Package R: SDMPlay

Species Distribution Modelling Playground

Charlène GUILLAUMOT, Alexis MARTIN

Semin'R, 16 juin 2017
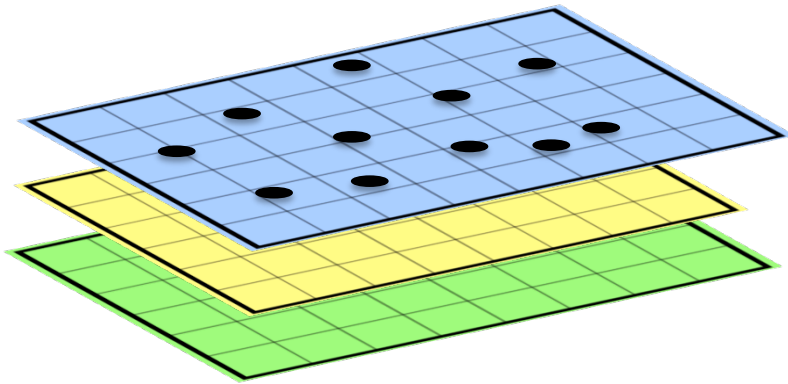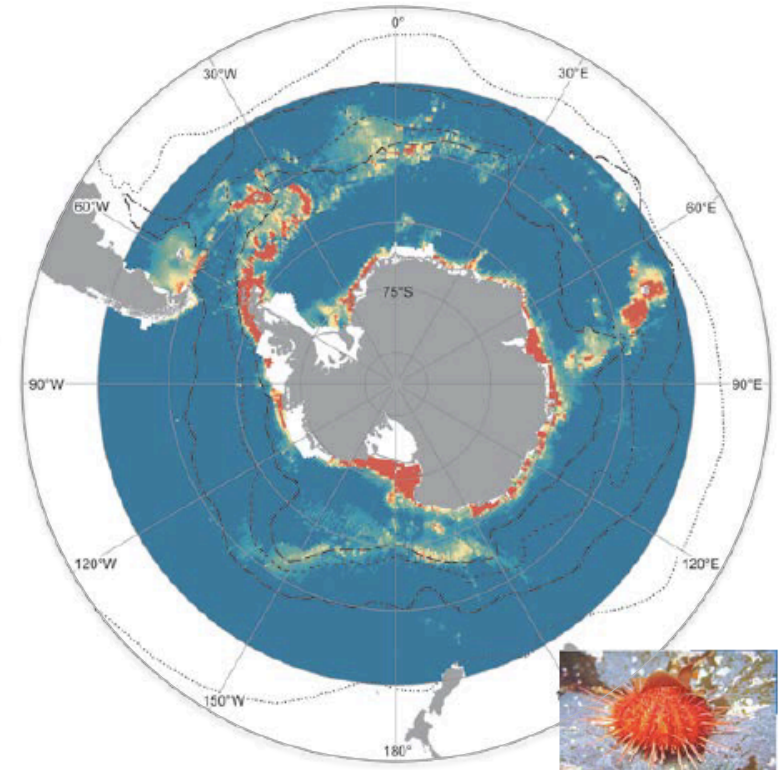
Species Distribution Modelling?

•Données de présence

•Descripteurs spatiaux de l'environnement

Cartes de distribution potentielle de l'espèce d'étude

Species Distribution Modelling?

RESEARCH ARTICLE

Improving the Use of Species Distribution Models in Conservation Planning and Management under Climate Change

Luciana L. Porfirio[1]*, Rebecca M. B. Harris[2], Edward C. Lefroy[3], Sonia Hugh[1], Susan F. Gould[4], Greg Lee[2], Nathaniel L. Bindoff[2,5,6], Brendan Mackey[4]

1. Fenner School of Environment and Society, College of Medicine, Biology and Environment, Australian National University, Canberra, Australian Capital Territory, Australia, 2. Antarctic Climate & Ecosystems Cooperative Research Centre, Hobart, Tasmania, Australia, 3. Centre for the Environment, University of Tasmania, Hobart, Tasmania, Australia, 4. Griffith Climate Change Response Program, Griffith University,

Species Distribution Models: Ecological Explanation and Prediction Across Space and Time

