

Interactive comment on “Implementation of a chemical background method for atmospheric OH measurements by laser-induced fluorescence: characterisation and observations from the UK and China” by Robert Woodward-Massey et al.

Anonymous Referee #1

Received and published: 27 January 2020

This manuscript describes OH interference measurements performed using the Leeds LIF FAGE instrument with the inclusion of an inlet pre-injector during three separate field deployments. I was very interested in reviewing this manuscript due to its importance in the measurement of ambient OH. With large reported discrepancies between measured and modeled OH and the significance of accurate OH measurements, it is important for all LIF groups to conduct these tests. This manuscript is thorough and well written; however, I have concerns regarding some of the analyses which I believe can be resolved with further clarification. Nevertheless, once these changes are made,

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I fully recommend publication in AMT.

Specific comments

Figure 5: Do the authors have any thoughts on why there is more variability in the propane results? And why does C3F6 produce a more gradual decay?

P11, line 367: I suggest the authors consider adding the description of the injector tip to Figure 1 for clarity. In addition, can it be clarified that this injector tip is not interrupting the sample flow?

P13, lines 464-71: I suggest the authors perform a simple modeling test to determine if SCIs are the likely cause of this interference. While it is negligible when extrapolated to ambient concentrations, acknowledgement and quantification of this interference, if it is in fact from SCIs, can be used in comparison with other FAGE instrumental overviews.

Figure 10: Do the authors have any suggestions as to why there appears to be greater variability at lower OH_{wave} and OH_{chem} measurements? Assuming the majority of these points are nighttime measurements, is NO₃ responsible? Overcorrection of O₃/H₂O?

Section 2.3: More information about the field deployments needs to be presented. How long (#days) were each deployment? Were measurements continuous? The authors later mention instrumental issues such as power outages. This would be the section to provide more detail about such matters.

P 16, lines 544-8: Did the authors compare OH_{int} to the same parameters that were previously implicated? It seems that since there was little to no OH interference measured, that by comparing OH_{wave} and OH_{chem} individually to these parameters, the trend will largely be representative of actual OH.

P16, lines 558-9: Are the authors convinced that an over-subtraction of O₃/H₂O is not occurring during the daytime as well? Figure 13 shows OH_{chem} larger than OH_{wave} at peak concentrations. In addition, AIRPRO summer 2017 reports a negative interfer-

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ence ratio (-0.09). Is this also related to an over correction of O₃/H₂O? The authors are encouraged to give more insight into this.

P16, line 573: Do the authors have any suggestions for why the nighttime OH levels were so much higher during AIRPRO summer 2017 in comparison to the other two campaigns?

P17, line 578-87: While there are few points of high OH measurements, was any analysis performed on their relationship with BVOCs, O₃, or temperature? Were these high concentrations measured on different days/times? While it may be limited, the authors are suggested to provide more of an analysis of these points.

P18, lines 611-13: The sentence 'These findings. . .in this type of environment.' should be reworded or omitted. While one of the field sites showed high BVOC and low NO concentrations, it should not be implied as being representative of a forested environment. While the BVOC and NO conditions may have been similar, other key compounds, such as SO₂, would have likely been larger, altering the environmental conditions further from that of a forest.

Technical corrections

Abstract. P1, line21: change scavenging to scavenger

P3, line 81: either remove the word 'by' or change to 'Mao et al. (2012)'

P3, line 82: Lew et al., 2019 should be added as a reference for OH interference measurements in a forested environment

P5, line 175: add reference Rickly and Stevens, 2018

P8, line 267: move comma to read as 'AIRPRO winter, but after'

Figure 4: make red and blue markers consistent with graph 3

P9, line 303: remove second 'reduction' in this sentence

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P12, line 398: change to 'OH removal efficiency of ~12%'

P16, line 567: change 'as' to 'because'

P17, line 590: either remove 'of' or change to 'Fittschen et al. (2019)'

P17, lines 599-601: The authors are suggested to add 'in moderately to highly polluted environments' to the end of this sentence for clarification.

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