

Interactive comment on “Water level, vegetation composition and plant productivity explain greenhouse gas fluxes in temperate cutover fens after inundation” by M. Minke et al.

Anonymous Referee #1

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doi:10.5194/bgd-12-17393-2015: Water level, vegetation composition and plant productivity explain greenhouse gas fluxes in temperate cutover fens after inundation. bg-2015-463

This paper considers effect of water level, vegetation composition and plant productivity to emission of the greenhouse gasses in rewetted cutover fens. The paper very well technically crafted with “great statistics”, but very important ecological point of view is missing. Rewetting of cutover fens is important in ecological and also social point of view. Excavated areas can to change again to wetland ecosystem and thus start biogeochemical recovery processes including restore carbon storage in soil. I think that

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would be interesting use approach of ecophases (Mitsch, 2009). Basically we recognized three ecophases: terrestrial ecophase (water level is more than 10 cm below the surface), limosal ecophase (water level near the soil surface) and the litoral ecophase (water level more than 10 cm above the soil surface). Results of paper based on the manual chamber measurements realized during 26 measuring campaigns. Estimations of annual CH₄, CO₂ and N₂O fluxes were calculated using different models and approaches. As the result are presented modeled data only. Directly measured data are not presented and reader cannot compare actually measured data with modeled (theoretical) data. By my opinion, actually measured data have a higher value than modeled and estimated data. Focus of the paper is quite large and wide. For reader will be potentially difficult orientate in the paper. Maybe it would be preferable omit the N₂O fluxes. In the case of the N₂O, authors argue that the role of N₂O exchange was negligible for the GHG-balances of all sites (page 17418; line 12-13). The overall feeling of presented paper is embarrassed without clearly formulated “home message”. This is probably due to missing hypotheses in the Introduction sections. Filling of knowledge gaps is not scientific aim.

Detail comments and questions

Page 17397; line 1-2 The claim that the plants are strong sources of methane is not true. The role and effect of plants in this case is enhancing of greenhouse gasses emissions from soil profile and its partial biochemical interactions. Please change the sentence ...” of plants in shallow water of *Typha* and *Phragmites australis*, i.e. of species that are potentially strong sources of methane...”.

Page 17397; line 4-5; The radiative forcing in term of the IPCC (IPCC 2007) and I think that for processing studies of different ecosystems is more suitable use amount of Carbon (C) in different form such as C-CO₂ and C-CH₄. Biochemical processes used and transform (sequestered) a carbon and important role of wetlands is long-term store of this C in soil.

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Page 17398; A map to show the site location at both the local and regional scale would be helpful.

Page 17401; Line 19-22; I recommend shortening this paragraph.

17401; Line 25; Meteorological parameters for the flux models were recorded in two climate stations at distance 5.6 km and 6.3 km. I think that climate stations are too far from places where chambers measurements were made.

Page 17402; Line 15; It is true that in the eddy covariance community a positive sign refers to a flux from the ecosystem to the atmosphere and a negative sign to an ecosystem sink. But it is depending of our consensus; I think that organic production based on consumption of CO₂ from the atmosphere cannot be negative. Production is positive fundamental process of the organic mass formation.

Page 17403; Where measured soil temperatures for modeling? Soil temperatures from too far climate stations cannot be used for flux models.

Page 17405; Line 15; Why add the annual random error of the approach one to the uncertainties of annual emission?

Page 17409; This section is long. I recommend shortening this section and data presented in a table.

Page 17410; Differences in production of the *Phragmites australis* it may be caused by different density of stand. What is density of the reed stand? Page 17440; I recommended add the Table 2 in the appendix as a detail information of plant species cover.

Page 17448; Fig 2. Results of comparison of the different chamber types would be used in different paper which will be focused in this topic. In presented paper this point is not important detail of methods. What is main result of paper?

Page 17449 and 17450 Figures 3 and 4 could be merged into a single image with left

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and right panel of graphs.

Page 17439 to 17446 Table 1 to 7; Too many tables. I recommended simplified Table 1 (Site characteristics). Water level fluctuations are presented in Figure 3 and 4. Characteristics of individual plots on the site can be probably merged (averaged).

References Mitsch WJ, editor. 2009. Wetland ecosystems. Hoboken, N.J: Wiley Anon. IPCC - Intergovernmental Panel on Climate Change.

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