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Atmospheric
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Interactive comment on "Evaluation of the global oceanic isoprene source and its impacts on marine organic carbon aerosol" *by* S. R. Arnold et al.

Anonymous Referee #1

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This study combines laboratory measurements of phytoplankton isoprene production and global phytoplankton distributions from satellite observations to estimate the spatial and temporal distribution of oceanic isoprene fluxes. These are implemented in a global chemistry model, simulated and observed isoprene concentrations are compared, and the contribution of isoprene to the organic content of marine aerosol is calculated and compared with observed aerosol organic concentrations. The authors conclude that isoprene only plays a very minor role in modulating marine aerosol organics. Two estimates of isoprene production are derived, one from first principles, the second one using observed isoprene as constraint. Both estimates are insufficient to yield significant amounts of SOA. The study makes use of several important assump-

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tions, e.g., regarding the lifetime of isoprene in the sea water relative to evaporating to the atmosphere, the characteristics of the mixed layer depth and the SOA yield. Each of these factors influence the eventual result, but the authors provide thorough discussions and compare with many observational studies, and make a convincing case for their final conclusion.

One aspect, however, was not dealt with although it is vital in establishing isoprene abundance over the ocean, i.e., the chemical oxidation rate. This is an important factor: when oxidation of isoprene is more efficient, a larger emission flux is needed to establish a specific concentration. The authors mention that degradation of isoprene may enhance the source of radicals (p 16460, l4-5). This then would speed up the isoprene oxidation by OH, a sort of positive feedback maybe. I missed some information on the reactivity and reaction scheme of isoprene: what reactions are considered in GEOS-Chem? can it be expected that the isoprene chemistry scheme, probably developed for continental conditions (relatively high isoprene and low OH), is also representative for marine conditions? how does isoprene oxidation feed back to oxidant/radical concentrations in the model? However, I do not expect that the main conclusion of the paper, i.e., that isoprene does not contribute significantly to marine OC, will be different because of this.

One small comment: Table 2: the ITOP isoprene concentration is missing (-).

The paper is clearly structured and well written, and suitable for publication with minor changes.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 16445, 2008.

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