Homework 3
Eliott Foust
Code uploaded to https://github.com/wefoust/Meteo515_AtmosStats

Question 1)
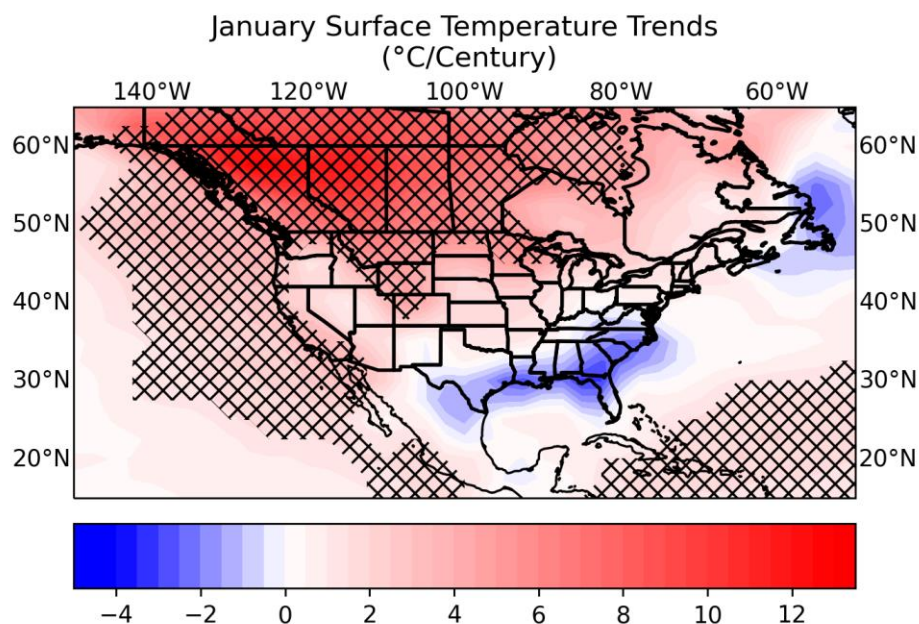All data was successfully ingested and formatted for this assignment.

Question 2)
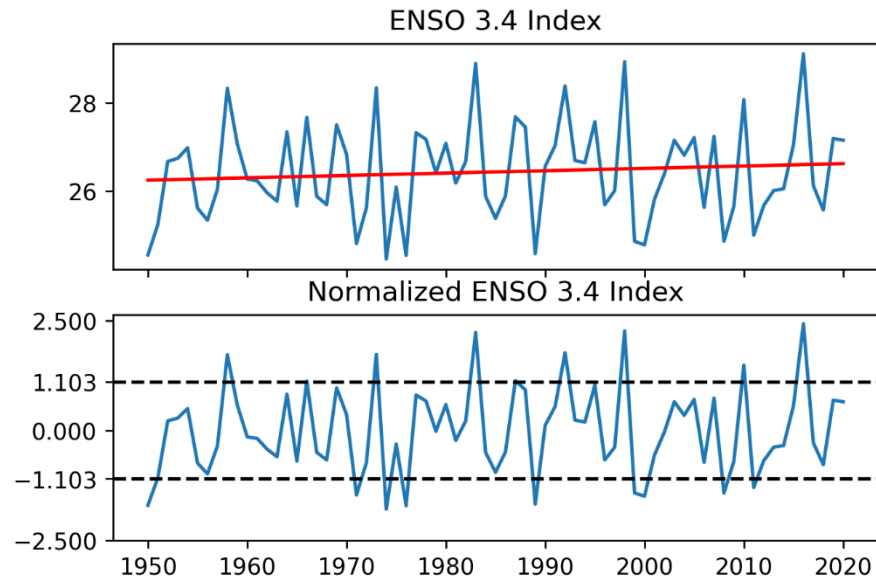
La Nina Years 1950, 1971, 1974, 1976, 1989, 1999, 2000, 2008, 2011
El Nino Years 1958, 1966, 1973, 1983, 1987, 1992, 1998, 2010, 2016

Question 3)

