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## A socio-spatial analysis of air pollution exposure in the Greater Paris

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According to the WHO, in 2019, 23% of global mortality was attributable to environmental risk factors with significant gradients related to social factors, at the origin of significant health inequalities in the cities. Air pollution is one main environmental risk in urban spaces, and must therefore also be understood by taking into account the issue of socio-spatial inequalities.

Realistic modelling of population exposure to air pollution in large cities requires taking into account air quality at the level of the individual, as well as individual spatial dynamics (mobility and realization of daily activities) that shape each person's risk of exposure. These requirements call for the development of interdisciplinary tools combining the representation of urban space, traffic simulation, emission calculation, advanced air quality models, and the consideration of behavioral and socio-economic dimensions in the modeling process.

We present here a socially and spatially differentiated modeling study of the factors and behaviors that build the exposure of individuals to air pollution in the Greater Paris. This study was carried out using an integrated urban modeling platform including the OLYMPUS emissions model and the CHIMERE chemistry-transport model. The OLYMPUS tool, developed at LISA, is an innovative emission model based on the activity of individuals, making it possible to simulate the socio-differentiated mobility of individuals, for the construction of a pollutant emission inventory adapted to a given urban area. The use of CHIMERE then makes it possible to cross air quality, individuals and mobility, and address the issue of individual exposure to air pollution in a dynamic and integrated manner.

We simulated the year 2009 in the Greater Paris region, and calculated the exposure of individuals taking into account their mobility and their social characteristics, activity and place of residence. Our results are interpreted with regard to the main scientific and societal questions that arise on the subject: Are some individuals more exposed than others? Are these inequalities in exposure linked to the places where people live? To mobility practices? Can they be dependent on socio-professional categories? Do they affect socially vulnerable populations in the same way?

Beyond access to an assessment of exposure inequalities in the current situation, this work makes it possible to support the reflection on the impact of public action on the reduction of environmental inequalities.

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## **Références**

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