Jane Elith[1] and John R. Leathwick[2]

[1]School of Botany, The University of Melbourne, Victoria 3010, Australia; email: j.elith@unimelb.edu.au

[2]National Institute of Water and Atmospheric Research, Hamilton, New Zealand; email: j.leathwick@niwa.co.nz

IDEA AND PERSPECTIVE

Predicting species distributions for conservation decisions

Antoine Guisan,[1,2,3,4]* Reid Tingley,[5] John B. Baumgartner,[5] Ilona Naujokaitis-Lewis,[6] Patricia

Abstract

Species distribution models (SDMs) are increasingly proposed to support conservation decision making. However, evidence of SDMs supporting solutions for on-ground conservation problems is still scarce in the scientific literature. Here, we show that successful examples exist but are still largely hidden in the grey literature, and thus less accessible for analysis and learning. Furthermore, the decision framework within

Species Distribution Modelling?

- Paramètres environnementaux

- Points de présence

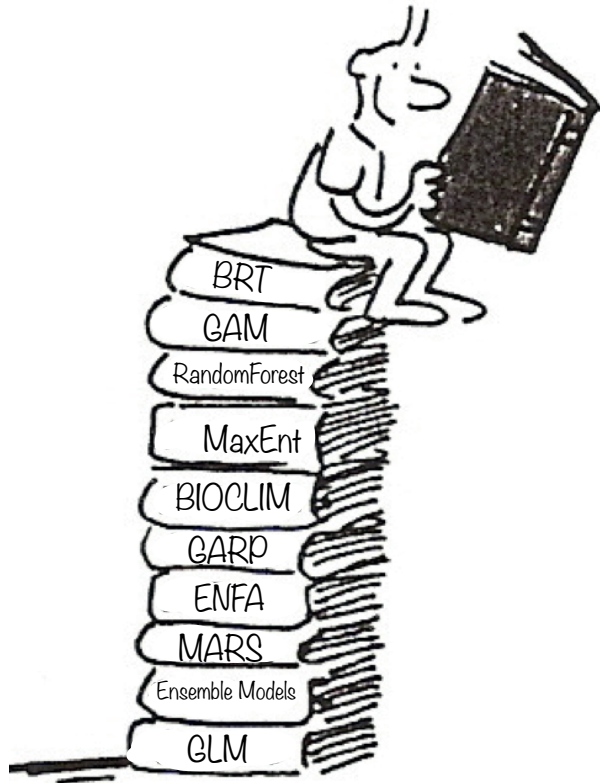- Points de background environnemental ou données d'absences

Algorithmes de modélisation

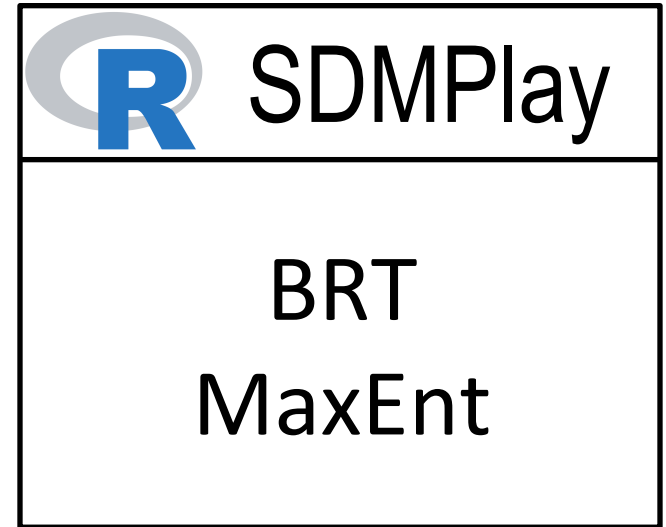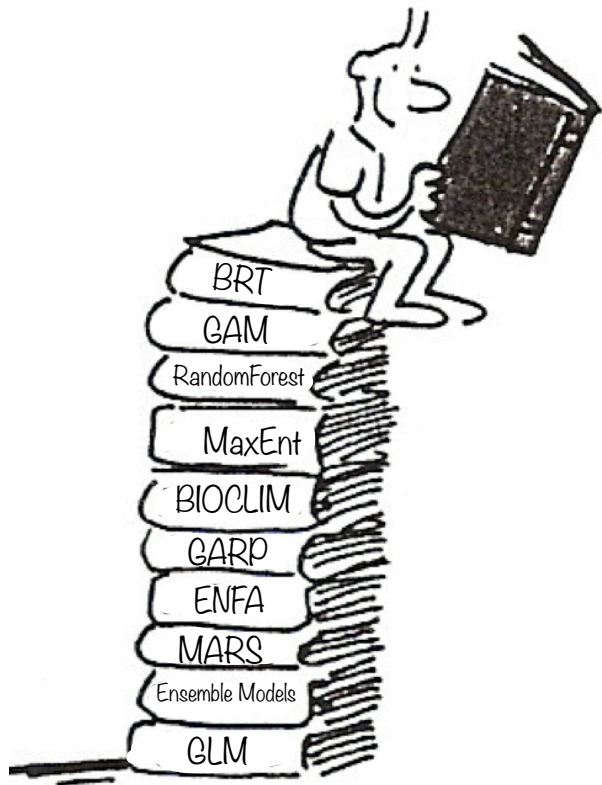| pixel	profondeur	T°	salinité
présence	-1000	4.5	33
présence	-40	2.4	33.1
présence	-23	2.3	34.1
présence	-800	1.4	32.9
background	-78	3.3	33.4
background	-270	1.2	33.2
background	-567	1.3	33.7
background	-230	4	32.8
background	-84	3.1	32.9

