Local species frequencies can be rescaled to remove the influence of regional sampling effort and species richness, after these rescalings the local frequencies of any species should be comparable between neighbourhoods, so then why do we need a separate model of temporal change? “An explicit statistical model was used to estimate change” (Hill, 2012, in abstract).

The model of change uses information about local effort (proportion of benchmarks recorded) to work out the “time factor” (a type of scaling factor) that would be needed within a time period for the “true” probability of discovery for a species in a hectad to equal a parameter that combines a local estimate of (hectad and time) period recording effort and the “intrinsic” (i.e. time-independent) recordability of a species (could be thought of as averaged/smoothed rescaled frequency across time-periods – jjj() in Fortran code).

Possible advantages of the time factor approach include the explicit model over just the modelling of frequencies in each time period (which have awkward properties, not following any particular distribution [only note that beta regression could be used]); the other advantage of the time factor approach may be that it allows the frequency rescaling to take place across all time periods, so that the estimates of alpha, local richness etc. are based on more information. This means that the rescaled frequencies (i.e. the time-independent recordability of a species mentioned above) are likely to be more robust.

Also, if you did the analyses independently, and there had been a lot of local change that had increased/decreased richness within neighbourhoods between time periods, then there is the possibilty that the rescaling by richness could obscure real change? (Although this would affect ranks more than frequencies?)

Dear Mark,

I hope this finds you and the family all well, and that lockdown has not been too frustrating for you (no doubt you have been kept busy watering and tending to the garden during the very dry spells that we’ve had).

I’m sorry to bother you with a question about Frescalo, but I have recently revisited it for the BSBI Atlas 2020, and it would be useful to have your response to the following query.

The question regards the analysis of temporal change: if one runs Frescalo on different time slices independently, then one can extract the rescaled per-hectad species frequencies for each time period. As I understand it these are estimates of the probability of finding species x in hectad y that can be compared across space and time. However, if one runs Frescalo on all the time periods of interest together, then only one estimate of the rescaled per-hectad species frequencies is reported by the program (which I assume is then an averaged measure across time periods); I am wondering why the within-time period rescaled per-hectad species frequencies cannot be used to look at change between time periods directly, given that they already incorporate adjustments for neighbourhood recorder effort and local richness?

The conclusion I have reached is that the additional time factor/benchmark approach is a better approach to modelling change because the distributions of species’ rescaled frequencies within time periods are awkward to model (i.e. they are not naturally normal, Poisson, or whatever, or easily transformable).

The reason I ask is that I wanted to use the rescaled frequencies within time-periods downstream in some analyses of local phylogenetic diversity (as indices of occupancy), but the fact that the only way to do this was by running Frescalo separately on the different time periods made me concerned that I was missing something, and that the rescaled frequencies were not in fact comparable across time in the way that I was assuming.

All best wishes,

Oli