Centro de Biologia Ambiental

Encontros Scientia

The relative importance of climate in predicting species distributions: insights from biological invasions

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Abstract

Species' climatic requirements are expected to have an important role in shaping their distributions. Consequently, a large body of ecological research has attempted to predict the potential spread of invasive species or the impact of climate change on biodiversity by matching the climates in which species are observed to those existing in new areas. Several studies have shown that this approach can be of value; however, recent analyses of large-scale biological invasions have also identified a noteworthy number of species naturalized under novel climatic settings. In my presentation I will show examples of each of these cases and discuss potential causes behind climatic mismatch, particularly those of ecological origin. I will also present work of our research group aiming to identify consistent associations between the biological, ecological and biogeographical traits of species and their patterns of response to novel climatic settings. Using European terrestrial gastropods as a study model, we found that climate mismatch between the native and non-native ranges was significantly higher when: (i) native ranges are elongated north-south, (ii) native climate-niche breadth is narrower or (iii) when native ranges reach lower latitudes. Unshelled species, i.e. slugs, were also found to be occupying a higher diversity of new climates than snails. These results suggest that decreases in the accuracy of climate-matching are mainly related to lower levels of distributional equilibrium with climate in the native region. In addition, coarse-scale predictions for species able to competently explore microclimatic variability – as appears to be the case with slugs – may also be challenging. We conclude that species traits may provide valuable a priori indication on the accuracy of climate matching as predictor of potential distribution in new areas or time periods.

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