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Species Distribution Model using Remote-Sensed Dynamic Habitat Index

Mairi Souza Oliveira, Clémentine Préau, Maxime Lenormand, Samuel
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► **To cite this version:**

Mairi Souza Oliveira, Clémentine Préau, Maxime Lenormand, Samuel Alleaume, Sandra Luque. Species Distribution Model using Remote-Sensed Dynamic Habitat Index. IUFRO Forest Environment DIV8 Conference 2023, Oct 2023, Evora, Portugal. hal-04256967

HAL Id: hal-04256967

<https://hal.inrae.fr/hal-04256967v1>

Submitted on 24 Oct 2023

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Species Distribution Model using Remote-Sensed Dynamic Habitat Index

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

UMR TETIS, INRAE, France

IUFRO 2023 | Evora, Portugal

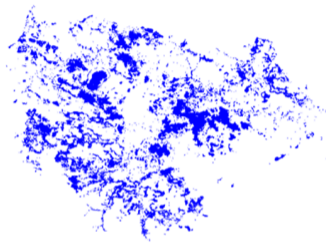
Tuesday, 24 October 2023



Motivation



Presence data



Predicted suitable habitat

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

Species Distribution Models

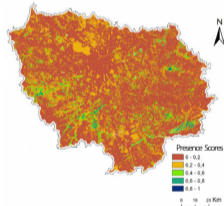
Presence data



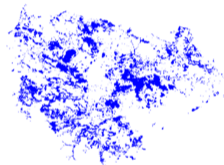
+



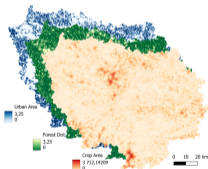
Suitability map



Suitable habitat



Environmental variables

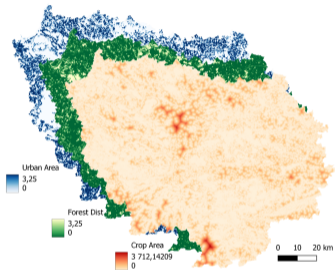


Package 'biomod2'
Thuiller et al. (2023)



Environmental Predictors

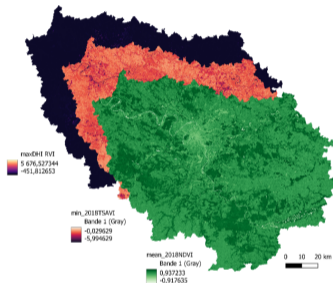
Land Use (LU)



- ▶ Data preprocessing ('expert knowledge')
- ▶ Categorized data
- ▶ Morphological information

└ Distance to the closest...
└ Area...

Remote Sensing (RS)

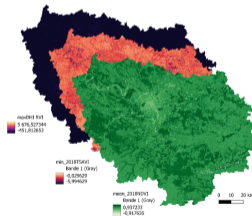
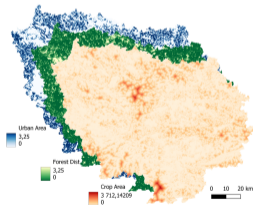


- ▶ 'Raw' data
- ▶ Continuous radiometric indices of vegetation
- ▶ Temporal information

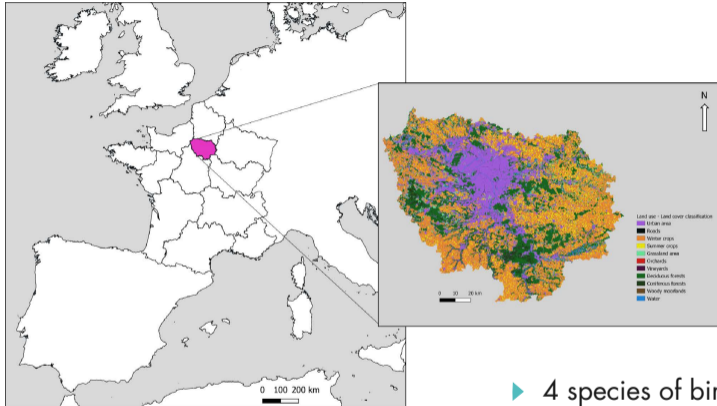
└ Annual statistics...
└ Seasonality...

Research question

Can we retrieve a similar information from both data sources?



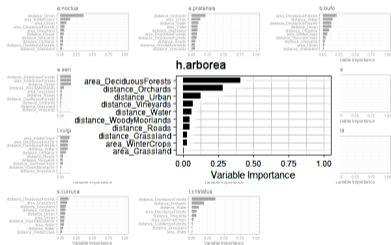
Case Study Site



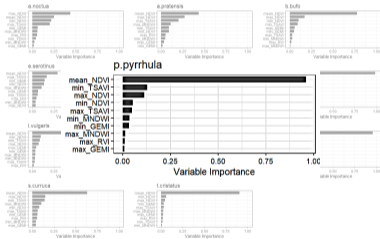
- ▶ 4 species of birds
- ▶ 5 amphibians
- ▶ 2 mammals

