Improved Estimates of Recent Tropical Expansion and the Role of Natural Variability Versus Forced Change

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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 wide 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 discuss recent community efforts undertaken as part of the U.S. CLIVAR and ISSI organizations to improve the estimates of recent tropical expansion by characterizing the metrics of tropical width, and to better understand 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 can account for a large fraction of the observed circulation trends in recent decades.