Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2017-429-RC2, 2017

Biogeosciences Discussions

Interactive comment on "Modeling seasonal and vertical habitats of planktonic foraminifera on a global scale" *by* Kerstin Kretschmer et al.

Anonymous Referee #2

Received and published: 20 December 2017

The authors use existing sediment trap and plankton tow data to add seasonal and depth habitat information to the PLAFOM2.0 model. The authors then compare model results to modern data, concluding that they find a reasonable agreement between simulated and observed results for species-specific flux timing and depth habitat. The manuscript is well written, and the discussion of global trends in depth habitat is fantastic and alone an important contribution to the literature. Moreover, in light of an increasing understanding of the consequences of foraminifera habitat tracking for proxy data interpretation, the development of such a modeling tool is potentially quite useful.

The manuscript is successful in modeling modern depth preferences from unfortunately sparse observational data. While the model seems to reproduce broad trends (spinose species in near-surface waters) and earlier-when-warmer seasonality in some environ-

ments, figures 6-7 and the supplemental figures often show a strikingly poor fit between modeled and observed timing and depth preferences at specific sites. As the authors point out, the model tends to underestimate both amplitude of seasonal changes and potentially depth stratification. The authors should consider explicitly discussing why the model might be insensitive in replicating observed variability and how this would be likely to effect modeling of different climate inputs.

When the authors discuss relative abundance of species, are they referring to relative abundance with respect to just modeled species or all foraminifera? Is this consistent throughout? It might be worth clarifying this point

Why have the authors chosen not to include sediment trap based habitat depth based assessments?

p8/l23 (and throughout) – Do the authors really mean differences in biomass as opposed to species abundances? If so, is the biomass different in different species and how is this accounted for? And how does this metric compare to species abundances, as presumably used in the modern data to which the model is compared? p9/l18 (and throughout this section) – I'm not sure it makes sense for "maximum production" to be "year-round." Could you clarify? section 3.3 – might be helpful to define what you mean by "surface" and "subsurface" as these are pretty general terms but are being used as if the authors have a fairly specific depth range in mind p12/l30 –"prefer thriving" -> "thrive" p12/l33 – delete "largely" p14/l4 – delete "among each other" p14/l11 - delete "preferably" p14/l31 – "cold to transitional" compares a temperature to a zonation p15/l22 – a -> the p17/l2 – might be better to describe these as short time series as compared to plankton tows which really are "snapshots" p17/l18 – or genotypes or phenotypes? p17/l26 "a few"?

Figure 6 is extremely difficult to read given the mix of opacity and multiple symbols and colors. Is there a better way to present this data?

Figures 6 and 7 (a-c) suggest a quite poor fit of modeled data to sediment trap ob-

servations. i.e. 7c shows the model completing missing the flux timing of bulloides in JGOFS34. The authors include an overview or why there might be some data-model mismatch, but I think a wider discussion of why and how this could impact or limit interpretation of model results is warranted

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