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Revisiting ENSO impacts on the Indian Ocean SST based on a combined linear regression method

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The El Niño-Southern Oscillation (ENSO) has great impacts on the Indian Ocean sea surface temperature (SST). In fact, two major modes of the Indian Ocean SST namely the Indian Ocean Basin (IOB) and Indian Ocean Dipole (IOD) modes, exerting strong influences on the IO rim countries, are both influenced by the ENSO. Based on a combined linear regression method, this study quantifies the ENSO impacts on the IOB and IOD during ENSO concurrent, developing, and decaying stages. After removing the ENSO impacts, the spring peak of the IOB disappears along with significant decrease in number of events, while the number of events is only slightly reduced and the autumn peak remains for the IOD. By isolating the ENSO impacts during each stage, this study reveals that the leading impacts of ENSO contribute to the IOD development, while the delayed impacts facilitate the IOD phase switch and prompt the IOB development. Besides, the decadal variations of ENSO impacts are various during each stage and over different regions. These imply that merely removing the concurrent ENSO impacts would not be sufficient to investigate intrinsic climate variability of the Indian Ocean, and the present method may be useful to study climate variabilities independent of ENSO.