Species Distribution Modelling?

Species Distribution Modelling?

R SDMPlay

BRT
MaxEnt

Package SDMPlay…

Species Distribution Modelling Playground   ⓇR

Documentation for package 'SDMPlay' version 1.0

- DESCRIPTION file.

Help Pages

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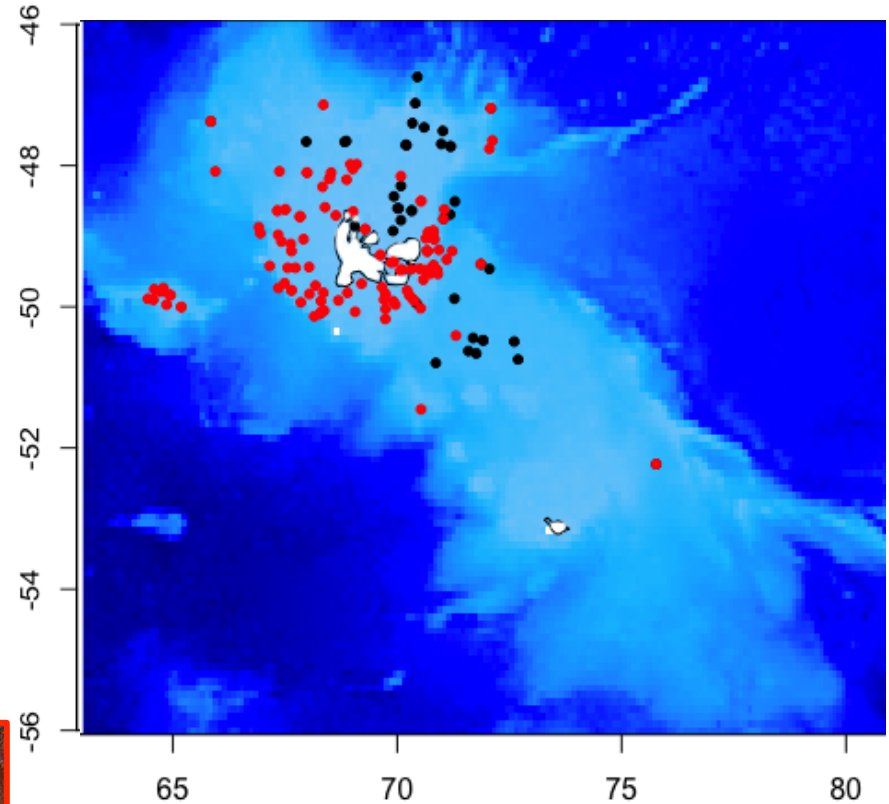# Données de présences d'oursins sur le plateau des Kerguelen

