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## Influence of Antarctic Oscillation on the Southeastern Africa summer precipitation during 1979-2018

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In this study, the possible associations between the precipitation in the Southeastern Africa (SEAF, in this study area between 10°S to 25°S and 25°E to 53°E,) and the Antarctic Oscillation (AAO) in seasons from October to March (DJFM) was investigated. A statistically significant three-month lag correlation between them was found. After removing the El Niño/Southern Oscillation and Indian Ocean dipole signals, AAO from August to October (ASO-AAO) and DJFM-precipitation was significantly correlated, and the interannual correlation coefficients calculated by CMAP, GPCP, CRU, and GPCC were +0.63, +0.42, +0.59, and +0.53 ( $p < 0.05$ ), respectively. The positive correlation suggests that an enhancing (weakening) ASO-AAO could be conducive to increases (decreases) of DJFM-precipitation in SEAF in austral summer. Further analyze the corresponding water vapor and circulation conditions. The responses of local and regional meteorological conditions to the ASO-AAO support the AAO-precipitation links. During positive ASO-AAO years, in the troposphere low level is a cyclonic flow field in the high level is an anticyclonic circulation, accompanied by an enhanced ascending motion, and such a structure is favor to rainfall. A preliminary mechanism analysis shows that a positive ASO-AAO may induce a sea surface temperature warming tendency in Western Equatorial Indian Ocean. This warming then enhances the regional ascending motion in SEAF and enhances the convection precipitation on the northwest SEAF. Moreover, the anomalous sensible and latent heating, in turn, intensifies the cyclone through a Gill-type response of the atmosphere. Through this positive feedback, the tropical atmosphere and SST patterns sustain their strength from spring to summer and eventually the SEAF precipitation. Note that's for simplicity, the AAO index was multiplied by  $-1$  throughout this study.