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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Ten years of atmospheric methane from ground-based NDACC FTIR observations" *by* Whitney Bader et al.

Anonymous Referee #2

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This manuscript presents the analysis of atmospheric methane trends derived from FTIR measurements at ten NDACC sites that cover both, Northern and Southern Hemisphere over the period of 2005-2014. Using GEOS-Chem simulations the authors found that - anthropogenic sources of atmospheric CH4 are responsible for the renewed growth of CH4 that has been registered by different observational systems since 2005; - main contributors into the interannual variations of CH4 total columns are the natural sources (wetlands and biomass burning).

General comments:

In Page 5 line 15. The authors noted that CH4 total columns for the Toronto site have a systematic error due to unknown instrument artifact and then made some manipulations with the data which seem to be doubtful. The main issue is how to separate

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(in data) the signals, which come from real atmospheric processes and from the instrument that doesn't work in a proper way. Could authors suggest more reasonable criteria/way for the correction of CH4 time series for Toronto? Or, maybe, it would be better to omit Toronto site's data for the period of 2008-2009 from the analysis?

In Page 9 line 34. The explanation of the the lower value of CH4 trend (∼0.22%/yr for 2005-2012) for the Jungfraujoch site given in the paper is in contradiction to the following: - according to a reference (Collaud Coen,2011), the coming of polluted air to the Jungfraujoch site was usually detected using the monitoring of CO, NOx and SO2 concentrations in the ambient air by local sensors. Authors need to bring compelling arguments proving that portions of polluted air, which can reach high altitude site, will significantly influence not only the concentrations of some gases but also the CH4 total column. - for Zugspitze (also a high altitude site), which is located not so far from Jungfraujoch, CH4 trend has the value of 0.31%/yr (2005-2012). Therefore it is worth to explain such noticeable difference between trends for Jungfraujoch and Zugspitze.

In Page 10 line 13. This is not quite clear why "small annual changes of methane and smaller uncertainty ... complicates the agreement between the FTIR and GEOS-Chem ...".

In Page30 Table 3. Methane trends derived from FTIR measurements over 2005-2012 are higher for the stations that are located in the Northern Hemisphere than for sites in the Southern Hemisphere. In comparison to FTIR trends, GEOS-Chem simulations give us an opposite tendency: CH4 trends have lower values for the Northern Hemisphere. Could authors suggest any reasons of such inconsistency between observational and modeling estimations of CH4 trend?

Technical corrections: Table 3. Column "GEOS-Chem trend [2005-2012]", row "Unit": please, check units.

Taking to account the above described considerations the manuscript can be published in ACP.

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