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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Global modelling of the total OH reactivity: investigations on the "missing" OH sink and its atmospheric implications" *by* Valerio Ferracci et al.

Anonymous Referee #1

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This paper presents a study of the global impacts of "missing OH reactivity" in models used to determine the atmospheric oxidising capacity, and investigates the extent to which additional sinks are required to reconcile observations of OH reactivity with model simulations. The authors use an interesting approach to determine the emissions field necessary to improve the agreement between observed and modelled OH reactivity. The impacts of the reaction between OH and CH3O2, and its branching ratio, on budgets for OH, CH3O2 and the global methane lifetime are also discussed.

In general, the paper is well written and will be of interest to the atmospheric science community. However, the discussion would benefit from some additional detail regard-

ing the regions and environments affected most by missing reactivity, and how the OH and HO2 concentrations are affected in the model. The results of this work could also be used to provide some recommendations as to where future measurements of OH reactivity are most needed to give better constraint for modelling of global methane lifetimes and ozone budgets. Minor comments are listed below.

Page 2, line 6: O(1D) production is observed at wavelengths below 340 nm.

Page 3, line 5: Please comment on the location for which 80 % of the total kOH is missing.

Page 4, line 23: Please update the reference to http://iupac.pole-ether.fr/

Page 7-8, Table 2: Does the use of the mean kOH measured over the whole duration of each campaign skew the averages in any way? Do all the field campaigns have similar data coverage throughout the day or throughout the campaign?

Page 8, Figure 2: Is there a reference for the 20 % measurement uncertainty in observed kOH? I would expect this to depend on the specific technique used to measure kOH and the particular instrument configuration.

Page 10, line 1: Please quantify, or avoid, the statement 'reasonably good agreement'.

Page 17, Figure 6: How many iterations are typically required to obtain the emissions field? Is the r2 in the lower panel of Figure 6b skewed by the few points with high reactivity?

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