Assignment 1

Download the monthly "temperature" and "salinity" data until the depth of 500 meters for a 4° × 4° region during 1871 – 2010 in one of the Bay of Bengal or Arabian Sea or Andaman Sea (xyzt, demo has been shown in the class).

(a) Plot the entire Indian Ocean Basin and locate that region that you have chosen for your analysis.

(b) Plot the region-averaged time series of temperature and salinity variations over the 140 years at the surface. Also, plot the region-averaged climatological monthly variations for 12 months of the same temperature data (i.e., temperature and salinity variation for the months: Jan, Feb, March, …., Dec).

(c) Show the seasonal variations of both the physical parameters averaged during two of these seasons at the surface, February – April and October – December.

(d) Plot the standard deviation (show profiles) of both the temperature and salinity averaged during the above two seasons in the region chosen above.

(e) Plot the T/S diagram during 1871-2010.

(f) Show the interannual variation in Sea Surface Temperature (SST) and Sea Surface Salinity (SSS). Identify the positive and negative phases of Indian Ocean Dipole (IOD), the El-Nino and La-Nina years, and why are they so ?

(g) With the help of linear regression line ($y = mx + c$), calculate the rise/ decrease in both temperature and salinity per year. Calculate and plot the variation with respect to depth.

(h) Make use of at least three AI/ ML models to predict the SST and SSS for the next 5 years (until 2015), training the AI/ ML models with the data during 1871-2010. Plot and make a comparison among these three outputs.

Physically interpret and explain all the results. Compile all the figures and corresponding interpretations into a story and make a nice report of maximum 10 pages. Attach the codes at the end of the report.

Note: All 21 groups should choose separate regions. Any group found to have chosen the same region, the assignment stands cancelled. The regions can be in proximity of a coast or in the open ocean but must be 4° × 4° in the Bay of Bengal, Arabian Sea or Andaman Sea.

For SST, you can use the SODA 2.2.4 dataset from APDRC website (http://apdrc.soest.hawaii.edu/).