

Interactive comment on “Process-based estimates of terrestrial ecosystem isoprene emissions” by A. Arneth et al.

Anonymous Referee #1

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“Process-based estimates of terrestrial ecosystem isoprene emissions”: Arneth et al

The main message of the paper is that elevated atmospheric CO₂ concentrations can inhibit isoprene emissions (results based on lab data) and this effect may offset the increase in isoprene emissions due to CO₂ fertilization of plants. This work has important climate implications and is suitable for publication in ACPD once the following science and typographical comments are addressed.

General comments:

My previous comment related to the length of the paper has been addressed by moving model descriptions to an appendix. However, there are sections of the papers that act effectively as a review of past work which is largely unnecessary.

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The paper title does not reflect the work described. It needs to mention the response of isoprene fluxes to atmospheric concentrations of CO₂.

There are a few instances where grammar/language confuses the sentence meaning.

On the whole this is a well written and interesting paper.

Specific comments

1) The authors have used several models to test their isoprene flux sensitivity to changes in atmospheric CO₂; however the 3-D plots make it difficult to compare the model responses. I suggest in addition to these plots the authors come up with a standard scenario for light and temperature and plot isoprene flux versus CO₂ concentration. This will help with a) assigning a nominal model uncertainty associated with these responses, and b) the justification for choosing one model for more detailed calculations later in the paper.

2) The relative simplicity of the Niinemets et al formulation is not a well justified reason for choosing it for further calculations. It would be more justified, for example, if this formulation was close to the median of all the model responses.

3) Page 8025. The importance of the epsilon parameter has been mentioned on the previous page. Some of this section could be written more succinctly.

4) Section 5. I am concerned that the authors are using daily mean temperatures for their model and comparing results with measurements. Could this perhaps explain the large discrepancy in 2001 at the French site?

5) The authors are correct that the “temperature history” is unlikely to explain a doubling of isoprene fluxes between successive days and I think this statement needs to be made stronger. The response of isoprene fluxes to elevated surface O₃ is very unclear. Are other trace gas measurements available at this site? Could ancillary meteorological data be used as a proxy for elevated O₃, e.g., high surface pressure and temperature?

6) Suggest avoidance of ca. for circa and use approximately.

7) I would like to see some level of uncertainty attached to the model estimates presented in order to quantify the Earth system response to changing levels of atmospheric CO₂.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 8011, 2006.

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