Taxonomie
Profondeur
Année de collection
Campagne
Longitude/ Latitude

Brisaster antarcticus

Ctenocidaris nutrix

Voir Guillaumot et al. 2016, Zookeys

Package SDMPlay…

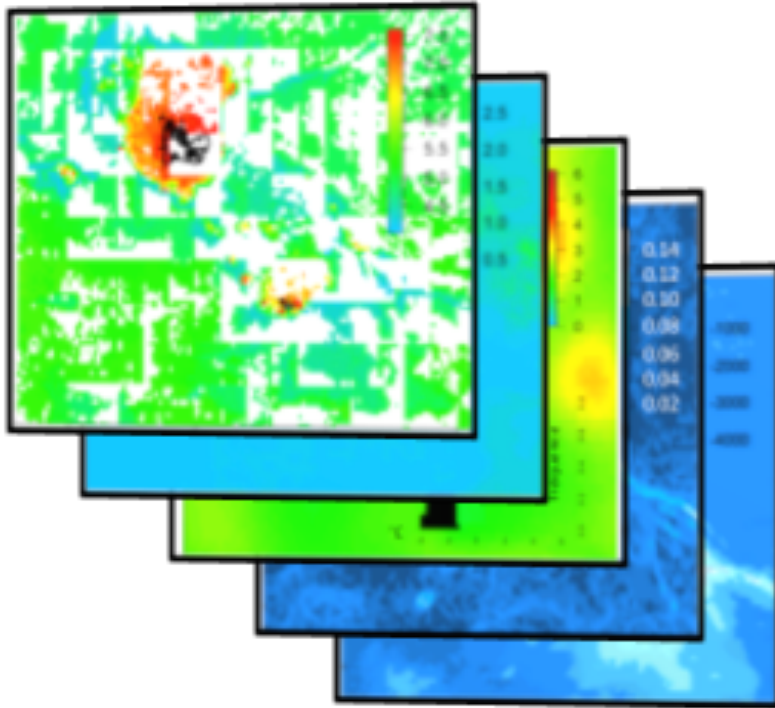**Species Distribution Modelling Playground** R

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Données environnementales sur le plateau des Kerguelen

Température de surface
Température de fond
Salinité de surface
Salinité de fond
Chlorophylle
Profondeur
Géomprhologie
Concentration en oxygène
Pente

…

Voir Guillaumot et al. 2016, Zookeys

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Fontion SDMtab

Permet de créer la matrice à implémenter dans l'algorithme de modélisation

Algorithmes de modélisation

pixel	profondeur	T°	salinité
présence	**-1000**	4.5	33
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Package SDMPlay…

Species Distribution Modelling Playground R

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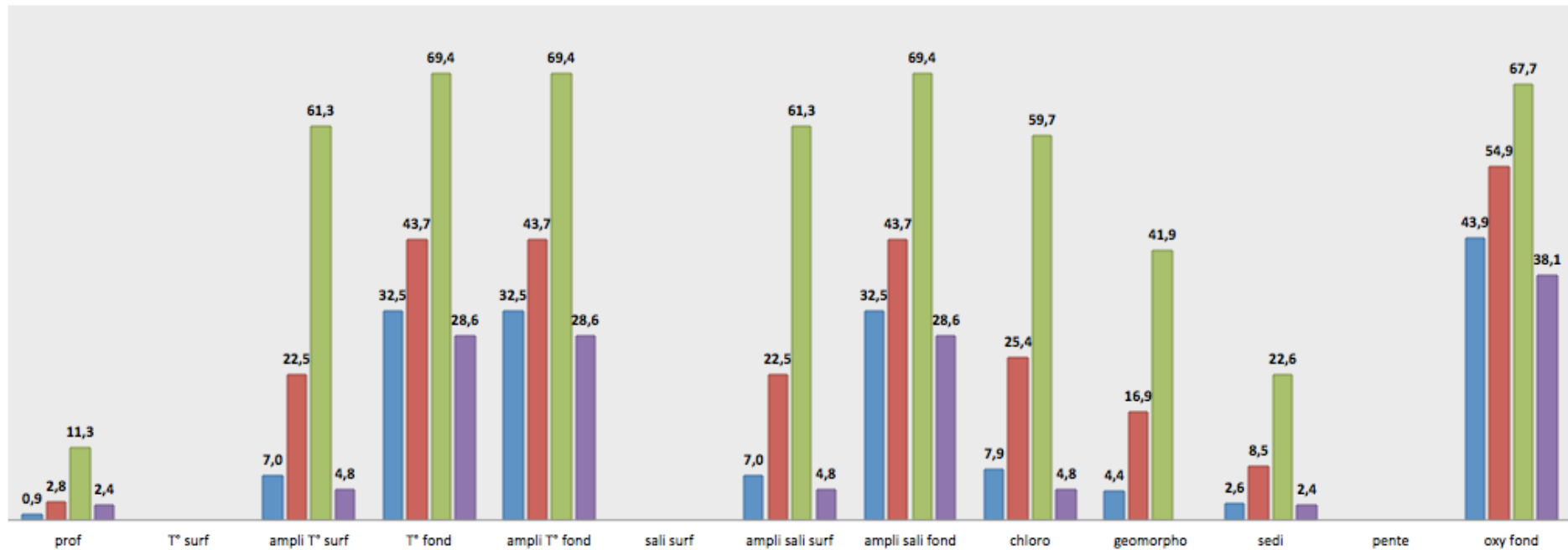
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Fontion SDMdata.quality

