Bachelor/Master Thesis

Urban Emission Estimates Using Atmospheric Observations

“Bottom up”: \( E = \text{individual emission} \times \text{economic activity} \)

“Top down”: \( C = C_0 + H(E) \)

\( E \): Emission flux [\( \mu \text{mole m}^2 \text{s}^{-1} \)]

\( C \): Concentration [ppm]

\( H \): Atmospheric “transfer function”

More than 50% of the world population lives in cities, where 70% of fossil fuel carbon dioxide comes from. Very recently European Commission set up a carbon emission reduction target of 80%-95% below 1990 levels by 2050. Therefore monitoring and control of urban emissions is extremely important to achieve that goal. The “Top-down” method assesses emissions of greenhouse gases and pollutants by using atmospheric observations and atmospheric transport models.

The tasks of this thesis are:

1) Literature study of the methodologies that are used to determine the urban emission flux (\( E \), unit: \( \mu \text{mol/m}^2\text{s} \)) using atmospheric observations (\( C \), unit: ppm).
2) Analyze recent atmospheric measurements from Berlin and/or Boston with standard statistical methods.
3) Combine the measurements with an existing atmospheric transport model to assess the emission flux.

Contact: Prof. Jia Chen (Room: N1512), jiachen@tum.de