

Interactive comment on “Effect of hypoxia and anoxia on invertebrate behaviour: ecological perspectives from species to community level” by B. Riedel et al.

Anonymous Referee #2

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Riedel et al. present a carefully carried out experimental in situ study on the short term impacts of hypoxia on benthic communities in the Adriatic, a habitat that suffers from frequent occurrence of hypoxia. The study presents a substantial amount of novel data on the response of individual species and communities to hypoxia with the aim to provide a basis for increasing monitoring efficiency in the future. While the paper is written well, I believe that the main body of the ms should be significantly shortened, particularly with respect to the presentation of the results.

Specific points:

1) Shortening of the results section: I believe that this section should be dramatically

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shortened. The authors might think about integrating the main points into a table and to move the bullet points for each species into the supplementary.

2) The authors discuss oxygen thresholds using ml/l. This is difficult, as oxygen supply to animals is a function of partial pressure and solubility of oxygen in water, see e.g. Verberk et al. 2011 Ecology, Hofmann et al. 2013 BG for an explanation. The temperature dependence of critical oxygen partial pressures is also well documented. The authors should discuss these points, particularly with respect to variability in temperature in the habitat and anticipated future changes in temperature. The concept of critical oxygen partial pressure should be explained.

3) The authors nicely demonstrate that pH significantly decreases during the incubations. Here, it would make sense to briefly discuss that low pH goes along with high CO₂ partial pressures and low calcium carbonate saturation state, a problem that will become much more severe in the future (see Melzner et al. 2013 and references therein for a discussion).

Hofmann, A.F., Peltzer, E.T., and Brewer, P.G. (2013) Kinetic bottlenecks to chemical exchange rates for deep-sea animals – Part 1: Oxygen. *Biogeosciences Discuss.*, 9, 13817-13856, doi:10.5194/bgd-9-13817-2012

Melzner, F., Thomsen, J., Koeve, W., Oschlies, A., Gutowska, M.A., Bange, H.W., Hansen, H.P., Körtzinger, A. (2013). Future ocean acidification will be amplified by hypoxia in coastal habitats, *Marine Biology*

Verberk WCEP & Atkinson D (2013) Why polar gigantism and Palaeozoic gigantism are not equivalent: effects of oxygen and temperature on the body size of ectotherms *Functional Ecology* 27: 1275-1285. doi: 10.1111/1365-2435.12152

Verberk WCEP, Bilton DT, Calosi P & Spicer JI (2011) Oxygen supply in aquatic ectotherms: Partial pressure and solubility together explain biodiversity and size patterns. *Ecology* 92:1565-1572

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