



An Investigation of the Differences between the North American Dipole and North Atlantic Oscillation

Xuejing Zhou (1,5), Ruiqiang Ding (1,2), Wei Wang (3,5), Jianping Li (2,4), Zhaolu Hou (1), Wei Xie (1,5)

(1) State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics (LASG), Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China, (2) Laboratory for Regional Oceanography and Numerical Modeling, Qingdao National Laboratory for Marine Science and Technology, Qingdao 266061, China, (3) College of Atmospheric Science, Plateau Atmosphere and Environment Key Laboratory of Sichuan Province, Chengdu 610225, China, (4) College of Global Change and Earth System Sciences (GCESS), Beijing Normal University, Beijing 100875, China, (5) Chengdu University of Information Technology, Chengdu 610225, China

Abstract: This study examines the differences between the North American dipole (NAD) and the North American Oscillation (NAO) in terms of their spatial structure, temporal variations, and climate impacts. The results indicate that the sea level pressure anomalies associated with the NAD are located in more western and southern areas than those associated with the NAO, and that the NAD has its own temporal variability. In addition, the NAD has a greater influence on the SST and precipitation anomalies in the northern tropical Atlantic (NTA) than does the NAO in the North Atlantic. In the tropical Pacific, the NAD tends to be more effective in forcing the SST warming during spring in the northeastern subtropical Pacific (NESP), and this can extend equatorward to reach the equatorial central Pacific in the autumn, finally leading to a central Pacific (CP)-type El Niño event. In contrast, the NAO induces only weak SST warming over the NESP, so that a CP-type El Niño event does not occur. Additional analysis indicates that the influence of the NAO can pass to the tropical Pacific only when the NAD and NAO have the same sign, suggesting that the NAD may serve as an important bridge linking the NAO to ENSO (El Niño-Southern Oscillation).

Keywords: North American dipole (NAD); North Atlantic Oscillation (NAO); central Pacific (CP)-type El Niño