Geophysical Research Abstracts
Vol. 21, EGU2019-17837-1, 2019
EGU General Assembly 2019

Forced and unforced behavior of the interhemispheric SST contrast during the instrumental period

Andrew Friedman (1), Gabriele Hegerl (1), Andrew Schurer (1), Shih-Yu Lee (2), Wenwen Kong (3), and John Chiang (3)

(1) University of Edinburgh, School of Geosciences, Edinburgh, United Kingdom (andrew.friedman@ed.ac.uk), (2) Research Center for Environmental Changes, Academia Sinica, Taipei, Taiwan, (3) Department of Geography, University of California, Berkeley, United States

The north-south interhemispheric sea surface temperature (SST) contrast influences the location of the intertropical convergence zone and the intensity of the monsoon systems. We examine the decadal behavior of the interhemispheric SST contrast in observations and simulations from phase 5 of the Coupled Model Intercomparison Project (CMIP5), from 1881–2012. Using 3-year means, the contributions of external forcing and internal variability to the interhemispheric SST contrast are separated using a formal detection and attribution methodology. The separate contributions of the northern and southern hemisphere SST are also examined.

A significant influence of anthropogenic forcing is detected, consisting of asymmetric northern hemisphere cooling until 1980 and asymmetric northern hemisphere warming from 1980 to 2012. The remaining unforced component is marked by north–south maxima in the 1930s and 1960s, and a rapid north-south drop around 1970. Additionally, shifts in the interhemispheric contrast are examined using 9-year running trends. The north-south shift around 1970 is found to be the most prominent in the historical record. Based on the detection and attribution analysis, it is found to be largely unforced, and due to unforced contributions from both the northern and southern hemispheres. Such magnitude shifts are rare in the control simulations, though some high-variability models are able to reproduce them. Large-magnitude shifts in the control simulations feature disparate spatial patterns, suggesting that different processes can contribute to interhemispheric temperature shifts.