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Impacts of COVID-19 lockdown strategies on NO_x , CO and CO_2 surface observations on two megacities: focus on the traffic sector in Mexico City (Mexico) and Paris (France)

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In 2020, the COVID-19 pandemic imposed countries to apply stringent policies to slow down the spread of the SARS-CoV-2 virus. During the Spring time, most countries had announced a national lockdown that had important consequences on many capital cities such as Mexico City and Paris. The shutdown of many of these economic activities had a direct impact on the traffic sector. Travel restrictions led to a drastic decrease of major air pollutants in those two cities. From each local air quality monitoring network, we discriminated background, urban and traffic sites. By looking at the differences between urban sites versus background sites, we observed in Mexico City a decrease of 51%, 58 % and 44 % for ΔNO_x , ΔCO_2 and ΔCO concentrations, respectively, during the lockdown. Markedly, their concentrations remained below typical levels after the end of the lockdown until September. Then, from September to the end of the year, the pollutants concentrations increased back to the same level as before the lockdown. The same behavior was seen at Paris. During the spring lockdown period, we observed a decrease of 72 %, 70 % and 88 % for ΔNO_x , ΔCO_2 and ΔCO concentrations, respectively. Until the end of the summer, the concentrations of those pollutants remained at the same level as during the lockdown. From September, we observed an increase of pollutants concentrations to the levels of previous years.

Despite road traffic increases by the end of the lockdown in both megacities, the remainly low concentrations seen for those pollutants until September might be an effect of the atmospheric dispersion combined with a slow reactivation of anthropogenic activities. Nevertheless, a second lockdown period imposed in France (from Oct. 30 to Dec. 15) have clearly not shown the same impact on pollutant concentrations as the first one exhibited. On the contrary, no significant changes in pollutant concentrations were observed during the second lockdown, and moreover, peaks of ΔNO_x , ΔCO_2 and ΔCO concentrations were seen during the last weekends of the lockdown of up to 32 % of increase, compared to the weekday-level during the 2nd lockdown. This can be explained by less stringent travel restrictions combined with pre-Christmas preparations in Paris.