Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2017-247-RC2, 2017

Atmospheric Measurement Techniques Discussions

Interactive comment on "Identification of spikes associated with local sources in continuous time series of atmospheric CO, CO_2 and CH_4" *by* Abdelhadi El Yazidi et al.

Anonymous Referee #1

Received and published: 9 December 2017

Introduction

In this paper an attempt is made to systematically separate spikes in records of ambient greenhouse gas mole fraction observations caused from local emissions that should not be used in studies aiming at constraining regional fluxes. The problem is addressed by identifying concentration spikes of few minutes duration in greenhouse gas continuous time series from 4 stations by applying automatic detection methods (COV, SD and REBS) previously used for atmospheric pollution but not systematically for greenhouse gas time series.

Language and structure

The article is well written, though too lengthy and it contains quite some minor but still sloppy errors that should be corrected. For this I included a list of minor corrections at the end of this review. An additional check of the text by a native speaker would be beneficial to the paper. Here and there the text is too long. It is a useful exercise, but not rocket science, so could be dealt with also by a shorter text. I propose to shorten section 3.3 and 3.4 with 30-50%. An important issue is that the paper only handles two methods as the COV method is discarded right away. The text should be revised to better reflect this. I would suggest to move the first paragraph of the conclusions in section 4 to replace parts of the introduction and summary, as this is the best introduction text to the paper.

General comments

The topic is very relevant for improving the quality of ambient greenhouse gas observations by a regional network like the ICOS atmosphere network in Europe by an automated procedure, additionally to human manual quality control. The methodology used is sound but not spectacular. The two spike detection methods tested are very basic and relatively straightforward techniques that have proven their usefulness in air quality applications. It would have been useful to also look into more sophisticated methods that apply Fourier transform Savitkzy-Golay (1964) filters or wavelet transforms (e.g. Wee et al, 2008) to achieve this end. I would like to see some good arguments whether and why this has not been considered. I agree with referee #2 that it would be good to refer to the percentages of hours detected than the absolute number. It would be good to state in the text more clear that avoiding spikes is more important than filtering them out and detection of spikes should always be followed by looking to the cause of the spikes in order to try to minimize them further. It is good to see from this paper that the contribution of the spikes in general is low on the average signal observed, except for the PDM site with the obvious problem of the nearby pollution source. The 4 sites chosen for the paper are said to be representative for the ICOS atmosphere station network, but neither of them is a continental tall tower

within 100 km or an urban region. It would also be interesting to see how the spike detection results vary for the vertical gradient along a tall tower where the footprint of the measurements varies from local for low sampling heights to more regional for the higher elevations.

Minor corrections

l24 European -> European Research

l28 in Amsterdam Island -> on Amsterdam Island

l38 change to: analyzers located at 200m from each other,

l40 we -> we also

l42 as -> in; for -> used for

l43 like ICOS -> like that of the ICOS atmosphere network

l53 thereafter -> hereafter

l54 allows -> allows for

l54 move "to separate" after "time series"

l58 CO2 -> CO2,

l59 while -> because

l60 logbook -> a logbook

l66 are -> is

l69 modelers -> modelers,

l77 been rarely -> rarely been

l80-l85 these sentences should be move to forward in introduction

l85 emissions -> emissions, instrumental failures, intermittent leaks etc.

l90 European -> ICOS RI?

l101 are -> have been

l102 (Bergamaschi -> (e.g. Bergamaschi

l140 recommendations -> specification (https://www.icos-ri.eu/documents/ATC%20Public)

l161 calculations -> calculation

l212 and proved robustness -> and has been proven robust

l218 As all data in our study in the first step is averaged to 1 minute values

l247 remove ", spikes in other words"

l258 lead -> leads

l287-289 repetitive text

l291 detect automatically -> automatically detect

l291-293 As COV method is discarded move this to introduction and forget about it in the whole paper

l321 that -> that the

l338 remove "even"

l344 remove "the"

l368 methods -> methods that

l407 remove "The"

References

Savitzky, A.; Golay, M.J.E. (1964). Analytical Chemistry. doi:10.1021/ac60214a047
Wee et al (2008). Electrophoresis. doi:10.1002/elps.200800096

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2017-247, 2017.