

Interactive comment on “Kinetic bottlenecks to chemical exchange rates for deep-sea animals – Part 1: Oxygen” by A. F. Hofmann et al.

Anonymous Referee #2

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In this manuscript, Hofmann et al. aim to combine physico-chemical characteristics of seawater into mechanistic equations that try to define and describe the oceanic oxygen supply potential. The authors aim to elucidate how global warming will affect oxygen limits to marine life. Overall, is a well-written manuscript that highlights the importance of temperature and pressure in oxygen supply.

The main problem I see is that the manuscript does not attempt to include organism-dependent properties. Moreover, I don't see that most oceanographers would change the use of pO₂ or oxygen content to use a more complicated metric to elucidate oxygen supply potential.

Results for the Mediterranean Sea are surprising. I believe that authors should explain better these results and give an honest opinion about if the use of these met-

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rics is appropriate for these regions that appear to gain a benefit from warming over-compensating oxygen loss.

Specific comments:

The use of acronyms throughout the manuscript makes it difficult to follow, especially for authors not familiar with them.

P. 13819. L. 22-26. Paper by Gray defines different limits for different groups of organisms, not just a simple concentration limit as stated by the authors. A review on the thresholds of hypoxia for marine communities by Vaquer-Sunyer and Duarte (2008) also shows a wide range of hypoxia thresholds for marine organisms and that the use of a single, universal threshold is not appropriate. Authors should acknowledge that previous studies point to the need to use a range of thresholds instead of a single value (Gray et al. 2002, Vaquer-Sunyer and Duarte, 2008).

P. 13821. L. 4. The authors state that the use of a single concentration value as a limit provides no temperature dependence information. This can be overcome by using the values as a percent of oxygen saturation or pO₂. Effects of temperature on oxygen limits for marine life have been reviewed recently. No reference to that work is presented here.

There seems to be typographic errors in most equations where the “=” symbols appear with “:” before (e.g. equations 7, 9, 11, 12) and equation 14 with an exclamation symbol above the equal symbol.

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