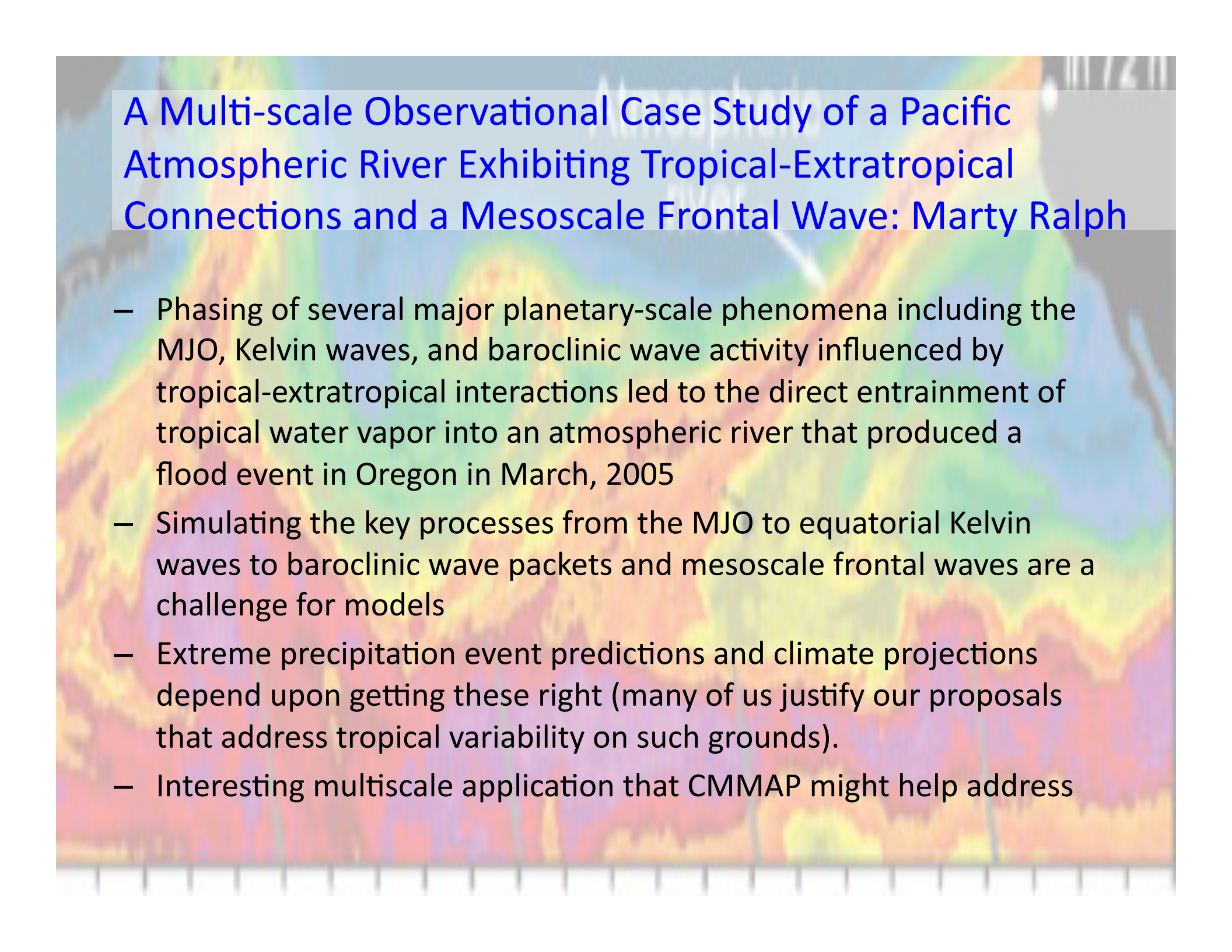


MJO Breakout Session Report

CMMAP Team Meeting
August 5, 2010



A Multi-scale Observational Case Study of a Pacific Atmospheric River Exhibiting Tropical-Extratropical Connections and a Mesoscale Frontal Wave: Marty Ralph

