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# Advances on urban air quality modeling: bias correction approach for estimated annual NO2 levels and macroscopic traffic simulators for scenario planning

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Awareness of air pollution impacts on public health is quickly increasing, especially in urban areas where legal air quality (AQ) limits are often exceeded. This awareness has driven policymakers to minimize citizens' exposure not only by direct legislative control in emissions (i.e., the application of a Low Emission Zone), but also by applying mobility restrictions to modify traffic patterns, and by the use of forecasted warnings to alert citizens of air pollution episodes. The European AQ directives encourage the use of numerical models to support the design and evaluation of such strategies.

In this framework, we present a versatile AQ model, CALIOPE-Urban (Benavides et al., 2019), able to address the threefold objectives to (i) compute urban air quality forecast at the street-scale resolution; (ii) to perform reanalysis studies of historical periods using a bias correction methodology that preserves the model spatial variability; and (iii) to simulate the traffic flow response to the application of different traffic restrictions and their effect on urban AQ.

In this contribution, we discuss two specific applications. On the one hand, CALIOPE-Urban is used to estimate the NO2 levels in the city of Barcelona (Spain) during the entire year of 2019. To do so, we report accurate maps of NO2 levels during the whole year by consistently integrating the AQ model data with publicly available observations from the official monitoring network in Catalonia (XVPCA) available in Barcelona by means of a bias correction method. On the other hand, the macroscopic traffic simulator BCN-VML (Rodriguez-Rey et al. 2021) coupled with CALIOPE-Urban is used to assess the AQ impact of the traffic flow-induced changes after the application of a traffic restriction policy.

## References

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