

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

J. Williams et al.

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We thank Dr. Alex Guenther for his encouraging remarks.

Dr. Guenther raises the point that VOC measurement are difficult to make with high accuracy as has been shown from previous intercomparisons. We agree entirely and have re-iterated this point even adding an additional reference in this regard. We emphasise this point now in the concluding remarks with: “It should be noted, however, that the measurement of enantiomeric monoterpenes represents an increase in analytical difficulty. Since it has already been shown through non-enantiomeric VOC measurement intercomparisons that such determinations can be subject to large errors (Apel et al., 1994, 1999, 2003, Slemr et al., 2002), particular care must be taken with these measurements in the future. Accurate knowledge of monoterpenes will be essential for the accurate modelling of present and future atmospheric hydrocarbon

emissions by forests, and recognise the sophistication of interactions between flora, fauna and the atmospheric environment.”

Dr Guenther questions whether the observed variation in enantiomeric ratio is caused by location or environmental conditions.

Firstly it should be noted that that the flights conducted in Suriname were taken between 8:00 and 17:00 local time and not at the same time of day. Nor were the samples taken at the same location, the overland samples were taken between circa 302 and 308 degrees longitude (i.e. about 660 km). Thus the effect presented in Figure 6 does not occur simply because of a local hotspot or the restriction of samples to a particularly area. This is in contrast to previous measurements made from ground based rainforest sites which have only a very small footprint of influencing biomass. The strategy in this study was to test the ecosystem chemical signature over as wide a range as possible using the jet aircraft.

To clarify this point the following text has been added

“It should be noted that the Tropical forest samples exhibiting the enantiomeric enhancement in (-)- α -pinene were taken at different times of day (7:30-17:30 local time) and over several hundred kilometers. The effect seen in Figure 6 is therefore not the result of a specific distribution of trees at a single location, as is the case in ground based rainforest studies, rather it is consistently observable over the entire Guyana region.”

As suggested by Dr. Guenther to avoid any ambiguity, the number of samples in each experiment has now been given in the text. Boreal forest (150), greenhouse (30) and Tropical forest (152). Changed text includes:

“In total, 152 cartridges were sampled from 0-10 km altitude and between 6-3.5° N and 129-123° W.”

“The same calibration procedure was also adopted in boreal forest, in total 150 on-line

samples were taken.”

“For comparison with the Tropical data a further 30 cartridge samples were taken from the Botanical Garden of the Johannes Gutenberg-University which is part of the Institut für Spezielle Botanik in the Department of Biology.”

Dr Guenther suggests strengthening the point that the dominant monoterpene measured in previous studies was alpha pinene. We therefore included a further independent reference to reinforce this point, namely Rinne et al., 2002.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 9583, 2006.

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