Quantifying uncertainty in palaeoclimate reconstructions

A.C. Parnell (1), J Haslett (2), M Salter-Townshend (1), B Huntley (3), and J.R.M. Allen (3)

(1) School of Mathematical Sciences, University College Dublin, Dublin, Ireland, (2) School of Statistics and Computer Science, Trinity College Dublin, Dublin, Ireland, (3) School of Biological and Biomedical Sciences, Durham University, Durham, UK

We propose a method to give honest palaeoclimate reconstructions from proxy data whilst quantifying the many uncertainties involved. Our focus is that of inverse modelling where a causal process is defined which quantifies how climate changes affect proxy observations. This causal chain is inverted using Bayesian statistical methods to provide information on climate. The method we propose can take account of the chronological uncertainty. the measurement uncertainty in obtaining the proxy data, and the uncertainty in the relationship between proxy and climate. We present an example using pollen, though the method is much more widely applicable.