

Madden Julian Oscillation Impacts
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1. What is the Madden-Julian Oscillation (MJO)?

The Madden-Julian Oscillation (MJO) is a tropical disturbance that propagates eastward around the global tropics with a cycle on the order of 30-60 days. The MJO has wide ranging impacts on the patterns of tropical and extratropical precipitation, atmospheric circulation, and surface temperature around the global tropics and subtropics. There is evidence that the MJO influences the ENSO cycle. It does not cause El Niño or La Niña, but can contribute to the speed of development and intensity of El Niño and La Niña episodes.

2. How does MJO activity vary over the course of the year?

The MJO is often quite variable, with periods of moderate-to-strong activity followed by periods of little or no activity. Because MJO impacts are well known, especially in the global tropics, periods when the MJO is active offer opportunities for enhancing NWS climate prediction and decision assistance. Typically, the northern Hemisphere late fall, winter, and early spring have the greatest level of MJO activity.

3. How does the MJO change during the ENSO cycle?

Overall, the MJO tends to be most active during ENSO neutral years, and is often absent during moderate-to-strong El Niño and La Niña events. The MJO activity during late 2007 and early 2008, which occurred during La Niña conditions, is unusual but not unprecedented.

4. What are the typical MJO impacts on U.S. weather?

The MJO influences both precipitation and surface temperature patterns across the US. The two most significant impacts over the US during Northern Hemisphere winter are an increase in the frequency and intensity of heavy precipitation events along the US west coast, and an increase in the frequency and intensity of cold air outbreaks across the eastern US. The MJO also influences tropical cyclone activity in both the eastern Pacific and Atlantic basins during the Northern Hemisphere summer.