Geosci. Model Dev. Discuss.,
doi:10.5194/gmd-2016-227-RC1, 2016

Geoscientific Model Development Discussions
Open Access
EGU

Interactive comment on "BUMPER v1.0: A Bayesian User-friendly Model for Palaeo-Environmental Reconstruction" *by* Philip B. Holden et al.

C. ter Braak (Referee)

cajo.terbraak@wur.nl

Received and published: 31 October 2016

General comments

The first aim of this paper is to alleviate a difficult problem in every Bayesian analysis: that of setting priors. In this case for the Bayesian approach to palaeo-environment reconstruction using Gaussian response curves. This approach was first proposed in Holden et al. 2008. The priors are partly based on the data to be analyzed (as in Empirical Bayes), so that the approach is not fully Bayesian in the strict sense; but it practical and appealing.

The second aim is to provide a more general evaluation of this approach, with the new

Printer-friendly version

Discussion paper

priors, to simulated data sets and a number of (famous and newer) data sets. The approach is compared with the simple approach based on weighted averaging with deshrinking using inverse regression, aka WAPLS1.

The computation approach avoids the usual MCMC computation, or approximations thereof (e.g. INLA), in Bayesian analysis by limiting the approach to one-dimensional modelling and reconstruction and by discretising the parameters, so that in fact 2,560 possible parameter combinations remain. Thereby a fully Bayesian analysis is possible without MCMC. The posteriors for these models act as if they are weights in a model averaging exercise. It is well known that simple models when averaged can solve complex problems.

In my view, the paper fits in the journal, has a clear aim and fulfils the claims.

Specific comments

In one place, it looks like the distinction between prior and posterior is lost in the notation/formulas. In section 2.2 prob(SRC_jk) is surely the posterior denoted by prob(SRC_jk|Y,X), where Y and X are the training data (as in eq (1)). Note that the model setup also belongs to the condition. In eq(2), the posterior weights are meant, is it not? Instead of adapting all formulas (when I am right in this) state explicitly that "From now on prob(SRC_jk) is the posterior probability, the probability of the SRC given the training data Y and X.

The probability distributions in section 2.3 form a hurdle model (zero inflated distribution wit truncation at 0 of the count distribution. If I am right in this, please mention this.

I numbered the pages from 1-20.

P2L4: in the model? It depends of course what you mean with model here. But in the natural sense, the model is fixed and only the parameters of the model are uncertain, and for discrete parameters their distribution (weights). So, say so. Even although the approach has aspects of model averaging, it is best viewed as defining one model...,

which is then fixed.

P4L14 (end section 2.2) At how many points is x evaluated?

P4L19 The expected abundance follows a distribution??? This is not a distribution in any of the senses you use in this paper; it is a Gaussian response curve model; see ter Braak & Barendregt 1986 http://dx.doi.org/10.1016/0025-5564(86)90031-3 when it has aspects of a distribution.

P4L39-41. Eq (11)Note it relation to the exponential distribution and geometric distribution. https://en.wikipedia.org/wiki/Exponential_distribution. Probably you treat is as a discrete distribution and truncate is at 0 (or y<1).

On P5L1 we learn that you made an assumption on the data y: between 0 and 100. Please be more explicit and/or give a more general denominator in (11). Such things can lead to strange errors later on, when used without further scrutiny.

P13L40 To make the program even more user-friendly a wrapper in R and/or Python appears much wanted. Make it a priority.

Technical corrections

P2L21. The two -> Two (they were not mentioned before)

Cajo ter Braak, Wageningen , 31 October, 2016

Interactive comment on Geosci. Model Dev. Discuss., doi:10.5194/gmd-2016-227, 2016.

Printer-friendly version

Discussion paper