Deconstruction of a science paper's data-evidence basis

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MPO 624

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My Paper

- Title, citation
  - Realistic initiation and dynamics of the Madden-Julian Oscillation in a coarse resolution aquaplanet GCMR.
    - R. S. Ajayamohan Boualem Khouider and Andrew J. Majda
- Size of evidence set:
  - 4 figures, 0 tables, 0 magic-number (in-text) results

Figure 1

- "Display raw data"
  - Hovoemoller of model zonal wind, precipitation
  - (bottom) Stucture of warm pool
- Showing model can produce MJO-like features

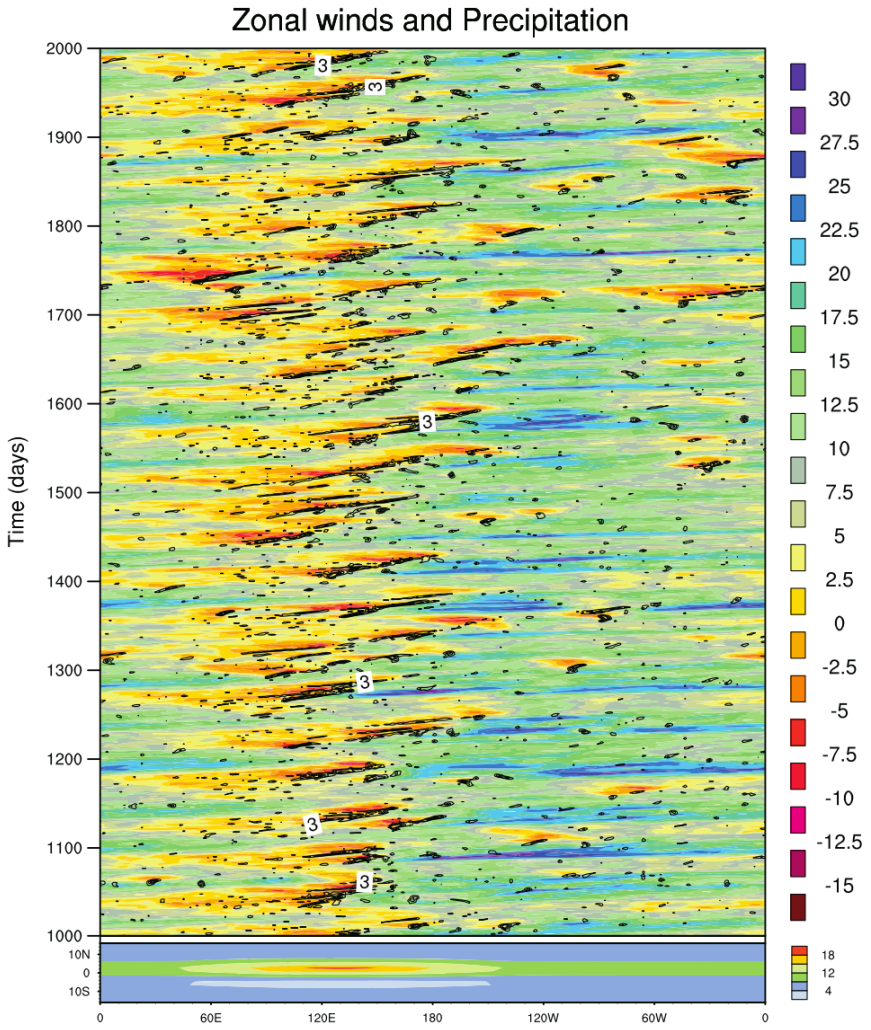


Figure 2

- "Raw Data" and "Relationship exists"
  - Zoomed in version of Fig 1
- Cause and Effect relationship of dry-Kelvin waves and MJO

