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PARALLEL SESSION B : FRONTIER DOWNSCALING TOOL
B2: HUMAN-CLIMATE REGIONAL INTERACTIONS, TOWARDS RESMS

Future climate of Brussels and Paris for the 2050s under the A1B scenario

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Within the framework of the ACCEPTED project (an Assessment of Changing Conditions, Environmental Policies, Time-activities, Exposure and Disease), a high-resolution urban dynamical downscaling technique has been applied for the cities of Paris and Brussels. The ACCEPTED project aims to improve our understanding of future exposure situations to air pollution and its impact on health to a mid-century horizon 2050s accounting for the effects of a changing urban climate. In this study simulations of present and future urban climate over Brussels and Paris areas are conducted. The regional climate simulations were performed with a new version of the limited-area model of the ARPEGE-IFS system at 4km resolution coupled with the Town Energy Balance scheme (TEB). In order to further downscale the regional climate projections to a urban scale of 1km resolution, a stand-alone surface scheme was employed in offline mode. The downscaling strategy was first evaluated for a 10-years period [2001-2010] using ERA-INTERIM re-analysis data. This 10-year period is considered as the warmest period on record since modern meteorological records began around the year 1850. In a next step, a downscaling simulation for the period 2046-2055 under the A1B scenario was performed. Results from our simulations indicate that while both cities warm substantially for the 2050s horizon (1.6 °C and 1.8 °C for Brussels and Paris respectively), climate change will have a neutral impact on annual mean urban heat island (UHI) intensity. The largest and statistically significant change of nocturnal (daytime) UHI is noted during winter (summer) season with an increase (decrease) of +0.2 °C (-0.1 °C) for both cities. During summer, the decrease in daytime UHI is directly connected to soil drying over rural areas, while the increase in nocturnal UHI during the winter can be explained by the projected decrease of wind speed. However, large impacts on urban climate can be expected from the combination of urban development and potentially more frequent occurrence of extreme events such as heat waves.

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