



Detailed climate-change projections for urban land-use change and green-house gas increases for Belgium with COSMO-CLM coupled to TERRA_URB

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Recent research clearly show that climate modelling at high resolution - which resolve the deep convection, the detailed orography and land-use including urbanization - leads to better modelling performance with respect to temperatures, the boundary-layer, clouds and precipitation. The increasing computational power enables the climate research community to address climate-change projections with higher accuracy and much more detail. In the framework of the CORDEX.be project aiming for coherent high-resolution micro-ensemble projections for Belgium employing different GCMs and RCMs, the KU Leuven contributes by means of the downscaling of EC-EARTH global climate model projections (provided by the Royal Meteorological Institute of the Netherlands) to the Belgian domain. The downscaling is obtained with regional climate simulations at 12.5km resolution over Europe (CORDEX-EU domain) and at 2.8km resolution over Belgium (CORDEX.be domain) using COSMO-CLM coupled to urban land-surface parametrization TERRA_URB. This is done for the present-day (1975-2005) and future (2040 → 2070 and 2070 → 2100). In these high-resolution runs, both GHG changes (in accordance to RCP8.5) and urban land-use changes (in accordance to a business-as-usual urban expansion scenario) are taken into account. Based on these simulations, it is shown how climate-change statistics are modified when going from coarse resolution modelling to high-resolution modelling. The climate-change statistics of particular interest are the changes in number of extreme precipitation events and extreme heat waves in cities. Hereby, it is further investigated for the robustness of the signal change between the coarse and high-resolution and whether a (statistical) translation is possible. The different simulations also allow to address the relative impact and synergy between the urban expansion and increased GHG on the climate-change statistics. Hereby, it is investigated for which climate-change statistics the urban heat island and urban expansion is relevant, and to what extent the urban expansion can be included in the coarse-to-high resolution translation.