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Assessing regional moisture source contributions to Congo Basin precipitation variability

Ellen Dyer (1), Dylan Jones (1), David Noone (2), and Jesse Nusbaumer (3)

(1) Department of Physics, University of Toronto, Toronto, Canada, (2) College of Earth, Ocean, and Atmospheric Sciences, Oregon State University, Corvallis, USA, (3) Department of Atmospheric and Oceanic Sciences, University of Colorado-Boulder, Boulder, USA

Local evaporation plays an important role in the bulk of Congo Basin precipitation, but the variability and seasonality of the precipitation cannot be attributed mainly to local sources. We examine the relative importance of vapor from neighbouring regions to precipitation variability in the Congo Basin, using a new water tracer capability in the Community Earth System Model (CESM1.2), in which water is tagged as it is evaporated in geographically defined regions. In this approach, regional vapor tracers are tracked through phase changes until the vapor is precipitated. We employ a small ensemble using CESM1.2 in an AMIP configuration, and results are compared with the ECMWF Interim reanalysis and the Climate Research Unit rainfall data set. Regions are chosen so that Congo Basin precipitation is totally accounted for by the source regions. The tagged water results will be compared to results from a stable isotope run using the same model setup. Regional tags are related to the corresponding isotopic signatures of atmospheric vapor and precipitation in the Congo Basin. We find that the southern and western Indian Ocean are significant sources, providing a important contribution to variability in Congo Basin precipitation. We also examine the difference between the two rainy seasons. and find that they are a function of the moisture source contribution but also the vertical structure of moisture flux convergence.