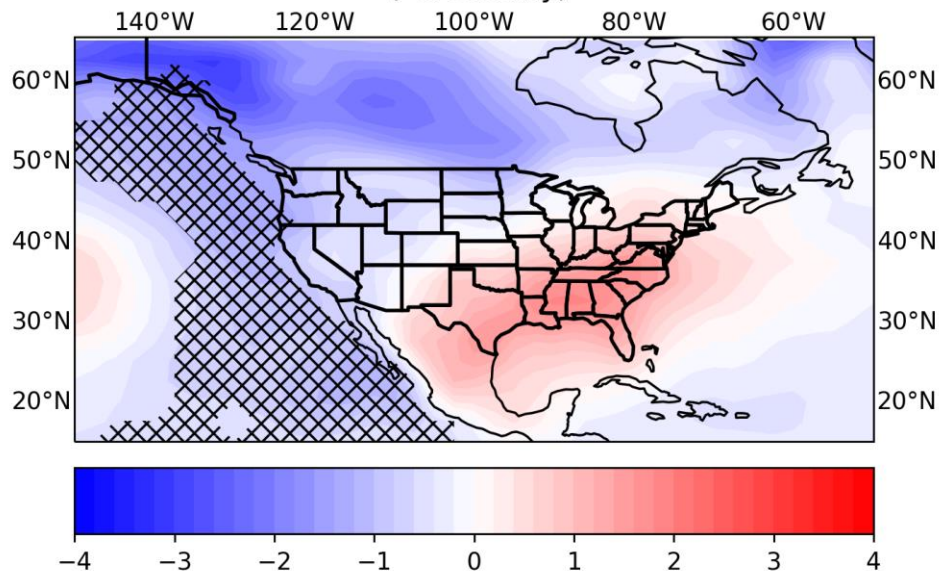*Note: I have a plotting issue of hatching individual points. Hence some minor hatching is not shown.*

Question 4a)

Question 4b)
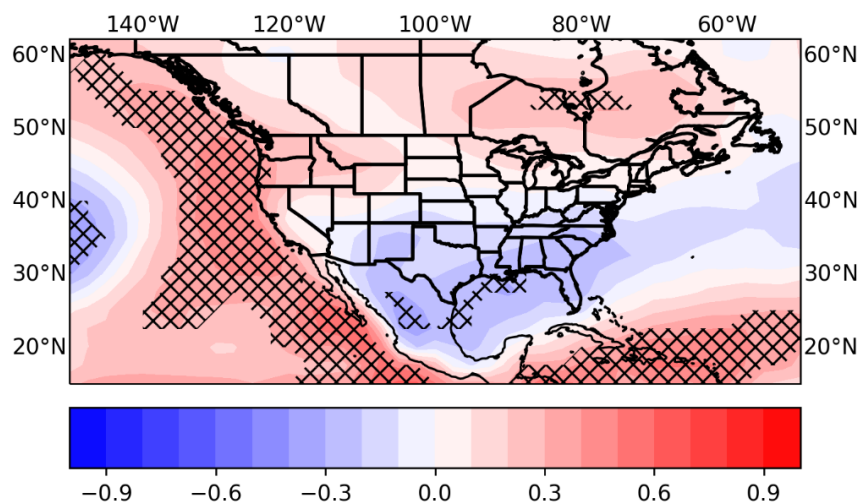
The map reveals significant positive correlations along the West Coast and throughout the Caribbean, as well as a negative correlation in the Southern US. This is consistent with the pattern in shown in the surface temperature trend maps. In the case of La Nina, the ENSO index falls, and temperatures over the West Coast and Caribbean also fall; this is portrayed inversely of the Southern US.

