

EGU21-12054

<https://doi.org/10.5194/egusphere-egu21-12054>

EGU General Assembly 2021

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Future humidity extremes in an urban-rural context - using regional climate model projections down to convection permitting scales for Berlin

Gaby S. Langendijk, Diana Rechid, and Daniela Jacob

Climate Service Center Germany (GERICS), Hamburg, Germany (gaby.langendijk@hzg.de)

Urban areas are prone to climate change impacts. A transition towards sustainable and climate-resilient urban areas is relying heavily on useful, evidence-based climate information on urban scales. However, current climate data and information produced by urban or climate models are either not scale compliant for cities, or do not cover essential parameters and/or urban-rural interactions under climate change conditions. Furthermore, although e.g. the urban heat island may be better understood, other phenomena, such as moisture change, are little researched. Our research shows the potential of regional climate models, within the EURO-CORDEX framework, to provide climate projections and information on urban scales for 11km and 3km grid size. The city of Berlin is taken as a case-study. The results on the 11km spatial scale show that the regional climate models simulate a distinct difference between Berlin and its surroundings for temperature and humidity related variables. There is an increase in urban dry island conditions in Berlin towards the end of the 21st century. To gain a more detailed understanding of climate change impacts, extreme weather conditions were investigated under a 2°C global warming and further downscaled to the 3km scale. This enables the exploration of differences of the meteorological processes between the 11km and 3km scales, and the implications for urban areas and its surroundings. The overall study shows the potential of regional climate models to provide climate change information on urban scales.