

## Review of Jauhiainen et al

### General comments

The justification for the research reported in this manuscript is the lack of data on N<sub>2</sub>O emissions from tropical peat. Measurements of N<sub>2</sub>O flux at 6 sites subjected to different disturbances (drainage, burning, agriculture) were measured over various periods from 2000 to 2007. Water table depth was also measured. The manuscript is well-written for the most part, but makes only a modest contribution to our knowledge of factors influencing N<sub>2</sub>O fluxes from tropical peat. Partly this is due to a lack of supporting data to relate the N<sub>2</sub>O flux values to, as only water table depth was measured concurrent with N<sub>2</sub>O fluxes. Its main contribution is flux values for these under-studied ecosystems, which are then compared to CO<sub>2</sub> and CH<sub>4</sub> fluxes (measured at the same sites and reported elsewhere). The authors conclude that N<sub>2</sub>O fluxes are very variable in time and space (a fact well-known) and that annual emissions in terms of CO<sub>2</sub>eq are relatively small when compared to CO<sub>2</sub> and CH<sub>4</sub>. The study is inconclusive with respect to effect of disturbances and management, likely because of the experimental design (uncontrolled conditions, non-simultaneous measurements). Perhaps the flux values could be reported in a short communication article.

### Specific comments

P. 5424

L. 1: The opening sentence is a bit awkward; consider re-phrasing.

L. 3: Is this the main knowledge gap that is being addressed with the study reported? (i.e. "N<sub>2</sub>O dynamics"). It would be better to more specific on the research question that authors are trying to address.

L. 5: Objective(s) and the location of the study site (country) should be added here. Also, the period of measurement.

L. 14-15: Please quantify these statements (most; modest peak).

L. 15-16: It is well known that N<sub>2</sub>O fluxes vary significantly in space and time, typically presenting log-normal or other 'skewed' probability distributions (eg. Yates et al., 2007. SSSAJ 70(3)). The main (novel) finding of this research should be stated here. The title refers to 'disturbance history' and 'management' so this factor should be addressed in your summary of results: what are the conclusions related to these two factors?

P. 5425

L. 8: What is the relevance of N<sub>2</sub>O exchange being 'concurrent' with CO<sub>2</sub> and CH<sub>4</sub>?

P. 5426

L. 10-13: Consider changing to 'There are a limited number of studies quantifying all three major GHG fluxes from tropical peat sites'.

L. 15-20: More background and justification on the research questions related to potential factors affecting N<sub>2</sub>O fluxes from peat should be given in the introduction. What led the authors to choose the study sites with the given characteristics (eg. how are N<sub>2</sub>O fluxes affected by peat burning? drainage?)? As the authors state, most research has been conducted in boreal peatlands. What is known about N<sub>2</sub>O production in peat of cold regions? What are contrasting factors (temperature, rainfall, pH?) in tropical regions that would affect N<sub>2</sub>O fluxes? Which hypothesis did the authors formulate before their study?

L. 19-20: This is a relatively weak objective. Can it be formulated to address a research question?

P. 5427

L. 6: More information on the peat chemical characteristics at each site needs to be given (eg. pH, N content). What type of peat was present at each site?

P. 5430:

L. 6: What is the justification for selecting these arbitrary values for data filtering. Why only at these two sites?

Technical corrections

P. 5424

L. 25: Delete 'the' before 'greenhouse'.

L. 26: Replace 'where especially' with 'of which'.

P. 5425

L. 4: Replace 'the' with 'a'

L. 5: Replace 'on' with 'over'.

P. 5426

L. 24: Refer to Table 1 at end of opening sentence.

P. 5427

L. 6: Do you mean 'six' sites?

L. 9: Delete 'but'.

L. 10: Give annual rate of fertilizer applications.

L. 17-22: Use abbreviations (eg. NDF) here.

L. 26: When where samples taken (time of day, time of year)? How many replicates for each sampling location? Some of this information is given in Table 1, but it needs to be referred to here.

P. 5428

L. 1: Fix spelling for 'microtopography'.

L. 27: The location/existence of a canal has not been explained at this point.

P. 5428

L. 6: 'linear temporal change': give more details on this. Do you mean '...from the slope of the linear regression between gas concentration vs. time'?

L. 7: What do you mean by 'was studied for linearity'?

P. 5430

L. 18: Please use statistically appropriate terms: what does 'wider scatter' mean?

P. 5431

L. 4: The average referred to is not shown in figure.

L. 18-20: This is hard to follow. There is need to justify the use of cut-off values better.

P. 5432

L. 1-3: This sentence does not appear to be coherent: how can the cut-off points influence the 'deviating fluxes'.

Table 1: This table is hard to follow. It would be useful to break down some of the information into separate columns (eg. water table depth, history, latitude).