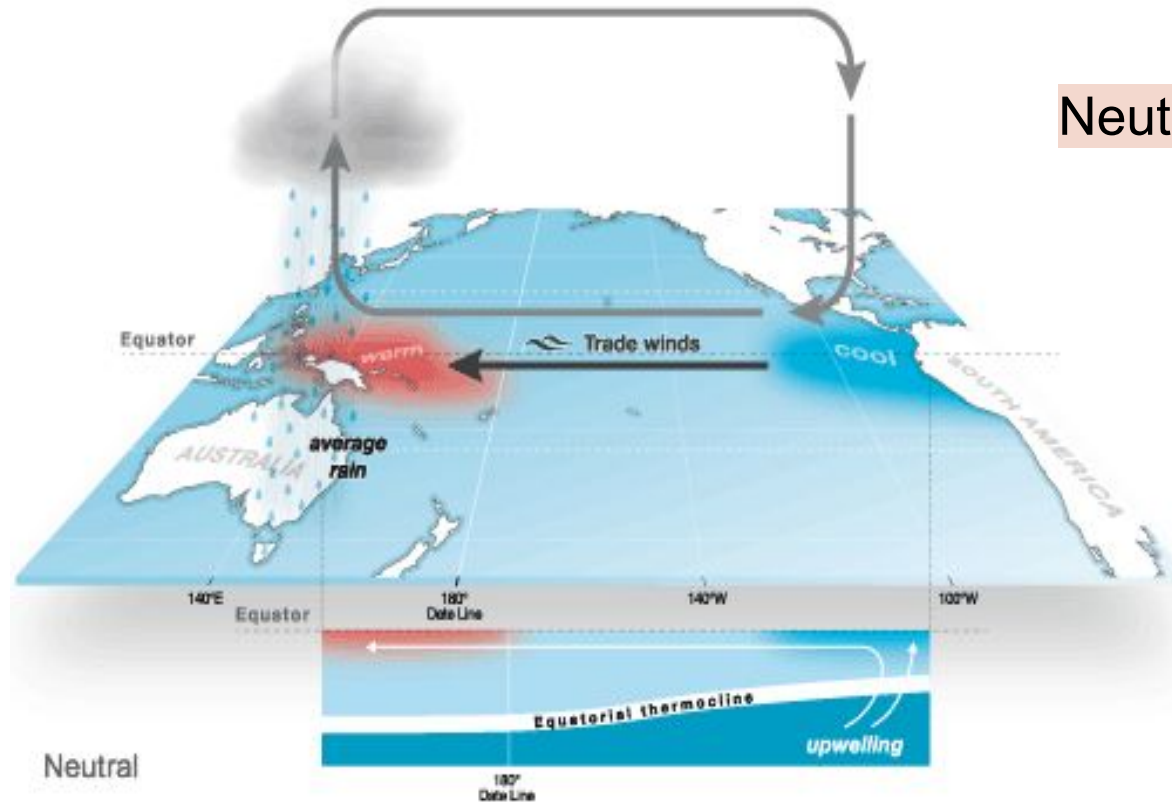


A satellite image of a tropical cyclone, likely a typhoon, over the Pacific Ocean. The image shows a large, swirling cloud system with a distinct eye in the center. The surrounding clouds are dense and white, contrasting with the dark blue of the ocean. The landmasses of Southeast Asia and Australia are visible in the background.

