Megacities concentrate nowadays the major part of local air quality problems in Europe and in the world. They also represent a significant contribution to the continental and global pollutant atmospheric background. The problem is not their individual existence but mostly their multiplicity and their proximity over all the continents. Besides, their size (primary plumes are visible by satellite), their extremely dense structure and their tendency to attract the surrounding populations constitute an obstacle to the sustainable development of urban zones.

Within the framework of the FP7 MEGAPOLI project, we studied the influence of European megacity structure on their capacity to alter the lower continental atmosphere. We used the CHIMERE eulerian model to characterize the sensitivity of primary and secondary pollution steaming from megacities to different forcing parameters (landuse, emission intensity, urban spreading…). At first, by aggregating / disaggregating anthropogenic emissions, we showed that the geographical arrangement of high emitting zones in Europe (BeNeLux in particular) could prevail over the existence of big cities, and impose pollution gradients in Europe. We also showed that the intensification of the urban built (by opposition to city spreading) could aggravate local secondary pollution (ozone production) but doesn’t affect a lot the total quantity of oxidants produced over Europe. However, thanks to simulations with inert emission tracers, we showed that city spreading over new territories could modify the geographical ways of export of pollutants from cities towards the rest of the continent.

Finally, we have observed the simulated chemical plumes exported by the largest megacities of Europe. We will present their chemical time evolution, depending on emission spreading around the city.