Mexico City – Mexico

MERCI-CO_2 an example of atmospheric accounting of emissions in Mexico City

The last time Mexico City published an inventory of GHG emissions was in 2016, with data relating to 2014. At the time, emissions amounted to 56.2 $MtCO_2$ in Mexico City metropolitan Area (MCMA), with 78% originating from transport and industries. According to its latest reporting to CDP in 2020, Mexico City's emissions amounted to nearly 47 $MtCO_2$ in 2018, up from 24 $MtCO_2$ in 2012. Yet, the magnitude of this increase is largely explained by changes in accounting methodologies and improved data accuracy. Indeed, Mexico is driving cutting-edge research to enhance its carbon accounting methodologies, testing new approaches, like atmospheric emissions measurement.

Mexico City Regional Carbon Impacts (MERCI-CO_2) is a French-Mexican research project led by the Laboratoire des Sciences du Climat et de l'Environnement (LSCE) and the Institut Pierre Simon Laplace (IPSL) on the French side, and the Grupo de Espectroscopía y Percepción Remota (EPR), the Centro de Ciencias de la Atmósfera (CCA) of the Universidad Nacional Autónoma de México (UNAM) on the Mexican side. Financed through a call for tenders launched by French National Research Agency (ANR), the project is supported by the Secretaria del Medio Ambiente (SEDEMA) of Mexico City. It started in early 2017 and now due to finish by the end of 2021.

The project aims at the deployment of a dense network of CO_2 sensors at ground-level and altitude within the Mexico City Metropolitan Area to measure CO_2 concentration gradients and their change in time. Modelling is then run with computers to compare results from the censors and the atmospheric model implied by the city's statistical inventory. Through atmospheric inversion, this comparison allows to precisely spot the locations and activities where statistical inventory have failed to match the atmospheric model, and then help to find ways to improve the statistical method. In the end, atmospheric measurement could even help verifying the effectiveness of CO_2 emission reductions taken by the city authorities. It also allows faster update of the information, whereas statistical inventory always need a few years perspective to collect data. In the case of Mexico, the city supports the project by allowing installing sensors on the local city air quality stations. Sensors were due to be set up in Spring 2020, but the pandemic delayed the deployment.

Atmospheric measurement has the advantage to provide high-precision pictures of the GHG concentrations over a territory, identify nearly real-time evolutions and spot the sources of variations. Yet, it is limited when it comes to distinguish the territorial origins of emissions in dense urban area, since gases circulate with winds. From this point of view, Mexico City geography – located in high-altitude basin at 2,000m and surrounded by mountains up to 5,000m – prevents emitted pollutants to be dispersed by winds. This is a plus to get more atmospheric signals, but in the other hand makes it harder to precisely differentiated the sources of emissions. Which is why remote sensing is not meant to replace statistical inventories, but to provide additional information to complete them. Atmospheric systems are also limited to territorial emissions, and other approaches like consumption-based accounting can bring useful perspectives to understand one city's footprint.

The atmospheric approach applied to urban CO_2 emissions is relatively recent and still in the evaluation stage and focused on big cities. Indeed, the most precise analyser stations are costly (up to €100,000), but low-cost censors are more affordable (up to €5,000). Such a project also requires high-skilled expert to run modelling software, as well as political support from the local government to be sustainable. Therefore, Mexico City is one of the only few cities testing this system in the world. Paris city council also voted the *Météo Carbone®* project in July 2020 to provide monthly measures of GHG emissions in the city, in partnership with Origin.earth, a subsidiary start-up of Suez.[2]

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