



Young Scientist Award Lecture: Using convection-permitting models to better understand tropical convection

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The parameterisation of tropical convection remains one of the major challenges in atmospheric science and is a key uncertainty in future climate predictions. In recent years we have gained the ability to run convection-permitting simulations over relatively large domains for periods of time that allow a statistical (rather than case study) analysis of convective behaviour. This talk will provide an overview of several pieces of work that utilise 40-day continental-scale convection-permitting simulations run over summertime West Africa as part of the UK 'Cascade' consortium. The simulations are used to describe important mechanisms for the initiation of convection, including gravity waves, soil moisture-precipitation feedbacks and low-level convergence. All of these processes play a major role in determining where and when convection will trigger but are not adequately represented in coarser-scale models that employ a convective parameterisation scheme. Convection-permitting models are better able to represent many of these processes and can therefore demonstrate, through comparisons with coarser-scale models, how errors in the representation of convection can feedback onto the larger-scale monsoon flow. It is demonstrated that improvements to the diurnal cycle of convection and convective triggering should reduce the precipitation dry bias that commonly occurs in global models in the Sahel region of West Africa.