ESR24-021 - Constraining Vienna's carbon footprint

Zusammenfassung

Cities are hot spots of anthropogenic greenhouse gas (GHG) emissions. Recognizing this, cities across the world, including Vienna, have announced ambitious net zero targets. However, the efficacy of mitigation may be compromised by uncertainties in municipal GHG inventories. Observations and atmospheric modeling can provide powerful solutions to independently monitor progress of urban climate mitigation policy and enhance transparency.

Constraining Vienna's Carbon Footprint (CVCF) will build upon the infrastructure, partnership and findings of the Vienna Urban Carbon Laboratory (VUCL), which established a tall-tower research station measuring CO2 and CH4 fluxes, concentrations and stable isotopes in Vienna's city center. In addition to continuing these measurements, CVCF will establish a peri-urban observation station in the Vienna Woods and develop a new clumped-isotope method to better distinguish traffic emissions from biogenic sources of CO2.

To unlock the full potential of these measurements for quantifying Vienna's CO2 and CH4 emissions, CVCF will use atmospheric transport modelling. The project will develop a completely novel isotope-enabled inverse modelling framework that will combine the information contained in the various measurements. The foreseen system will take advantage of both the highly resolved but spatially limited information contained in the flux footprints as well as the less resolved yet spatially more extensive concentration footprints. This approach will set new standards for urban-scale inverse modelling, to make best use of tall-tower observations of both GHG fluxes and concentrations. The resulting multi-scale inversion system will also be able to constrain urban GHG emissions simultaneously and fully consistently with the GHG emissions on larger scales (e.g., national or European).

Wissenschaftliche Disziplinen:
Atmospheric chemistry (40%) | Environmental physics (40%) | Sustainable urban development (20%)

Keywords:
greenhouse gasesflux measurementsisotopic measurementstransport modellinginverse modelling

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Weiterführende Links zu den beteiligten Personen und zum Projekt finden Sie unter
https://wwtf.at/funding/programmes/esr/ESR24-021/