- Phasing of several major planetary-scale phenomena including the MJO, Kelvin waves, and baroclinic wave activity influenced by tropical-extratropical interactions led to the direct entrainment of tropical water vapor into an atmospheric river that produced a flood event in Oregon in March, 2005
- Simulating the key processes from the MJO to equatorial Kelvin waves to baroclinic wave packets and mesoscale frontal waves are a challenge for models
- Extreme precipitation event predictions and climate projections depend upon getting these right (many of us justify our proposals that address tropical variability on such grounds).
- Interesting multiscale application that CMMAP might help address

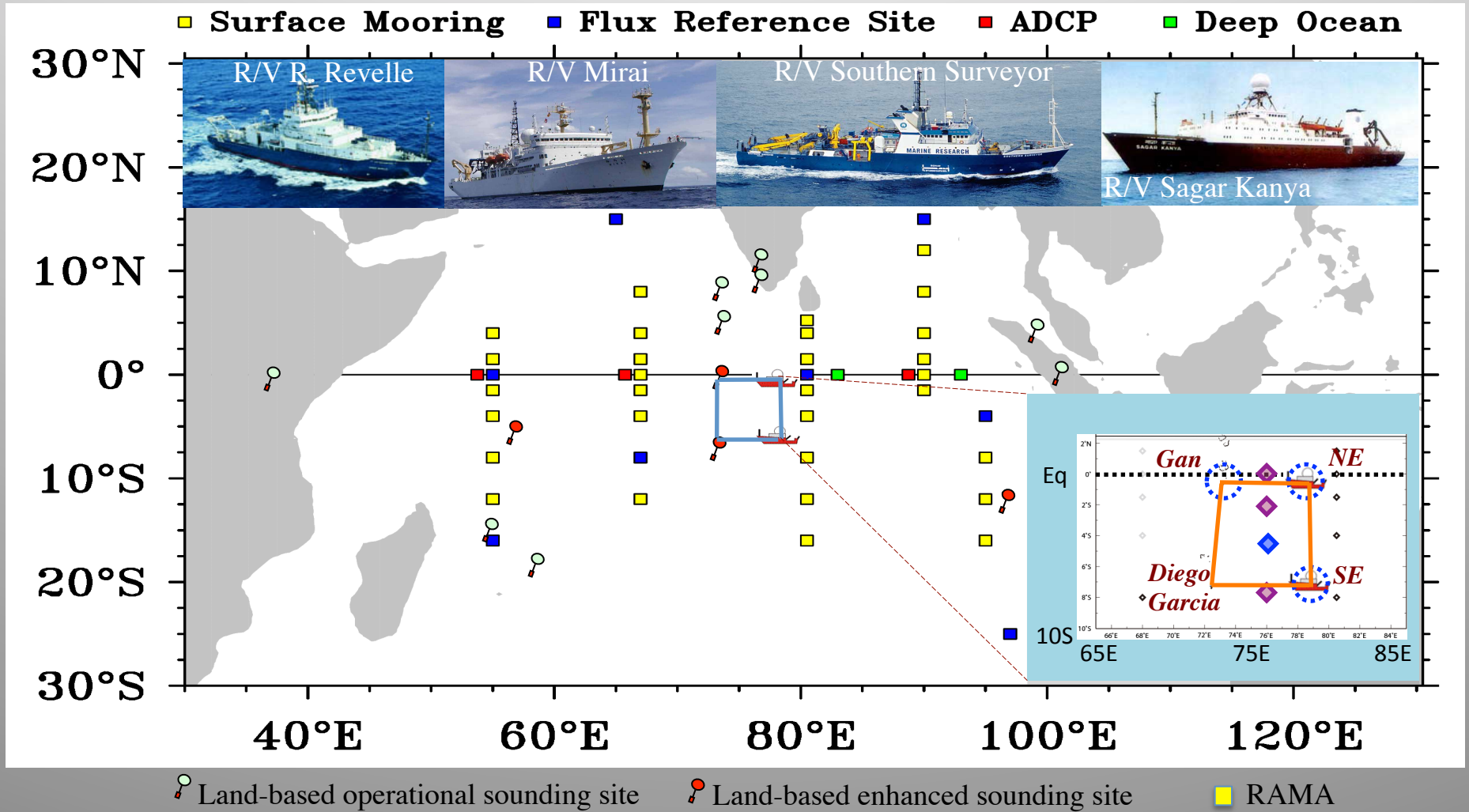
Using a super-parameterized version of WRF to study the ITCZ and convection parameterization: Stefan Tulich

