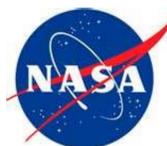


Using GPM/TRMM to Evaluate Northward Propagation of Precipitation in the ARWRF Indian Monsoon



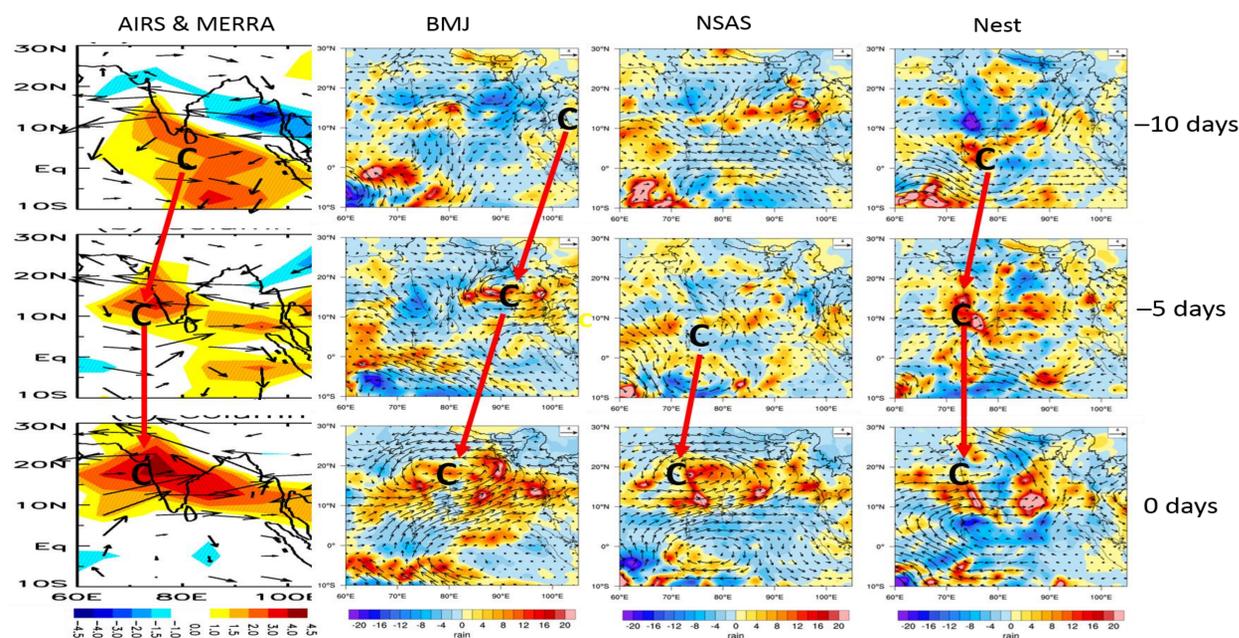
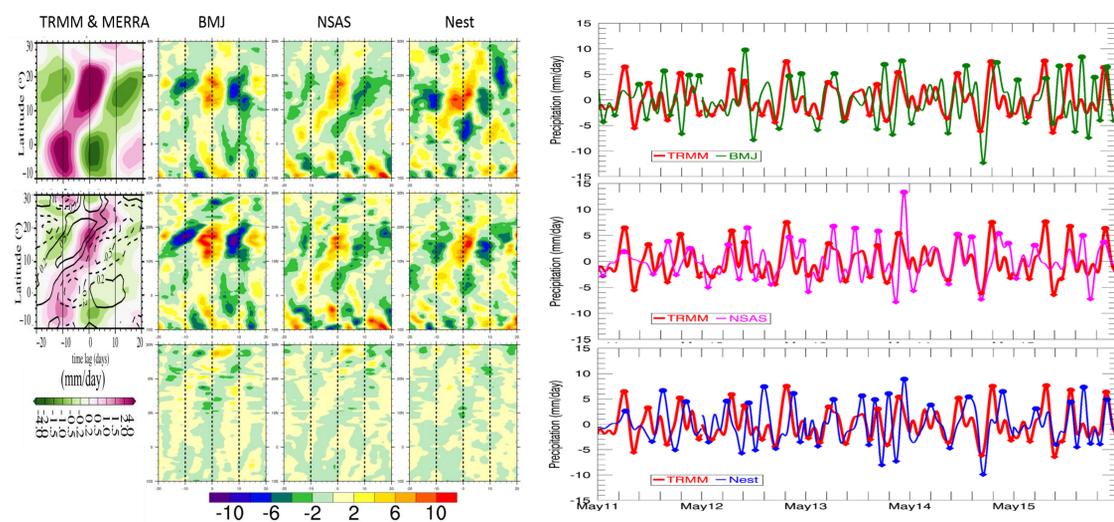
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Objectives

- Test influences of cumulus parameterizations on ARWRF simulations of Indian Monsoon intraseasonal oscillation
- Schemes being investigated: Betts-Miller-Janjic (BMJ), New Simplified Arakawa-Schubert (NSAS), NSAS + nested Indian subcontinent/Indian Ocean sector

