

Dear Georg,

Thank you for your additional comments which are very helpful. Answers are provided in short below and more extended responses can be found in the complete list of responses to all referees and editor.

Main comments:

-Objectives were expanded in the introduction as requested by Editor and Ref 2.

**"The primary objective of this study is to estimate annual net CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O fluxes as well as fluvial C fluxes from two typical Irish grasslands over organic soil. We further combine estimates of terrestrial net ecosystem exchange (NEE), fluvial C export, and CH<sub>4</sub> fluxes associated with grazing livestock, as well as biomass C export, to calculate the net ecosystem C balance (NECB). By comparing two grasslands with contrasting drainage, soil nutrient status and management practices, we assess the role of these attributes in respect to biomass productivity, GHG and waterborne C fluxes, and appraise the hypothesis that specific site characteristics (low soil fertility and higher water table levels), management systems (low stocking density and low inputs) and regional climate can affect the overall C balance of these ecosystems. Finally, this study provides data to support a progression towards the IPCC Tier 2 reporting level in Ireland by producing emission factors (EFs) for CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and DOC for typical organic soils under grassland."**

-Acronyms/abbreviations were checked so that they appear the first time in full in both abstract and main text.

-Section 3.7 L 4-9 moved to M&M.

Table 1 and 2 will be re-checked upon typesetting so that text is 'in-line'.

Additional comments

(1) p. 5558, l. 13: NEE removed from parenthesis as sufficient information for abstract.

(2) p. 5567 l 1: new title: "CO<sub>2</sub> flux modelling"

(3) p. 5573, l. 9 The terms 'biomass' and 'vegetation height' have been substituted for 'grass' and follow the terminology used by the IPCC. We feel the term 'Canopy height' is typically used for pure graminoids grassland or in morphological studies or mostly for forestry and we deem it is not appropriate for use here.

(4) section 4.5: *results of EF's should be first introduced in section 3; these are original results of this study and should be first mentioned in the Results section*

We strongly feel this adds superfluous text in an 'already-long' manuscript. Given the new, clearer objectives as stated in the introduction, we feel that it is therefore now suitable to treat the subject of EF in the discussion only. This is similar to how GWP is often treated and such presentation of the calculation of EF has been replicated in similar papers in Biogeosciences, e.g. Elsgaard et al. 2012.

(5) Fig. 1: changed text/caption to 'vegetation height'

(6) Fig. 2: edited panel number "(a)" missing in upper panel; edited "s-1" instead of "sec-1"

(7) Fig. 4: edited "h-1" instead of "hr-1"

(8) Fig. 5: added y-axis text

(9) Fig. 6: removed

(10) Fig. 7: replaced "grass" in y-axis and legend and put units on y-axis in parenthesis

(11) Fig. 8: added y-axis text; put units on y-axis in parenthesis; and edited "h-1" instead of "hr-1"

(12) Fig. 9: edited y-axis text and put units on y-axis in parenthesis

(13) Fig. 10: This figure is mentioned in the Results section and replaces Fig 6 which has been removed.