Atmos. Chem. Phys. Discuss., 11, C13083–C13085, 2011
www.atmos-chem-phys-discuss.net/11/C13083/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric greenhouse gases retrieved from SCIAMACHY: comparison to ground-based FTS measurements and model results" *by* O. Schneising et al.

Anonymous Referee #2

Received and published: 13 December 2011

This paper describes the evaluation of retrieved SWIR column estimates of CO2 and CH4 from the SCIAMACHY satellite using two global 3-D transport model (one for CH4 and one for CO2) and the Total Carbon Column Observing Network (TCCON). It is definitely worthy of publication, subject to the authors addressing the comments below. Reading the manuscript I felt that unless there is a major breakthrough in the analysis of the observed spectra or a new source of evaluation data becomes available for the 2002-2009 timeframe this is probably the last word on the quality of SCIAMACHY CO2 and CH4 data.

page 28715, line 11: I am surprised that the authors do not comment on the ability of

SCIAMACHY to observe year to year variability of CO2 and CH4.

page 28716, line 6: If the retrieved products include a proper error characterisation post-2005 SCIAMACHY data can in principle be used for inverse modelling.

Page 28716, line 25: Explain why reductions of regional-scale flux uncertainties cannot in practice by reduced by thermal IR measurements – there is plenty of evidence from AIRS that CO2 variations can be observed in the free troposphere.

Page 28717, line 9: Revise OCO-2 launch date.

Page 28717, line 13: Suggest adding that it will be launched in 2018 *if selected*.

Page 28717, line 26: Are you sure that this method was via correlation analyses?

Page 28721: I am surprised that the authors did not adopt one model that could provide CO2 and CH4 values using consistent representations of the meteorology – just using the same driving meteorological fields does not guarantee a consistent representation.

Page 28724, paragraph 1: It seems that SCIAMACHY can observe a seasonal cycle where there is a strong local biosphere signal. One could interpret the noise over Darwin and Wollongong as the real estimates of measurement noise. But of course the authors could wriggle out of this comment by telling the reader (and this reviewer) the distance (time and space) criteria they used to match the model, SCIAMACHY, and TCCON data, and/or explaining that Darwin, for example, has a reasonably heteorogenous landscape and that the model is a smooth representation (over some 60,000 km2) of the truth. In any case, more details are required.

Page 28724, line 18 onwards: We would all appreciate a nice uniform global offset that we could subtract but unfortunately, you've shown that your estimates of regional bias are, well, regional and therefore couldn't be applied to the globe. Consequently, I question the value of even presenting global bias statistics.

Page 28725, line 16: Consistent only if one uses the SCIAMACHY error.

Page 28726, line 17: The authors cite clouds but I recommend they consider other effects, too.

Page 28730, line 2: multi-variate regression approaches are all well and good *iff* the regression coefficients have some physical meaning, otherwise this approach is ad hoc and is of limited scientific worth.

Tables: Please include the number of points used the statistics. Worth stating somewhere the period that you are investigating (Table 1).

Tables: Have the authors included somewhere the column fitting uncertainty in their statistics?

Figure: The authors really ought to decrease the y-axes limit. For example, they have used a 60 ppmv range for a 20 ppmv signal for Figure. Tut, tut!

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 28713, 2011.