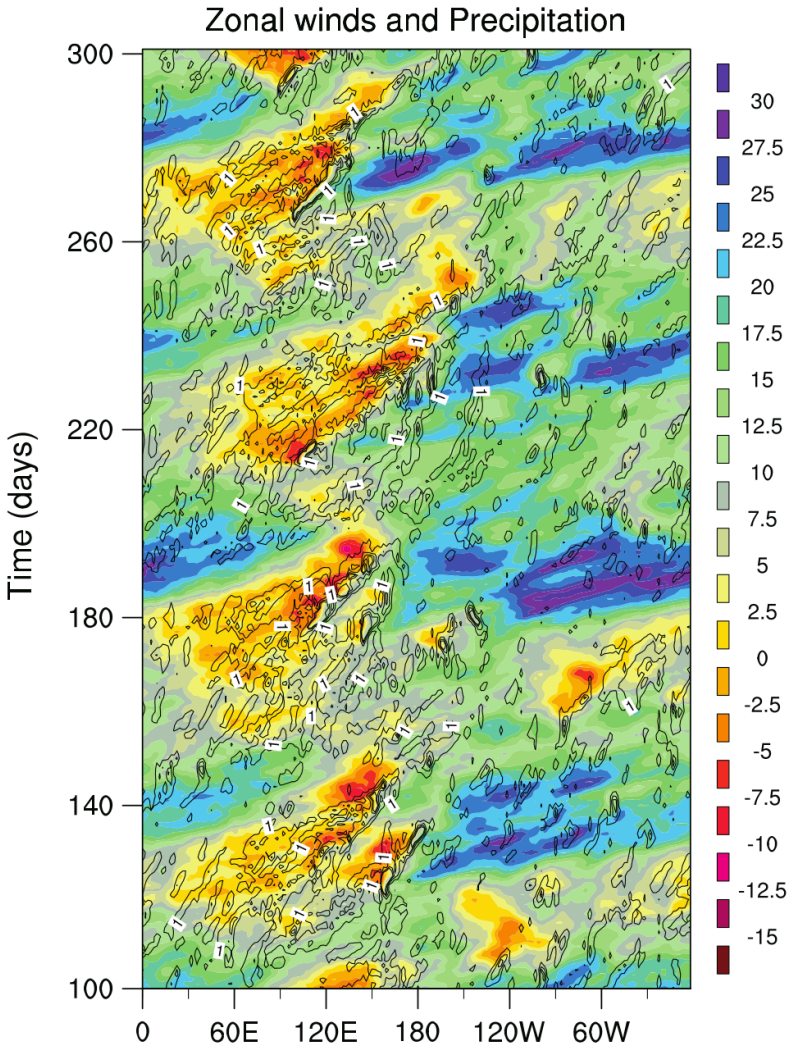
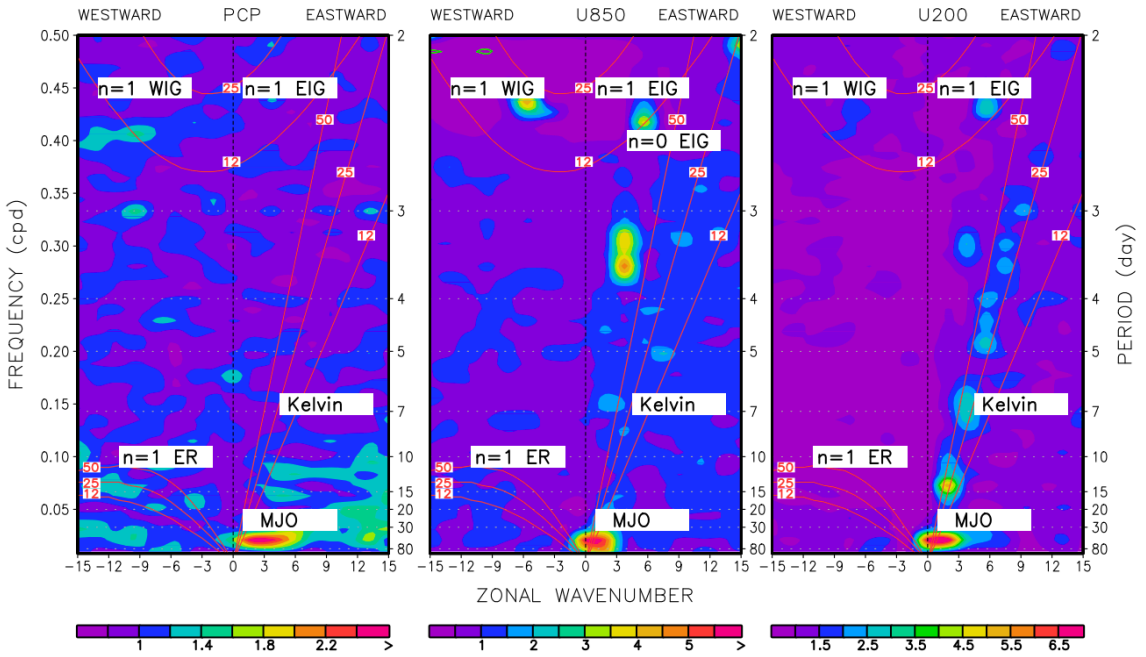


