Megacity influenced ground level distribution of VOC – first results

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Introduction

Within the MCMA-2006 Campaign (Mexico City Metropolitan Area - 2006) the influence of the emission of the city on the surrounding area and region should be studied. The aim was to get information whether and in what extent the city of Mexico influences the Mexico City basin. The exported primary pollutants like VOC have the potential to affect human health. To plan preventive strategies the knowledge of the personal exposure close to humans is of high importance.

Method

The personal exposure to VOCs of children and their parents at three different sites (T0, T1, T2) was measured using passive sampling method (3M passive sampler): T0 - within MCMA located at the Instituto Mexicano del Petróleo, T1 - at the Universidad Tecnológica de Tecámac in the State of Mexico, T2 in Rancho La Bisnaga, north of Tizayuca in the State of Hidalgo. The designations refer to transport of the urban plume to different points in space and time. 21 VOC were selected representative for alkanes, cycloalkanes and aromatics, chloroaromatics, terpenes.

121 children (age: 9-12 years) and 67 parents were recruited for this study. Additional the indoor and outdoor exposure was studied in schools and apartments/homes at every site. The VOC was determined after extraction with GC-MS.

Results

As a rule the exposure (characterised by the sum of the 21 VOCs) decreases with the distance from the city. At the same measurement point the exposure ranking is as followed: adults > children > apartments > schools. The indoor exposure is higher than the outdoor exposure. The outdoor VOC-patterns at the different measurement sites are similar. The main components are toluene, limonene and xylene. In the most of the cases the highest exposed site for every component is T0 following by T1 and T2; exception limonene, which is highest at T1 (maybe influenced by local flora (plants etc.)).

Interestingly the indoor exposure pattern recorded at all sites (especially at T1 and T2) in Mexico is very similar to those pattern registered in Germany within the frame of epidemiological studies ($r = 0.83 \ldots 0.95$; $p<0.001$).

Conclusions

Regarding the outdoor exposure against VOC the capital influences the exposure in the surrounding areas. However the total personal load is determined by the indoor exposure though the high exposure in Mexico city obviously depending on the indoor activities.