EMS Annual Meeting Abstracts
Vol. 14, EMS2017-712, 2017

Regional climate change scenarios over Europe using an on-line coupled regional atmosphere-chemistry model.

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The objective of REPAIR lies on studying the impact of the air quality climate interactions (AQCI) and potential future emission reductions due to the increased use of renewable energies (including wind and solar) on climate change in Europe through its mitigating role in radiative forcing and air quality. For that aim, a series of climate experiments (coupling and uncoupling atmospheric chemistry) are conducted, covering the present (1981-2010) and future (2031-2050) climatologies.

In this work, we present the results of comparing regional climate change scenarios using coupled and uncoupled experiments over Europe. The model used is WRF-CHEM. The spatial configuration consists of two one-way nested domains. The inner domain is a compliant Euro-Cordex domain with spatial resolution 0.44º, while the mother domain is much larger, covering most of North-Africa deserts in order to adequately simulate natural aerosols. The experiments were driven by a run of the ECHAM6 model under the RCP 8.5 scenario.

Results indicate that although the use of the full coupled model (much more computationally expensive) does not simulate significant changes in climatology, it has some significant impacts on extreme events, such as heat waves and convective precipitation.