Variability of Tropical Intraseasonal Convective Anomalies and their Statistical Forecast Skill

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The tropical atmosphere exhibits significant amounts of variance on time scales of 20-90 days. In particular, the Madden-Julian Oscillation (MJO) is the main mode of tropical intraseasonal variation with significant influences on the Asian-Australian Monsoons, Indo-Pacific thermocline variability and mid-latitude teleconnections. Previous works have shown that tropical intraseasonal convective anomalies (TICA) display different modes of eastward propagation, seasonal and interannual occurrences. This study examines the characteristics of eastward propagating TICA events. An objective-tracking algorithm is applied to 22 years of Outgoing Longwave Radiation (OLR) data to characterize their propagation, life cycle, zonal displacement and structural properties (minimum OLR anomaly, variance of OLR anomaly, area, number of cold clusters, rate of growth and decay). The zonal wind (U) components at 850 hPa and 200 hPa from 22 years of NCEP/NCAR reanalysis are used to describe the large-scale circulation associated with TICA events. Four main TICA types are recognized depending on their eastward propagation and region of most significant influence (Indian Ocean, India/China

Sea, SPCZ and Pacific Ocean). A statistical analysis is carried out to determine if differences in structural properties of convective anomalies are also associated with different TICA types. Probability curves are then constructed to determine the likelihood of TICA occurrences according to their zonal displacement and frequency per season. In the last part of this work, a combined (CEOF) analysis of OLR, U850, and U200 is performed to build a statistical forecast model based on multiple linear regressions using the first two leading EOF modes. The statistical forecast skills of different TICA types are analyzed and their implications for midlatitude teleconnections are discussed.