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Atmospheric Measurement Techniques Discussions

Interactive comment on "Estimation of waste water treatment plant methane emissions: methodology and results from a short campaign" *by* C. E. Yver-Kwok et al.

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Please find below the answer to the second reviewer.

Interactive comment on "Estimation of waste water treatment plant methane emissions: methodology and results from a short campaign" by C. E. Yver-Kwok et al. Anonymous Referee #3 Received and published: 3 March 2014

The paper addresses methodological aspects of the determination of CH4 emissions of a waste water treatment plant in Valence, France. These systems have a minor contribution (roughly 2%) to the national methane sources, but are poorly constrained.

The paper presents different methods to get a better estimate of the sources related to waste water treatment plants. Already the first sentence of the abstract shows that the paper is a “potpourri” of methodological ideas to quantify the sources with a lack of coherence. It is well known that state of the art analyzers such as FTIR and CRDS do measure precisely with a high temporal resolution. But they measure concentrations and not fluxes. The issue is do use them in a proper way to estimate emission fluxes. The presented methods with a variety of chambers and C2H2 tracer release are individually interesting and demonstrate the potential to get ideas on emission strength of the different compartments within the plant. To assess the CH4 source strength on a regional scale the 222Rn tracer method is applied. I am not too familiar with this approach, but I can follow the approach for e.g. stable nocturnal boundary conditions where both 222Rn and CH4 are accumulating and from the ratio of the increase the CH4 source can be estimated in case the 222Rn source is known. The application in neutral and instable conditions is less convincing, especially in case the CH4 source is extremely inhomogeneous and a superposition of many individual plumes. A time interval from 12pm (noon?) to 8pm on 18th September was used. In opposition to the statement on lines 5 and 6 page 9203 the wind is coming from roughly 200 thus not from north. The explanation why the station is sampling along a transect of 90km is missing. The bombastic introduction is not balanced by the content of the rest of the paper. It is a compilation of several pilot studies over a very short time to identify CH4 sources in the treatment plant. Unfortunately the main sources was not properly identified and it remains a hypothesis that the solid sludge pile is the main contributor. It seems not a big effort to directly measure this e.g. with a chamber. I cannot recommend the paper for acceptance in AMT, but suggest to resubmit a better structured version.

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We thank the reviewer for the comments. We have revised the paper according to these comments and those from the other reviewer. - We have changed the structure

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by organizing the results in terms of measured scales. These range from the process scale to the greater area around the plant, in order to tell a coherent story.

- The manuscript aims at demonstrating the applicability of the different methods to measurements in a waste water treatment plant. In order to emphasize this main point, we extended the discussion of the different methods. The results are to serve as illustration rather than provide high confidence estimates of methane emissions.

- We have also clarified the radon tracer method. In the literature, this method is used in all boundary layer conditions, including both afternoon and night (Levin et al., 1999;Schmidt et al., 2001; Biraud et al., 2000; Messager et al., 2008; Hammer and Levin,2009; Yver et al., 2009). Good correlation between the signals ensures that the different necessary assumptions are respected. We are aware that there was only one event and we use it only as an illustration of the method, highlighting the fact that despite this uniqueness, it happens to be in agreement with the inventories for the Valence region. We calculate a 90km transect using the fact that the event lasted 8hours with an average wind of 3m/s so we could have sampled air coming from a maximum distance of 8*3600/1000*3=86.7km. We have checked and corrected the wind direction.

- Finally, we have reanalyzed the measurements of concentrations to properly identify the main source of emission on the site and added a part about it in the manuscript as well.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 9181, 2013.