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Interannual Seesaw Between the Somali and the Australian Cross-Equatorial Flows and its Connection to East Asian Summer Monsoon

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The correlations among the summer low-level cross-equatorial flows (CEFs) over the Indian-west Pacific Ocean region on the interannual timescale are investigated by using both the NCEP/NCAR reanalysis and ERA40 datasets. A significant negative correlation (seesaw) has been illustrated between the Somali CEF and the three CEFs north to Australia (the South China Sea, the Celebes Sea and the New Guinea. They are referred to as the Australian CEF in combination). A seesaw index is thus defined with a higher (lower) value representing the intensified (weakened) Somali CEF but the weakened (intensified) Australian CEF. The connection of the seesaw with East Asian summer monsoon (EASM) is then investigated. The results suggest that an enhanced seesaw corresponds to the intensified EASM with more rainfall in North China, the Yellow River valley and the upper reach of the Yangtze River. The seesaw reflects the opposite co-variability between the two atmospheric action centers in the southern hemisphere, the Mascarene subtropical high and the Australian subtropical high. Whether the seesaw-EASM connection is influenced by El Niño–Southern Oscillation (ENSO) or the Indian Ocean SST Dipole mode (IOD) is analyzed finally. The results keep unchanged when the ENSO-related or IOD-related signals are excluded, although ENSO exerts a significant influence. This implies an additional predictability for EASM from the CEF seesaw.