

Understanding the mechanisms associated with an unstable relationship between Pacific Decadal Oscillation and Indian Ocean Basin mode

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It is known that a low frequency variability of sea surface temperature in the Pacific and Indian Ocean, i.e., Pacific Decadal Oscillation (PDO) and Indian Ocean Basin Mode (IOBM) not only affects a local marine ecosystem but also influences weather and climate in the globe via atmospheric teleconnections. In addition, the PDO and IOBM interacts with each other. While many previous studies have discussed the interaction between PDO and IOBM, it is still useful to understand the relationship of PDO and IOBM. To examine this, we analyzed the observational datasets and pacemaker experiments using the Nanjing University of Information Science and Technology Earth System Model version 3 (NESM.v3). A low frequency running correlation between PDO and IOBM indices shows that the relationship of PDO and IOBM is not stable on the low frequency timescales. We found that the PDO structure during each decade is quite different, which subsequently leads to a different response of temperature and precipitation in the globe. By conducting pacemaker experiments, we found that a non-stationary relationship of PDO-IOBM is mainly due to a negative phase of PDO in recent decades.

Keywords: PDO, IOBM, Unstable relationship