



Improved estimates of recent tropical expansion and the role of natural variability versus forced change

Sean Davis (1,2), Kevin Grise (3), Nicholas Davis (1,2), Paul Staten (4), Darryn Waugh (5), and Karen Rosenlof (1)

(1) NOAA Earth System Research Laboratory, Boulder, United States (sean.m.davis@noaa.gov), (2) Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado at Boulder, Boulder, United States, (3) University of Virginia, Charlottesville, United States, (4) Indiana University, Bloomington, United States, (5) Johns Hopkins University, Baltimore, United States

In the past decade, a number of studies have suggested that the subtropical edges of Earth's Hadley circulation are shifting poleward. However, these estimates for so-called tropical expansion have spanned a large range, and estimates from the upper end of this range are significantly larger than that predicted by global climate models. In this talk, I will present results from recent community efforts that were undertaken to better characterize the plethora of metrics used to quantify tropical width, and to better separate the role of natural variability versus forced change in driving recent tropical width trends. These recent studies find that some of the previously-used tropical width metrics are not directly related to Hadley cell changes, and that by using an appropriate subset of metrics, the range of tropical widening is substantially reduced to the point where observations and models agree. Furthermore, these studies find that internal variability alone can account for a large fraction of the observed Hadley cell changes in recent decades.