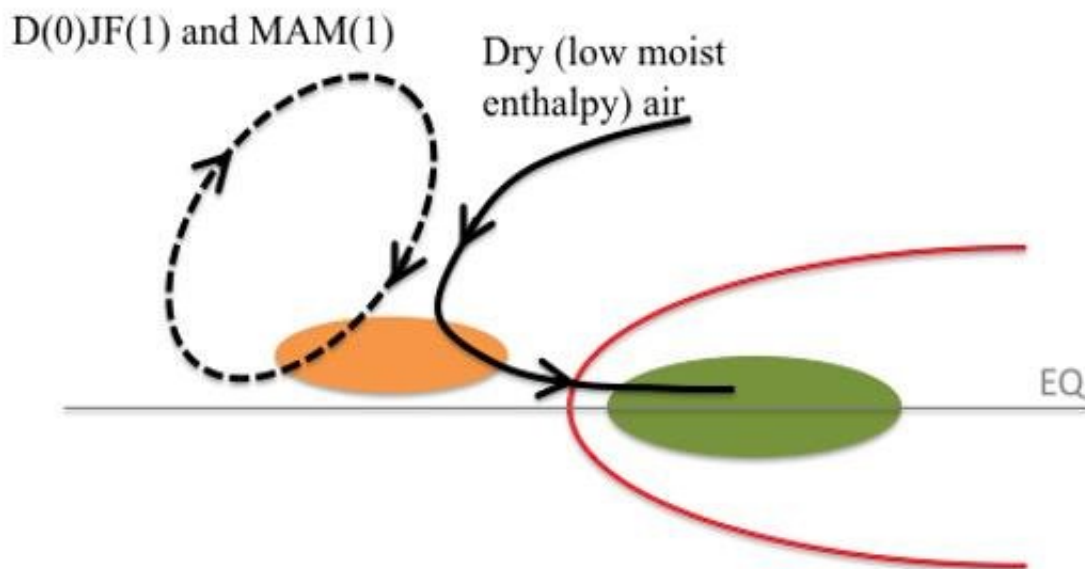


New mechanism to explain how El Nino influences East Asian and NW Pacific climate

December 13 2017



Schematic of the anomalous moist enthalpy advection mechanism. Warm SSTAs in the equatorial CEP (red line) enhance local convection (green shading) and thus stimulate cyclonic anomalies to the northwest (black solid line). The northerly component of the western flank of the cyclonic anomalies advects off-equatorial dry (low moist enthalpy) air into the tropical WNP and thus suppresses convection there (orange shading). The suppressed convection further stimulates the WNPAC (black dashed line) to the northwest. Credit: (Wu et al. 2017a)

Western North Pacific anomalous anticyclone (WNPAC, or referred to as Philippine Sea anomalous anticyclone) is the most important anomalous circulation pattern connecting El Niño and East Asian-western North Pacific monsoon. WNPAC begins from the El Niño late winter to the following summer, and thus is one of the most long-lasting anomalous circulation patterns over the entire tropical climate system.

Researchers from the Institute of Atmospheric Physics (IAP) of the Chinese Academy of Sciences and University of Hawaii proposed a new [mechanism](#) to explain the maintenance of WNPAC called the anomalous moist enthalpy advection mechanism. This mechanism explains why WNPAC forms in the late fall of El Niño developing phase.

Since the 2000s, it has been widely accepted that WNPAC is maintained by local air-sea interaction via wind-evaporation-Sea Surface Temperature (SST) feedback over the tropical WNP during El Niño mature winter and the following spring. However, some recent studies found that WNPAC can be simulated by the atmospheric general circulation model (AGCM), driven by El Niño-related warm SST anomalies in the central-eastern Pacific plus climatological SST in other ocean areas.

This indicated that WNPAC can be maintained by an atmospheric bridge from equatorial central-eastern Pacific without the help of local air-sea interactions in the WNP. The contradiction between the leading theory and the AGCM experiments suggests that a new theory is needed to be developed for the maintenance of WNPAC.

"The anomalous moist enthalpy advection mechanism proposed in our study works through pure atmospheric dynamic and thermodynamic processes and does not rely on the local air-sea interactions in the WNP," says Dr. WU Bo, lead author of the study published in *Journal of Climate*.

According to the study, idealized numerical experiments further suggested that the contribution of the new mechanism to WNPAC is larger than that of the local air-sea interactions. "Furthermore, the new mechanism can reasonably explain the formation timing of WNPAC, which cannot be explained by previous theories," says Prof. ZHOU Tianjun from IAP, a co-author of the study.

More information: Bo Wu et al, Atmospheric Dynamic and Thermodynamic Processes Driving the Western North Pacific Anomalous Anticyclone during El Niño. Part I: Maintenance Mechanisms, *Journal of Climate* (2017). [DOI: 10.1175/JCLI-D-16-0489.1](https://doi.org/10.1175/JCLI-D-16-0489.1)

Provided by Chinese Academy of Sciences

Citation: New mechanism to explain how El Nino influences East Asian and NW Pacific climate (2017, December 13) retrieved 28 April 2024 from <https://phys.org/news/2017-12-mechanism-el-nino-east-asian.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.