El Niño & la Niña events

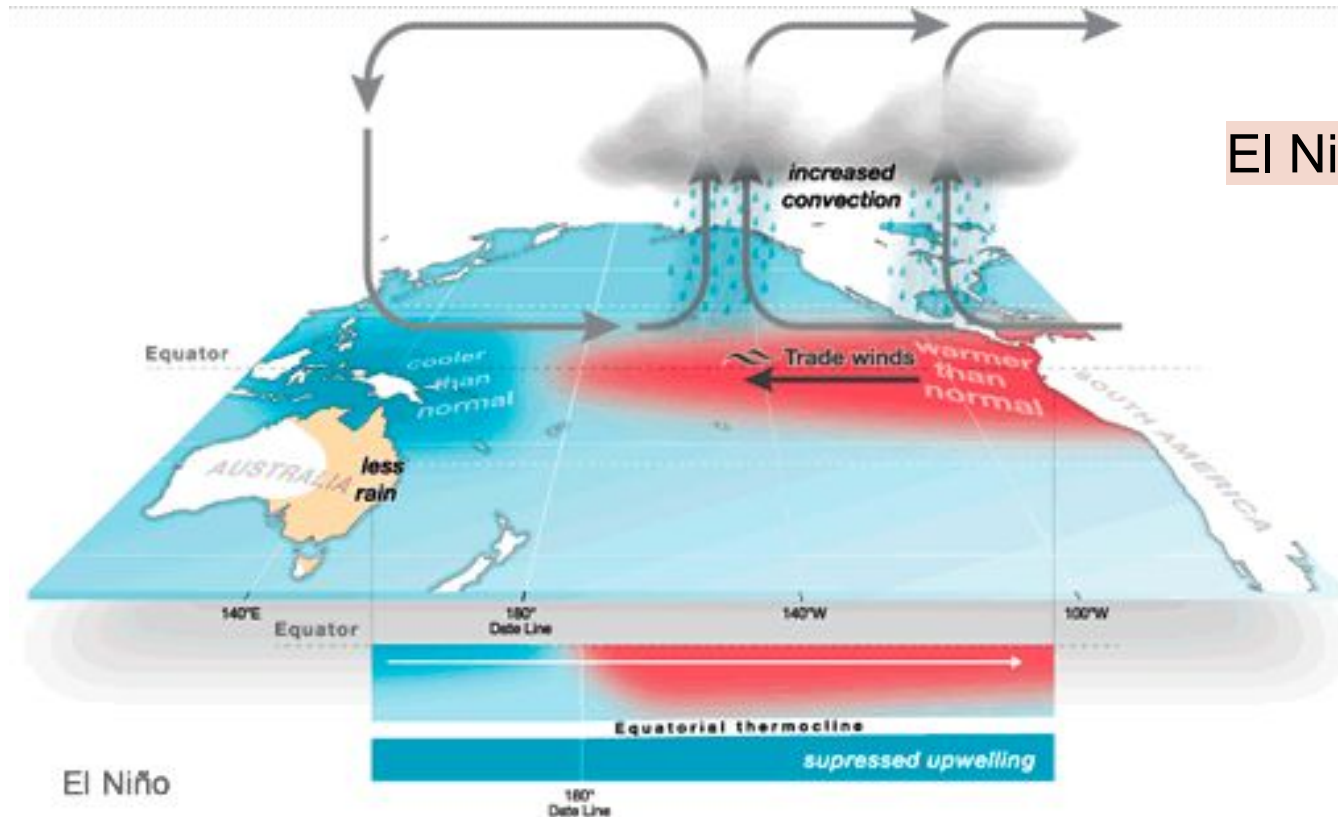
Le Kim NGUYEN, Nam Hieu NGUYEN LE, Julien Pasquiou, Clotilde Faure

