# Coastal Upwelling in the Western Bay of Bengal: Role of Local and Remote Windstress

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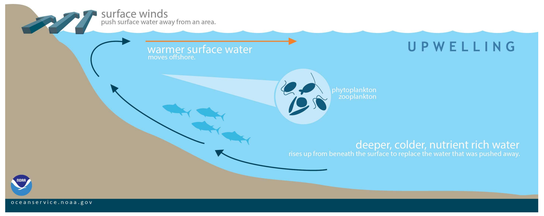
## I. INTRODUCTION

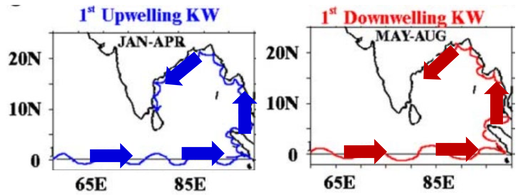
- **Coastal Upwelling:** Upward flow resulting from local alongshore wind driven offshore Ekman transport (ET).




(https://oceanservice.noaa.gov/education/tutorial_currents/03coastal4.html: accesses on 27th September 2023

- Alternatively, it can also be driven by coastally trapped internal Kelvin waves (KW), in the absence of local winds.
- Coastal upwelling is the most important physical process determining the biological productivity of coastal oceans.

**Seasonal KW Cycle: Modified From Rao et al., 2010**




- In the Western Bay of Bengal, both local wind-driven ET and remotely driven KW are known to drive coastal upwelling (Vinaychandran et al., 2021.)
- *Research Gap:* The relative contribution of ET and KWs and its alongshore variation have not been explored, particularly in observations.

## II. OBJECTIVES

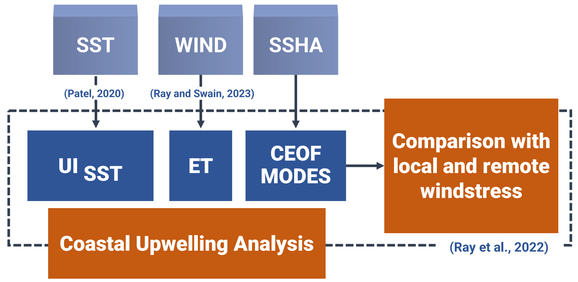
- **Identify variability associated with local wind-driven ET and remote wind-driven KWs.**
- **Characterise their relative contributions over different parts of the coastline.**

## III. DATA AND METHODS

### DATA

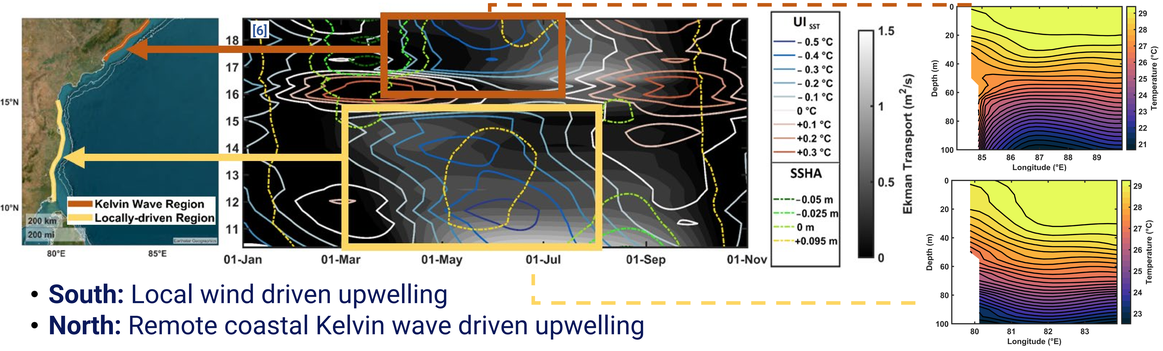
| Parameter | Dataset | Grid Spacing | Temporal Resolution |
|---|---|---|---|
| Zonal and Meridional Windstress | CMEMS WIND_GLO_WIND_L4 _REP_ OBSERVATIONS_012_006 | 0.25° × 0.25° | 6 h |
| Sea Surface Temperature | OSTIA REP Level 4 SST | 0.05° × 0.05° | Daily |
| Sea Surface Height Anomaly | CMEMS SEALEVEL_GLO _PHY_L4_MY_008_047 | 0.25° × 0.25° | Daily |

### METHODS



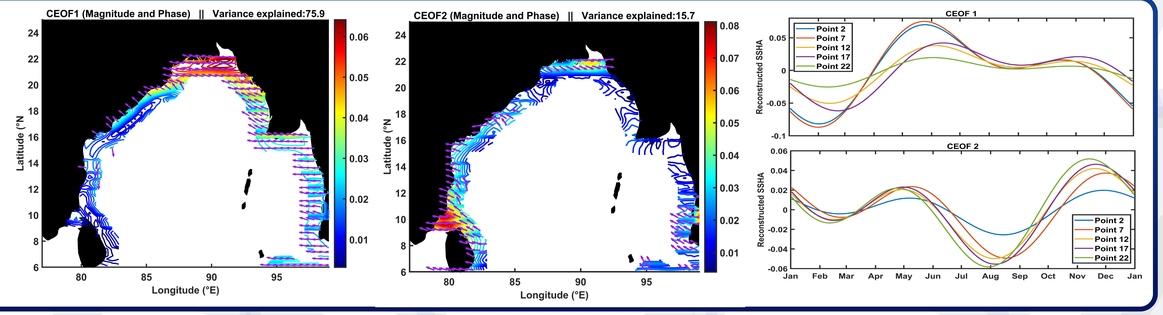

## IV. THE BAY OF BENGAL COASTAL UPWELLING SYSTEM

### DECADAL CLIMATOLOGY OF UPWELLING INDICES (2009-18)

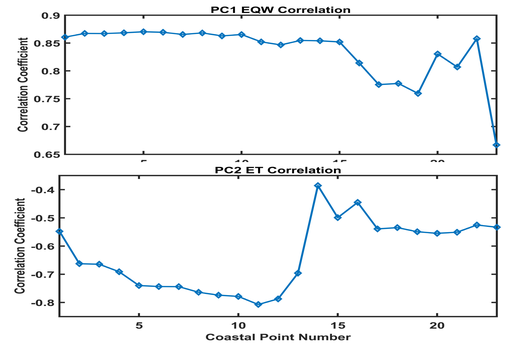



- **South:** Local wind driven upwelling
- **North:** Remote coastal Kelvin wave driven upwelling

## V. SEPARATION OF MODES




## VI. COMPARISON WITH LOCAL & REMOTE WINDS




## VI. CONCLUSIONS

- Coastal SST cooling coincides with alongshore winds in the south, while the cooling precedes the winds in the north.
- SSHA along the northern section is influenced by Mode 1 which is correlated with equatorial zonal winds.
- SSHA along the south is driven by Mode 2 which is correlated with local winds.
- **Coastal upwelling south of the KGD is local-wind driven, while the upwelling to the north is remote wind-driven.**


**References**

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