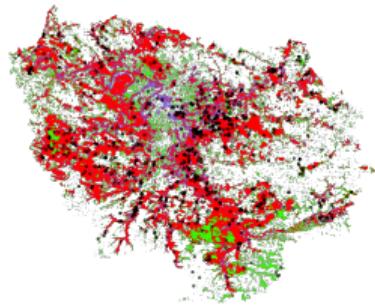
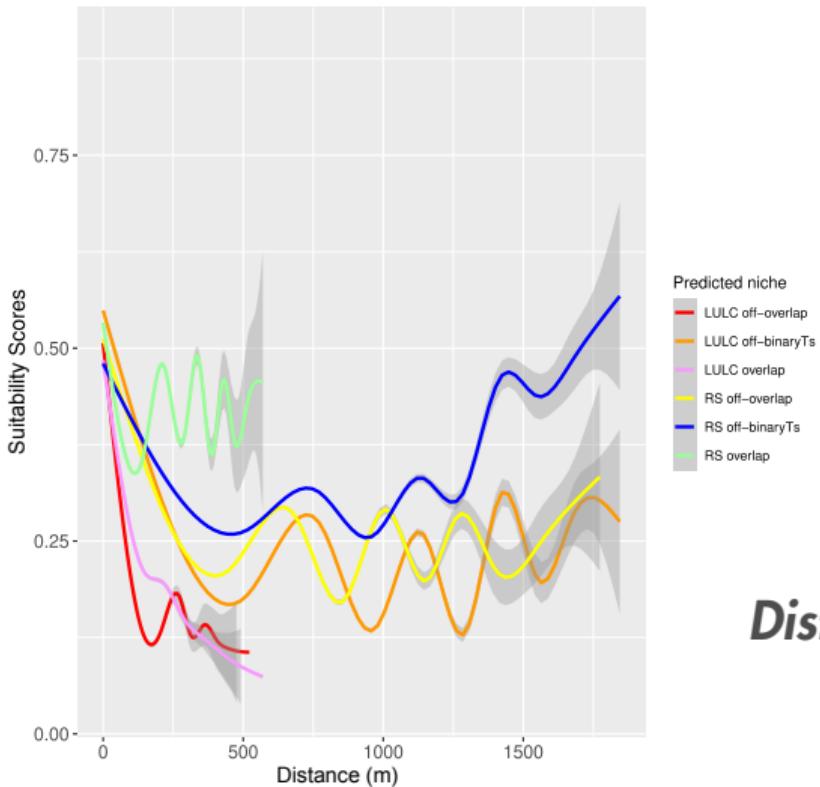


Bufo bufo



- Predicted niche parts
- RS Off-overlap
- LULC Off-overlap
- Overlap
- Occurrences

Results - Response curves



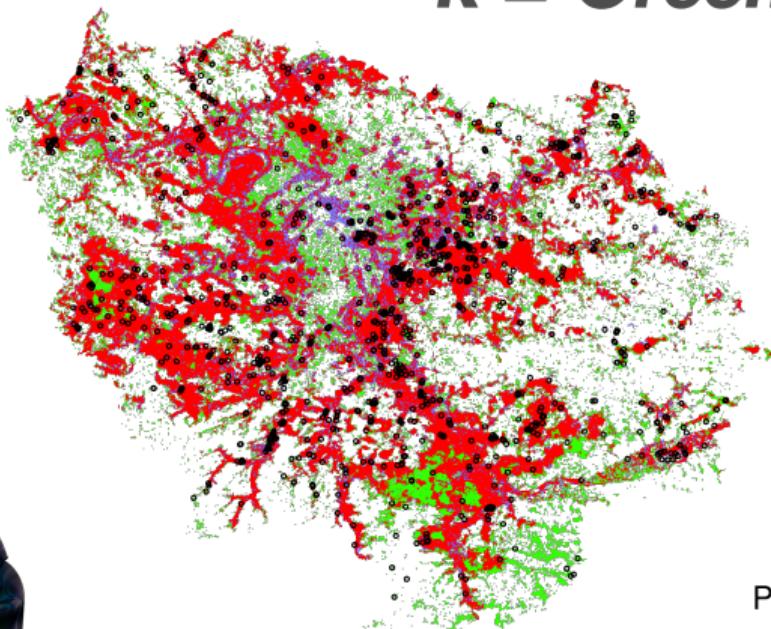
Distance to the forest

Results - R ratio

$$R = \text{Green} / \text{Blue}$$



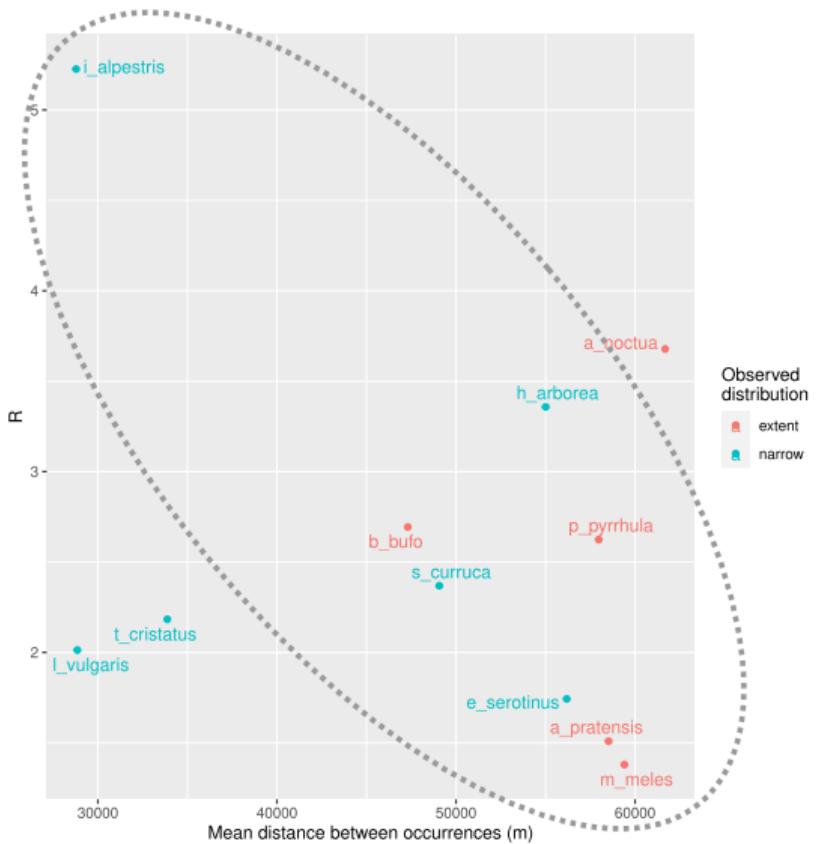
Bufo bufo



Predicted niche parts

- RS Off-overlap
- LULC Off-overlap
- Overlap
- Occurrences

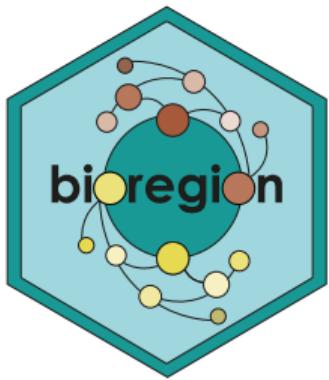
Results - R ratio



Take home message

- ▶ It is not possible to determine which approach is better than the other in this study.
- ▶ The RS approach predicts a larger habitat than the LU approach.
- ▶ Strong influence of the (biased) observed data.

Biogeography



<https://biorgeo.github.io/bioregion/>