EGU2020-12061
https://doi.org/10.5194/egusphere-egu2020-12061
EGU General Assembly 2020

The forced response of the El Niño–Southern Oscillation-Indian monsoon teleconnection in ensembles of Earth System Models

Tamas Bodai[1], Gabor Drotos[2], Matyas Herein[3], Frank Lunkeit[4], and Valerio Lucarini[5]
[1]Pusan National University, IBS Center for Climate Physics, Busan, Korea, Republic of (bodai@pusan.ac.kr)
[2]Instituto de Física Interdisciplinar y Sistemas Complejos, CSIC-UIB, Palma de Mallorca, Spain
[3]MTA–ELTE Theoretical Physics Research Group, and Institute for Theoretical Physics, Eötvös University, Budapest, Hungary
[4]CEN, Meteorological Institute, University of Hamburg, Hamburg, Germany
[5]Department of Mathematics and Statistics, University of Reading, Reading, UK

We study the teleconnection between the El Niño–Southern Oscillation (ENSO) and the Indian summer monsoon (IM) in large ensemble simulations, the Max Planck Institute Earth System Model (MPI-ESM) and the Community Earth System Model (CESM1). We characterize ENSO by the JJA Niño 3 box-average SST and the IM by the JJAS average precipitation over India, and define their teleconnection in a changing climate as an ensemble-wise correlation. To test robustness, we also consider somewhat different variables that can characterize ENSO and the IM. We utilize ensembles converged to the system's snapshot attractor for analyzing possible *changes in the teleconnection*. Our main finding is that the teleconnection strength is typically increasing on the long term in view of appropriately revised ensemble-wise indices. Indices involving a more western part of the Pacific reveal, furthermore, a short-term but rather strong increase in strength followed by some decrease at the turn of the century. Using the station-based SOI as opposed to area-based indices leads to the identification of somewhat more erratic trends, but the turn-of-the-century "bump" is well-detectable with it. All this is in contrast, if not in contradiction, with the discussion in the literature of a weakening teleconnection in the late 20th century. We show here that this discrepancy can be due to any of three reasons: ensemble-wise and temporal correlation coefficients used in the literature are different quantities; the temporal moving correlation has a high statistical variability but possibly also persistence; MPI-ESM does not represent the Earth system faithfully.