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Biogeosciences Discussions

Interactive comment on "Spatial and temporal variations of dissolved organic carbon and inorganic carbon concentrations and delta;¹³C in a peatland-stream continuum: implications of peatland invasion by vascular plants" *by* S. Gogo et al.

Anonymous Referee #1

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This manuscript aims to study temporal/spatial variation in dissolved C within the La Guette peatland in France. This is a topical subject area with a significant amount of recent literature, which demonstrates the importance of peatland systems in controlling DOC and CO2 concentrations/fluxes in associated streams/rivers.

The paper is based upon 16 sites (in different parts of the peatland), sampled on 4 occasions for DOC, 13DOC, DIC, 13DIC, pH, temperature and conductivity. The dataset

is therefore relatively small and the authors attempt to use it to answer many different questions about the C dynamics of the system. This is where in my opinion the paper is lacking - there is simply insuffucient data to support much of the analysis and many of the conclusions. For example, the manuscript explores seasonality - this is based upon one sample per season which is insufficient to determine seasonal differences in a hydrologically dynamic system such as a peatland. The authors also compare closed and open plots (with/without vascular plants). The stats are based on 2 sites each, sampled in each of the seasons (n=8, Fig 3). This approach mixes spatial variability (how did the 2 open sites differ?) and temporal variability (were the differences between the sites consistent within each season?). Collectively there is too little data to say anything conclusive about temporal changes, and too few sites to say much about spatial variability.

I found the manuscript poorly organised. For example, in the key points highlighted in the abstract on p3516 there is no mention of seasonality, although it is discussed widely in the manuscript. The concept of a "CO2 critical zone" at the peat surface is also discussed on p3516, although CO2 concentration in peat increases with depth (?). The authors do not say why they measured 13C in the abstract - indeed it is not mentioned at all (this is probably the most interesting part of their data).

Section 3.1 (Global trend of DIC and DOC concs and 13C) is nothing to do with global trends. The authors talk about "more DOC" in the open plots. This refers to concentration data and not fluxes (conc x flow) - concentration data alone does not tell you whether there is more/less DOC in a stream.

One further comment (last 3 lines) - the authors interpret Fig 7 as showing that CO2 degassing causes the pH to rise. I agree that has been shown to occur in the laboratory. However, high epCO2 in peatland surface waters is typically associated with high organic acidity (high DOC) and this is as likely to be the effect the authors are seeing in their field data, as downstream CO2 degassing.

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