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Modelling the impact of global changes on European summer 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 RCP8.5 scenario used in this study is defined by a rising radiative forcing pathway leading to 8.5 W.m-2 in 2100.
Long term simulations of summer periods (July 1st to August 31st) with CHIMERE model are conducted, reproducing present (1995-2005), future (2045-2055) conditions in emissions, climate, and boundary conditions. Mean summer surface ozone levels from each simulated case are compared in order to discriminate the impact of climate and the impact of RCP8.5 scenario emission progression alone on surface ozone levels.