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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The imprint of stratospheric transport on column-averaged methane" *by* A. Ostler et al.

Anonymous Referee #1

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The authors use an estimate for the age of air inferred from SF6 profile observations to correct model values of stratospheric CH4. The magnitude of this correction can be significant leading to large differences in XCH4 and, via an inverse model approach, large biases in global CH4 flux estimates.

The paper in general would benefit greatly from clarifying a few basic issues.

Are the authors suggesting that model transport of the stratosphere (i.e. the meteorological analyses) be improved or that the model chemistry and transport of composition in the stratosphere be improved? As the author will know already the meteorological analyses used by many of the offline CTMs are from major NWP centres so there is little that can be done to improve the underlying meteorology.

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Interactive Discussion

Discussion Paper

The method, which is scantly described in this paper, appears to rely on a small selection of SF6 vertical profiles. I am surprised that the model age of air is biased by up to three years. Is the SF6 method reliable? What are the major uncertainties associated with relating results evaluated at these measurements sites to the rest of the globe? These details should be included in this paper if the results rely heavily upon them.

A great deal of effort has been placed on the influence of an incorrect stratosphere on XCH4 but then the authors make an assumption about ignoring inter-annual variations and using monthly mean distributions as climatological distributions. The authors suggest this error would cancel out but only if it affects the corrected and model age in the same way. The author should consider expanding on this point to make it clearer to the reader.

The authors also appear to ignore trends in stratospheric age because they are “still under debate.” In principle, this approach is fine but would these trends affect the method and the results? If yes, by how much?

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 20395, 2015.