The Indo-western Pacific Ocean capacitor mode and coherent climate anomalies in post-ENSO summer

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El Niño typically peaks in boreal winter, and the associated equatorial Pacific sea surface temperature (SST) signal dissipates before subsequent summer. Its impact, however, outlasts until boreal summer in the Indo-western Pacific, featuring basin-wide Indian Ocean warming and tropical Northwestern Pacific cooling accompanied by the Pacific-Japan (PJ) teleconnection pattern with an surface anomalous anticyclone (AAC) extending from the Philippine Sea to the northern Indian Ocean. Two formation mechanisms have been proposed for these climate anomalies in post-El Niño-Southern Oscillation (ENSO) summer. One hypothesis invokes the wind-evaporation-SST (WES) feedback in the tropical Northwestern Pacific, while the other points to inter-basin feedback between the Indian Ocean and tropical Northwestern Pacific. Based on a coupled model experiment, we propose an ocean-atmosphere coupled mode that synthesizes the two mechanisms. This Indo-western Pacific Ocean capacitor (IPOC) mode evolves seasonally from spring to summer under seasonal migration of background state. In spring, the WES feedback is operative in association with the tropical Northwestern Pacific cooling, while in summer the Indian Ocean warming and the inter-basin interaction maintains the AAC. While the IPOC mode is independent of ENSO in mechanism, ENSO can drive this mode in its decay phase. This excitation, however, has undergone substantial interdecadal modulations, depending on ENSO amplitude and persistence of Indian Ocean warming. The ENSO-IPOC correlation is high after the mid-1970s and at the beginning of the 20th century, but low in between.

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