# Assessing the ammonium nitrate formation regime in the Paris megacity and its representation in the CHIMERE model

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Ammonium nitrates significantly contribute to the fine particulate matter load, in particular in the Paris agglomeration where two measurement campaigns, PARTICULES and FRANCIPOL, have recently made available a large database on this compound and its gaseous precursors, nitric acid and ammonia. These new observations give the opportunity (for the first time in France) to assess the ammonium nitrate formation regime (in terms of limited species) as well as the ability of the CHIMERE chemistry-transport model to simulate each species and to reproduce in fine the observed regime. Quite satisfactory results are obtained on nitrates, mainly due to a significant contribution of imports from outside the agglomeration. However, significant biases affect both gaseous precursors. Various uncertainty sources are discussed, including those relative to ammonia trafic and agricultural emissions, thermodynamic equilibria or oxidative capacity of the atmosphere. Despite these errors, CHIMERE manages to simulate a $HNO_3$-limited regime, in agreement with observations, at least at the daily scale. This study especially confirms that further work on the OH radical characterization in the CHIMERE model and agricultural ammonia emissions are required to improve the simulation of the ammonium nitrate formation regime.