The Madden Julian Oscillation (MJO) and its effects in United States Temperatures

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Schematic of the Madden-Julian Oscillation - cross-section along equator

- upper level divergence
- enhanced evaporation
- low level convergence
- mean westerly wind
- increased shortwave flux

COLD to WARM

approx. 60° of longitude or ~30 days
What is the MJO?

• We really don’t know how it develops
• What we know:
  • Large area of convection that moves around the globe from west to east in 30-90 days.
  • It affects the weather in other parts of the world.
The question

Basically what is the role of MJO convection in temperature variations across the United States?
MJO Locations
Phase Diagram
The approach

Average standardize anomalies over a box located over the northeast United states will be calculated.
If temperatures standardized anomalies are one and half above or below normal for two consecutive days, it will be counted as an event.
Events

- Warm
  - Year
  - Seasons

- Cold
  - Year
  - Seasons
Finally plot each event in the phase diagram
Warm events year
Winter
Spring
Cold events year
Winter
Spring
Summer
Fall

SON Phase Diagram

Phase 7 (Western Pacific)  Phase 6

Phase 8 (Western Africa)  Phase 1

Phase 5 (Maritime)  Phase 4

Phase 2 (Indian Ocean)
Conclusions

• For warm events MJO tends to be located over phases 4, 5 and 6
• Cold events are more difficult to predict, there may be other factors.
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• Cold events are more difficult to predict, there may be other factors.
• During spring time cold events MJO tend to be located in phase 7
• During fall MJO tends to be located over phases 7, 8 and 1
Future Work

• Analyze other factors (NAO, AO, ENSO, etc...)
• Relationship between MJO amplitude and cold (warm) events strength and duration.