Review of "$\delta^{18}O$ water isotope in the iLOVECLIM model (version 1.0) – Part 3: A paleoperspective based on present-day data-model comparison for oxygen stable isotopes in carbonates" by Caley and Roche

This is a quite short manuscript that reports on an application of the newly developed iLOVECLIM model in paleoclimatology/paleooceanography, where "paleo" is restricted to the Late Holocene. I particularly like Sction 3.1 on the comparison to continental records, but unfortunaly this comparison turns out to be the most difficult one because of the limitations of the atmospheric component of iLOVECLIM.

Major comments:

1. From the viewpoint of a reader, it would be more convenient to merge the three parts to one, or at least the first and the second part, if the third part can be conveincingly expanded to become an article in its own right. This has the advantage that the merged paper would contain only one common Introduction section, and that one could refer to, for example, a single Methods section. Indeed, any presentation of a new model should contain a model-data comparison as an integral part, at least with respect to current observations, maybe less so for paleo-data. To restrict the model „verification" to just delta O-18-salinity relationship is not sufficient from my point of view.

2. Because the O-18 of carbonate critically depends on temperature, the modeled temperature should be assessed as well and ideally compared to a "Late Holocene" temperature reconstruction, to rule out that errors in the modeled temperature and water isotope distributions compensate each other. Indeed, the authors touch on the effect of a temperature bias in the deep ocean, but they may miss a similar effect in the near-surface ocean.

3. The paleo-temperature equation by Shackleton (1974) was derived for inorganic precipitates. As shown by Mulitza et al. (2003) and Mulitza et al. (2004), it is more appropriate to use a paleo-temperature equation derived for living planktonic foraminifera, even taking into account differences between the different species..

Minor comments:

Note that the results by Telford et al. (2013) suggest that changes in habitat depth with time (from the present to the past) may have a significant effect. Similarly, any salinity-temperature relationship may change with time, as well as the temperature and salinity that happen to coincide with a (modern) oceanic front that should be really defined by strong horizontal gradients in temperature and other hydrographic quantities.

Changes in habitat depth and seasonality are also at the heart of the forward models of planktonic foraminifera, for example, by Schmidt and Mulitza (2002), Fraile et al. (2007, 2008). It comes as a surprise that their effects should only be of second order. Indeed, the correlation between modeled and reconstructed calcite O-18 may be deceiving – it may only be relatively large ($R^2 = 0.85$) because various species are lumped together (Fig. 5). When individual species are considered, the correlation is considerably weaker (Fig. 7 – the numbers are hard to read and warrant a table). The correlation for individual species may be well influenced by factors such as species-specific habitat depth and seasonality.

In this connection, listing the various habitat depths is useful, but may be better presented in a table. Fig. 7 in particular should be enlarged and all font sizes increased to make it readable. The manuscript also requires slight proof-reading with respect to wording and spelling.

Apparently, the effect of a temperature bias in the deep ocean was also described by Paul et al. (1999). These authors relate a warm bias to the representation of vertical (isopycnal) mixing. The authors of the present manuscript should similarly analyze the source of their cold bias.

To my knowledge, the correct citation of the MARGO synthesis of SST reconstructions for the LGM should be MARGO Project Members (2009), as opposed to Waelbroeck et al. (2009) (this usage would be similar to the citation of the older CLIMAP synthesis of SST reconstructions for the LGM).