**Geoscientific
Model Development
Discussions**

Interactive comment on "Optimising the FAMOUS climate model: inclusion of global carbon cycling" by J. H. T. Williams et al.

Anonymous Referee #1

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Using a perturbed physics ensemble technique the authors try to optimize the parametrization of the terrestrial and marine carbon cycle components of the model FAMOUS. For the terrestrial component they use both modern observations and past reconstruction to optimize the parameters, while they use only modern observations for the marine carbon cycle. They also present the performances of the last version of the FAMOUS model.

Their study leads to a new set of parameters for the carbon cycle that is within the range of 65-140% of the initial set of parameters.

The new parametrization leads to an improvement in the performances of the model and the new version seems to be better than the old ones.

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It is a nice work well presented and I recommend it for publication.

However, the part devoted to the marine carbon cycle is not detailed enough. Only the surface nitrate content is shown and discussed. While this is an important variable, the authors could also show the depth-latitudinal distribution of nitrate in the Atlantic and Pacific basins. If this article is to be referenced for all future work using the new version of FAMOUS then some other figures need to be shown in the text or in a supplementary material such as: export production, air-sea CO_2 flux, depth-latitudinal distribution of O_2 and/or AOU in the Atlantic and Pacific basins . . . This information is needed to know the performances of the marine carbon cycle of FAMOUS.

Interactive comment on Geosci. Model Dev. Discuss., 5, 3089, 2012.