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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Intercomparison of aircraft instruments on board the C-130 and Falcon 20 over southern Germany during EXPORT 2000" *by* N. Brough et al.

Anonymous Referee #1

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General Comments:

The paper describes an airborne intercomparison of in-situ instrumentation for NO, NOy, O3 and CO. For the individual species similar instruments, based on identical physical/chemical detection schemes, are deployed on two different aircraft that have been flown wing-by-wing. The paper provides new insight into the quality of state-of-the-art atmospheric trace gas measurements. In particular, in-flight intercomparison for NOy measurements are of great value, since the reliability of the Au-converter to quantitatively measure NOy in particular in the troposphere has been questioned recently (see e.g. Crosley, JGR-D, 101, 2049, 1996). The data presented is of high quality, and the paper itself is well written and thus deserves publication in ACP after some minor

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revisions.

Specific Comments:

Largest differences are observed for the NO and NOy measurements. In order to judge, whether these differences are significant, a careful evaluation of the precision and accuracy of the used instruments is mandatory. Here the paper could be improved: Although in-flight calibrations, zero and artifact measurements are described in great detail, and at least for the UEA instruments quantified by citing mean values and standard deviations, the calculation of the overall accuracy in Tables 1 and 2 is not reproduceable. For the DLR instruments precision, zero gas measurement and artifact measurement reproduceability are not quantified at all. In particular, a detailed discussion of the rather poor accuracy of the UEA NO/NOy measurements is important to explain the systematic differences found during the comparison.

In addition, although the conversion efficiency of the Au-converters for NO2 is specified, similar information for HNO3 and interfering species like HCN, NH3 and N2O are missing. Quantitative conversion of those interfering, non-NOy species in one of the converters could add to the observed discrepancies.

Finally I would like to add a cautionary remark: Although this intercomparion demonstrated good agreement between individual instruments, one should keep in mind that similar instruments relying on identical physical detection processes have been used, so that in particular interferences cannot be excluded. More information on the reliability of atmospheric measurements for these species can only be gained by intercomparing instruments with different detection schemes, e.g. VUV versus TDLAS in the case of CO, UV-Absorption vs. CLD in the case of O3, and CLD vs. LIF in the case of NO.

Technical Corrections:

Page 3598, line 22: Hohenpeißenberg Page 3603, line 22: a VUV instrument and a

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TDLAS were simultaneously operated and intercompared for CO on the NOAA WP-3
Page 3610, line 18: Hübler

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 3589, 2003.

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Interactive Comment