Modeling species present distribution and predicting the impacts of climate change in data-poor areas : an example from the Kerguelen Plateau.

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Abstract

Species and community distribution modeling is commonly used in ecology, biogeography and can constitute seminal conservation planning tools. Distribution modeling procedures usually have three main objectives: (i) approximating realized ecological niches, (ii) interpolating over vast areas true occurrence data based on correlations with abiotic parameters, and (iii) estimating potential shifts in distributions with regards to past and future environmental changes.
Interpolating species distribution data over wide expanses of waters like the Southern Ocean presents strong interests for improving our understanding of marine life in remote and little-investigated areas. Methodological issues however arise due to data heterogeneities because our knowledge of species distribution relies on the compilation of different campaigns. Such spatial (sampling areas and strategies) and temporal heterogeneities (environmental changes over the sampling period) influence the performance of models : a critical point for the choice of algorithms to be used in such studies.
Our work aims at testing the performance of widely used procedures (MaxEnt, BRT) to model the current distribution of four echinoid species with contrasted ecological niches over the Kerguelen plateau. Presence-only data were used. They were compiled from different campaigns (1872-2015) and might show significant heterogeneities. In addition, potential shifts in species distributions were modeled in accordance with the IPCC AIB scenarii for 2100 and 2200 and were compared to the magnitude of past changes (1955-2012).

Keywords: species distribution modeling, prediction, heterogeneities, sea urchins, Kerguelen plateau

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