

## **Does Convective Precipitation Efficiency Depend on Temperature?**

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The CMIP5 inter-model spread of equilibrium climate sensitivity ranges from 2.1 to 4.7 K. Recent studies noted that differences in the treatment of convective precipitation efficiency (CPE) – specifically the autoconversion rate for clouds to form rain – contribute to the large inter-model spread (e.g. Zhao et al 2015). Current convective parameterization schemes in state-of-the-art climate models carry a constant CPE, though the value can vary significantly from one model to the other. Mauritsen and Stevens (2015) showed that a temperature-dependent CPE increases hydrological sensitivity and produces negative cloud and water vapor feedbacks in the ECHAM6 model, and reduced the climate sensitivity. On the other hand, Li et al. (2019) showed that, the same modification in CAM5, resulted in a higher climate sensitivity, due to a positive shortwave cloud feedback associated with optically thinner ice clouds. To address this apparent inconsistency between climate models, we explore the potential dependence of CPE on temperature in the cloud-resolving System for Atmospheric Modeling (SAM), as well as in reanalysis data and observations.