

Transfer functions

Class work:

1. Comparison of transfer functions

We want to use the Modern Analogue Technique (MAT), weighted averaging (WA) and weighted averaging partial least squares (WAPLS) to reconstruct pH from the Round Loch of Glenhead using diatoms (data available in the *rioja* package, *data(SWAP)* and *data(RLGH)*).

1. Determine the appropriate WAPLS model.
2. Compare the reconstructions (scatter plots and time series plots).
3. Calculate correlations among the three reconstructions
4. How many different analogues does MAT use.

2. Spatial autocorrelation

Arctic pollen data used by Frechette et al. (2008) is available in the *palaeoSig* package and called *arctic.pollen* *data(arctic.pollen)*. We want to explore the effects of spatial autocorrelation on transfer function performance.

We want to test transfer functions for July temperature and July sunshine.

Run and cross-validate MAT and WA transfer functions.

Use random data to train the transfer functions (*runif()*).

Use spatially structured random data to train the transfer function (data is available in folder *data*, if possible run transfer function for all 999 random data series). Remove duplicated locations from the species data. (*dup <- duplicated(my.coordinates)*, *my.species.new <- my.species[!dup,]*)

Compare cross validated r^2 of random transfer functions to real transfer functions.

3. Assessment of transfer functions

We want to re-examine our MAT and WA based reconstructions of week 8 and 9 and compare them to WAPLS reconstructions.

Reconstruct July temperature and January temperature for your site using MAT, WA and WAPLS.

- Compare the reconstructions among methods
- Are there phases with agreement and other where reconstructions disagree? How would you interpret this?
- Estimate correlations of January and July temperature for each method.
- Compare the correlation of WA optima of the two reconstructions to correlations between July and January temperature
- Assess analogue quality (Squared chord distance to the closest analogue in the training set)
- Compare analogue quality and the standard deviation of the analogues chosen for each sample
- Compare the correlation of July and January temperature of all analogues chosen to the correlation of the MAT based reconstructions.