Atmos. Chem. Phys. Discuss., 6, S1289–S1291, 2006
www.atmos-chem-phys-discuss.net/6/S1289/2006/

Atmospheric Chemistry and Physics Discussions

ACPD

6, S1289–S1291, 2006

Interactive Comment

Interactive comment on "Methane production from mixed tropical savanna and forest vegetation in Venezuela" *by* P. J. Crutzen et al.

P. J. Crutzen et al.

Received and published: 22 June 2006

Review, referee #1

This is an important issue, yet we not agree with the referee's argument in our case for the following reason. Nighttime ozone profiles made during the Guri 1988 campaign clearly indicate a nocturnal mixing layer (NML) of ˜100 m (Figure 8; Sanhueza et al. J. Atmos. Chem. 35, 249-272, 2000); the new reference and the main points given below are included in the revised version.

The nighttime vertical profiles of O3 within the (NML), shown in the Sanhueza et al. (2000) paper, indicate that gases (including methane) are not uniformly mixed in the 100 m layer. However, the fact that ozone concentrations at the surface decrease relatively slowly during the night (Figure 5 in Sanhueza et al., 2000) suggest that there is a significant mixing in the NML; a very shallow isolated layer would produce a rapid complete depletion of ozone at a height of 3-4 meters, were O3 measurements were made. Furthermore, that ozone concentrations reach a rather constant value near midnight, indicates that equilibrium between dry deposition and mixing from the remnant boundary layer (over ˜100 m) is reached. Therefore, in addition to a mixing (likely restricted) within the NML, most likely there is an entrance of “fresh” boundary layer air to the NML, which would dilute trace gases (including methane) that are emitted in the NML.

Whether there is a vertical gradient in CH4 can not be derived from available information. Note that the region is hilly, contributing to turbulence, and that CH4 emissions from forests mainly occur at canopy height, which means that the ground based measurements may actually underestimate CH4 concentrations in the NML. Considering also that there is mixing from remnant boundary layer air, the emission that are derived could be underestimated and should be considered as a lower limit. These comments also address the point raised by J. Kesselmeijer.

Referee # 2

Specific comments:

1. See referee #1. Uncertainties are now discussed in more detail.

2. In the revised version we refer to the Carmo paper, however, they do not state that the CH4 emissions are due to vegetation. 3. Considering that global CH4 emission from termites is ˜ 20 Tg yr-1 (IPCC, 2001: Frankenberg et al. 2005) and assuming it is well distributed, this source would contribute ˜10 Tg yr-1 to our annual estimate. The possible contribution of termites was included/mentioned in the revised version. On the other hand, it is very difficult to estimate the contribution of “small wetland pockets”, however, since the study region is quite hilly, their presence is restricted to small areas; therefore, emission of methane from this source should be small.

ACPD
6, S1289–S1291, 2006

Interactive Comment

EGU

4. The pertinent sentence was deleted.

We do not comment on further valuable contributions by J. Kesselmeijer, T. Karl, and F. Keppler, as their comments do not specifically address our paper.

Conclusion. Our estimate of annual emissions of CH_4 of over 30 Tg yr^{-1} likely shows that tropical vegetation emits methane.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 3093, 2006.