# High-resolution numerical modelling of seasonal volume, heat, and freshwater transport along the Indian coast

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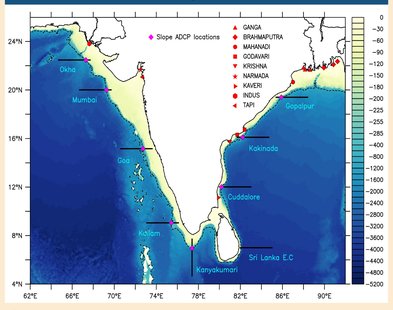
Outstanding Student & PhD candidate Presentation contest

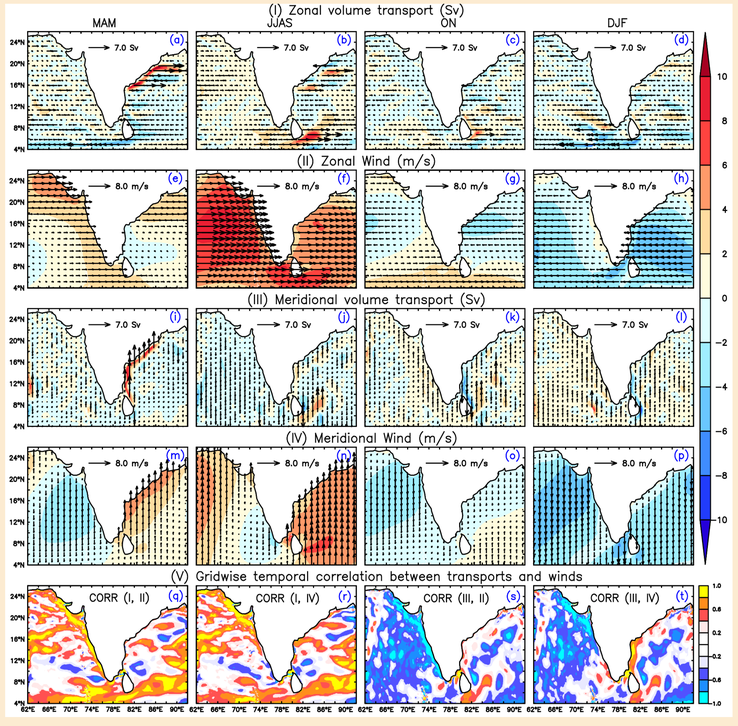
## Introduction

### Study area



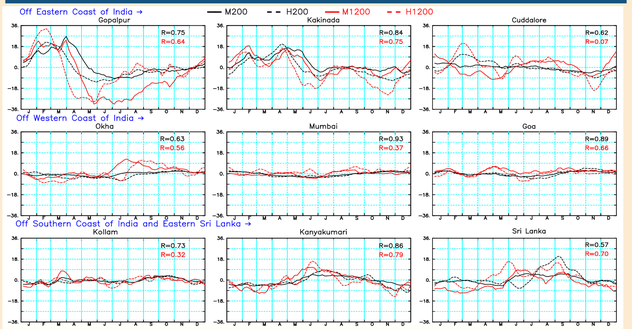

- The circulation of Arabian Sea and Bay of Bengal are dictated by the reversal of winds and equatorial remote forcing,
- A high resolution model (MITgcm, 1/20°) was setup to estimate the alongshore exchange of volume and freshwater along the Indian coast.
- Model temperature, salinity and currents were validated at surface and subsurface. Model simulations are in agreement with observations.

## Transports and wind

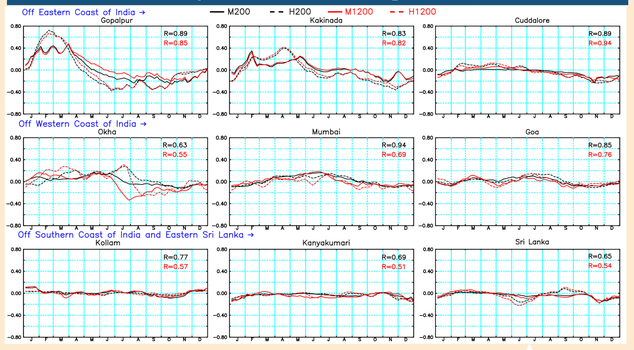



## Volume and freshwater transports

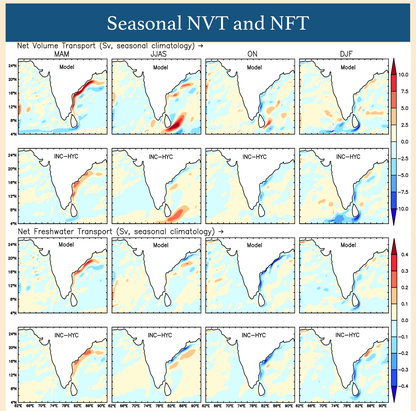
### Alongshore volume transport (AVT)




### Alongshore freshwater transport (AFT)




### Seasonal NVT and NFT

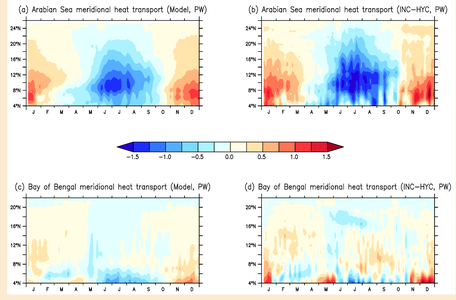



Transects – 3 each along the western, eastern and southern coastline of India

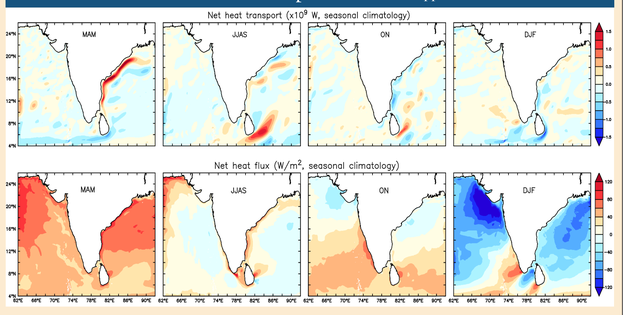
Model transports validated with HYCOM reanalysis data.

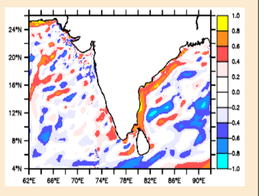
## Heat transport

### Meridional heat transport (MHT) – upper 100m




### Seasonal heat transport and flux– upper 100m



## Conclusions

- Zonal transport follows zonal wind direction and is in phase with meridional wind  Remote forcing plays a larger role in meridional transport.
- Along the south-eastern coast, positive correlation is attributed to two major drivers:
  - The Western Boundary Current flowing as a result of negative wind stress curl and
  - The East Indian Coastal Current driven by alongshore wind and Ekman pumping in the interior of the bay.
- AVT on the eastern coast is stronger with high seasonal variability due to the poleward flowing WBC and equatorward flowing EICC. The west coast transport is influenced by large intra-seasonal oscillations.
- AFT transport is computed to be two orders less than AVT. Seasonality of AVT and AFT contradicts each other on the western coast whereas they are in phase on the eastern coast.
- The net freshwater transport is maximum in BoB (6.03%) during JJAS season, along the northeastern coast, followed by ON season (4.85%).
- MHT over AS is stronger than BoB. Both basins act as heat source during the summer monsoon and heat sink during the winter monsoon.
- Net heat flux positively correlates with net heat transport along the eastern coast of India and southeastern AS.