Potential Vorticity Accumulation Following Atmospheric Kelvin Waves in the Active Convective Region of the MJO

Introduction

- Convectively Coupled Atmospheric Kelvin waves (CCKWs) are part of the substructure of the Madden-Julian Oscillation (MJO).
- CCKWs are present in most MJO events (Roundy 2008, JAS)
- Schubert and Massarik (2006, Dynamics of Atmospheres and Oceans) showed that latent heat release in the MJO is associated with PV generation off the equator

Could diabatic heating from rainfall within CCKWs contribute to PV inside of the MJO?

Data Sources

- ECMWF Interim Reanalysis (1989-2009) \rightarrow anomalies
 - Ertel's PV on 315k and isobaric surfaces
 - Zonal and meridional winds on 315k surface.
- NOAA Interpolated OLR (1979-2009)
- MJO filtered
- CCKW filtered
- NCEP/NCAR Reanalysis (1979-2009)
- MJO filtered zonal winds at 200 hPa and 850 hPa
- TRMM 3B42 Rainfall Estimates (1998-2008)

Custom MJO Index

- Similar to Wheeler and Hendon (2004)
- We used *MJO filtered*:
 - OLR, Zonal Wind at 200 and 850 hPa
- First 2 principal components correspond to RMMs 1 and 2
- Necessary to remove CCKW and other signals
 - Otherwise MJO events contain redundant CCKW information which can bias composites.
- Full details found in MacRitchie and Roundy (2012)



Figure 1 Comparison of MJO indices for an arbitrarily chosen 30 day period beginning on 23 April 2004.

Red \rightarrow Filtered index Blue \rightarrow RMM index

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