Even though the correlations explain the pattern of temperature trends to some degree, the significant correlations are as weak as 0.5, which is often considered a moderate correlation. Given this, it is possible that other phenomenon or noise also impacts the surface temperature trends -- other than the climatic forcing. Additionally, the significance is predominately over the oceans. This may be the result of less variability of surface temperature over the ocean, which lowers the critical value for significance.
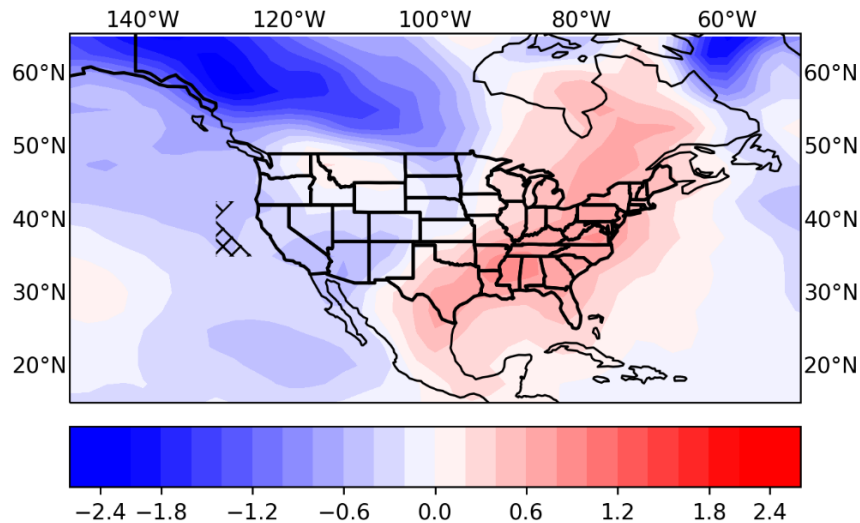
Question 4c)

Uncorrelated La Nina Surface Temperature Composite

This map somewhat resembles the La Nina composite, but the pattern over the eastern US is distorted and temperatures are slightly warmer over the east coast and in the Caribbean. Also, the number of significant locations is drastically reduced. This result is unexpected for me. I expected to see either a noisy pattern, a coherent map that does not resemble the correlation map, or some form of an inverted correlation map. The lack of significance makes this difficult to interpret or attribute any particular phenomena that are driving the distortions in the pattern over the eastern US and the Caribbean. Despite this, patterns of variability like the NAM, PDO, or other modes may be responsible for the colder values over Alaska, and the warmer values over the eastern US.

Question 4d)
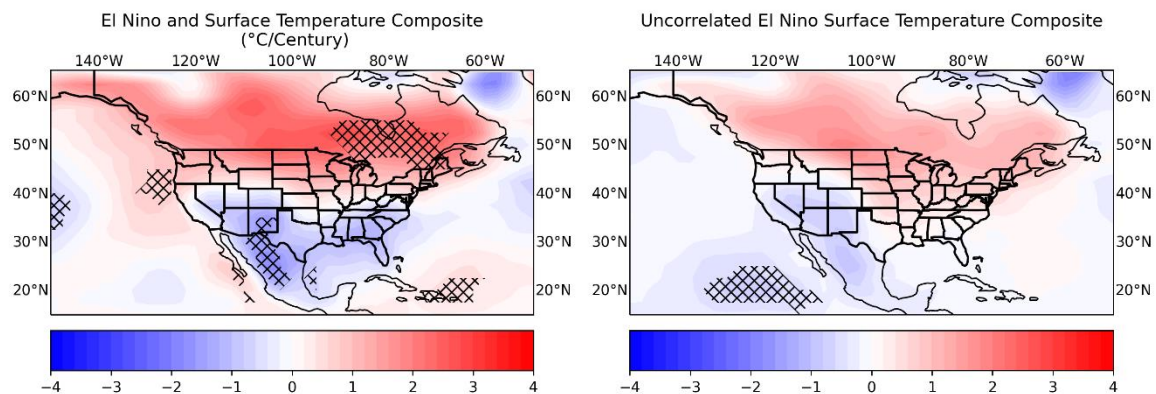
The maps show the correlated and uncorrelated regressed temperature composites with El Nino. When compared to the La Nino maps, there is less distortion in the pattern between the maps. Again, this makes it difficult to attribute any specific phenomenon. However, there is an organized pattern of cooling off the west coast of Mexico. This area may be the most likely area to be coupled with some phenomena.