Results - Variable importance

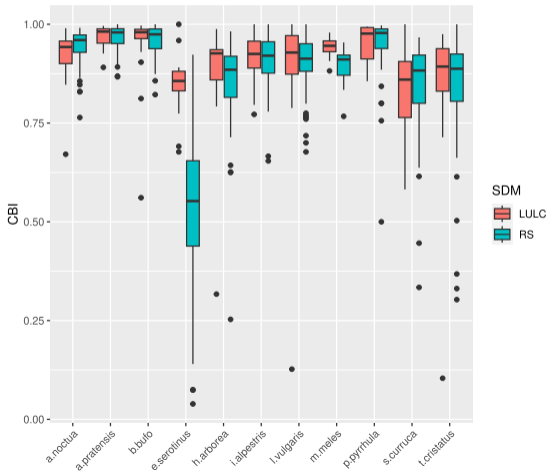
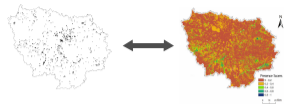
Land Use (LU)



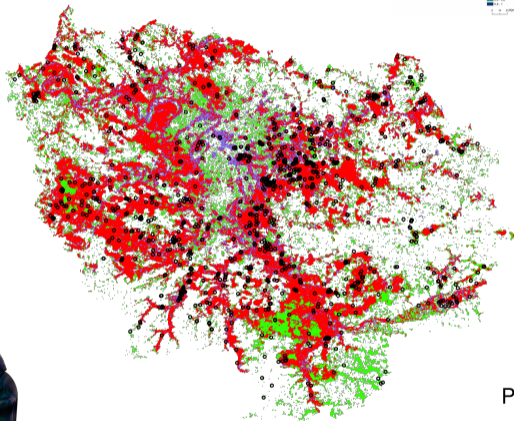
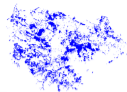
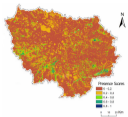
Remote Sensing (RS)



Results - Garbage in, garbage out?







Results - Overlaps

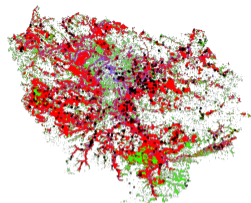
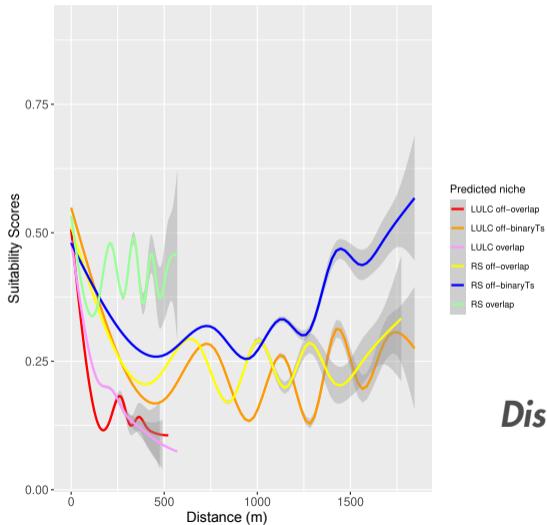


Bufo bufo

Predicted niche parts

-  RS Off-ovlap
-  LULC Off-ovlap
-  Overlap
-  Occurrences

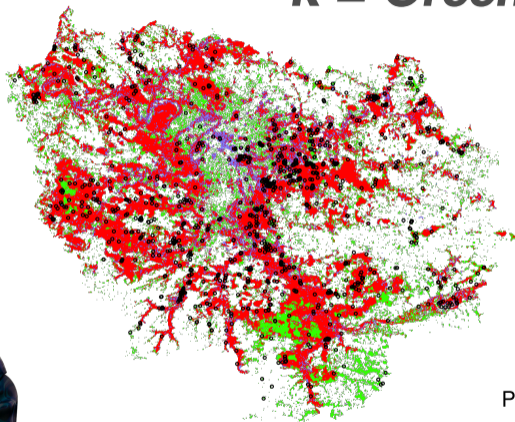
Results - Response curves



Distance to the forest

Results - R ratio

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

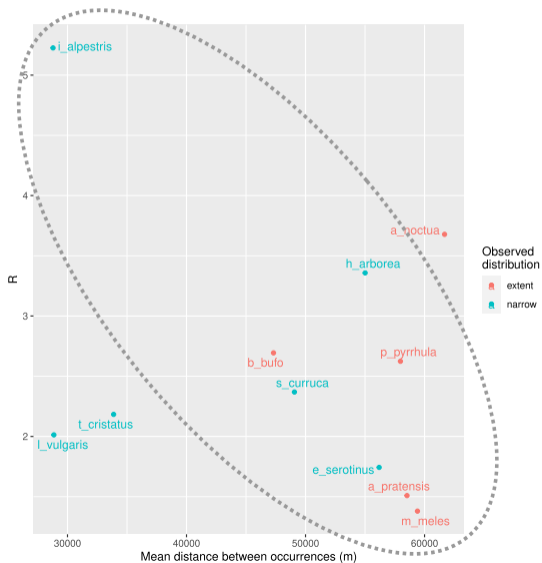


Bufo bufo

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/>