

Evaluation of multiple indices of the South American monsoon

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Abstract

In this article, multiple methods for estimating the onset and demise of the South American Monsoon System (SAMS) are evaluated during the period 1979-2018. The results obtained from indices based on precipitation, outgoing longwave radiation and combined empirical orthogonal functions (LISAM) show a delay in the SAMS onset while the demise dates do not show marked changes during the considered period. The latter indicates that the observed shortening of the SAMS (and the consistent lengthening of the southern Amazon dry season) mainly depend on variations at the onset stage of the SAMS, as identified in previous studies based on different databases and methodologies. This result is independent on the observational dataset considered. This allows resolving previously inconsistent results on the shortening of the SAMS. Furthermore, the climatological patterns of precipitation and atmospheric circulation at surface and upper levels associated with SAMS are best represented by the precipitation-based index; however, all indices exhibit general difficulties in representing the evolution of the atmospheric circulation at 200 hPa. Finally, our analyses suggest that including northeastern (NE) Brazil in the domain considered to characterize the SAMS tends to alter the estimates of SAMS timing, primarily its onset. In particular, the trend towards late onsets of the SAMS is evidenced by all indices over spatial domains that do not include NE Brazil, while this trend is considerably weakened or not significant when this area is included. This denotes a strong sensitivity of the different indices to the spatial domain considered for SAMS characterization.

Palabras clave

Palabras clave de autor: [demise](#); [LISAM](#); [OLR](#); [based indices](#); [onset](#); [precipitation](#); [based indices](#); [South American monsoon](#); [wind](#); [based indices](#)

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