El Niño Southern Oscillations and its events



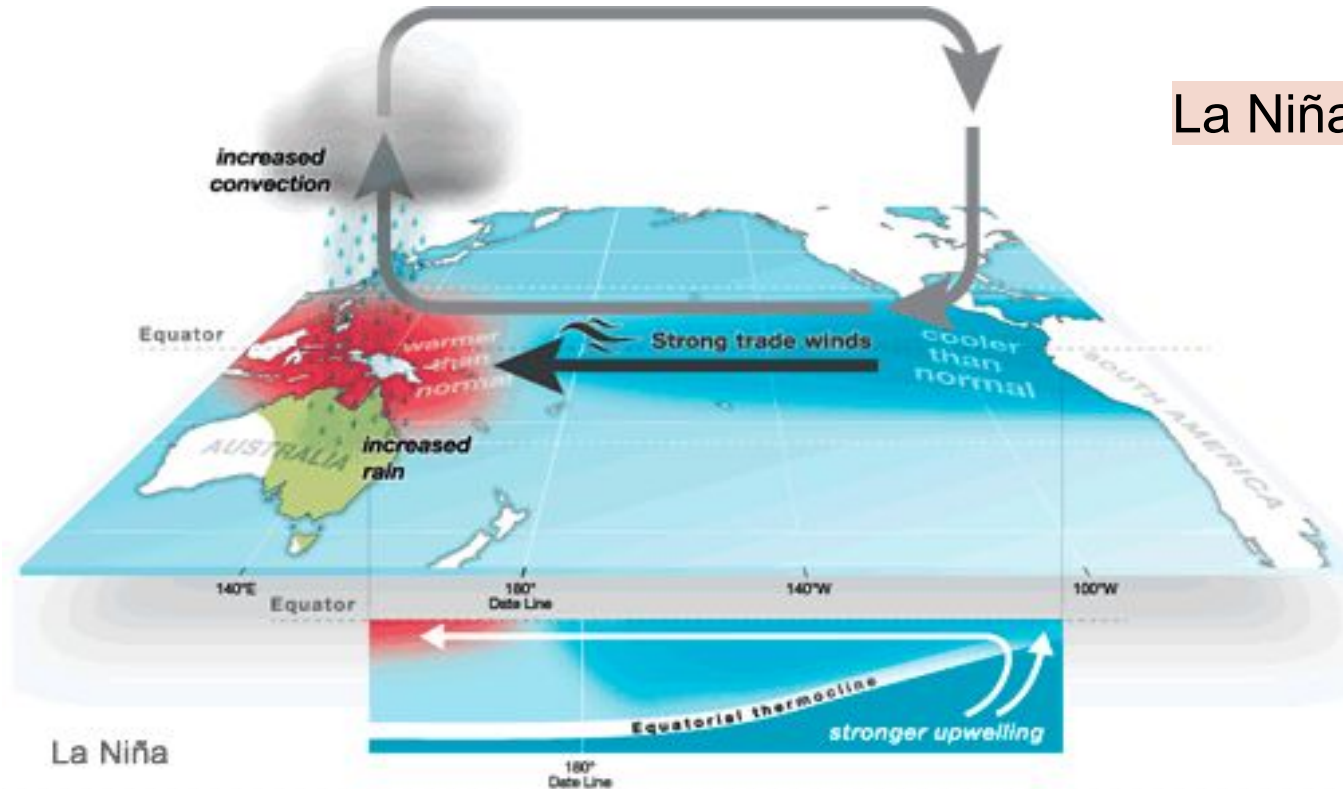
Neutral situation

El Niño Southern Oscillations and its events



El Niño situation

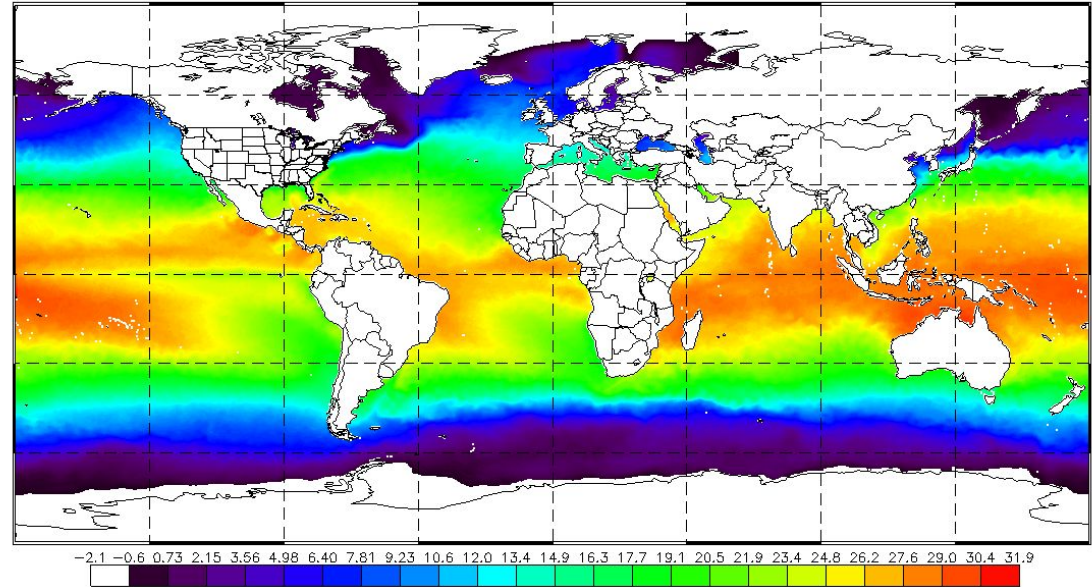
El Niño Southern Oscillations and its events