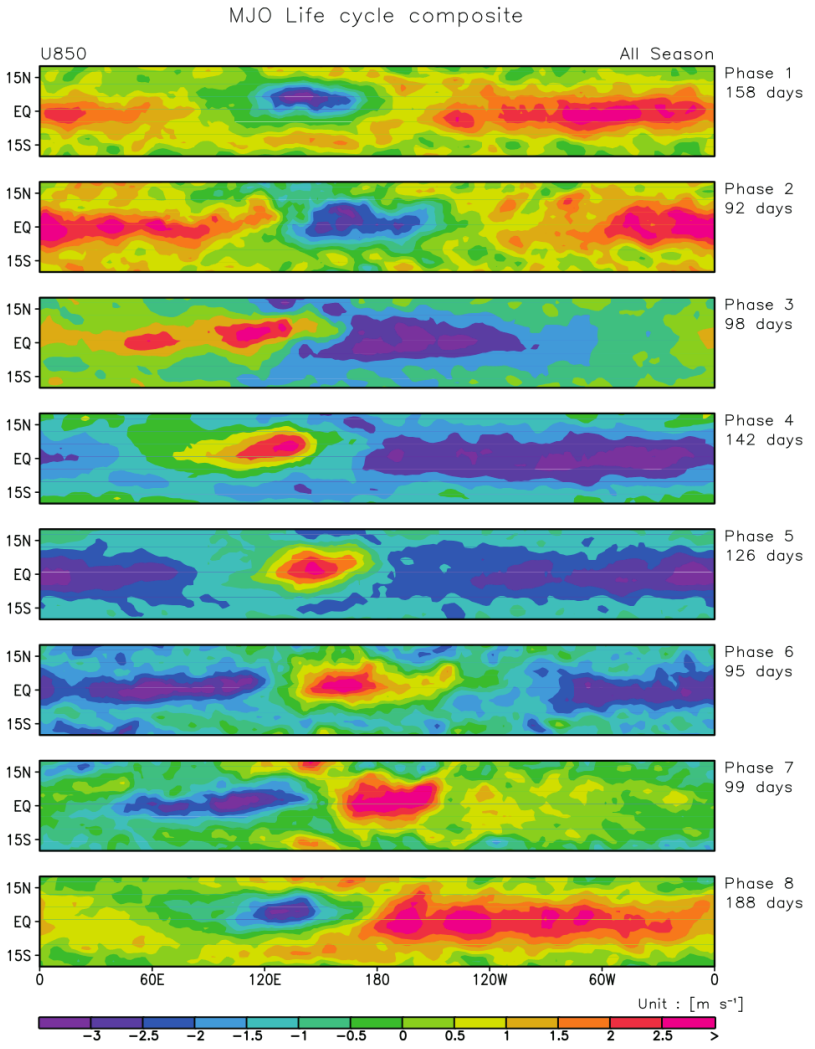
Figure 3



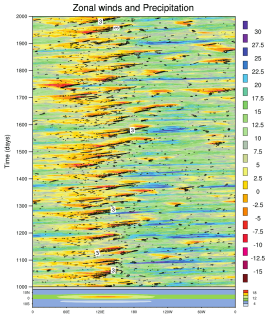
- Highly-filtered “Summary of Raw Data”
- Power Spectra Shows what features are present in the model data

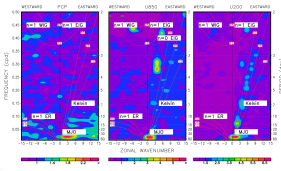
Figure 4

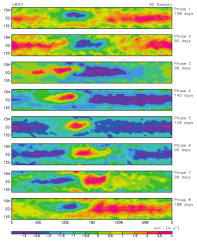
- “Summary display of raw data”
- Shows the 8 phases of the MJO in composite U850

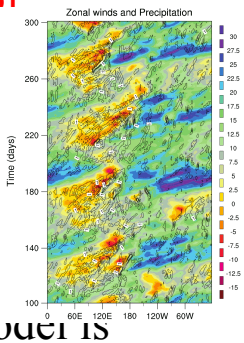


The Abstract, and how figures support its claims









n mechanisms for the initiation and propagation of the Madden-Julian Oscillation (MJO) are still widely debated. The capacity of operational global climate models (GC to correctly simulate the MJO is hindered by the inadequacy of the underlying cumulu parameterizations. Here we show that a coarse resolution GCM, coupled to a simple multicloud model parameterization mimicking the observed dynamics and physical str of organized tropical convection, simulates the MJO in an idealized setting of an aquaplanet without ocean dynamics. We impose a fixed nonhomogeneous sea-surface temperature replicating the Indian Ocean/Western Pacific warm pool. This results in a succession of MJOs with realistic phase speed, amplitude, and physical structure. Each MJO event i initiated at a somewhat random location over the warm pool and dies sometimes near eastern boundary of the warm pool and sometimes at a random location way beyond t warm pool. Also occasionally the MJO events stall at the center of maximum heating. reminiscent of the fact that in nature some MJOs stall over the maritime continent whi others reach the central Pacific Ocean and beyond. The initiation mechanism in the model is believed to be a combination of persistent intermittent convective events interacting with observed large-scale flow patterns and internal tropical dynamics. The large-scale flow patterns are associated with planetary-scale dry Kelvin waves that are triggered by preceding MJO events and circle the globe, while congestus cloud decks on the flanks of the warm pool are believed to force Rossby gyres which then funnel moisture toward the equatorial region.