

The Madden-Julian Oscillation, modulation of daily rainfall in Southwest Asia, and severe drought

Mathew Barlow

The role of the Madden-Julian (30-60 day) Oscillation (MJO) in modulating wintertime precipitation over Southwest Asia is examined. Occasional eastward extensions of the Mediterranean cyclone belt are the primary precipitation mechanism for Southwest (SW) Asia. As the MJO propagates across the Indian Ocean, the associated upper-level wind anomalies impinge on the wintertime westerlies over SW Asia, with the largest signal occurring when the center of MJO convection is in the eastern Indian Ocean. Stratifying average Afghanistan daily precipitation (from station data), Nov-Apr, based on the phase of the MJO in the eastern Indian Ocean reveals a robust relationship. Enhanced convection in the eastern Indian Ocean, related to the positive phase of MJO, is associated with suppressed precipitation over SW Asia; suppressed convection in the eastern Indian Ocean, related to the negative phase of the MJO, is associated with enhanced precipitation over SW Asia. In the seven years of available daily station data, the ten largest precipitation events all occur when the MJO is in its negative phase (suppressed convection) in the eastern Indian Ocean. The dynamics and potential predictability of this relationship are explored. The role of this relationship in the link between El Nino - Southern Oscillation (ENSO)-related variability in the West Pacific and drought over SW Asia, as in the recent extended La Nina episode of 1998-2001, is also examined.