

AS205:Ocean Dynamics(Assignment 2)

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Introduction

We describe the seasonal means of sea surface temperature(SST) and sea surface salinity(SSS) in the Bay of Bengal and Arabian Sea. This is undertaken to study the spatial and temporal patterns of the two fields. The seasonal means are constructed for the year 2022.

Datasets

The datasets used in this analysis is as follows:

- **Sea Surface Temperature(SST)** : GHRSSST data.
- **Sea Surface Salinity(SSS)** : SMAP data.

Methodology

The datasets are choosen for the domain of $40^{\circ}E$ to $100^{\circ}E$ and $0^{\circ}N$ to $25^{\circ}N$. This covers the North Indian ocean. We then calculate the seasonal mean with the following seasons:

- **Spring** : January, February, March, April
- **Summer** : May, June, July, August
- **Winter** : September, October, November, December

We contrast the differences in spatial and temporal features in the SST and SSS fields for the Arabian Sea and Bay of Bengal.

Sea Surface Temperature

Spring

- The seasonal mean for spring is plotted in Figure 1.
- The Equatorial Indian ocean is considerably warmer than the Northern Indian ocean.
- The freshwater forcing in Bay of Bengal near the head bay and the Northern part of Eastern Arabian sea lead to cooler SST.
- The Arabian Sea is cooler than the Bay of Bengal on an average. This might be due to strong stratification in the Bay of Bengal which leads to warmer SST.

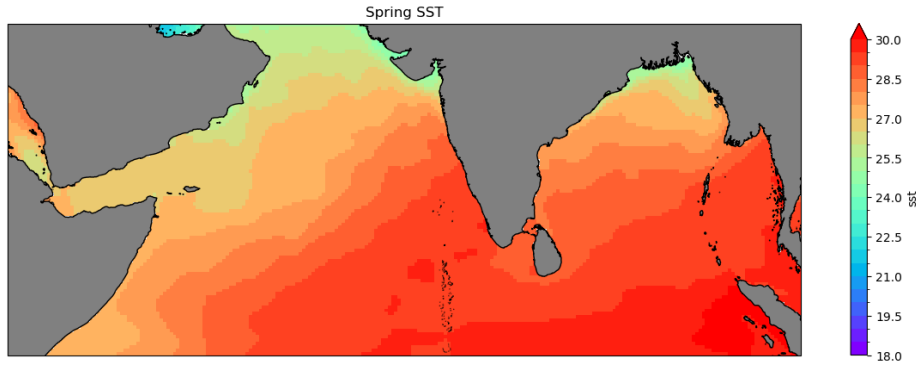


Figure 1: SST seasonal mean for spring

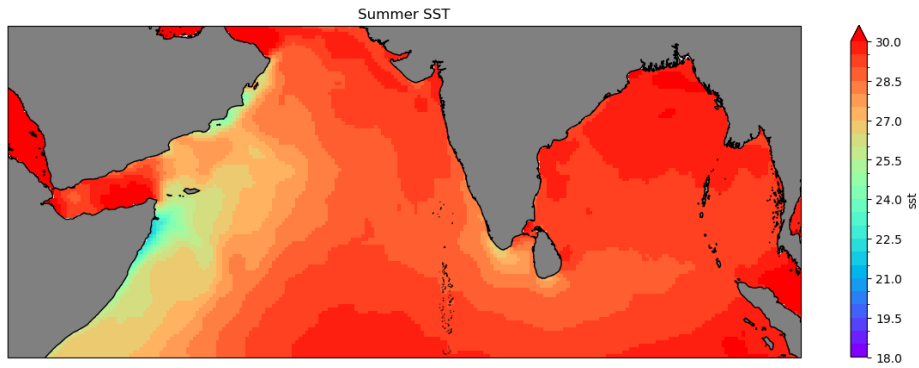


Figure 2: SST seasonal mean for summer

Summer

- Comparing it with spring by summer, we see considerable warming in Northern Indian ocean in all the basins.
- Though the equatorial Indian ocean seems to have the same SSTs.
- The eastern coast off Somali and Saudi Arabia seems to have lower SSTs compared with spring that could be due to upwelling happening there.
- The northern Bay of Bengal is warmer as compared to southern bay due to strong stratification present.

