Differential Column Sensor Network in Munich and Low-Cost NOx Sensor Development

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The majority of anthropogenic greenhouse gas (GHG) emissions originate from cities, therefore monitoring emissions in cities is essential to fight climate change. In addition to GHG, nitrogen oxides (NOx) also play an important role in the urban climate. Our current research in the Professorship of Environmental Sensing and Modeling focuses on quantifying greenhouse gas emissions and understanding the metabolism of pollutants in urban environments.

We have established an autonomous urban sensor network based on the method of differential column measurements to quantify emissions of CO2, CH4, and CO [1]–[3]. There we deploy multiple solar-tracking spectrometers (EM27/SUN) measuring column-averaged concentrations upwind and downwind of an emission source or a city (Figure 1). Using these measurements combined with models of atmospheric transport [4], we have demonstrated a new experimental strategy to determine greenhouse gas and pollutant emissions in both local and urban scales.

In addition, we are currently developing low-cost and small-sized NOx sensor based on Cavity Attenuated Phase Shift Spectroscopy and electrochemical cells. These sensors have great potential to further study the emission and distribution of NO2 in the urban areas.

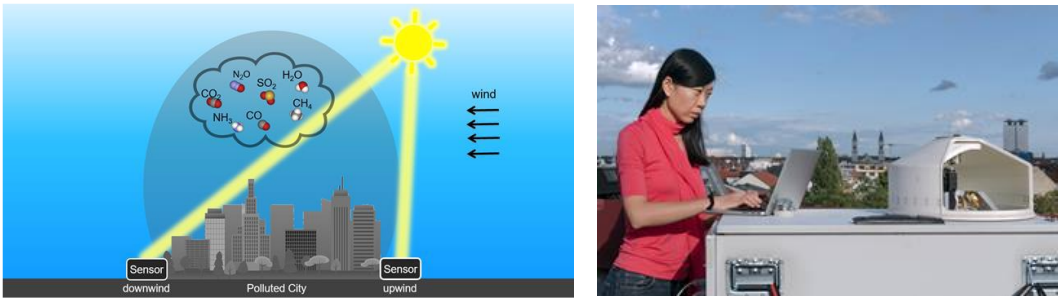

Fig. 1: (left) measurement principle of differential column measurement, (right) automated sensor system performing solar measurements to obtain the column-averaged concentrations of CO2, CH4 and, CO (Photo CC-BY-SA by Andreas Heddergott).

References

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