

## **A multi-diagnostic intercomparison of tropical width and jet timeseries using meteorological reanalyses and satellite observations**

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Poleward migration in the latitudinal extent of the tropics and jet latitudes of  $\sim 0.25 - 3^\circ \text{ decade}^{-1}$  has been reported by several recent studies based on satellite observations, radiosonde data, and meteorological reanalyses covering the past  $\sim 30$  years. The goal of this presentation is to identify the extent to which this large range of trends can be explained by the use of different data sources, time periods, and edge definitions, as well as how the widening varies as a function of hemisphere and season. Towards this end, we apply a suite of edge latitude diagnostics based on tropopause height, winds, precipitation/evaporation, and OLR to multiple reanalyses and satellite OLR data sets. These diagnostics include both previously used definitions, as well as new objective definitions designed for more robust detection. The wide range of trends found in previous studies is shown to be primarily due to the use of different data sets and edge definitions, and only secondarily due to varying start/end dates. We also show that the large trends ( $> \sim 1^\circ \text{ decade}^{-1}$ ) previously reported in tropopause height and OLR-based diagnostics are due to the use of subjective definitions. Statistically significant Hadley cell expansion of  $1.0 - 1.5^\circ \text{ decade}^{-1}$  is found in three of the four reanalyses that cover the full time period (1979-2009), whereas other diagnostics reveal poleward expansion rates of  $-0.4 - 1.0^\circ \text{ decade}^{-1}$  that are mostly not statistically significant. Finally, hemispheric and seasonal differences in the trends are also found, but the differences are not statistically significant.