
Ecoregionalisation of the Southern Ocean and the robustness of species distribution models in the context of climate change

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Abstract

Species distribution modeling is commonly used in biogeography and ecology to estimate the spatial distribution of species and communities as a function of environmental factors. Merging distribution models of species assemblages based on abiotic and biotic data can be used for ecoregionalisation, a convenient approach for conservation purposes in the current context of climate change. Based on scenarios of future environmental change, the ecoregionalisation approach provides the means to determine regions in which communities are particularly at risk considering the amplitude of the predicted changes. Significant environmental changes have already been documented in the Southern Ocean (e.g. sea water temperature and salinity) for which often poor and heterogeneous biodiversity data are available. The compilation of heterogeneous data from various sources implies temporal heterogeneities that can constitute a critical point when modeling species distribution. Using a database that includes more than 7,000 georeferenced occurrence records of echinoids (sea urchins) based on samples collected in the Southern Ocean during cruises led between 1872 and 2015, we explore the heterogeneity of species distribution data in space and time with regards to past and future environmental changes to estimate the robustness of modeling approaches and the consequences for the ecoregionalisation approach.

Keywords: Southern Ocean, Species distribution modeling, Ecoregionalisation, climate change

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