

Interactive comment on “The influence of small-scale variations in isoprene concentrations on atmospheric chemistry over a tropical rainforest” by T. A. M. Pugh et al.

Anonymous Referee #2

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This is a very well written paper addressing an very interesting and relevant topic for the ACP public and AC community. It addresses a topic that has recently gained a lot of interest triggered by the observations of high OH concentrations over the Guyana's during the Gabriel campaign and the OP3 campaign, Borneo. These high OH concentrations have been explained in terms of a OH recycling mechanism involved in isoprene oxidation which then turned out to result in simulated isoprene concentrations much larger than observed in a global chemistry-climate model as discussed by Butler et al. (2008). In that paper the rather controversial topic of a potentially important role of the segregation of isoprene and OH associated with the turbulence regime has been proposed as an explanation for these discrepancies. This paper by Pugh et al

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actually shows, based on the OP3 data set, that the by Butler et al. proposed intensity of segregation of 50% is indeed way too large and that is it likely more on the order to 10%, comparable to numbers already provided by Verver et al. 2000. It suggests that other explanations, e.g., a poor presentation of boundary layer dynamics, simulated emissions, O₃ conc., should be pursued in this explanation of the discrepancies in such global scale model analysis, a conclusion that I strongly support. Thus, I really appreciate the main point made in this paper but unfortunately agree with the other reviewer that the application of a box model, that doesn't include the terms that potentially provide a large contribution to the covariance term, does not seem to be the appropriate methodology to confirm this relative small role of turbulence in the isoprene - OH reaction efficiency. Here it seems that or direct measurements as done by Dlugi et al. for temperate forests or the application of LES models including the chemistry with sufficient degree of detail, or the already conducted research by Verver et al. 2000, including the higher order terms, seem to be the most appropriate research approaches. Actually, recognizing the work by Verver et al. already being done in 2000 one needs to also mention that this implies that the presented work does not appear to be novel.

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