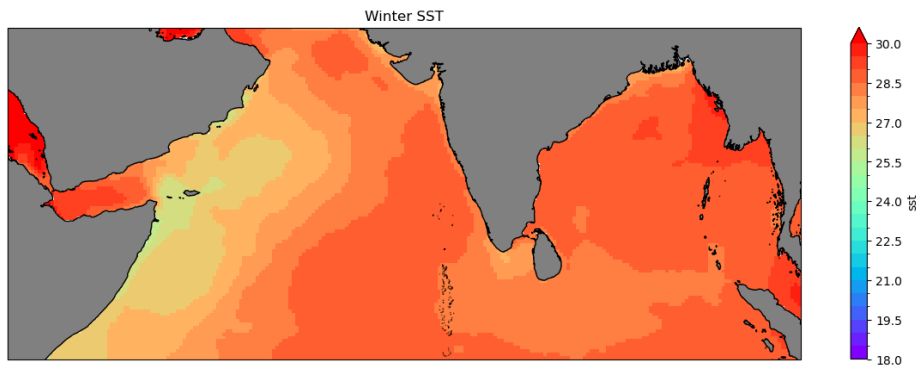


Figure 3: SST seasonal mean for winter

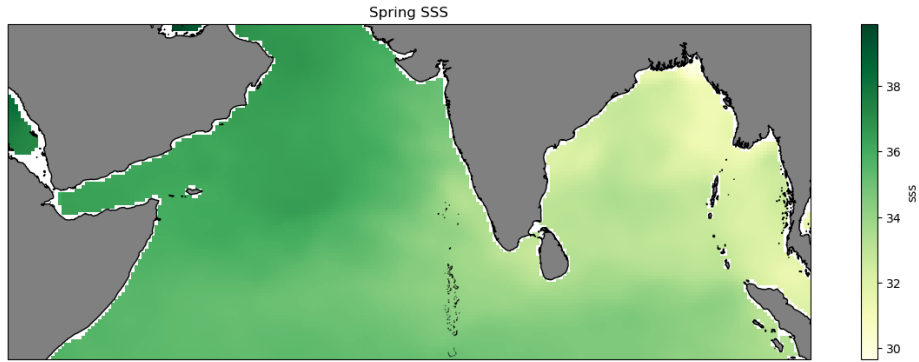


Figure 4: SSS seasonal mean for spring

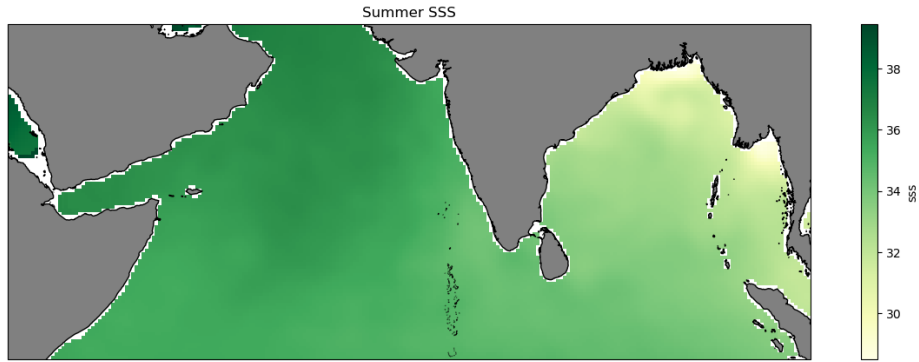


Figure 5: SSS seasonal mean for summer

Winter

- As expected, the coolest SSTs are observed in winter. This is shown in Figure 3.
- On an average, again the Arabian sea is cooler than the Bay of Bengal.

Sea Surface Salinity

Spring

- The Bay of Bengal is fresher as compared to Arabian sea due to large freshwater forcing.
- The Arabian sea has drainage from Gulf of Aden and Red Sea which are salty water bodies.

Summer

- By summer, the Arabian sea has become saltier due to evaporation.
- The Bay of Bengal also shows mild saltening.

Winter

- The Arabian sea continues to get saltier and the southern Arabian sea is also saltier as compared to spring and summer.
- The river water discharge in the northern Bay leads to reduction in salinity and this is clearly seen in the Figure 6.
- Hence, the northern bay is fresher in winter as compared to summer or spring.

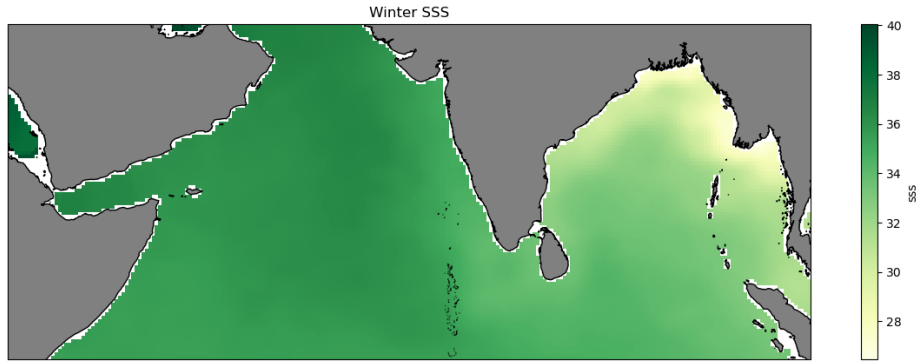


Figure 6: SSS seasonal mean for winter

Conclusions

- We compared the seasonal means of SST and SSS for northern Indian ocean.
- On an average the Arabian sea is saltier than the Bay of Bengal. This is primarily due to large freshwater influx in the bay.
- The Arabian sea is cooler than the Bay of Bengal as strong stratification in the bay prevents the deepening of mixed layer and hence the shortwave heat is surface trapped.