Assignments-2

1. Plot the ENSO (Nino 3.4) and Indian Ocean Dipole/Dipole Mode Index (IOD/DMI) time series from the following data source for the period of Jan-1900 to dec-2023:
   https://psl.noaa.gov/gcos_wgsp/Timeseries/Data/nino34.long.anom.data
   https://psl.noaa.gov/gcos_wgsp/Timeseries/Data/dmi.had.long.data

2. Compute the correlation co-efficient between the above time series.

3. Plot the Pacific Decadal Oscillation (PDO) and Inter-decadal Pacific Ocean (IPO) time series from the following data source from Jan-1900 to Dec-2023:
   https://psl.noaa.gov/gcos_wgsp/Timeseries/Data/pdo.long.data
   https://psl.noaa.gov/data/timeseries/IPOTPI/tpi.timeseries.hadisst11.data

   I guess these two time series are not filtered for the decadal variability. So, to see the decadal variability we need to filter the time series by applying a low-pass filter/smoothing of the time series using some smoothening function such as Lanczos filter/boxcar smoother/parzen smoother/hanning smoother/running mean of 10 years (i.e. 121 months/data points). You can use any method.

4. Plot the filtered time series of IPO from the following data source for Jan-1900 to dec-2023:
   https://psl.noaa.gov/data/timeseries/IPOTPI/tpi.timeseries.hadisst11.filt.data

   Here, when you will compare the filtered time series from question-3 with question-4 you will find similar behaviour. So, Compute the correlation-coefficient between the filtered time series from Q3 and Q4.

5. Repeat the filtering process for the ENSO time series of Q1 for decadal variability and compute the correlation coefficient with filtered PDO/IPO time series.

6. Subtract the filtered time series of ENSO from the original time series of ENSO and compute the correlation coefficient with the filtered ENSO/IPO/PDO time series.

7. Plot the Atlantic Multi-decadal Oscillation index (AMO) time series for the period jan-1900 to dec-2023 from the following data source:
   https://psl.noaa.gov/data/correlation/amon.sm.long.data

8. Compute the correlation coefficient between
   AMO and ENSO (Q1)
   AMO and IPO (Q4)

9. Make a 250 words summary on this assignment that what you have understood with these time series and correlation-coefficients.