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Modelling the impact of global changes on summer european surface ozone levels at the 2050 horizon

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As pointed by the IPCC, climate change and evolution of green house gases emissions in the coming decades are likely to affect regional pollution levels as well as the background ozone levels (Jacob et al., 1999): first, the evolution of climate due to the increase of green house gas emissions is liable to induce modifications of the meteorological parameters of crucial interest for air quality. Secondly, the emissions of air pollutants will be affected by changes in population and energy demands as well as policy aiming to reduce global warming or pollution impacts.

In order to assess the relative impact of climate change and change in green house gas emissions, a set of regional simulations is conducted using CHIMERE model (Bessagnet et al., 2009). These simulations account for change in anthropogenic emissions of precursors from future scenarii, global background pollutant levels through appropriate boundary conditions from LMDz-INCA model, and future meteorological conditions reflecting AR5 scenario. For consistency, all these forcings are built on the same scenario: the RCP 8.5 (Representative Concentration Pathways, Riahi et al., 2007) developed in IPCC-AR5 framework for climate projections. The RCP85 scenario used in this study is defined by a rising radiative forcing pathway leading to 8.5 W.m-2 in 2100. In the framework of AR5, this scenario refers to the most pessimistic case.

Two long term simulations with CHIMERE model are conducted, reproducing present (1995-2005), future (2045-2055) conditions in emissions, climate, and boundary conditions. The simulated periods correspond to summer, running from July 1st to August 31st each year. A third set of simulations involves present climate and boundary conditions with future emissions.