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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Formaldehyde over the eastern Mediterranean during MINOS: Comparison of airborne in-situ measurements with 3D-model results" *by* R. Kormann et al.

R. Kormann et al.

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Reply to referee # 1:

We would like to thank the referee for his/her thorough review of our manuscript. We carefully checked his/her comments and made the following changes:

Page 1304, Abstract: The detection limit is indeed given at the 1-sigma level. This is now stated in the abstract.

Page 1305, lines 11 and 12: We changed the text following the suggestions of the referee.

Page 1306, line 8: We changed the text by adding, that more recent studies in the MBL by Wagner et al., 2002 and in the free troposphere by Fried et al., 2003 achieved very

good measurement-model agreement.

Page 1307, liquid water: Due to the forward facing inlet the instrument effectively measures total HCHO both in the gas and liquid phase. But the measurements during MINOS were performed under cloud-free conditions so that memory effects due to cloud water sampling can be excluded.

Page 1308, calibration: We agree with the referee that calibration of the instrument should have been done with a gaseous standard added close to the inlet and that zero gas measurements should have been performed with scrubbed ambient air re-introduced into the inlet close to the tip. Unfortunately space limitations on the aircraft forced us to follow a simplified approach. The operation of a permeation device on board of the plane was not possible, so that in-field gas-phase calibrations could not be made. Laboratory tests after the campaign of the whole system including the constant pressure inlet showed good agreement between liquid and gaseous calibrations, indicating nearly 100% transmission and no measurable memory effects within the precision and detection limits of the instrument. During the field deployment the liquid standard was introduced directly into the analyser. In a similar way the zero gas measurements were performed by scrubbing ambient air with a Hopcalit scrubber ahead of the HCHO analyser downstream of the constant pressure inlet. Since a background measurement takes approx. 15 min, only one in-flight BG measurements was made per flight. Although, the BG measurement was not made by re-introduction of the scrubbed air into the inlet, laboratory studies did not indicate significant memory effects of the constant pressure inlet.

Page 1309, O3 effect: We followed the suggestions of the referee and changed the text according to his/her recommendations.

Page 1311: We changed that.

Table 2: We changed the altitude bin to 8-9 km.

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Figure 3: We will revise figure 3.

Page 1313, box model: The box model was initialised with average mixing ratios for NOx (200 pptv), PAN (100 pptv), CO (85 ppbv), O3 (100 ppbv), and NMHC as observed in the 10-12 km altitude range during the MINOS campaign (see Fig. 4). Integrations were made for a period of 20 days. The NO2/NO ratio exhibits a strong diurnal variation. Thus, the simulated enhancement in HCHO is not only an effect of higher acetone and CH3OH mixing ratios, but also a consequence of enhanced photochemical production of HCHO from CH3O2 + NO. We added a short paragraph describing the effect of NO enhancements on HCHO formation.

Discussion, 1st sentence: We followed the suggestion of the referee and revised the sentence.

Table 3: The fact that acetone was increased is now mentioned in the caption.

Page 1314: We revised the text following the suggestions of the referee.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 1303, 2003.