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Modeling species distribution shifts with environmental changes in data-poor areas. An example from the Kerguelen Plateau.

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Expression of interest:

Species distribution modeling (SDM) has recently received a growing interest from Antarctic marine biologists to address conservation issues and predict potential species distribution shifts with environmental changes. However, species occurrence data in the Southern Ocean (SO) are often temporally and spatially biased and must be corrected before modeling species distribution. Here, we tested and corrected for these biases and modeled the distribution of four common echinoid species with contrasted ecological niches on the Kerguelen Plateau. Species distribution shifts with environmental changes predicted according to IPCC scenario A2 for 2100 were compared to past ([1955-1974]) and present distributions ([2005-2012]).

Abstract

Species distribution modeling (SDM) is a correlative approach based on the relationship between species occurrence and environmental data. A growing number of SDM has been produced for SO marine species to address conservation issues, and evaluate the direct impact of human activities on biota, and predict the potential distribution shifts of invasive species. Methodological clues have been developed to address sampling issues including the paucity of data available and sampling biases associated with heterogeneous sampling protocols and efforts in the Southern Ocean, providing robust and relevant distribution predictions.

On the extent of the Kerguelen Plateau, information about species occurrences and biotic interactions between benthic species has been gathered for several years through long-term ecological observing such as the IPEV program PROTEKER (IPEV n°1044) and oceanographic cruises of the Research Vessel Marion Dufresne. Studying species distribution and predicting their potential shift constitute a priority with regards to fast environmental changes. In our study, the distribution of four common echinoid species of the Kerguelen Plateau was modeled for present ([2005-2012]) and past conditions ([1955-1974]) and compared to the magnitude of distribution shifts according to IPCC scenario RCP 8.5 ([2050-2099]).