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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Methane emissions from boreal and tropical forest ecosystems derived from in-situ measurements" *by* V. Sinha et al.

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We thank Dr. Bergamaschi and co authors for their helpful comments and appreciation of the approach outlined in the manuscript for estimating regional scale methane emissions.

1) Based on the boreal forest data shown in his comment (Bergamaschi et al., 2007), which represent the model simulated surface mixing ratios in Hyytiäla for the period of our measurements, we agree that the model surface VMRs compare closely with the in-situ measurements. In the revised version, we shall make a due note of it, where the inter-comparison between the SCIAMACHY /TM5 column averaged methane mixing ratios and our boreal data is discussed (Lines5-10; Page14022).

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2) Regarding the global boreal forest extrapolation, we shall make it clearer in the text that the global estimate is only a potential source estimate and therefore should be interpreted appropriately.

3) We note however that the case of "laminar layers preventing vertical mixing " as postulated by Bergamaschi et al. (2007) is not consistent with the measured vertical profiles of the CO2 mixing ratios during the course of the night. Bergamaschi et al. (2007) note that plotting percentages results in variations of less than 0.5The suggestion of using a logarithmic concentration profile within the NBL is a good one. In the revised version, we shall calculate the flux using a logarithmic concentration profile at 20:00 and 06:00 LT, to derive a more accurate flux. Assuming that methane has a vertical profile similar to the CO2 mixing ratios (see Figure 6 at http://www.atmosphere.mpg.de/enid/figures-sinha), and applying a logarithmic fit to the profiles at 20:00 and 06:00 LT, Equation 1 of the manuscript can be re-written as:

$[\int_0^{180} f_{06:00}(z)\,dz]\,A = [\int_0^{80} f_{06:00}(z)\,dz]\,A + F_{CH4}\,A\,(36000) / C.F. + N_{Residual\,layer}$

where $f_{06:00}(z)$ and $f_{20:00}(z)$are given by the logarithmic fits in Figure 6 at http://www.atmosphere.mpg.de/enid/figures-sinha and $N_{Residual\,layer}$ = CH4 [avg. between 16:00 LT and 19:00 LT] x A x 100; C.F. is the factor used for converting nmol mol^{-1} m to molecules cm^{-2} = 2.69 x 10^{12}

Calculating the flux in this manner we get a value of 3.22 x 10^{11} molecules cm^{-2} s^{-1}. Using 3.22 x 10^{11} molecules cm^{-2} s^{-1} in Equation 2 of the manuscript in stead of the 3.62 x 10^{11} molecules cm^{-2} s^{-1} used earlier, yields a very small boreal vegetation flux of 1.32 x 10^{11} molecules cm^{-2} s^{-1}. In the revised version, Figure 6 mentioned here, will replace Figure 6 of the manuscript and the flux calculation method employing logarithmic profiles will be used.

Reference

Bergamaschi et al.: Interactive Comment, Atmos. Chem. Phys. Discuss., 7,

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 14011, 2007.

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