Permet vérifier la qualité initiale de jeu de données

Proportion de présences qui tombent sur des pixels non informatifs

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Fontion delim.area

Permet de réduire l'étendue géographique et profondeur des couches environnementales

Ex. réduction à 1000m

Package SDMPlay…

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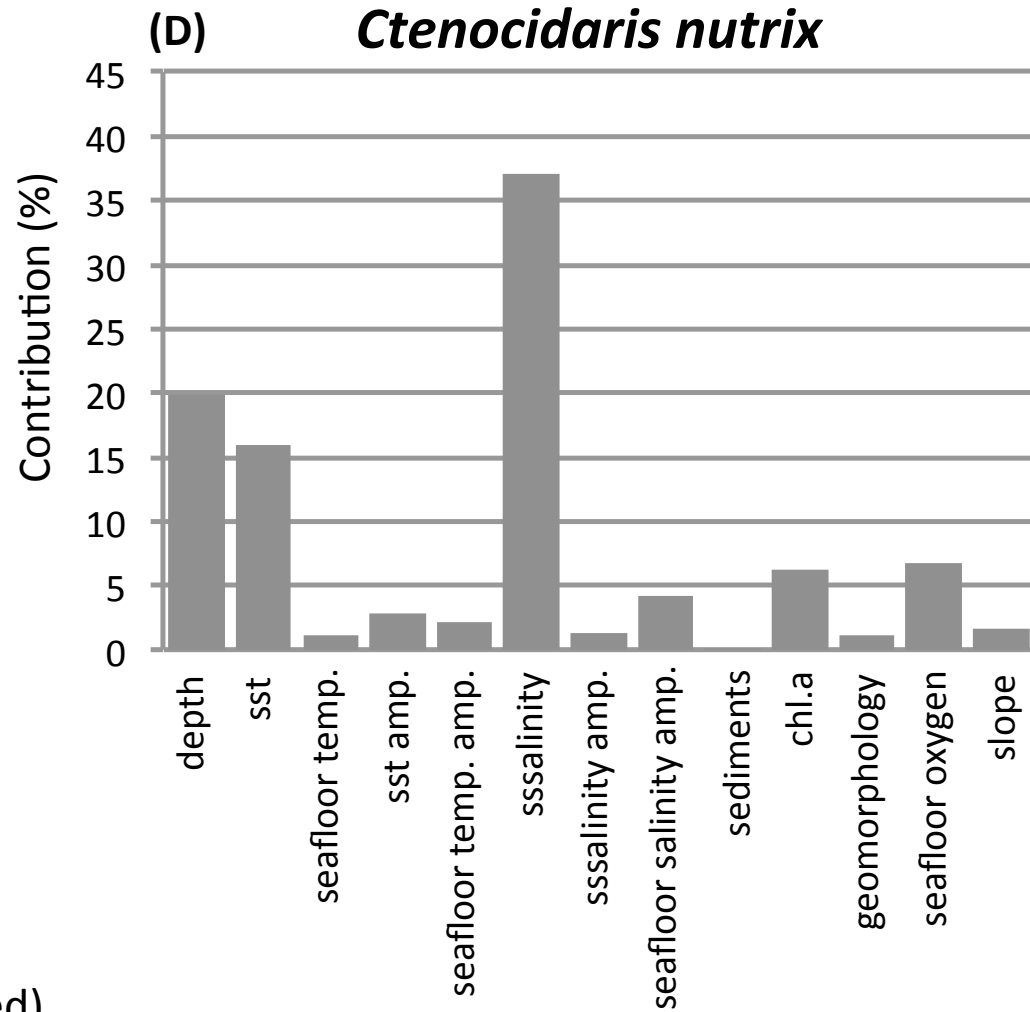
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Exemple de résultats de modèles
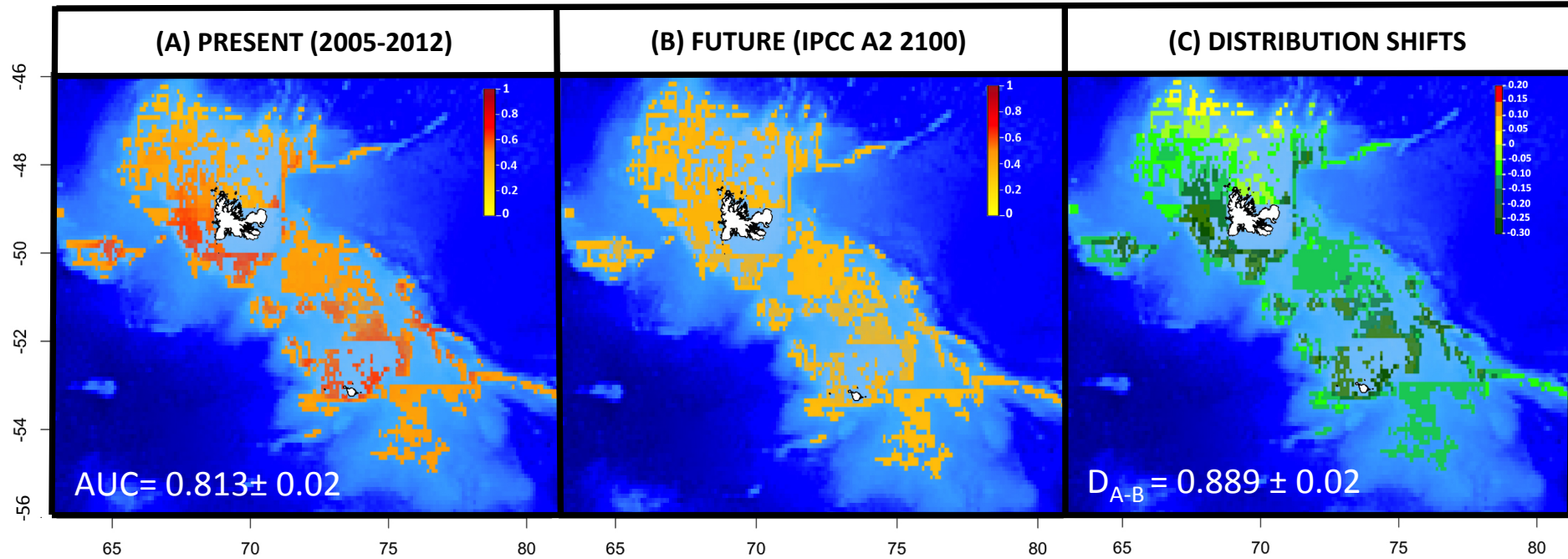
Guillaumot et al. (submitted)

Exemple de résultats de modèles

(D) *Ctenocidaris nutrix*

Guillaumot et al. (submitted)

