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The Dependency between the Arabian Peninsula Wet Events and Sea Level Pressure Patterns during Spring Season

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This work investigates the relationships between regional extreme wet events in the Arabian Peninsula during the spring season (MAM) and sea level pressure (SLP) patterns. Based on NCEP/NCAR reanalysis data, S-mode principal components were computed from the de-seasonalized daily SLP for spring months between 1960 and 2013. The analysis covered a window for the region (15-70°E and 2.5-50°N). This window coupled different oceanic-land influences (e.g. the Indian, Mediterranean and the Sahara configurations) that may impart an effect on rainfall variations in the study domain. A set of eight significant circulation spatial patterns were retained, which explained 84.8% of the total explained variance. The derived patterns explained a wide variety of flows over the peninsula, with a clear distinction between zonal and meridional advections. The extreme wet events (R95 and R99) were defined from a relatively dense network of 209 observatories covering the peninsula, using the 95th and 99th percentile of rainfall distribution respectively. The links between the dominant SLP patterns and significant wet events were established and the physical interpretations of these associations were examined. The results, as revealed by the location and intensity of high pressure centers, highlight the strength of eastern and southeastern advections corresponding to these extreme events. Other patterns have a local character, suggesting an orographic origin of some wet events in the region. The relationships described in this research can advance the understanding of the large-scale processes that contribute to the wet weather events in the Arabian Peninsula. These findings can therefore contribute to better management of water resources and agricultural practices in the region.