Geophysical Research Abstracts
Vol. 20, EGU2018-3035-2, 2018
EGU General Assembly 2018

Western tropical Pacific multidecadal variability forced by the Atlantic multidecadal oscillation

Cheng Sun (1), Fred Kucharski (2), Jianping Li (1), Fei-Fei Jin (3), In-Sik Kang (4), and Ruiqiang Ding (5)

(1) Beijing Normal University, Beijing, China (scheng@lasg.iap.ac.cn), (2) Earth System Physics Section, Abdus Salam International Centre for Theoretical Physics, (3) Department of Atmospheric Science, University of Hawaii–Manoa, (4) School of Earth Environment Sciences, Seoul National University, (5) Institute of Atmospheric Physics, Chinese Academy of Sciences

Observational analysis suggests that the western tropical Pacific (WTP) sea surface temperature (SST) shows predominant variability over multidecadal time scales, which is unlikely to be explained by the Interdecadal Pacific Oscillation. Here we show that this variability is largely explained by the remote Atlantic multidecadal oscillation (AMO). A suite of Atlantic Pacemaker experiments successfully reproduces the WTP multidecadal variability and the AMO–WTP SST connection. The AMO warm SST anomaly generates an atmospheric teleconnection to the North Pacific, which weakens the Aleutian low and subtropical North Pacific westerlies. The wind changes induce a subtropical North Pacific SST warming through wind–evaporation–SST effect, and in response to this warming, the surface winds converge towards the subtropical North Pacific from the tropics, leading to anomalous cyclonic circulation and low pressure over the WTP region. The warm SST anomaly further develops due to the SST–sea level pressure–cloud–longwave radiation positive feedback. Our findings suggest that the Atlantic Ocean acts as a key pacemaker for the western Pacific decadal climate variability.