The Data

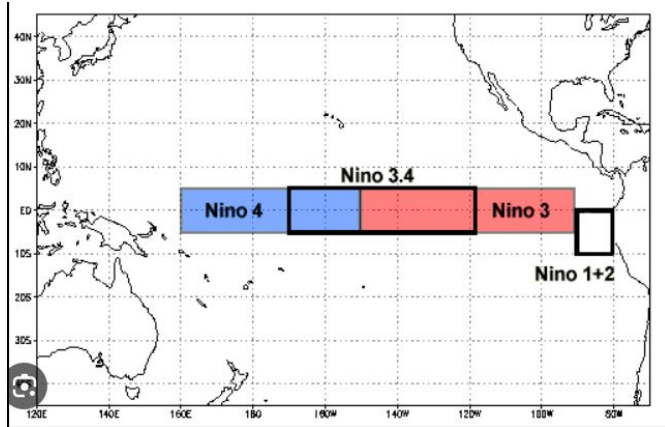


Monthly Mean Satellite-only Nighttime SST for January, 1994



Time period: January 1998 - February 2016

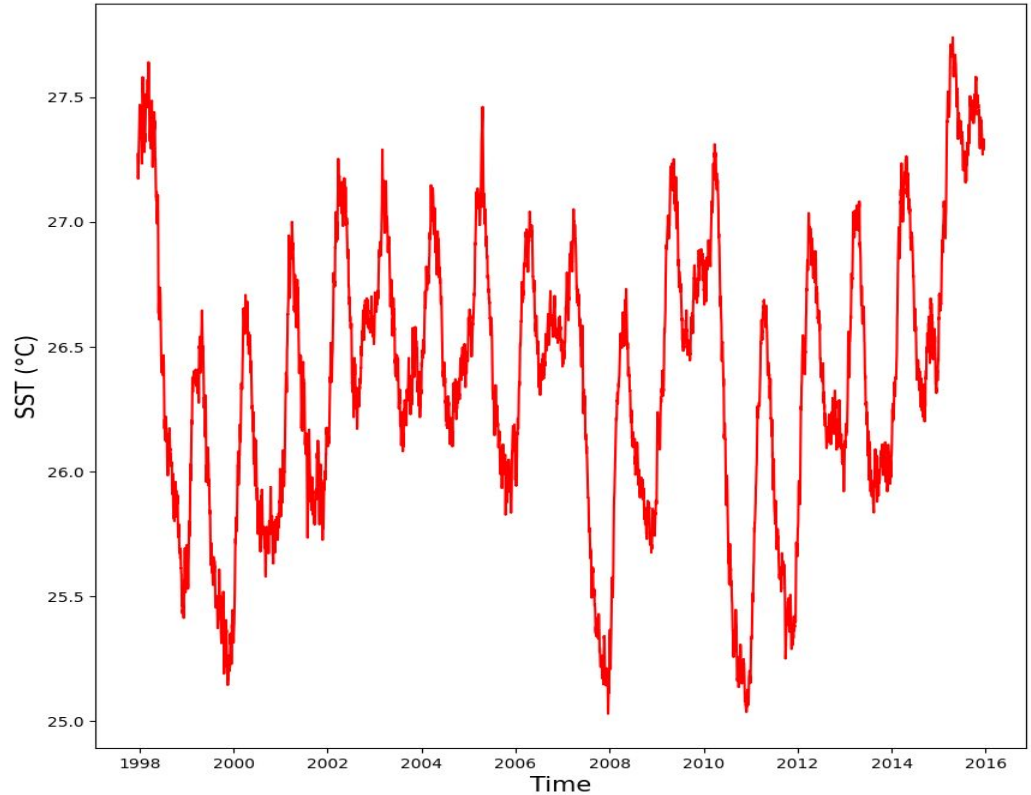
Index Niño 3.4 (ENSO Index)



zone :

