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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Seasonal cycles of isoprene concentrations in the Amazonian rainforest" *by* C. R. Trostdorf et al.

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General comments

The paper by Trostdorf et al. presents interesting observations of the seasonality of atmospheric isoprene concentrations in the Amazon region. One year of observations contribute substantially to our knowledge. However, I have some remarks concerning introduction and background discussion. Some specific suggestions are given below.

Specific comments

1) The abstract starts with too much general discussion and introduction into the research topic. It should concentrate on the real results and interpretations in order to attract the reader.

2) Within the introduction the authors discuss the amount of VOC species released into the atmosphere. An annual number of 1800 Tg of VOC is compared with 510 million Tg of methane (220 from anthropogenic sources), 500 Tg of isoprene and 130 Tg of monoterpenes. Are these numbers correct ? I assume it should read just "Tg methane" instead of "million Tg". Furthermore, I know that the numbers given for isoprene and monoterpenes refer to Tg C. For methane the numbers (without the million) refer to Tg CH4. These two reference bases are different and should be clearly indicated. What is meant with 1800 Tg of VOC, carbon or total molecular weight, carbon as I assume ? I would propose to give the correct basis for each number. Another possibility would be to recalculate all numbers to be cited as Tg C.

3) Within the third paragraph of the introduction the authors write "Emissions of isoprene from plants are known to be both light and temperature dependent, and monoterpene emissions are dependent on temperature. However, it has been shown that some Mediterranean and tropical plants emit monoterpenes in light and temperature dependent fashion directly from recently fixed carbon". I think we learned from numerous studies with European plant species (see BEMA project) as well as from first studies within the Amazonian rainforest, that the release of isoprene and monoterpenes is closely related. The biochemical pathways (see Lichtenthaler Annual Rev. Plant Physiol. Plant Mol. Biol. 1999. 50:47Ű65) are quite well understood. I would therefore like to raise the question whether we should stop writing that isoprene is released under light and temperature control, whereas monoterpenes are emitted under temperature control alone. Even if a following next sentence is adjusting or overriding this old dogma, it is not describing the situation correctly any more. Both groups of isoprenoids are produced within the chloroplasts within the same reaction pathways. The only difference is that monoterpenes, in addition for example to a production as signalling compounds, can be and are stored in special plant tissues such as glands and resin ducts (coniferous plants). The release of these stored compounds are indeed mainly underlying a temperature control. These storage phenomena are special cases, whereas a release of monoterpenes from broad leaved species meanwhile has

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been demonstrated often enough to follow light and temperature control in the same manner as reported for isoprene. Shouldn't we try to avoid misleading formulation in order to avoid any misunderstanding by colleagues not familiar with these details.

4) At the end of chapter 4 the authors write "It is likely that the seasonal variations in isoprene emission rates are driven by changes in the physiological capacity of the ecosystem to emit isoprene and that this is related to water availability. It is also possible that the changes are at least partly due to phenological variations." The authors come back to this point in the conclusions chapter. This interpretation fits perfectly into the actual discussions and I agree that this is a very important aspect for further studies and modelling to include seasonal development. I know (I guess the authors too) that several papers are in press and will contribute to our knowledge. We need more studies about this topic especially for the tropical forests which are affected by wet and dry seasons and by inundation for example. Furthermore, studies should include more VOC species. It would be interesting to know whether the authors also have data for other compounds besides isoprene ?

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 1291, 2004.