



Future changes to weather systems in the U.S. and Africa using convection-permitting simulations

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Detailed information on how climate change could affect diverse regions of the world is critical to prepare for its impacts. Convection-permitting model (CPM) simulations are suitable for regional analysis, as they more effectively resolve topography, microphysical features, and mesoscale flows. Used in conjunction with climate model warming scenarios, CPMs can provide insight into how climate change could affect mesoscale weather in specific regions. Here, CPMs are used to study weather systems in different parts of the world: 1) an ensemble of WRF simulations of mesoscale convective systems (MCSs) in a current and future climate over the Midwest U.S. and 2) MPAS-A simulations of weather systems over Africa in a warmer climate.

In the first study, we create a WRF ensemble of 192 historical and mid-century simulations forced by ERA5 and the Community Earth System Model (CESM1) Large Ensemble (LE) under RCP8.5. These simulations are used to study the variability in MCS structure and how that contributes to future rainfall changes in the Midwest. Projected increases in MCS rainfall from wide convective cores have a smaller spread in the future than deep convective cores and broad stratiform regions, highlighting the use of ensembles for quantifying future uncertainty. In the second study, future changes to weather systems in Africa are explored using MPAS-A with an end-of-century warming scenario (SSP3-7.0) from CESM2-LE applied. We find that the African easterly jet and monsoonal flow strengthen in a warmer climate, with an increase and equatorward shift in precipitation. Future warming also affects MCSs in this region. Results gleaned from these studies can help communities prepare for the future impacts of climate change on water resources, agriculture, and livelihood.

Thursday, 16 May 2024, 2:00PM

Refreshments 1:45PM

Please also join colleagues for refreshments and informal discussion after the seminar until 3:30pm

NCAR-Foothills Laboratory, 3450 Mitchell Lane

FL2-1022, Large Auditorium

Seminar will also be live webcast

<https://operations.ucar.edu/live-mmm>

Participants may ask questions during the seminar via Slido.