

## Technical / minor comments and suggestions

- **Formal description.** This section should be expanded, starting with a clarification of notations (example: what are  $C_a$  and  $C_o$  mathematically? Is  $C_o$  the indicator function that  $\text{age\_node1} \leq \text{age\_node2}$  and  $\text{node1} \in T$  and  $\text{node2} \in T$ , or a product of such terms for various choices of two nodes?). In the second equation at the bottom of page 4, should the terms be switched to show the prior  $P(C_o|T)$  instead of  $P(T|C_o)$ ? In the sentence that follows, does the indicator function  $\delta(T, C_o)$  also require that the node of interest be displayed by the tree  $T$ ; and should this definition be expanded to cases when “ $C_o$ ” includes multiple relative constraints?
- **Implementation.** “two additional functions”: additional compared to what? “Scripts are available”: will users need to write low-level scripts? It looks like a tutorial instead. The wording could be improved in this section, to better describe the authors’ contribution.
- **Two-step inference.** An equation or a more explicit description of the composite likelihood should be included. As stated, this composite likelihood is a factor of two terms: (Gaussian distribution)  $\times$  (posterior means and variances). Surely this is incorrect! Also, are branch lengths assumed to be independent, with 0 covariances in the Gaussian distribution used to build the composite likelihood? “per-branch” suggests independence, but should be clarified.
- The simulations need more details: how many replicates were run (how many trees, and alignments per tree)? It looks like there was only 1. Why not do several, if only 10? Could the marked improvement from 4 to 5 constraints result from idiosyncratic to the one simulated data, in which a “large” rate change was spanned by constraint number 5?  
The rates of small and large changes are said to be 33 and 1, but which process was used: Poisson? under the original or rescaled branch lengths?  
I could not find the description of the simulations underlying Figures S1-S4.
- Archaea: could a figure be added to show the 62-taxon tree, the relative-age constraints, and visualize the hypotheses being tested?
- Figures could be improved, like their legend (“n” and “y” is not explicit), and the x axis label “0” in fig. 5.  
Legends for figures 3-5 could recall which constraints were used (relative? calibrated? both?).  
The legend for figure 2 says that constraints are numbered according to the order in which they were used. Is that applicable to figure 5?  
Could the relative constraint(s) be visualized in figure 6?  
The legend for Fig. S1-S3 should explain why there are 3 violins for each condition (How many taxa, calibrated and relative constraints were there?).