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Radiative impacts of aerosols on dynamics: Application to the CAPITOUL field experiment

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Nowaday, aerosol modelling is an absolute interest for the understanding of the complex atmospheric system.
The role of aerosol particles is considered crucial for air quality, meteorological and climatical purpose.
Several studies show that the aerosol physical and chemical behaviours affect the atmospheric radiative budget by scaterring and aborbing the radiative fluxes.
Moreover, it has also been shown that the physical and chemical description of the aerosol is necessary to give shape to water droplets.
Finally, several reports from the World Health Organisation show that the fine aerosol particles can cause major diseases as cancer or pulmonary diseases, and should be now considered as a public health matter.\\
This study takes place in this context, and aims at estimating the radiative feedbacks of urban aerosol on the boundary layer.
The CAPITOUL field experiment, which took place in the city of Toulouse during one year from march 2004 to february 2005, is the framework of a modelling study during a 2-day IOP.
First, an emission inventory has been set up to reproduce the gaz and particles emissions.
Then, a simulation exercise aims at reproduce the aerosol evolution at the fine scale of 500 m, and the very specific spatial distribution at different resolutions.
In order to estimate the impact of aerosol particles on radiation, a radiative module has been developped to compute online the aerosol optical properties depending on the complex aerosol physical and chemical parameters.
The radiative fluxes are then impacted by the aerosol scaterring and aborbing behaviour, leading to change in the urban dynamics.
Those feedbacks on radiative fluxes lead to a change of the boundary layer's temperature.
The impacts are also compared to the urban surface impacts.