



**HAL**  
open science

## Species Distribution Model using Remote-Sensed Dynamic Habitat Index

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

► **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-04256967>**

Submitted on 24 Oct 2023

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# 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**

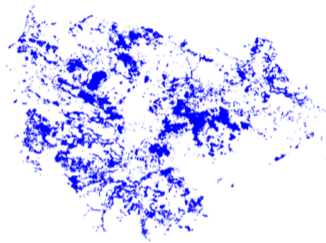
*Tuesday, 24 October 2023*



# Motivation



**Presence data**



**Predicted suitable habitat**

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

# Species Distribution Models

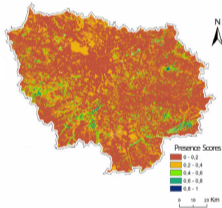
Presence data



+

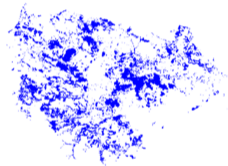


Suitability map

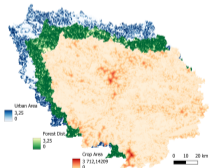


Threshold

Suitable habitat



Environmental variables

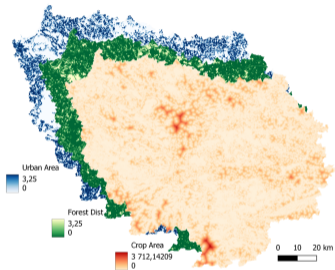


Package 'biomod2'  
Thuiller et al. (2023)



# Environmental Predictors

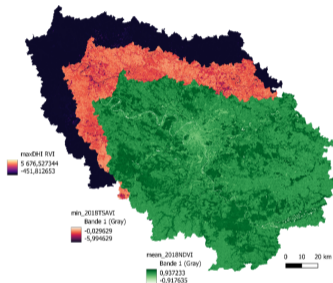
## Land Use (LU)



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

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

## Remote Sensing (RS)

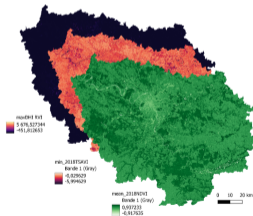
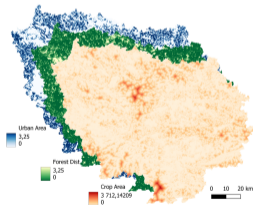


- ▶ 'Raw' data
- ▶ Continuous radiometric indices of vegetation
- ▶ Temporal information

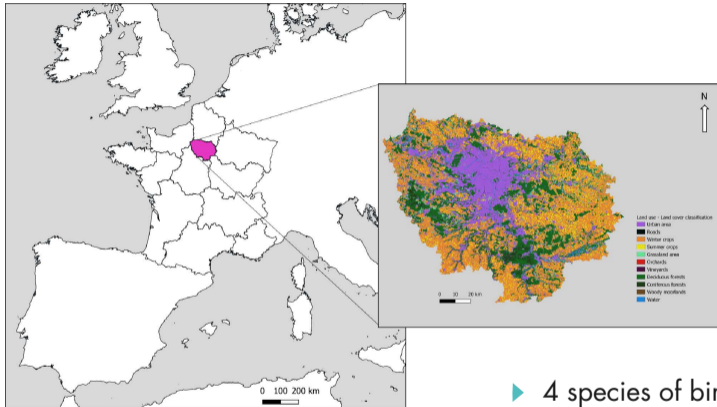
└─ Annual statistics...  
└─ Seasonality...

# Research question

Can we retrieve a similar information from both data sources?



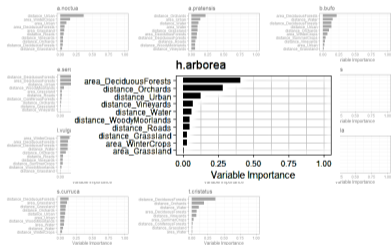
# Case Study Site



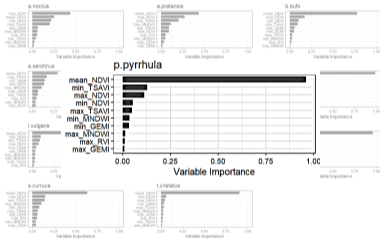
- ▶ 4 species of birds
- ▶ 5 amphibians
- ▶ 2 mammals

