

RAL SEMINAR SERIES

The Influence of Future Land-Use Changes on Regional Climate Change Projections

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In many regional climate modeling studies, projections of future climate conditions are produced assuming the current spatial distribution of different land cover types (e.g. urban, cropland, forest, etc.) will stay the same, even for long-term futures. In doing so, they neglect the potential impacts of human land-use changes (LUCs) on regional climate. In this talk, I will discuss how this may matter.

In this work, urban and agricultural LUCs following two Shared Socioeconomic Pathways (SSPs) related to one specific Representative Concentration Pathway (RCP) were used in the Weather Research and Forecasting model (WRF) to investigate how their implied LUCs might affect climate change in North America.

It was found that future LUCs can strongly influence projections of temperature and precipitation. Generally, urban land expansion casted a larger impact than agricultural land expansion. In areas where croplands replace forests, the temperature increase caused by greenhouse gas warming is reduced, while in and near future urban areas, the temperature increase caused by greenhouse gas warming is doubled by warming effects from urban land expansion. Meanwhile, urban expansion enhances precipitation over urbanized areas, while precipitation in the surrounding areas is reduced. Considering the SSPs and their related LUCs also increases projected human exposure to extreme temperature and precipitation events.