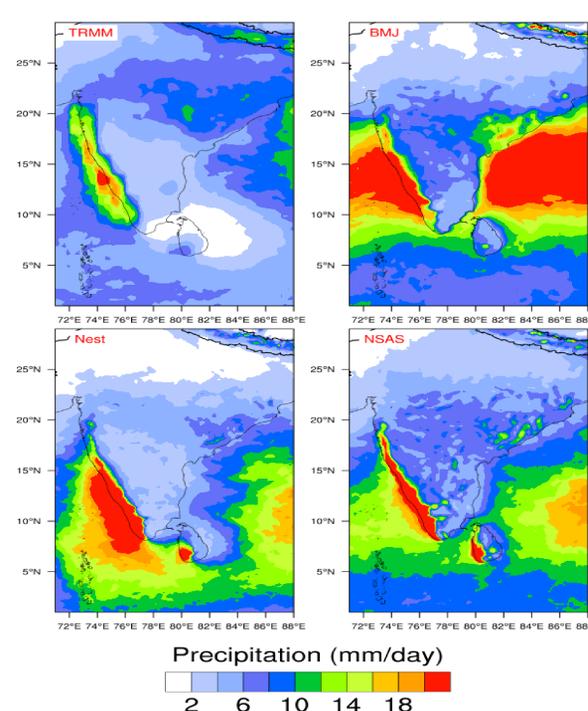
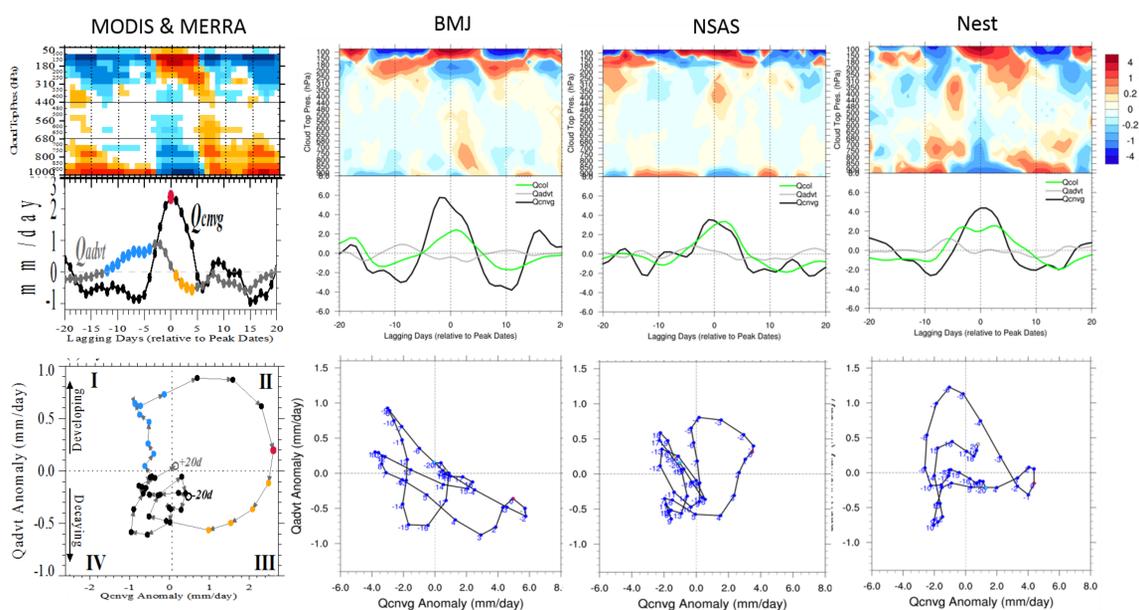


Northward Propagation and Water Budget Coherency

- Northward propagation of precipitation is associated with coherent variations between water vapor tendency related to large-scale convergence ($-Q\nabla\cdot\mathbf{V}$) and moisture advection ($-\mathbf{V}\cdot\nabla Q$), which have a phase-lag of about 5-10 days, with the positive convergence anomalies associated with transition from shallow to deep convection.
- The BMJ scheme has the advection decaying too fast before the enhancement of convergence, a result associated with cyclonic circulation propagating from the east (Indonesia).
- The NSAS scheme has the advection sustained during enhancement of convergence. Nested domain provides even better coherency. Both are associated with cyclonic circulation propagating from the south (Tropical Indian Ocean).

Intraseasonal Oscillation and Northward Propagation of Precipitation

- All three scenarios of the ARWRF simulations have intraseasonal oscillation in rainfall over the Indian subcontinent.
- The simulation using the BMJ cumulus parameterization does not reproduce the northward propagation of precipitation



Conclusions

- Cumulus parameterization influences tropical wave activity that in turn determines whether the model reproduces northward propagation of rainfall.
- High resolution simulation (Nest) provides more realistic simulation of rainfall over land as well as the northward propagation of rainfall.

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