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Interactive comment on "On the wintertime low bias of Northern Hemisphere carbon monoxide in global model studies" *by* O. Stein et al.

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We would like to thank Vaishali Naik for her valuable comment.

Indeed, the exact calculation of our methane lifetime needs to be clarified. We estimated CH4 lifetime due to tropospheric OH loss only, similar to what was done in the multi-model intercomparison studies by Shindell et al. (2006), Naik et al. (2013), and Voulgarakis et al. (2013). In accordance with these studies, the troposphere has been defined as those grid points where monthly mean ozone mixing ratios were less than or equal 150 ppbv. Our results are well in line with all of these model intercomparisons. In contrast, the total CH4 lifetime of 9.1 $\pm$ 0.9 years, as estimated from observations in Prather et al. (2012), included additional CH4 sinks in the stratosphere and on soils.

The values from our paper must be compared to their larger lifetime estimation due to OH loss (11.2 $\pm$ 1.3 years). In this regard, the methane lifetimes from our simulations MI and MI-OPT (9.7 and 9.8 years, respectively)are below their estimated range by 0.2 years and 0.1 years, respectively, indicating a slight overestimation of OH as pointed out by V. Naik.

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