Effect of the tropical Indian-Pacific warming on winter snow depth decadal increase over Tibetan Plateau during 1950-1999

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The sea surface temperatures (SSTs) of the tropical Indian-Pacific Ocean show a pronounced warming since the late 1970s. In this study, uncoupled atmospheric general circulation model (AGCM) experiments are conducted to examine the sensitivity of tropical Ocean basins from the Indian Ocean to the Pacific Ocean on wintertime snow depth over Tibetan Plateau (TP). Our results suggest that the tropical Indian Ocean (TIO) warming plays a significant role for the wintertime decadal increase of snow depth over East TP from 1980s to the end of 1990s, which is in contrast to the tropical West Pacific Ocean (TWP) warming, also is different from the tropical central and eastern Pacific Ocean (TCEP) warming. It is found that more moisture supply associated with the intensification of the southerly flow over the Bay of Bengal and an increase of humidity over the TIO are beneficial to the decadal increased snow depth over East TP after the late 1970s. Additional factors for excessive snowfall depth include a deeper India-Burma trough, that bring more cold north air southward to TP due to the TIO warming.

Key words: tropical Indian-Pacific warming, snow depth over Tibetan Plateau