Package SDMPlay…

Species Distribution Modelling Playground ®

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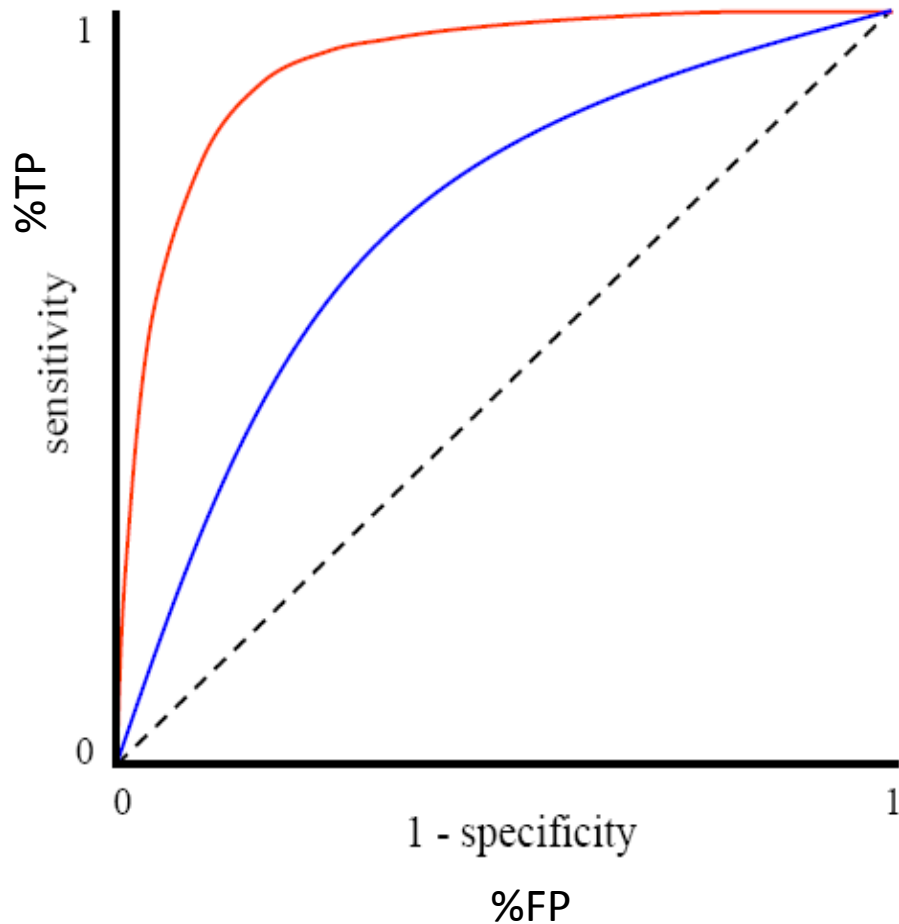
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Evaluer les modèles

ROC (courbe)= Receiver Operating System
AUC (aire sous la courbe): Area Under the ROC Curve

