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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A discussion on the determination of atmospheric OH and its trends" *by* P. Jöckel et al.

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Dear Patrick, Carl and Paul:

Thank you for letting me know about your OH paper which I thoroughly enjoyed reading. As you know people have talked about global synthetic OH-tracer ideas for decades but never too seriously. Your paper makes it clear that we can do a lot more homework before actually conducting such an experiment. In this context, there is one aspect of the MCF method that has always bothered me a bit but I am not sure if this has been quantitatively assessed and/or publicly discussed. My guess is that you may already have looked into it. Here is my difficulty and potential suggestions:

Difficulty: MCF+OH rate constant is highly temperature dependent (Exp -1550/T). This leads to a situation where MCF oxidation almost entirely takes place in the troposphere

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below 8 km. The method is thus more or less "blind" to OH in the the upper troposphere (UT). My guess is that if 8-12 km OH field were to double, the MCF method may not detect it. As you all well know, a lot of the ozone is synthesized in the UT where this method would not help much. Such non-linearities may also make trend detection difficult. A serious exploration of this shortcoming of the widely used MCF method may be timely.

Suggestion: While I grant the usefulness of long-lived MCF type molecules in simulating oxidation (largely below 8 km), I think other synthetic/model experiments could also be revealing. Two possibilities come to mind. (1) Also consider molecules that have no or very little temperature dependence in their oxidation rates. There are many molecules with near zero activation energies (aromatics, aldehydes) so conceiving such a possibility is not entirely out of line. Such tracers would see OH without greatly biasing things in favor of the lower troposphere. I don't know what it will show but its comparison with a widely used MCF type molecule (highly T dependent) would be very interesting. (2) Consider chemicals with multiple oxidation rates & lifetimes (few months to several years). Can we get additional OH information (e. g. seasonal behavior) from such an exercise?.

See you in Crete!

Best regards,

Hanwant Singh

Interactive comment on Atmos. Chem. Phys. Discuss., 2, 1261, 2002.