Interannual variability of East Asian winter monsoon in CAMS-CSM compared with CMIP5 AGCM models

Ning Sun (1,2), Zhun Guo (3,1), Tianjun Zhou (1,2), and Xiaolong Chen (1)

(1) LASG, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China (sunning@lasg.iap.ac.cn), (2) University of the Chinese Academy of Sciences, Beijing, China, (3) Climate Change Research Center, Chinese Academy of Sciences, Beijing, China

The simulation and projection of interannual variability of East Asia Winter Monsoon (EAWM) remain challenging for present models. We examine the surface temperature interannual variability of EAWM and linkage between its leading modes and related circulation anomalies during boreal winter based on Chinese Academy of Meteorological Sciences (CAMS) stand-alone atmospheric general circulation model (AGCM) from phase 6 of the Coupled Model Intercomparison Project (CMIP6). The results of CAMS are also compared with former version (24 CMIP5 AGCMs). The climatological large-scale meteorological parameters are reasonably reproduced in the CAMS AGCM, which ensures the robustness of our conclusions of EAWM's interanuual variability. For the northern mode, the simulation skill of CAMS is better than 6 out of 24 models of CMIP5 considering both spatial pattern score and temporal correlation coefficient. The associated main circulations are realistically reproduced by the CAMS, CMIP5 multimodel ensemble mean (MME) and CMIP5 Good Model including a westward shift of the East Asia trough and intensification of the Central Siberian High. Compared with CMIP5 Good Model, CAMS underestimated anomalous cold center causing by westward shift of simulated anomalous high pressure center and its associated anticyclone. For the southern mode, the simulation skill of CAMS is better than 12 out of 24 models of CMIP5. CAMS, CMIP5 MME and CMIP5 Good Model fairly reproduce such circulations in both low and middle level of troposphere, including the shoaling East Asia trough and anomalous surface southwesterly winds and an anomalous anticyclone near Philippine Sea. Compared with CMIP5 Good Model, CAMS overestimated surface southwesterly winds and anomalous warm center along coastal region of southeastern china due to the simulated much stronger El Niño-Southern Oscillation (ENSO)-EAWM relationship. The evaluation of capacity of CAMS in reproducing the interanuual variability of EAWM is the first step to investigate the changes of EAWM interanuual variability in the future.