



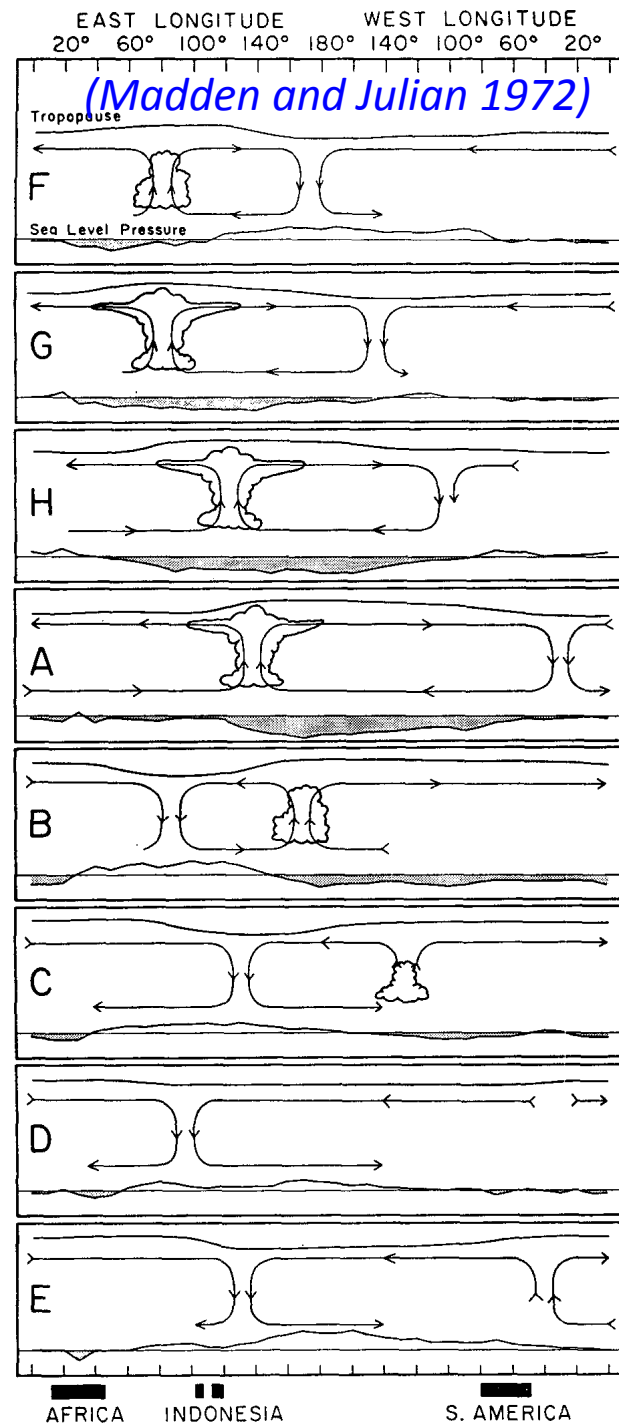
***DYNAMO/CINDY2011:
Initiation of the MJO***

***Richard H. Johnson
Colorado State University***

West Pacific Warm Pool, early Dec 1992 (Xin Lin)

“Because we found no evidence of the oscillation in the lower troposphere over the Atlantic or western Africa, we assumed that it originated somewhere in the Indian Ocean. The indicated convection was supported by the convergence (divergence) in the lower- (upper) level u winds and by mixing ratios and temperatures.”

