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INTRASEASONAL RAINFALL VARIABILITY OVER MOZAMBIQUE DURING THE AUSTRAL SUMMER SEASON AND ITS POSSIBLE RELATIONSHIP WITH MONSOON CIRCULATION

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ABSTRACT: Knowledge of summer rainfall variability provides useful guidance for the management of rain-fed activities (e.g., agriculture and hydropower generation) upon which most of the Mozambican rural population heavily depends on. For instance, knowledge of intraseasonal time-scale variability enables better tracking of the rainfall distribution as the season progresses. In this regard, this paper investigates rainfall ISV (intraseasonal variability) over Mozambique during the austral summer season (December–February), using the gauge daily rainfall data in form of anomalies for the period 1960–2005. The study uses Lanczos filter to separate the intraseasonal variations on the 10–25-day, 10-90 and 20–90-day time-scales, for which principal component analysis (PCA) with Varimax rotated option was applied. The PCA reveals 5 (4) modes for band 10–25-day (10-90 and 20–90-day), respectively. The patterns of modes 3 and 4 slightly change in these different time bands, while those of modes 1 and 2 remain almost unchangeable, even in non-filtered data, suggesting that these modes are present in all time scales. Composite and correlation analysis of low-level wind associated with each mode pattern captures a cyclonic circulation anomaly in different locations over southeast Africa. This cyclonic pattern effects in different ways the monsoon circulation system (anomalous north-westerly and northerly inflow) that favours increases in precipitation over Mozambique, especially in modes 3 and 4. In addition, a precipitation monsoon index (PMI), area averaged over the region (32°E–38°E, 14°S–19°S) and its associated low-level wind index, area averaged over the box (20°E–40°E, 7°S–14°S) are defined, based on obtained rainfall ISV modes, and previous work showing the Madden–Julian oscillation influence over the selected PMI region. Further investigation indicates the strongest significant relationships between PMI and the modes 3 and 4 of 10-90 day-band, suggesting that these modes better represent the monsoon ISV. Overall, the results strongly suggest that the selected region may represent the ISV of the southern African monsoon.

Key-words: Mozambique. ISV. Agriculture. Southern African monsoon.

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