- Used SP-WRF and compared to conventional parameterized versions.
- Argued that deficiencies in the simulation of convection-wave coupling can produce deficiencies in the mean climate
- Argued that overactive eddy activity through regulation of the moisture budget and horizontal moisture advection leads to mean state biases

The Madden Julian Oscillation (MJO) in CCSM4 and CESM1 (CAM5): Rich Neale, Dani Coleman

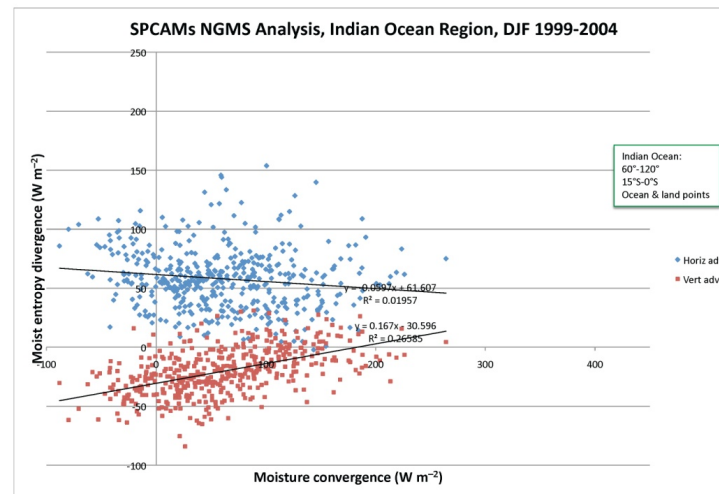
- ✓ Significant changes to deep convection in CCSM4 (CMT and parcel dilution)
 - ✓ Tropical variance increased at most time and space scales in CCSM4
 - ✓ Tropical U850mb variance improved; OLR variance too strong
 - ✓ Intraseasonal variance is a larger fraction of total variance
 - ✓ Multivariate MJO-type structures explain greater fraction of variance
 - ✓ Propagating strength of structures much greater
 - ✓ Wavenumber-frequency distribution of variance stronger in 'MJO phase space'
-
- ✓ Prescribed SST (CAM) experiments have weaker response
 - ✓ Resolution (2 deg -> 1 deg, CAM) buys you a stronger MJO
 - ✓ CAM5 is weaker than CAM4 (2 deg) – sacrificial tuning of deep convection!
 - ✓ CAPT forecasts shows CAM3 convective spin-up response is destructive for maintaining initialized propagation
-
- ✓ More analysis needed

**Provided Update on the
Dynamics of the MJO (DYNAMO)
Field Campaign
October 1, 2011 – March 31, 2012**



Process-Oriented Diagnostics for Climate Models (YOTC MJO Task Force)

- CLIVAR MJO WG developed diagnostics that makes it possible to diagnose the MJO in order to assess simulation and track improvements (e.g. amplitude):
- We can say confidently whether one model simulates the MJO and another doesn't but we need diagnostics that provide insight as to why
- Need to develop process-oriented diagnostics that focus on physical processes of relevance to the MJO so as to deepen understanding of simulations and promote improved simulation



Outstanding Issues: Process-Oriented Diagnostics

Much of discussion tabled until Winter meeting

1. Process-oriented diagnostics for multi-scale interaction (e.g. as they affect momentum, moisture budgets)
2. Reconciling differences in diagnostics among observational datasets
3. Suggestions for diagnostics?
4. CMMAP might be suited to take the lead in some diagnostic development