Geophysical Research Abstracts
Vol. 18, EGU2016-16136, 2016
EGU General Assembly 2016

Improvements made to simulated tropical variability in climate models by stochastic physics

Peter Watson and Tim Palmer
Oxford University, Atmospheric, Oceanic and Planetary Physics, Oxford, United Kingdom

Many climate models have too little variability in the tropics on daily to weekly time scales. This degrades their ability to simulate extreme events and how they will change with global warming. Stochastic parameterisations, which include a physically-based representation of the uncertainty in unresolved processes, have the potential to alleviate this problem by including variability associated with unresolved processes that is left out of deterministic models. The stochastic physics scheme used operationally by ECMWF has been shown to increase their weather forecast skill. Here we show that in an atmospheric GCM, the scheme makes the simulated tropical variability more consistent with observations by increasing daily precipitation variance, reducing its autocorrelation, and increasing the frequency of heavy-rainfall events. Stochastic physics may therefore be important for improving the model simulations and predicting how the statistics of extreme tropical events will change in the future. We also show also that even when the model's horizontal resolution is increased to that of a weather forecast model, there is still too little simulated tropical variability, so stochastic physics is likely to remain important even as computational power increases.