

Interactive comment on “iDirac: a field-portable instrument for long-term autonomous measurements of isoprene and selected VOCs” by Conor G. Bolas et al.

Anonymous Referee #2

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“iDirac: a field-portable instrument for long-term autonomous measurements of isoprene and selected VOCs”

This paper thoroughly details the trial of a deployable instrument for remotely measuring isoprene (the main focus of the manuscript) and similar VOCs. There is a great need for calibrated portable instruments that can monitor long term trends out in the field for campaigns and background measurements therefore the iDirac instrument is of great interest, as this can complement reference materials and satellite measurements to give a holistic overview of the atmospheric isoprene distribution.

The paper thoroughly introduces the instrumentation and shows the breadth of mea-

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surements that have been performed to test it. However, despite the wealth of information specific quantification is often not provided (please see Specific comments). I recommend that this manuscript be accepted once these minor corrections have been addressed.

General comments In the introduction it would be useful to explain the importance of isoprene with regards to impact on the OH reservoir in the troposphere, as well as on SOA. I think that a bit more detail is required about the instrumentation, particularly with regards to the drier and breakthrough and poisoning of the trap. Have any tests been performed to assess if the drier removes any VOCs? How do you recondition the trap, what if terpenes or heavy components stick and reduce trapping ability? Figure 9 – breakthrough effected by flow rate – how were the samples pumped into the system – what happens if you vary the sampling rate? Similar questions arise from the results depicted in Figure 11. It would also be helpful to have a clearer idea of what is meant by the trap becoming “poisoned” is this the result of moisture and what is the impact on uncertainties and sensitivity? I strongly suggest that Figure 3 includes information about the isoprene concentration depicted and I would also like error bars added to all figures where required e.g. Figure 7. Volumes should have an associated uncertainty. Finally, I think it would be useful to know why was a Gaussian shape was used for the fitting, have you tried any other peak shapes for fitting e.g. Voigt or speed-dependent Voigt? These might optimise results.

Specific comments P1. Line 23. Please change to “Isoprene is an important non-methane”... P1. Line 25. What is the impact of the SOA, please also add references P2. Line 16. Grab samplers: please add example reference e.g. Robinson AD DOI: 10.5194/acp-5-1423-2005 P2. Line 36. What about trueness? P3. Table 1. Please specify nitrogen purity percentage P4. Figure 1. Does the packaging and foam emit any VOCs? P5. Paragraph 2. What is the volume sampled? P5. Line 30. Why can you not use a non-return valve? P5. Line 43. Specify the desired volume P6. Lines 11-14. Consider combining sentences. P6. Line 21. Are there any other VOCs with

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similar ionisation values or boiling points? P6. Figure 3. What concentration does this peak represent? What's the S/N ratio? P7. Line 7. Should read "in a nitrogen balance" P7. Line 9. Is the calibration gas purchased or decanted, if the latter please specify how. P7. Line 20. Please specify the reduced pressure P7. Line 23. I think that you mean "nominally" not "typically"? P7. Line 38. IS the clock calibrated? P9. Line 15. What are the criteria for insufficient/sufficient (how many?) P9. Line 16. What is the criteria for "too great" P9. Line 26. What is the stability period of the gas standard? P10. Line 13. Replace "good practice" with "essential"! P10. Line 14-19. Please give numbers. P10. Line 26. What is the error on the volumes? P11. Paragraph 1. Are we talking about intermediate precision or reproducibility? P12. Line 13. What is the lowest volume used – this may impact uncertainty and S/N as the sensitivity is likely to vary with volume size P12. Line 31. "the grey and the grange instruments" I think you mean "orange"; please clarify (explain what the difference is before section 5.5). P13. Line 11. Specify uncertainty of BOC mixture and add the word "balance" to describe the matrix gas. P13. Line 12. Do you have an offset from losses to the chamber wall? P13. Line 15. Should be "tee-piece" P13. Line 17. "high" Specify above 8 ppb. P13. Line 22. What happens if you switched the trap? Have you considered the impact of breakthrough at high flow rates? P15. Line 8. Rephrase "pure substance". Surely there will be impurities in the raw materials? Perhaps state the purity of the reagent? P16. Figure 12. What does a blank run look like? P17. Line 7. Please resolve "Error! Reference source not found..." P17. Line 12. How has this been addressed in subsequent versions? P19. Figure 16. Can you please use a wider colour range? P19. Line 4. Is the poisoning moisture? What impact does this have on the sensitivity and uncertainties attributed? P19. Line 20. "can be run autonomously for months" Assuming the trap is not degraded?

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