EGU21-3300
https://doi.org/10.5194/egusphere-egu21-3300
EGU General Assembly 2021

The structure of Indian monsoon low-pressure systems in the subseasonal-to-seasonal prediction models

Akshay Deoras[1], Kieran M. R. Hunt[1,2], and Andrew G. Turner[1,2]
[1]Department of Meteorology, University of Reading, Reading, United Kingdom
[2]National Centre for Atmospheric Science, University of Reading, Reading, United Kingdom

Indian monsoon low-pressure systems (LPSs) are synoptic-scale cyclonic vortices that produce around half of the summer monsoon rainfall over India, and often cause catastrophic floods. Thus, accurate predictions of LPSs are crucial for disaster management and long-term planning. To improve the skill of LPS forecasts, it is important to understand how seasonal forecast models simulate the structure and behaviour of these weather systems. Here we examine in detail the simulation of the structure of LPSs by eleven models of the Subseasonal-to-Seasonal (S2S) prediction project. We use a feature-tracking algorithm to identify LPSs in all S2S models during a common re-forecast period of June–September 1999–2010. We then generate composite horizontal and vertical structures and compare them with those of LPSs in ERA-Interim reanalysis.

The results suggest that LPSs have the weakest intensity as well as precipitation in the Bureau of Meteorology (BoM), Australia, Hydrometeorological Centre of Russia (HMCR) and Japan Meteorological Agency models. Most S2S models simulate the warm-over-cold core structure that is commonly observed in LPSs, except for the BoM and HMCR models, which simulate weak positive temperature anomalies near the LPS centre in the lower troposphere. The vertical structure of relative vorticity is shallower and weaker in all S2S models than in ERA-Interim. In most S2S models, LPS composites feature a drier middle and upper troposphere than in ERA-Interim. There is a strong positive correlation between precipitation and the 925 hPa temperature anomaly in most S2S models and ERA-Interim supporting the hypothesis that evaporative cooling from precipitation and reduced insolation due to significant cloud cover are responsible for the lower-tropospheric cold core.