

# Impact of horizontal resolution on the tropical intraseasonal variability: Results from the Project Athena

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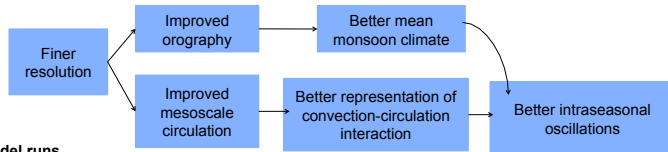
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## Objective

Examine the impact of spatial resolution on the South Asian monsoon mean climate and the northward propagating summer intraseasonal oscillation

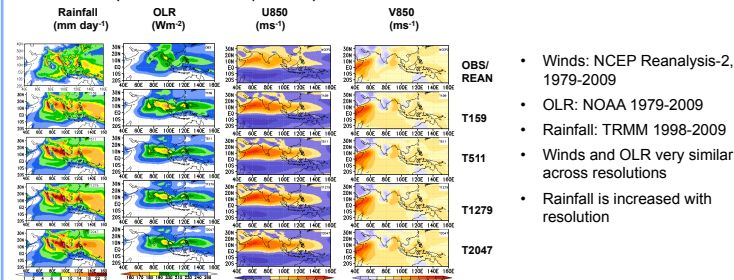
## Null hypothesis



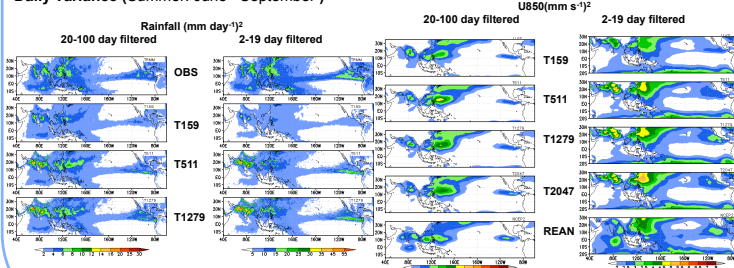
## Model runs

Model	Resolution		Length of each integration	Total period	Prescribed SST, sea ice
	Spectral	Grid size (km)			
ECMWF Integrated Forecast System (IFS)	T159	125	395 days 1 Nov Year-1 - 30 Nov Year-2	1960-2007 (48 integrations) 1989-2007 (19 integrations)	ERA-40 1960-1989, T159 ERA-Interim 1990-2007, T255 (Both interpolated to the respective model grids)
	T511	39			
	T1279	15			
	T2047	10			

## Mean climate (Summer: June –September)



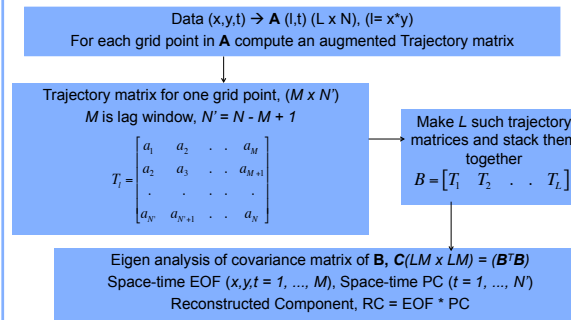
## Daily variance (Summer: June –September)



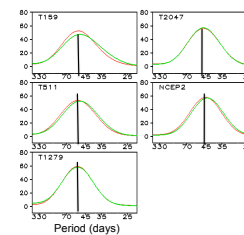
## Summer intraseasonal mode

- Analysis used: Multi-channel Singular Spectrum Analysis (MSSA) on 20-100 day filtered U850 anomalies
- Higher resolution model outputs interpolated to T159/125 km grid.
- Period analyzed: 1999-2008, MJJASO season
- MSSA lag window length: 85 days

## MSSA

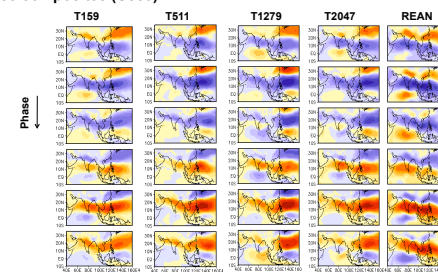


## Power Spectra of the northward propagating mode

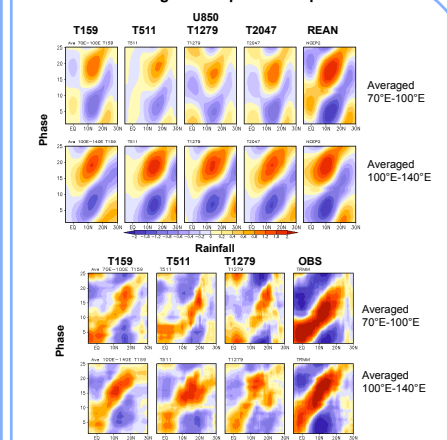


Data	ISO period (days)	Variance (%)
T159	51	8.8
T511	52	10.1
T1279	52	11.3
T2047	47	10.7
NCEP Rean2	45	13.2

## Phase composites (U850)

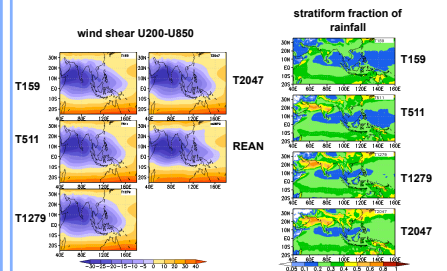


## Time – latitude diagrams of phase composites



## Summary and discussion

- Mean climatology over the monsoon region is similar across all the resolutions; especially in the winds.
- Marginal improvement in daily variance in precipitation
- Northward propagating ISO:
  - Spatial structure and amplitude similar across all runs
  - IFS model, even at T159 resolution, simulates the northward propagation of U850 reasonably well
  - Propagation in precipitation is weak for all resolutions
- Mean easterly wind shear is supposed to favor emission of Rossby waves; thereby critical for the northward propagation. This is similar in all resolutions.
- Increase in stratiform precipitation →? better ISO. Stratiform fraction is slightly increased from T159 to T511; but is not reflected in the ISO.



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