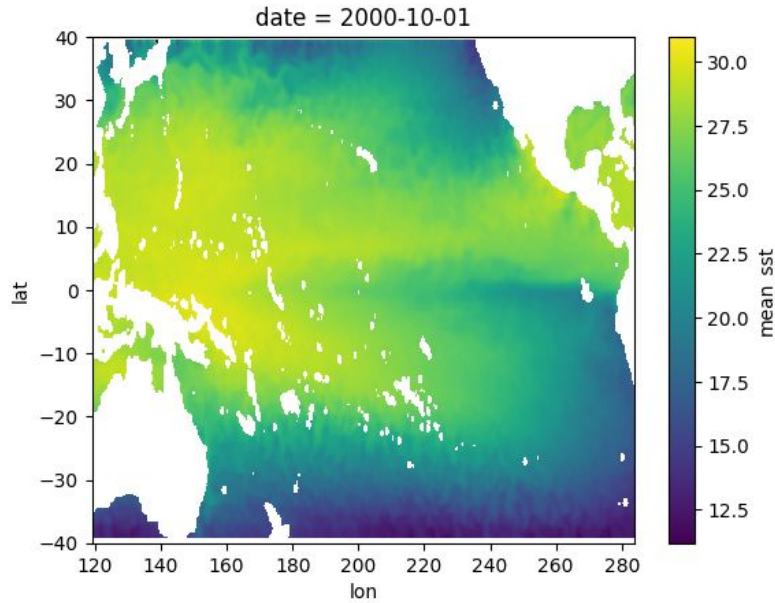
longitude: [180 ; 300]

latitude: [-20 ; 20]

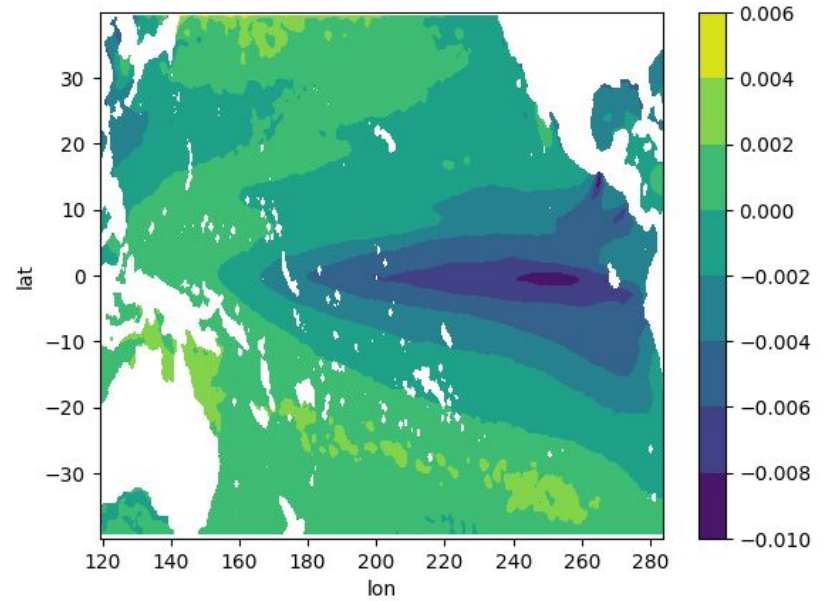


Mean SST in time between 01/01/1998 to 01/02/2016

Principal Components Analysis :