AUC = 0.5 modèle aléatoire

AUC > 0.85 bonnes performances de modélisation

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Modèles nuls

Evaluer les biais liés à l'effort d'échantillonnage...
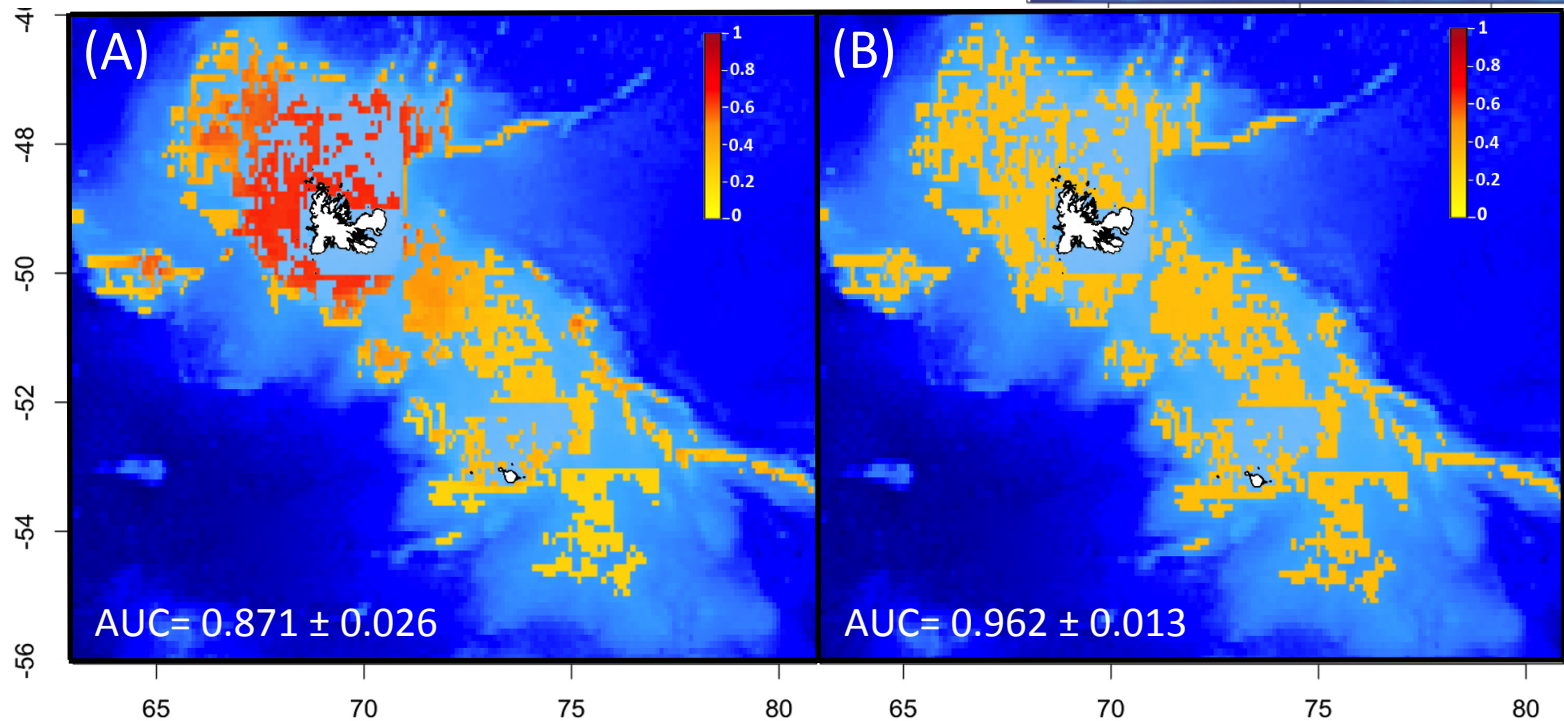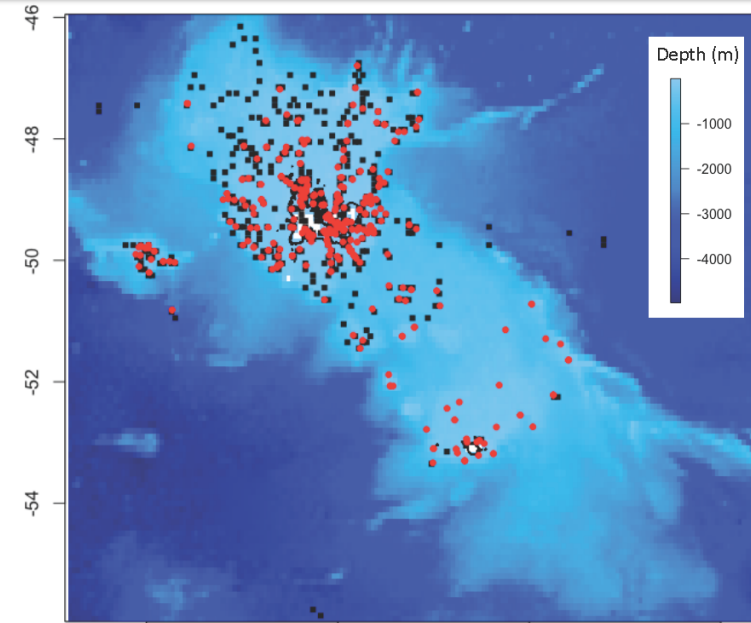
Conclusions

- Package idéal pour une première approche des SDMs
- Pratique pédagogique (TD avec les étudiants)
- Adapté aux jeux de données de présences-seules

Perspectives de développement:

➔ Ajouter des options de bootsrapping (répliquer les modèles)
➔Utilisation pour des données de présence/absence

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Merci pour votre attention !

Charlène GUILLAUMOT, Alexis MARTIN

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