

Can tropical Pacific winds enhance the footprint of the Interdecadal Pacific Oscillation on the upper-ocean heat content in the South China Sea?

*Fuan Xiao¹, Dongxiao Wang²

1. Guangzhou Univ., 2. Sun Yat-sen Univ.

In this study, an enhanced footprint of the Interdecadal Pacific Oscillation (IPO) on the upper-ocean heat content (OHC) in the South China Sea (SCS) since the 1990s was revealed. The negative OHC-IPO correlation is significant ($r = -0.71$) during 1990-2010 (P2), while it is statistically insignificant during 1960-1980 (P1). Analyses show that the scope of the equatorial Pacific wind anomalies is wider during P2 compared with that during P1 due to a larger east-west SST gradient and enhanced tropical warming in the Indian Ocean. When the IPO is negative during P2, a wider scope of the wind stress anomalies associated with the IPO could lead to 1) the southward migration of the North Equatorial Current bifurcation latitude (NECBL) by affecting the wind stress curl over the key region where it is near the climatological NECBL; 2) the interbasin pressure gradient (Sea Surface Height difference) between the western Pacific and the SCS increase; these two processes strengthen the Kuroshio Current and weaken the Luzon Strait transport (LST) or SCS throughflow into the SCS; and 3) the width of equatorial Pacific wind anomalies are wide enough to directly weaken the LST in the SCS through the Island Rule. These three pathways finally change the oceanic gyre in the SCS and increase the OHC. Our results suggest that the scope of the tropical wind stress is the crucial factor when we consider the relationship between the upper ocean thermal conditions in the SCS and the Pacific variability.

Keywords: Interdecadal Pacific Oscillation, Ocean heat content, South China Sea, Scope of trade wind