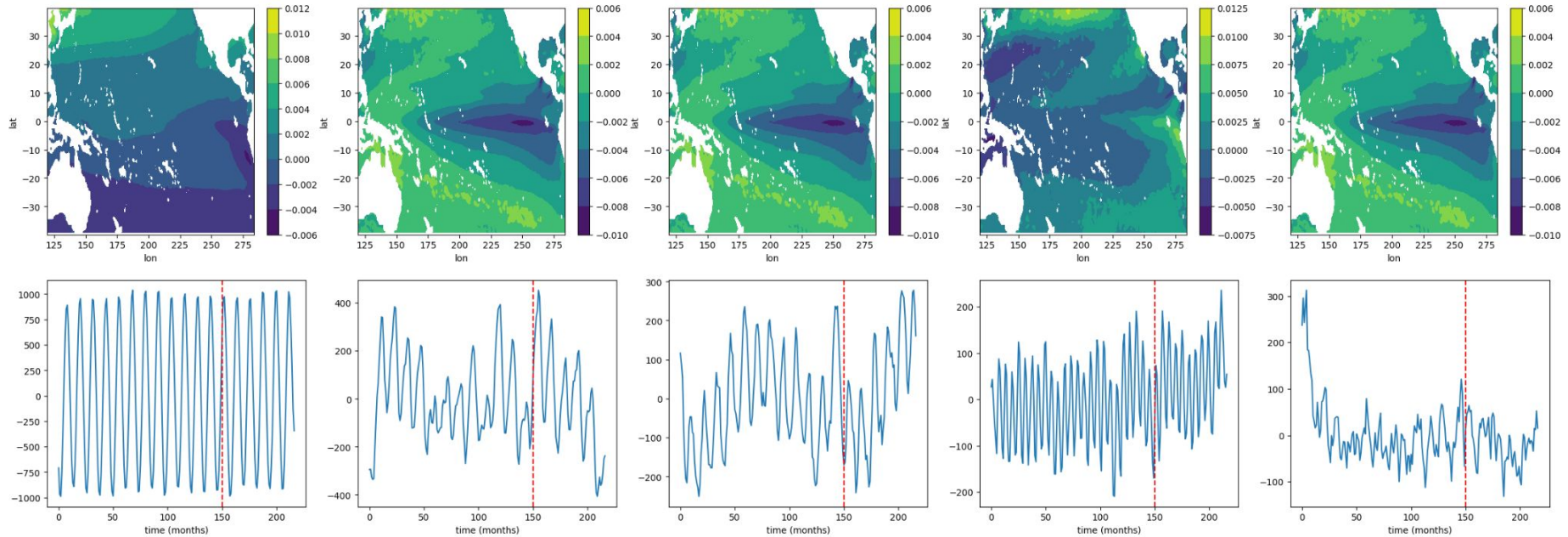


Map of mean SST from data



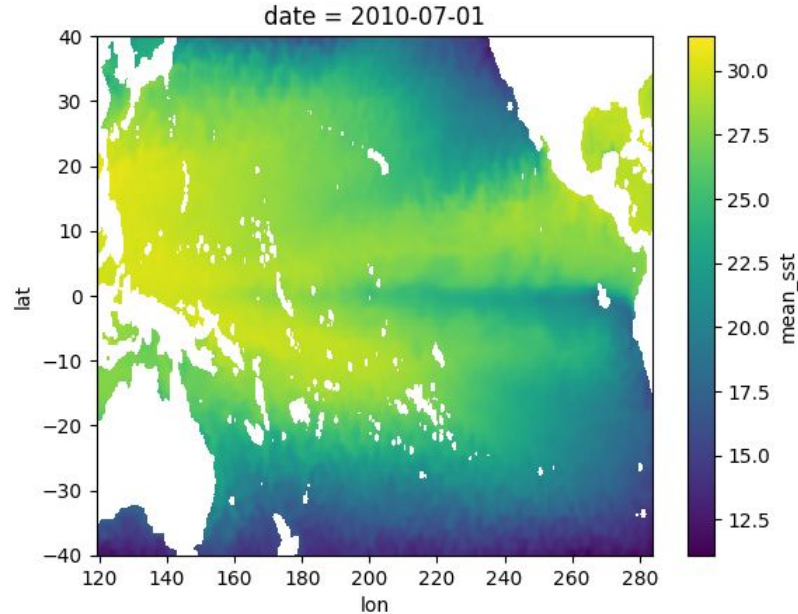
Map of SST with pattern 2 of PCA

Principal Components Analysis :



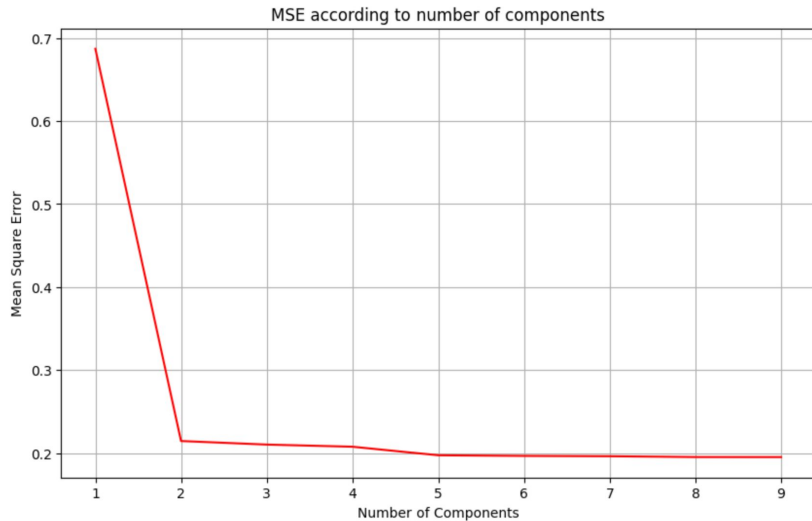
Map pattern and time series associated to each PCA component (5)

