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Biogeosciences Discussions

Interactive comment on "Identification of secondary fatty alcohols in atmospheric aerosols in temperate forests" *by* Yuzo Miyazaki et al.

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General comments:

This is a fine study, reporting the chemical characterization of secondary long-chain fatty alcohols (SFAs), which can serve as novel molecular markers for plant-derived aerosol particles. Use is made of gas chromatography-mass spectrometry of trimethylsilyl derivatives, and interpretation of the electron ionization mass spectra, which is appropriate methodology for the chemical characterization of long-chain fatty alcohols. As suggested below, it would be relevant to explore whether the SFAs found in the aerosol particles are due to photochemical degradation of plant waxes, resulting in the emission of SFAs into the atmosphere.

Specific comments:

Line 17 – abstract: It is mentioned that the SFAs show a correlation with sucrose, which is a marker for plant pollen. I am not sure this correlation is very relevant. As discussed below, it would be meaningful to explore other correlations.

Line 29: The authors write: "Because of their chemical structure and the similarity of parts of this structure to water, lipids are surface-active". I found this sentence unclear and too general, and suggest to delete it. It is not strictly necessary.

Lines 27 – 35: In this section, the authors discuss the possible origin of the SFAs and argue that they originate from the emission of plant waxes. I am not convinced about this interpretation. An alternative explanation could be that they are due to photochemical degradation of fragile wax surfaces of higher plants, releasing components of plant waxes, i.e, fatty acids and long-chain fatty alcohols, into the atmosphere, and that this phenomenon is most important in the growing season. It would therefore be relevant to check whether there is any correlation with fatty acids and solar radiation. I am aware that fatty acids were not measured in this study but it could be mentioned that this would be relevant in a future study, but perhaps data are available about solar readiation. The correlation of SFAs and sucrose could just be coincidental. I think it would be more safe to write (line 34): ". . .. due to large emissions of plant waxes or components thereof (i.e., fatty alcohols)". I wonder whether there is any report in the literature reporting the direct emission of waxes from plants?

Tables 1 and 2: The number of significant digits should be reduced to 2 or to 3 in case the number starts with "1".

Technical corrections:

Line 19 – abstract: . . .. from plant waxes and . . .. . .

Line 31: . . .. . . of long-chain hydrocarbons . . ..

Line 36: . . .. long-chain alcohols . . ..

Page 2 – line 1: . . .., a secondary FA (SFA), ...

Page 2 – line 8: . . .., we used gas chromatography-mass spectrometry (GC-MS) to identify . . .. Note: the abbreviation “MS” stands for “mass spectrometry” and not for “mass spectrometer”. See article: K. K. Murray, R. K. Boyd, M. N. Eberlin, G. J. Langley, L. Li, Y. Naito. Definitions of terms relating to mass spectrometry. IUPAC Recommendations 2013. Pure Appl. Chem., 85, 1515-1609, 2013].

Page 2 – line 9: . . .. and total suspended . . ..

Page 2 – line 18: Note: there should be a space before degrees centigrade.

Page 2 – line 33: same comment as above.

Page 3 – line 10: same comment as above.

Page 3 – line 11: . . .. for Gas Chromatography-Mass Spectrometry (GC-MS). Note: see comment above relating to “MS”.

Page 3 – line 14: . . .., trimethylsilylchloride, ...

Page 3 – line 15: . . .. . using a gas chromatograph . . .. Note: the abbreviation “GC” stands for “gas chromatography” and should not be used to refer to the instrument.

Page 3 – line 16: . . .. and coupled to a mass spectrometer (MSD5975C, Agilent). Note: see comment above relating to “MS”.

Page 3 – lines 17 – 18: . . .. were elucidated with low-resolution GC-MS (MSD5975C, Agilent) as well as with high-resolution GC-Time-of-Flight (TOF)-MS (JMS-T100GCV, JEOL) using electron ionization (EI).

Page 3 – line 35: it would be more correct to write: “The ion at m/z 73, corresponding to [Si(CH3)3+], is characteristic for TMS derivatives containing one or more derivatized OH groups.

Page 4 – lines 3 and 4: delete “=” after “m/z”.

Page 4 – line 16: . . .. or similar sources as those of . . ..

Page 8: legend of Table 2: chemical names should not be capitalized: . . .. n-nonacosan-10-ol . . .., n-nonacosan-5,10-diol .

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