

Interactive comment on “The global atmospheric budget of ethanol revisited” by W. V. Kirstine and I. E. Galbally

Anonymous Referee #1

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Summary: The paper describes an analysis of the ethanol cycle based on existing literature. The biogenic source of ethanol is estimated based on the limited number of existing flux measurements from various ecosystems scaled up globally. Other lesser sources are taken from the literature. The chemical sink is estimated independently based on various existing ambient measurements of ethanol mixing ratios, and a consideration of known removal processes. Although the total estimated source and sink disagree by just less than a factor of 2, the range of these estimates, considering the uncertainty, slightly overlap. This study differs from a previous study (Naik et al., 2010) that presented the global budget of ethanol based on fewer emission measurements and an atmospheric chemistry model. In that study, the known sources could not ac-

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count for observed ethanol mixing ratios by about 50%. The major finding of this study is that global biogenic emissions of ethanol are most likely greater than previously reported.

Comments: Considering the limited amount of data available concerning atmospheric ethanol and its sources, this paper describes a reasonable attempt to explain the global atmospheric ethanol budget. In determining whether or not this work is suitable for publication, one must determine if the presented material adds any new insight or improves our knowledge of the atmospheric budget of ethanol beyond what has already been presented in the literature. This work is the first to consider all of the reported flux measurements for biogenic ethanol. On the other hand, the procedure used to scale these measured emissions globally is a bit less sophisticated than what has been published in the past (Naik et al., 2010). It would be interesting to see if the difference between the biogenic emission estimates is mostly due to using different emission factors or the different scaling procedures. The uncertainties for the biogenic source of atmospheric ethanol in this study are given as roughly $\pm 50\%$ and some explanation of how this uncertainty was determined is discussed. Naik et al. gives an uncertainty of a factor of 3 in their biogenic ethanol emission factor, without much discussion, and before scaling the emissions to the global level. So this article seems to take a large step in improving the precision of the global biogenic ethanol emissions, assuming that uncertainties were propagated correctly. It is the opinion of this reviewer that the work should be published, but could be more interesting and useful if the authors could specifically pin down why their estimate of biogenic ethanol emissions is higher than those previously published.

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