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The relation of the monsoon-like Southwest Australian Circulation, SAM and SWWA winter rainfall

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Based on the reanalysis and observed data, the relation between the Southwest Australian monsoon-like circulation (SWAC), Southern Hemisphere Annular Mode (SAM) and the precipitation in southwest Western Australia (SWWA) during austral winter (June to August) is examined. We suggest that the apparent modest inverse relationship between the SAM and SWWA winter rainfall is caused by an extrusive extreme year 1964. We show that both the negative and positive phase of the SAM exhibit little impacts on the SWWA winter rainfall when 1964 is excluded. Moreover, the relation between the SAM and SWWA winter rainfall collapses in both prior and post 1964 in case the 1964 is eliminated. The result raises the possibility that the SAM plays non-significant role in influencing the winter rainfall over SWWA. On the other hand, the relation between the SWAC and SWWA winter rainfall is inherent. Interestingly, the SWAC is well linked with the SAM in the whole study period. Further analysis reveals that the correlation in the SWAC-SAM is mainly induced by the part which plays little role on the SWWA winter rainfall. Thus SAM activity does not produce modulation to the SWAC signal on SWWA winter rainfall. Additionally, the external forcing of the SWAC is discussed. The well-coupled linkage between the SWAC and SWWA winter rainfall may be instrumental for understanding and studying the rainfall variation of the SWWA which becomes especially important since the SWWA is under severe winter drought.