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Interactive comment on "Global prediction of planktic foraminiferal fluxes from hydrographic and productivity data" *by* S. Žarić et al.

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Zaric et al. model foraminiferal fluxes on a global scale with a monthly resolution. The model they use is based on sediment trap and enviromental data and forced with global data of hydrography and productivity.The validity of the model is tested by comparing the model data with a) sediment assemblage distributions on a global scale and b) additional sediment trap data. The "limited predictive skills" of the model output is, as the authors correctly explain, probably caused by the limited calibration set. Nevertheless, the paper is an important scientific contribution in combining field studies with modeling work in a novel concept. It opens the way for future research, which ideally will be able to reconstruct seasonal variation of environmental parameters in the past. The paper is well written and structured, the methods are thoroughly described and the conclusions are sound.

The authors explain the caveats of the model by the limited available environmental information and discuss possibilities for improvement in future work. In this respect some suggestions/points of criticism might be helpful:

1. The minimum size of the counted foraminifera should be consistent. What sizes were used in which data sets? The relative abundance and flux of N. quinqueloba, for instance, will strongly increase when a minimum size of >125 micrometer is used istead of >150. (page 863, line 9)

2. A differentiation of foraminiferal species between phyto- and zooplankton is essential when primary productivity serves as a basic parameter.

3. In the authors' approach the species concept will always limit the output results. Although no differentiation will be possible for genotypes (page 866, line 21-22), a differentiation of eco-phenotypes may improve the predictivity value of the model. N. pachyderma (s.), for example, has at least two morphotypes, type 1 has the shape of the right-coiling, while type 2 is totally overgrown. Type 2, to my knowledge, exclusively occurs in polar areas, while type 1 also is known from upwelling areas.

4. The concept of the paper is based on a "very modern analogue" situation. Sediment trap, hydrography and productivity data document the situation of the most recent years, while the data obtained from sediment surfaces reflect information of up to several hundreds of years. While the modern data might reflect already changes due caused by the Global Change, this potential information is at least partly lost by mixing of the most recent particles with pre-industrial material through bioturbation. Clues for possible most recent faunal changes are given by the work of Barker and Elderfield (Science, 297, 833-836, 2002). The enhanced carbon dioxide concentration of the atmosphere causes alkalinity changes in the ocean and results in stronger selective dissolution of certain foraminiferal species. (page 866, line 7-10)

5. In Figure 12 the authors compare modeled and measured foraminiferal fluxes of Somalia. A comparison of all available data (hydrography, productivity, relative abundance

BGD
2, S443–S445, 2005

EGU

(and partly fluxes) from plankton tows, sediment traps and sediment surface) could be a helpful check for the model predictivity. For the four species shown, modeled and mesuref fluxes match well. However, three of the most dominant species (G. bulloides, G. ruber, N. dutertrei) are not shown. What is the reason for not showing them, do the model results not fit the observations? If so, what might be the reason? A possible reason for the mismatch for G. bulloides in upwelling regions is given on page 862, line 1-9. Off Somalia, the available data of export productivity for a depth of 1000m could directly confirm this explanation.

6. In Figure 14 (see also page 867, line 3-9) the seasonal shift of the modeled fluxes for G. bulloides are shown for the N-Atlantic. The timing of the shift (January-April) is leading that of the spring bloom and that for the migration of G. bulloides as proposed by Ganssen and Kroon by several months. What is the reason for this discrepancy?

Future work including an ecosystem model will certainly improve the predictive skills of the work presented here.

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