Predicting spatial distribution of benthic foraminifera using Species distribution models

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In this study, we explore the use of Species Distribution Models (SDM) to infer spatial distribution of four species of benthic foraminifera around the globe. We modelled the distributions of *Peneroplis planatus, P. pertusus, P. arietinus* and *Coscinospira hemprichii* against a large collection of ecologically meaningful environmental variables (EMEV) variables in the Arabian Gulf. To identify combinations of effective predictor EMEV, we compiled several models and narrowed down to a subset based on set of predictive performance metrics. Mean iron concentration, diffusion attenuation, and dissolved oxygen were identified as important variables influencing the distribution of these species. The modelling task is essentially composed of two parts (1) Initial modelling of the actual known distributions of species in a well-defined basin and subsequent validation. (2) Spatial extrapolation over a global extent. Our model successfully predicted current habitat suitability for the four species within Arabian Gulf basin (AUROC = 92%). It also identified areas along the western coastline as highly suitable habitats (Habitat Suitability Index > 0.8). Further, it reliably identified areas with known distributions of the four species (AUROC = 89%) around the world. Here we demonstrate how a SDM model can be a useful tool in capturing complex habitat features for benthic organisms and reduce sampling and accessibility concerns.