Comparison between Measurements Performed by different MAX-DOAS Instruments During the FORMAT Campaign 2002

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Introduction

In a period when populations in urban areas are expected to increase (more than 4% between 1995 and 2010), air pollution remains a significant issue in both health and environmental problems, leading to a higher incidence of diseases and damage to vegetation and materials.

Photochemical smog from incomplete combustion processes and burning of fossil fuel / biomass constitutes one main source of air pollution in urban highly populated regions.

Since reducing air pollution in urban areas constitutes a major challenge in the next years, research programmes over the last decade strengthened the European research in atmospheric chemistry.

In order to improve the understanding on the impact of anthropogenic emissions, global measurements of key atmospheric constituents as for off-axis measurements provide valuable information.

Measuring devices and techniques have undergone substantial improvements during the last years, the MAX-DOAS technique being one of them.

MAX-DOAS provides off-axis measurements in addition to the zenith scattered light. Although a new method and yet to be proven for Formaldehyde determinations, its estimated detection limit is about 1 pptv for the troposphere.

In contrast to satellite sensors, which may observe the free troposphere and the upper part of the boundary layer, ground based remote sensing instruments like MAX-DOAS observe the whole boundary layer where the higher mixing ratios are expected. In addition they are also sensitive to the free troposphere and stratosphere.

The comparison of results from MAX-DOAS measurements in urban highly polluted and densely populated region.

Comparison of Results

Ground based measurements were taken simultaneously by several groups employing zenith and off-axis viewing directions.

The results prove that significant levels of HCHO and the other compounds were present during the campaign despite reduced emissions (holiday time) and unusual weather conditions.

Conclusions

An intercomparison study has been performed on data acquired during the last 10 days of July, when all three MAX-DOAS instruments involved in the 2002 FORMAT campaign acquired measurement data at the same site.

This study suggests the importance of obtaining a better understanding of the differences between the various devices that occur in reporting results.

See also: www.doas-bremen.de