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Typology of intraseasonal oscillations based on a Local Mode Analysis

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The Intraseasonal Oscillation (ISO; 20-120 day) is an important component of the variability of the Tropical convection that strongly perturbs the Asian and the Australian monsoons. Our knowledge of the physical origin of the ISO however remains largely incomplete, partially because of the large variability of its characteristics from one event to another. The aim is to determine how the patterns of the different ISO events may be objectively regrouped in a few types, related for example to season, ENSO or other large scale forcing. Patterns of the different ISO events are extracted using a Local Mode Analysis (LMA, Goulet and Duvel 2000). The LMA is based on complex empirical orthogonal functions computed for successive positions of a moving temporal window. When a maximum of variance percentage is detected, the pattern of the corresponding ISO event is extracted. For the present study, the ISO events are detected by an LMA applied on the 20-120-day band pass filtered OLR field for a large tropical region (0˚-200˚E; 30˚N-30˚S) and for the 1979-2005 period. The 144 events extracted are then objectively clustered into homogeneous types using a Hierarchical Ascending Classification. Our classification in 8 types synthetically describes 50% of the overall diversity of the ISO events.

The 8 types depict primarily the seasonality in the ISO modes, with the known northward (eastward) propagations over the Indian and Western Pacific basins during the northern summer (winter) seasons. While some similarities are noted from one type to another, important differences confirm however that the ISO may be classified in more than two types (i.e. the summer and winter types). In particular, some modes are very specific to particular months (bogus onset in May over the Bay of Bengal, for example). Also, different types are obtained for each season in relation to interannual

variability of the sea surface temperature field related primarily to ENSO. This study also shows different equatorial propagation characteristics (i.e. Madden Julian Oscillation) for each type confirming that the MJO is not a phenomenon distinct from the ISO.