

# **Different Impacts of Two Types of Pacific Ocean Warming on the Southeast Asian Rainfall during Boreal Winter**

Juan Feng

Center for Monsoon System research, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China

Lin Wang, Wen Chen

Center for Monsoon System research, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China

The effects of conventional El Niño-Southern Oscillation (ENSO) and ENSO Modoki on the wintertime Southeast Asian rainfall and related mechanisms are studied using the method of partial regression/correlation and numerical simulations of a simple baroclinic model. The results show that the Southeast Asian rainfall associated with two kinds of ENSO exhibits different spatial distributions. In the case of El Niño, the wet condition is observed over South China, and the dry condition is seen over the Philippines, Borneo, Celebes and Sulawesi. By contrast, for El Niño Modoki, the negative rainfall anomalies around the Philippines are weaker and are located more northward compared to the El Niño counterpart. The different Southeast Asian rainfalls that are related to ENSO and ENSO Modoki are attributed to the different anomalous Walker circulation and low-level anticyclone around the Philippines. Both the Philippine anticyclone and the descending branch center of the Walker circulation over the western North Pacific occupy a smaller domain and are located more northward during El Niño Modoki than during El Niño. All of these factors favor the difference of the Southeast Asian rainfall anomalies between the two events. Numerical experiments also suggest that the different low-level atmospheric responses are mainly induced by different diabatic cooling over the western North Pacific related to El Niño and El Niño Modoki.

## **Corresponding Author:**

**Name:** Juan Feng

**Organization:** Institute of Atmospheric Physics, Chinese Academy of Sciences

**Address:** No. 6 North Second Line, Zhongguancun,  
Haidian district, P.O. Box 2718,  
Beijing, 100190,  
P.R. China