Geophysical Research Abstracts
Vol. 21, EGU2019-3133, 2019
EGU General Assembly 2019

Future mean and extreme rainfall over Eastern Africa in a convection-permitting model

Declan Finney, John Marsham, David Rowell, Lawrence Jackson, Rachel Stratton, and Simon Tucker
University of Leeds, Institute for Climate and Atmospheric Science, Leeds, United Kingdom (d.l.finney@leeds.ac.uk)

Mountains, lakes and coastlines exert powerful controls on rainfall, particularly in the tropics. Eastern Africa is a natural laboratory for such effects as it includes the continents highest mountains, largest lakes and a major coastline of the Indian Ocean. Explicit simulation of the convection that generates rain has only recently become possible for climate simulations. We investigate here changes in Eastern African rainfall under global warming, using convection-permitting (CP) and parametrised simulations. The CP model shows wide-spread increases in mean and extreme rain rates in a business-as-usual scenario. However, the changes in rainfall frequency are much more spatially variable. Despite showing similar spatial patterns of total annual rainfall changes, the parametrised simulation cannot capture: (1) the large changes in rain frequency, or (2) the extent of increases in extreme rain rates which result from widespread increases in precipitation efficiency. Although, the parametrised simulation captures much of the CP simulated changes in lake and sea breezes, for the sea breeze the poor diurnal timing of the parametrised rainfall disrupts its rainfall response. Eastern Africa's fast-growing population is based around lakes, coasts and mountains and is highly vulnerable to changing extremes. Our results demonstrate the inability of global models to simulate key changes in storm dynamics and so extremes over Eastern Africa, with the physics revealed relevant across many locations around the world.