

Cloud and Precipitation Variability Associated with the Madden–Julian Oscillation over Tropical Australia: Himawari-8/9 and AUS2200

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This study investigates rainfall and cloud features of the Madden–Julian oscillation (MJO) propagation over tropical Australia. The evolution of total cloud cover and cloud types is analysed across the MJO using Himawari-8 and the convection-permitting UK Met-Office Unified Model simulations with a horizontal grid-spacing of 2.2 km (AUS2200) data sets for the warm and cold phase of El Niño–Southern Oscillation (ENSO) and enhanced convective phase of the MJO January–February: El Niño 2016 and La Niña 2018. Regarding the local phase, AUS2200 and Himawari-8 results show a familiar evolution of cloud population predominance: deep and shallow clouds coexist with deep, intense, narrow mesoscale convective systems in the growing stages. Widespread cloud coverage and rainfall appear during the active phase, becoming more anvil-dominated with time, and finally, suppressed conditions return. Results also suggest convection in the MJO tends to be modulated more by moisture variations associated with the large-scale tropical deep convection.