

Interactive comment on “Diagenesis and benthic fluxes of nutrients and metals during experimentally induced anoxia in the Gulf of Trieste (northern Adriatic Sea)” by N. Koron et al.

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We appreciate and accept the criticism of both referees and have revised the manuscript accordingly. The suggestions of the referees have improved a quality of our paper. All changes are marked red in the original article. We hope that the paper is now appropriately corrected and suitable to be published in Biogeosciences.

Response to the referee#2:

1. All experimental approaches with benthic chamber (oxic and anoxic) with longer exposure time (for example Rutgers van der Loeff, 1984; Anderson et al., 1986; Hall et al., 1989) obviously cannot take into consideration the instantaneous biogeochemical

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(and hydrodynamic) conditions at the sediment-water interface. Considering that in the Gulf of Trieste the hypoxic and anoxic events in the bottom water layer occur in late summer when the pycnocline isolates bottom water layer (Faganeli et al., 1985) and the input of sedimenting POM to benthos is lowered (Kemp et al., 1999). Therefore, we think, that the present experiment simulate quite well the conditions in the Gulf of Trieste and can be applicable to other similar systems.

2. Regarding benthic nutrient fluxes occurring in sediments at the same study site it should be pointed out that the rates in oxic, anoxic and reoxic conditions were already studied and published (Ogrinc and Faganeli, 2006; Faganeli and Ogrinc, 2009). To our knowledge, none has used the reaction-diffusion modelling in order to obtain the diffusive benthic fluxes in artificially produced anoxic and reoxic sedimentary environments. Modelling revealed quite good agreement with measured pore water concentration except in reoxydation phase subjected to intense bioturbation. Areal biological variability in sediments (patchy distribution of species) is usual a problem and can be overcome, rarely performed, by using several benthic chambers at the same study site. Also, we agree that the use of one-dimensional models may underestimate the real fluxes (This was added in the text on page 12).

3. Additionally, annamox can in small extent contribute to pore water nitrate production as a byproduct of CO₂ reduction (Canfield et al., 2005; Magonigal et al., 2004).

4. The nitrate distribution in pore waters was added in Fig. 2 and all graphs were enlarged.

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