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Title

Assessing the reliability of citizen-science data for the study of ant species' environmental niches and distributions

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Abstract

To obtain data at large spatial and temporal scales, scientists are increasingly taking advantage of citizen-science projects, where data collection is done by volunteers. However, the potential presence of bias due to differences in species detectability and sampling effort in space could affect the interpretation of scientific results. Quantifying such bias for different species groups is therefore key to using the full potential of citizen-science datasets. Here, we compare the environmental niches and predicted distributions of ant species in the canton of Vaud, Switzerland, based on quantitative inventories versus data from a large citizen-science project. For the majority of species (11 out of 15 from 6 different genera), we find significant overlap between the quantified environmental niches and a high correlation between model predictions based on the two datasets. Divergence in model predictions was observed mostly for species with low detectability or which occurred in both natural and urban habitats, because the latter were oversampled in the citizen-science project. Based on these findings we developed a method to correct for the spatial sampling bias of the citizen-science dataset. Applying this bias correction increased the niche overlap and prediction correlations. Our findings indicate that citizen-science data can reliably be used for species distribution modelling, as long as the characteristics of the species studied are considered. To take advantage of the abundance of citizen-science data when modelling the distributions of under-studied species for conservation purposes, integrating scientific and corrected citizen-science data is recommended to minimize the risk of biased predictions.