



Assessing the influence of two environmental variables on microfossil stratigraphies

Mathias Trachsel (1), Richard Telford (1,2), John Birks (1,2,3)

(1) Department of Biology, University of Bergen, Bergen, Norway (mathias.trachsel@bio.uib.no), (2) Bjerknes Centre for Climate Research, Bergen Norway, (3) Environmental Change Research Centre, University College London, London, UK

Biological assemblages are controlled by several environmental variables (e.g. temperature, precipitation, soil, etc.). Usually, the quantitative influence of several environmental variables on modern species assemblages is evaluated by assessing the influence of different variables on modern species assemblages by means of canonical correspondence analysis or related multivariate regression methods (e.g. Juggins 2013). For fossil assemblages, palaeoecologists have only recently started to assess the statistical influence of one environmental variable (Telford and Birks 2011) and have rarely attempted to assess the joint influence of different environmental variables. For this purpose, we propose a simple approach, generating synthetic variables with different proportions of two environmental variables and testing how much variation in the fossil data the reconstructions of these synthetic variables explain. We first applied this approach to simulated environmental and species data, and then applied the method to pollen data from two transects in Norway that both cover gradients from oceanic to continental sites. We found that our method was able to detect variables used to simulate species assemblages, differences in importance of these variables, and correlations between these variables. Applying the method to pollen data we find that pollen assemblages at coastal sites are mainly sensitive to past changes in July temperature, whereas inland continental sites are influenced by both July temperature and annual precipitation.

References

- Juggins (2013) QSR 64, 20 – 32.
Telford and Birks (2011) QSR 30, 1272 – 1278