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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Mirror image hydrocarbons from Tropical and Boreal forests" *by* J. Williams et al.

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First of all, the authors should be congratulated on doing this work. It adds an interesting and important dimension to the understanding of atmospheric monoterpenes, and it certainly stirs some discussion. There are a number of publications in the literature the authors have overlooked. Once incorporating the accumulated knowledge on monoterpenes in tree tissues, the authors' results become a bit clearer.

1. Comparing the sample chromatograms in Figure 3 to the literature [1], suggests that the elution order of camphene was mistaken. Further comparison with the work of Persson, Sjödin, and Wibe [2-5] on Scots pine (Pinus sylvestris) strongly suggests that the measured ambient beta-pinene at the Smear II research station in Finland was actually the (-) not the (+) enantiomer, the latter being quite rare in all tree tissue samples.

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Comparing Figure 3 to Figure 5 shows that the authors have corrected that mistake in Figure 5 for the Finnish samples. However, the question remains whether this misinterpretation holds for the tropical samples, and it would be advisable to double-check the elution order and results.

2. Comparisons of the authors' results with the extensive ambient abundance and flux measurement work done on Scots pine [6-8] is partially missing. It shows that the measured relative abundances at Hyytiälä are well in accordance with previous data. Comparing the measured ambient enantiomeric composition to leaf Scots pine tissue data [2-4] also shows an exceptionally good match, assuming the misinterpretations described above were made. This also means that, as generally assumed, leaves are the major monoterpene emitting tree tissues. It should be pointed out here that Scots pine tissues are special in two ways: (i) (+)-alpha-pinene is only dominant in leaf tissue, while (-)-alpha-pinene is dominant in all other tissues, and (ii) compared to other pine species, the enantiomeric monoterpene composition of Scots pine is unique [9].

3. The authors have compared their results for the tropical rainforest measurements only to Kesselmeier et al. (2000) for alpha-pinene. In terms of the monoterpene composition, it is interesting to note that Kuhn et al. [10, 11] found high amounts of sabinene (in flux and ambient air) in the Amazon instead of limonene, which is reported by the authors. As sabinene has a longer atmospheric lifetime than limonene, possibly this species was misidentified as well.

4. Based on the above list of possible errors and realizing that (i) had the authors measured in a boreal location dominated by Norway spruce (Picea abies), which, unlike Scots pine, is completely dominated by (-)-alpha- and beta-pinene [2, 5, 12], and (ii) though variability is high, in general, (-) and (-) and (+) and (+) enantiomers are correlated with each other but rarely (-) and (+) enantiomers [9], one must conclude that the observed "mirror imaging" was likely by chance, driven by the boreal forest data. Unless it can be shown by measurements in other locations that (+)-alpha-pinene dominates ambient monoterpenes in the boreal forest, the present results remain specific

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for scots pine.

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