– *Madden and Julian (1994)*

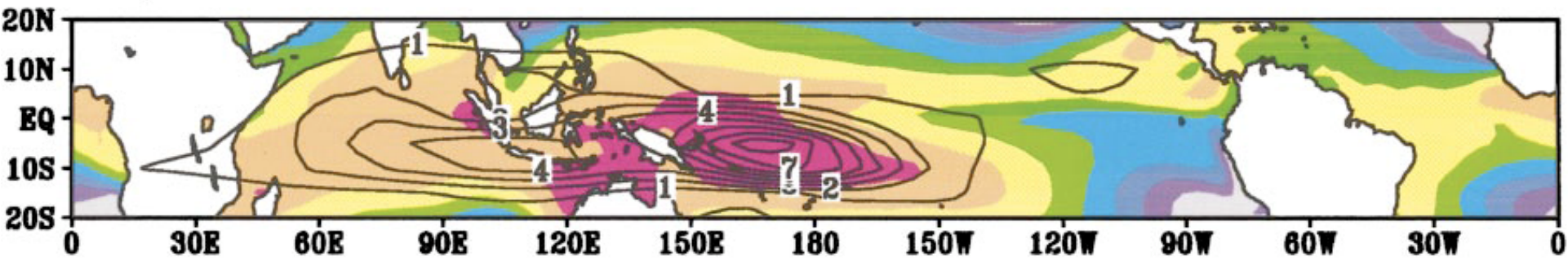


Variance of U_{850} for MJO, SST

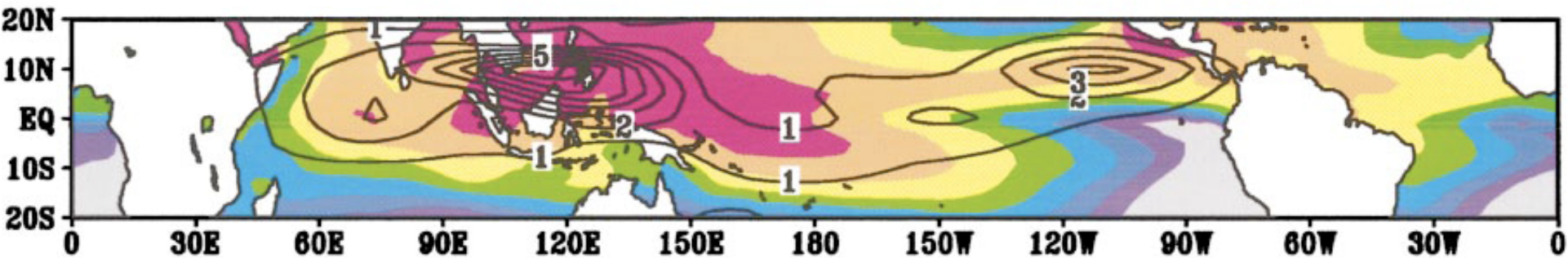
(Zhang and Dong 2004)

DEC-MAR

1979-1998



JUN-SEP

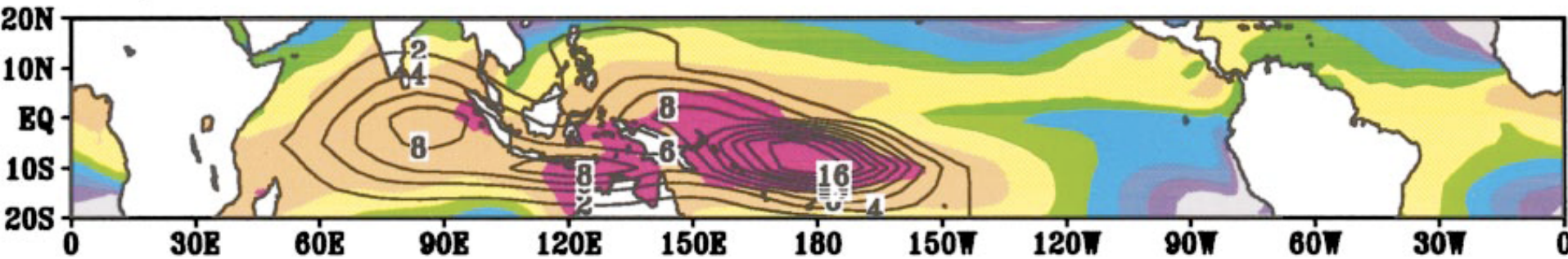


Variance of Precipitation for MJO, SST

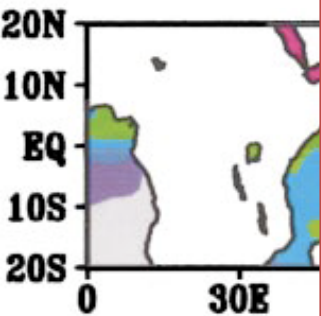
(Zhang and Dong 2004)

DEC-MAR

1979-1998



JUN-SEP



Key questions for DYNAMO/CINDY2011

- What is the optimal array location, timing, duration – from standpoint of the atmosphere? the ocean?
- Factors to consider: seasonal cycle, interannual variability of precipitation, IOD, ENSO, others?
- How long do measurements need to be made to have a high probability of capturing an MJO event?
- What is the optimal size, configuration of the sounding array? ...location of ship radars? ...other sensors?

MJO Initiation Mechanisms/Factors

- ❑ Local discharge-recharge processes
- ❑ Extratropical influences
- ❑ Precursor circumnavigating disturbances
- ❑ Stochastic forcing
- ❑ Other factors:
 - Ocean coupling: ocean mixed layer variability/waves/currents/diurnal warm layer/IO Dipole
 - Air-sea interaction: surface fluxes/SST gradients
 - Atmospheric boundary layer properties: moisture convergence/mixed layer depth/diurnal cycle
 - Properties of convection: mesoscale organization, cloud populations, tropospheric moistening/drying, cold pools, vertical distribution of latent heating, convective momentum transport
 - Roles of changing mean state of atmosphere: evolving mean flow and tropospheric shear, changing instability and moisture profile
 - Roles of equatorial waves: Rossby, Kelvin waves