Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-277-AC2, 2018

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characterisation of short-term extreme methane fluxes related to non-turbulent mixing above an Arctic permafrost ecosystem" *by* Carsten Schaller et al.

Carsten Schaller et al.

carsten.schaller@uni-muenster.de

Received and published: 30 November 2018

The comment was uploaded in the form of a supplement:
https://www.atmos-chem-phys-discuss.net/acp-2018-277/acp-2018-277-AC2-supplement.pdf

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-277, 2018.

Printer-friendly version

Discussion paper

Answer to Anonymous Referee #2

The comments of the reviewer are in black, our reply is coloured blue.

This manuscript presents an analysis of methane (CH4) eddy covariance (EC) data measured above a wetland in NE Siberia. The manuscript focuses on CH4 fluxes during night time in non-turbulent and low-mixing conditions when the EC measurement level is decoupled from the surface. Wavelet methods developed in a companion paper are used to estimate fluxes with 1 min time resolution over one summer and this high frequency flux time series is used to identify and classify high CH4 flux events during the analyzed period. These events are then speculated to be linked with atmospheric mesoscale circulation taking place in these nocturnal low-mixing conditions.
However, large part of the abstract, introduction and some other sections are discussing ebullition and other non-related topics, whereas results and conclusions are all about nocturnal low-mixing conditions. The authors should modify the beginning of the manuscript so that it matches with the end, so that the text forms one coherent entity. There are also other shortcomings in the text and description of data processing. Please see below.

As it stands the manuscript is interesting and shows promise but requires major revisions (see below) before publication. Once revised, it should be of interest also for the wider community working with micrometeorological flux measurements and hence the study is within the scope of ACP. Besides the shortcomings mentioned above, the presentation quality is good, although some figures need adjustment. I recommend the publication of this manuscript after major revision based on the comments below.

We thank Anonymous Referee #2 for his constructive comments. According to his remarks we revised our manuscript as described in the following reply.

GENERAL COMMENTS
1) Please modify the abstract and introduction so that they match with the results. In my opinion these sections should be largely rewritten since now they are quite disconnected from the rest of the manuscript. The results are about gas fluxes under nocturnal low-mixing conditions and the abstract and introduction should be written about this topic, not about arctic wetland CH4 emission dynamics. As you know, these problems related to low-mixing conditions are universal, not only related to arctic wetlands.

We agree that there is some kind of disconnection between the specific process of ebullition, which is presented in abstract and introduction, and the results of our manuscript. Nonetheless we think that it is important to consider that the scientific discussion on methane emissions in Arctic permafrost wetlands mentions ebullition as an important pathway. Thus the main reason of our data analysis was to find signs of ebullition using the wavelet approach – in our case studies, we detected other reasons for all found events, but no signs of ebullition. It seems that ebullition, occurring as heterogeneous single events on the spatial scale of the EC footprint of our towers, is not detectable. We think, that this finding might be also important for the scientific community.
We will rewrite parts of abstract and introduction as requested, so that it will be clear that ebullition is not the main topic of the manuscript, but we decided not to remove our remarks on ebullition completely due to its importance in Arctic permafrost wetlands.

2) The wavelet method is presented in the manuscript as more accurate than EC and

Fig. 1.

Printer-friendly version

Discussion paper