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Biogeosciences Discussions

Interactive comment on "Belowground in situ redox dynamics and methanogenesis recovery in a degraded fen during dry-wet cycles and flooding" *by* C. Estop-Aragonés et al.

Anonymous Referee #4

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In their discussion paper, Estop-Aragonés and colleagues analyzed the belowground redox conditions in a degraded fen over the period of two years under fluctuating water table conditions. They compared control plots which were affected only by the natural seasonal water table alterations with plots that were manipulated. The latter plots were artificially drained and rewetted in one year and flooded in the following year. The authors could show that, as expected, water table changes and the corresponding changes in soil moisture content had a strong effect on the redox dynamics. The artificially induced more intense draught led to greater electron acceptor regeneration, however, the water table depth rather than the draught duration was here important. They could furthermore demonstrate the co-occurrence of iron reduction, sulfate re-

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duction and methanogenesis, suggesting the formation of microniches.

The authors provide a nice and profound analysis of electron acceptor dynamics in the different peat soil plots and correlate these dynamics with parameters such as water tables, bulk densities and organic matter content. The paper is nicely written and the discussion is detailed and conclusive. Nevertheless, it might be shorted. Some of the data was published elsewhere (Figure 2-5) and in my opinion, this data does not have to be described in such a detail again, but should be only used to put the new data in context. It should be also clearly pointed out that this data has already been published. Maybe I overlooked it, but I could only find this information in the Figure legends, but not within the text part.

I have only few further remarks:

Introduction: Page 11657 lines 17-19: the release of CH4 is not only dependent on production and transport, but also on oxidation of CH4 by methanotrophic bacteria. The latter process significantly reduces CH4 emissions to the atmosphere. I know it is not the focus of this study, but I think it should be mentioned here.

Discussion: Page 11673, line 19: remove “only”

Figure 2: I think part of this Figure was also published in the paper Estop-Aragonés et al., 2012: “Controls on in situ oxygen and dissolved inorganic carbon dynamics in peat of a temperate fen”. This should be pointed out.

Interactive comment on Biogeosciences Discuss., 9, 11655, 2012.