# Results - Variable importance

## Land Use (LU)

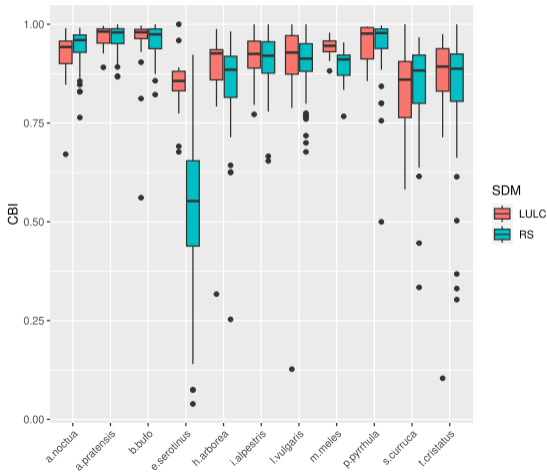
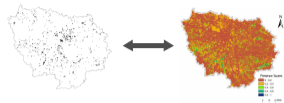


## Remote Sensing (RS)

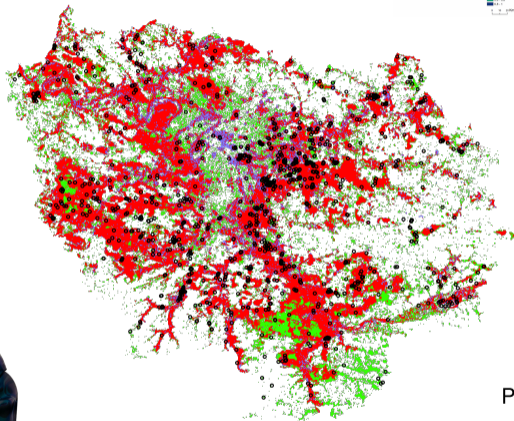
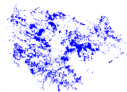
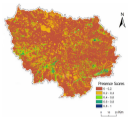




# Results - Garbage in, garbage out?







# Results - Overlaps

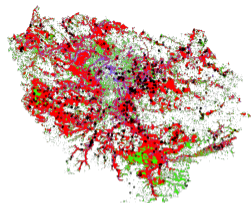
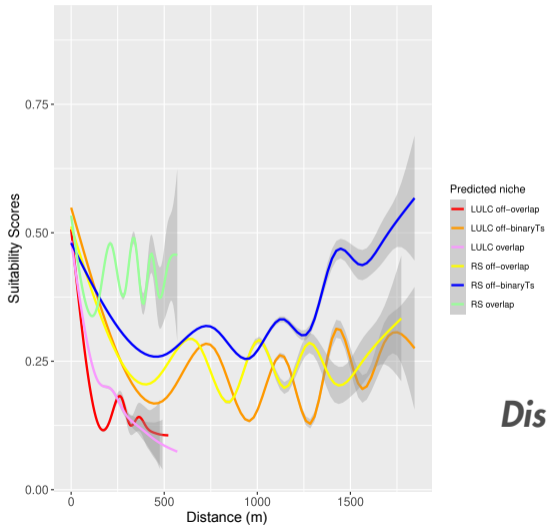


*Bufo bufo*

Predicted niche parts

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

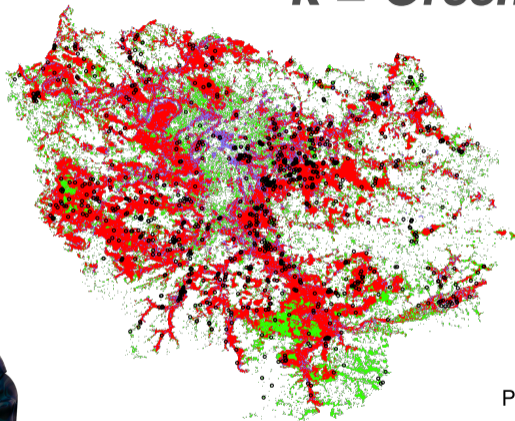
# Results - Response curves



*Distance to the forest*

# Results - R ratio

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

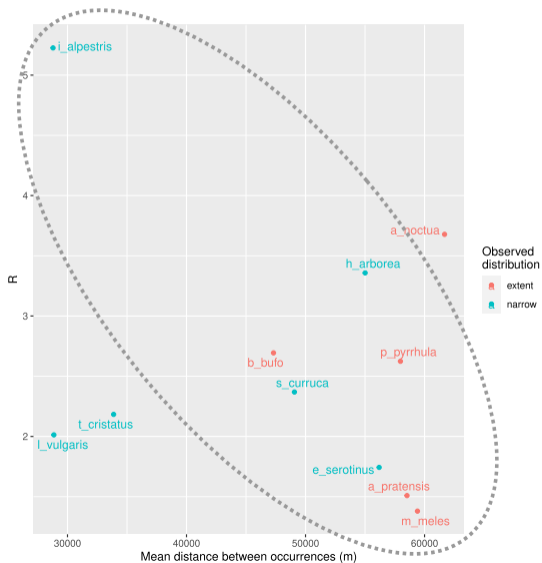


*Bufo bufo*

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/>