Geophysical Research Abstracts
Vol. 21, EGU2019-15156, 2019
EGU General Assembly 2019

Intercomparison of daily precipitation persistences in global observations and climate models

Heewon Moon (1), Lukas Gudmundsson (1), Benoit Guillod (1,2), and Sonia Seneviratne (1)

(1) Institute for Atmospheric and Climate Science, ETH Zurich, Zurich, Switzerland, (2) Institute for Environmental Decisions, ETH Zurich, Zurich, Switzerland

Persistence characteristics of precipitation are complementary to precipitation indices that are commonly used for model evaluation and are often based on precipitation amounts. In this study, daily precipitation persistence in an exhaustive set of observation-based daily precipitation data is assessed and used to evaluate global climate model (GCM) simulations for the period of 2003 - 2013. Daily precipitation time series are first transformed into categorical time series of dry and wet spells with a 1 mm/day precipitation threshold. Subsequently, Pdd (Pww), defined as the probability of dry (wet) day to be followed by another dry (wet) is calculated to represent daily precipitation persistence. The analysis focuses on the long-term mean and interannual variability of the two indices, Pdd and Pww, as well as the validity of the observation-based datasets for evaluating GCMs. Both observed and multi-model means show higher values of Pdd than Pww. Models generally show significant overestimation in both dry and wet persistences. While the spatial structure of the Pww bias is relatively homogeneous, the positive Pdd bias is largest in the Amazon and Central Africa and several regions such as southern Argentina, western North America, and Tibetan Plateau show weak negative bias. The interannual variability of both Pdd and Pww are generally larger in observations than in models where its magnitude is around the same as the statistical uncertainty of the Pdd and Pww. The underestimation of interannual variability in daily precipitation persistence in GCMs corresponds to previously identified underestimation in year-to-year persistence (Moon et al., 2018). Future analyses may focus on investigating the causes of the model biases identified in this study and their impact on the precipitation dynamics in future projections.

Reference:
Moon, H., Gudmundsson, L., & Seneviratne, S. I. (2018). Drought persistence errors in global climate models. Journal of Geophysical Research: Atmospheres, 123, 3483–3496. https://doi.org/10.1002/2017JD027577