Principal Components Analysis :

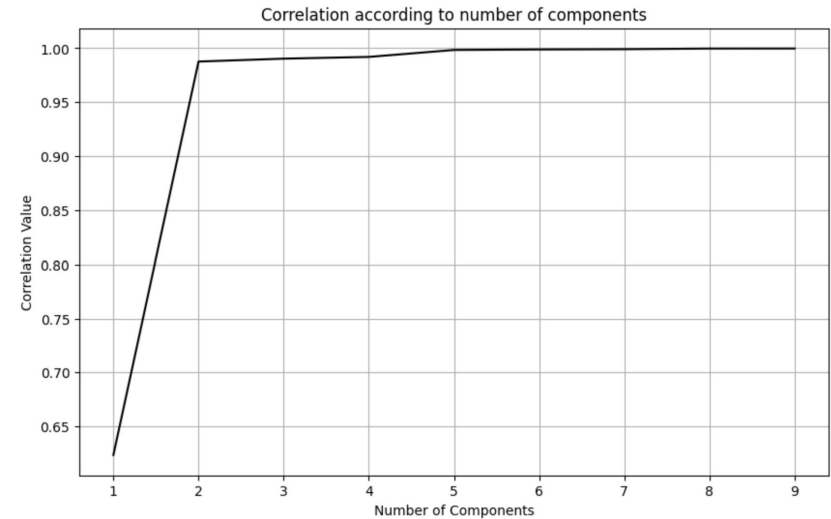


Real SST Map on month 150

PCA : choice of number of components

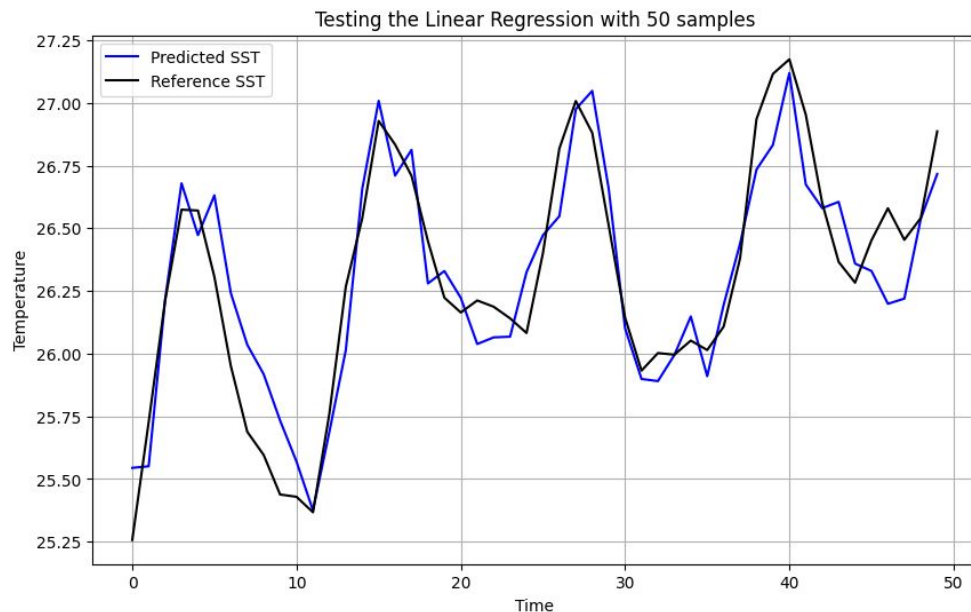


Evolution of MSE depending on the number of components



Evolution of correlation depending on the number of components

Forecasting One Month Ahead Using One Year of Historical Data



Testing

1 component:

MAE : 0.278

RMSE : 0.341

2 components:

MAE : 0.14

RMSE : 0.17

4 components:

MAE : 0.182

RMSE : 0.229

Merci