

# WEATHER REGIMES ASSOCIATED WITH SUMMER RAINFALL VARIABILITY OVER SOUTHERN MEXICO

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This study focuses on the identification of weather regimes (WRs) over Mexico, the tropical eastern Pacific, Central America and the Caribbean, associated with seasonal precipitation over southern Mexico. A self-organizing maps (SOM) analysis of sea level pressure, 850-hPa horizontal winds and 925-hPa-specific humidity for the period 1997–2013 was carried out to identify the circulation patterns. This approach allowed the discrimination of wet and dry regimes, with clear and distinct features. Weather patterns exhibiting negative (positive) mean sea level pressure anomalies, southerly (northerly) winds, above- (below-) average low-level moisture and little (large) influence of the North Atlantic Subtropical High (NASH), resulted in above- (below-) average precipitation over southern Mexico. The intra-seasonal variability of the WRs and their associated rainfall is well captured by this methodology. In particular, the mid-summer drought (MSD) during late July and early August, is clearly represented by a group of patterns, which evidence a strong influence of the NASH, strong easterly winds in the Caribbean Basin and reduced low-level humidity, all factors that combine to induce below-normal rainfall over southern Mexico. The analysis of the inter-annual variability of the WRs suggests that year-to-year variations in their frequencies can impact summer rainfall in the regions of southern Mexico considered in this study. In particular, the analysis indicates that the dominant WR associated with the MSD exhibits a 3- to 4-year modulation in its frequency of occurrence, which has not been previously reported in the literature. The main MSD pattern is more frequent during dry years and has a significant correlation with the Multivariate El Niño-Southern Oscillation (ENSO) Index (MEI), indicating that MSD is stronger during ‘El Niño’ years. Also, WRs associated with negative (positive) rainfall anomalies showed positive (negative) correlations with the MEI, suggesting a possible modulation by ENSO phases.