Relationships of global SST patterns to Australian rainfall variations

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Abstract

Analyses of the interannual variability of Australian rainfall on seasonal time scales have been performed by Nicholls (1989) and more recently Drosdowsky (1992). Both these studies have used rotated principal components to define the dominant large-scale anomaly patterns.

The large scale circulation anomalies associated with the patterns of rainfall variability have been examined using three data sets: (a) surface and marine data from COADS, (b) tropospheric geopotential heights, temperatures and winds at a network of rawinsonde stations over Australia and the southwest Pacific, and (c) gridded Southern Hemisphere surface and tropospheric analyses from NMC Melbourne. The observation of Nicholls (1989) of a lack of interesting relationships between Atlantic Ocean SSTs and Australian rainfall is supported by the more recent analysis. In this analysis three dominant teleconnection patterns are identified: the well known Southern Oscillation anomalies associated with the continental scale rainfall anomalies, a predominately winter season Indonesian-Indian Ocean pattern previously documented by Nicholls (1989), and a spring/summer south Tasman Sea pattern. The evolution of the last two patterns has been examined through composites, and physical mechanisms for the initiation and maintenance of the anomalies have been proposed. In both cases the rainfall and SST anomalies *appear* to be driven by the atmospheric circulation anomalies. The ability and potential of COADS in elucidating these causal relationships is discussed.