Atmos. Chem. Phys. Discuss., 7, S3076–S3080, 2007
www.atmos-chem-phys-discuss.net/7/S3076/2007/

Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Isoprene and monoterpene emissions from secondary forest in northern Benin" *by* J. E. Saxton et al.

J. E. Saxton et al.

Received and published: 13 July 2007

The authors would like to thank the reviewers for their comments and suggestions.

In response to the comments made by Anonymous Referee #1:

With the editor's agreement, the title can be changed to 'Isoprene and monoterpene measurements in a secondary forest in northern Benin' to provide more representative information about the content of the paper.

Page 4991 line 16 The range of values measured by Serca et al was 730-1820 pptv for isoprene and generally $<$ 20 pptv for monoterpenes. This information will be added to the paper.

Page 4991 line 21 The text has been edited to clarify the point raised.

Page 4993 line 5 In the absence of authentic standards or reliable library spectra, positive identification of the sesquiterpenes is likely to be a slow but incremental process. By moving to GCxGC-TOF separations there is much better pattern matching and subsequent intercomparison between samples / standards run over disparate time periods, and indeed even on different instruments assuming the same column types are used in each dimension. This is the analytical approach and technique now being adopted for example in metabolomics identification. We hope to continue to build our library of convincing matches and then use these to reinterpret historical data when appropriate.

Page 4993 line 9 We suggest (Page 4993 line 17) that the factors governing ambient limonene concentrations are complex and that measured ambient concentrations were more readily influenced by short term variations in emissions from the single major source proposed than the other monoterpene species identified. The line in question will be amended from ’clear diurnal variation’ to ’general diurnal variation’.

Page 4994 line 29 Our data showed a weak correlation between measured ambient air concentration and temperature for both limonene and isoprene. We did not carry out temperature controlled emissions measurements.

Page 4998 line 1 No oxidation products were detected in ambient air samples. Comprehensive GC analysis provides an opportunity to resolve a large number of materials collected using adsorption tubes and since the adsorbents used were appropriate for collect of these materials, it would have been possible for us to chromatographically isolate these compounds if present. The high humidity in the region was countered through the use of an ice bath condensing trap generating liquid water, plus a further drying once the samples were processed in the laboratory. The literature suggests that losses of oxidation products, if present in ambient air, could have occurred during both collection and further processing due to their high solubility. We were unable to verify oxidation products losses and therefore we are unable to determine whether these compounds were present.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Figure 2 We appreciate the reviewers comments here, but we would prefer to retain both plots relating to isoprene in a single unified a+b figure since we feel this aids the reader in understanding the high variability in averaged isoprene since it can be seen directly against the raw daily data. We do not feel that a qualitative comparison of emission algorithm versus data adds much here. If we had had sufficient input data to make the comparison quantitative then we would have made this comparison.

Figure 4 Line markers have been used to assist differentiation of the alpha and beta pinene data in case of colour changes through the production process. An updated plot using an alternative colour can be supplied to the editor.

Figure 5 This figure will be removed as suggested.

In response to the comments made by A. Guenther:

The quantitative data available from this study is limited with respect to emissions. However it does offer preliminary measurements to support further investigations in this region and provides the basis for further assessment of vegetation and emissions. The work here provides at least an overview of monoterpene types that are prevalent, and illustrates that emissions of species such as limonene are potentially large.

The authors are aware of previous work investigating the stability of terpenes on the adsorbents used. It has been noted by both referees that previous measurements in this region of Africa are scarce and as such, the number and identification of compounds collected in the field samples were unknown prior to analysis. Some stability studies were carried out with alpha-pinene, beta-pinene and isoprene, and in particular to determine the effects of removing ozone from the sample train. Under laboratory conditions storage over several weeks appeared satisfactory, although of course it is impossible to recreate the same temperature environment that the real samples experienced in transit. Storage tendency was for the slight loss of pinenes although without the formation of other artifact terpenoids; the measurements presented here are therefore likely to represent lower estimates.

The light intensity was not measured. Temperatures ranged from 26°C to 41°C. with the highest temperatures recorded during leaf cuvette measurements. The data presented here are provided to give an indication of likely sources of the species measured in ambient air. The authors recognise that more controlled sampling methods are required to provide accurate emissions measurements. A combination of many environmental and physical factors, including light and temperature, could be responsible for the discrepancy between these and previous measurements, but we do not feel that we have anything that can be specifically highlighted within the paper as the reason. We make comment in the paper now on the differences between these observations and those in Otter et al.

Page 4989 line 10 & page 4999 We agree that the linkage described in the text is too strong. We have altered this to reflect that there is a broad correlation between quantities of directly extractable terpenoid material and the general strength of plant emission. We had not meant to imply that there was like-for-like species comparison.

Page 4997 line 28 The authors acknowledge that the data presented on very reactive compounds is currently of unknown value. Whilst we are unable to draw definitive conclusions regarding the presence of very reactive compounds from this work, the authors felt it was useful to the wider community to provide an assessment of the possibility of the presence of such compounds to aid design considerations in future projects.

Table 3 The other volatile compounds were not terpenoid compounds and were therefore excluded as they are beyond the scope of the ambient air sampling results presented here. We have added to the text however a broad description of the material described as ‘other’.

Page 4996 line 15 The authors would like to thank the reviewer for drawing our attention to these recently published studies. We are happy to included reference to them in this paper.

Page 4996 line 26 The line will be amended to temperature-only dependent.

Figure 1 Coordinates will be removed from the legend.

Figure 5 This figure will be removed as suggested.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 4981, 2007.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper