



Spatial Pattern of Sea Surface Temperature Variability and Rainfall Dynamics over the Gulf of Guinea

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BACKGROUND

- The ocean plays an important role in the earth climate system as it's a major source of moisture and heat fluxes with the atmosphere and therefore its warming has considerable impact on the lower atmospheric circulation and precipitation intensities.
- West Africa and the Gulf of Guinea (GOG) has been characterized by high rainfall variability leading to severe floods and droughts in the coastal and Sahel regions with severe impacts on human and socio-economic activities.
- In view of the foregoing, it has become imperative to conduct a study to examine the spatial pattern and variability of sea surface temperature (SST) over the GOG and their influence on rainfall dynamics.

OBJECTIVES

- To examine the spatial pattern of SST variability in the GOG and the influence of SST on seasonal variation of rainfall in the GOG

STUDY AREA



Figure 1: The Gulf of Guinea

METHODS

SST and rainfall data of 50 years (1970-2020) at 2°x2° resolution was obtained from the Columbia Climate School international Research Institute (IRI) and ERA5 reanalysis at specific locations namely Latitudes 12°N, 10°N, 3°N, 1°N, 1°S, 3°S and 5S and Longitude 10°W, 8°W, 6°W, 4°W, 2°W, 0°, 2°E, 6°E and 5°E. Statistical and NCL codes were used for plotting for the SST against JJA of the driest and wettest years over the GOG.

RESULTS

Figure 2: SST variability over the GOG (A) Spatial pattern of SST variation over the GOG Monthly variation of SST in the GOG. (B) Annual SST of GOG between 1970 and 2020. SST was lowest in 1976 (26.09±1.8 °C) and highest was experienced in 2019 (27.72±1.6°C). (C) The monthly SST of GOG was highest in April with 28.91°C and lowest in August with SST of 24.59 °C.

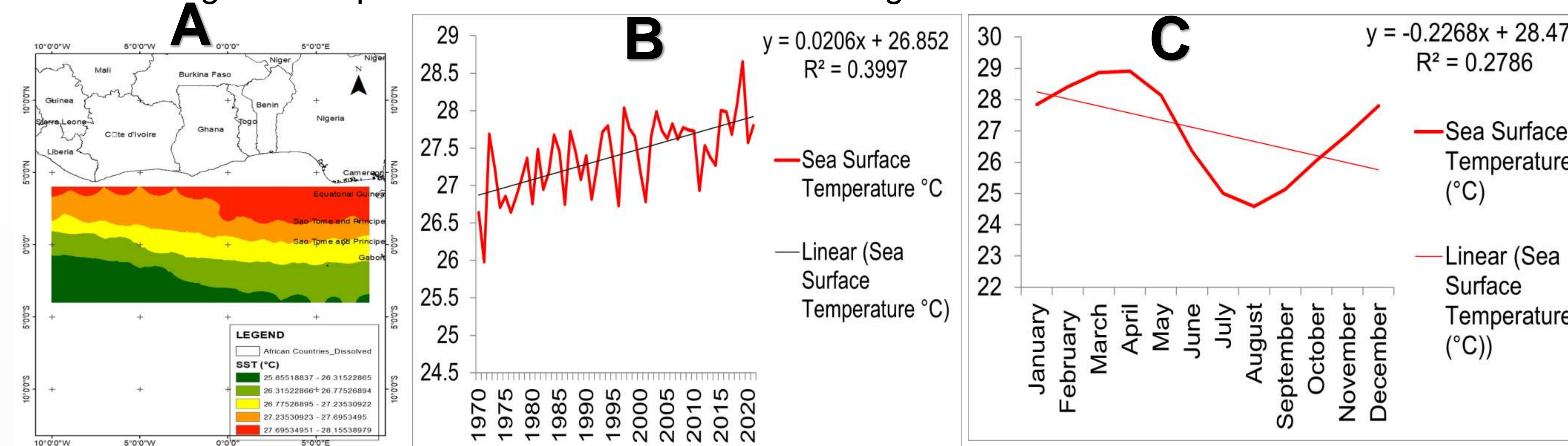
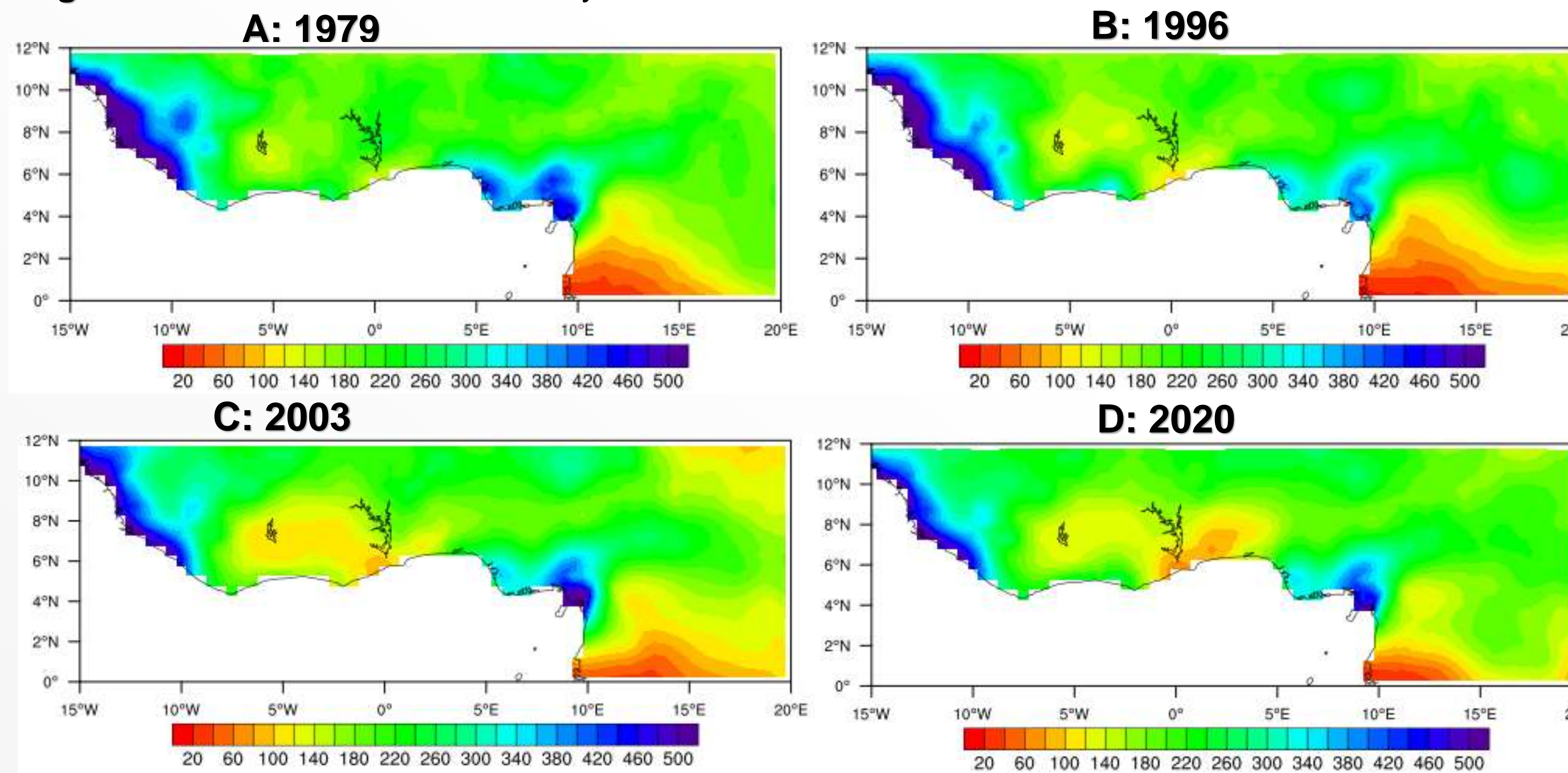


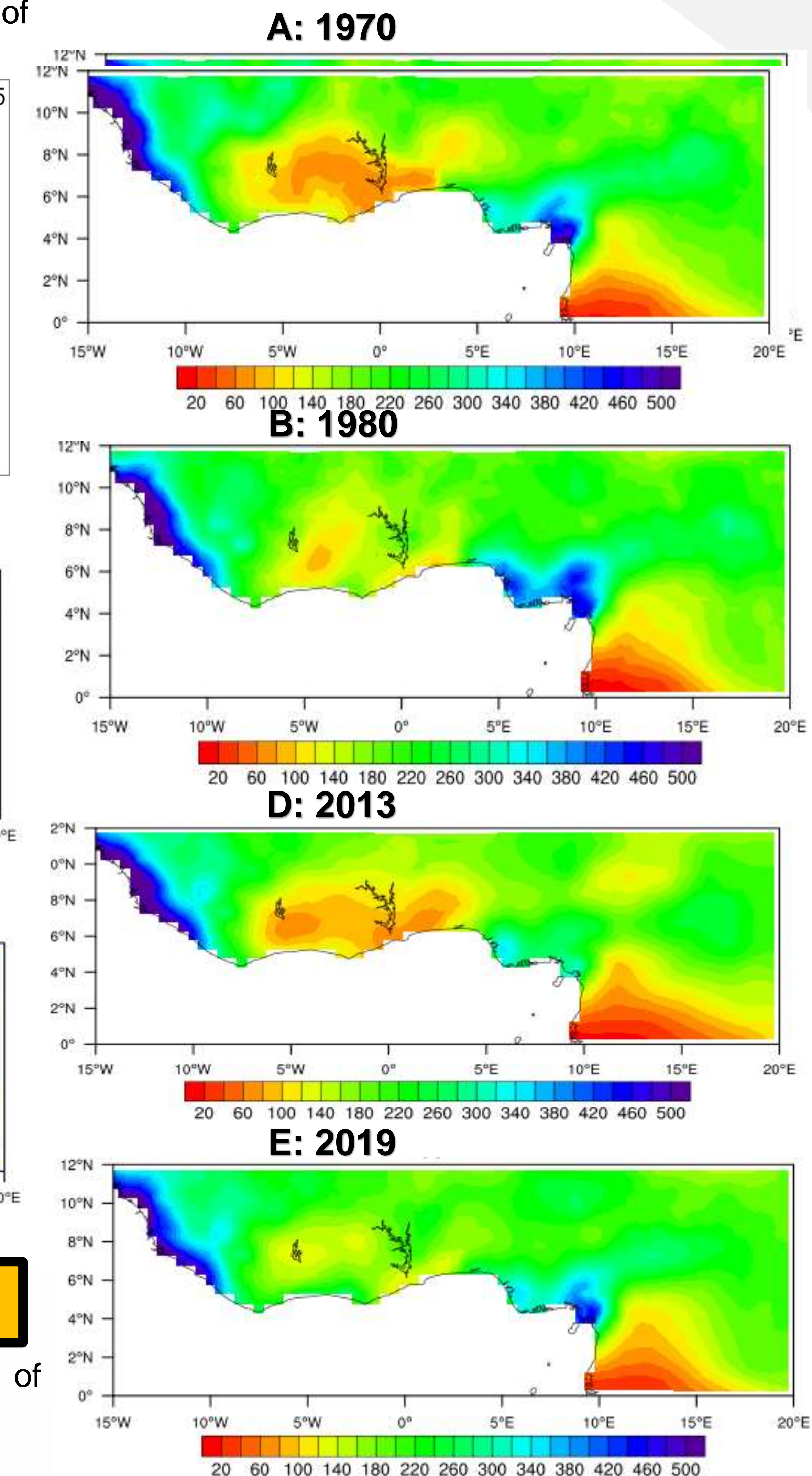
Figure 4: SST influence on the wet years in the GOG from 1979 to 2020



DISCUSSION AND CONCLUSION

- High interannual variability of SST was observed increasing at the rate of 0.0206 °C with R² of 0.3997. The increase in SST may lead to intense rainfall in the coastal GOG
- The anomalously low SST observed correspond to low rainfall in JJA of the dry years while high SST values explains increased rainfall during the JJA of the wettest implying the role of SST in West Africa climate
- The dynamics of wet and dry years shows the sensitivity of the West African rainfall to the pattern of SST over the GOG. The implies that dry and wet years are associated with certain pattern of SST in the GOG

Figure 3: SST influence on the dry years in the GOG from 1970 to 2019



ACKNOWLEDGEMENT

This study was sponsored by the Federal Government of Nigeria through (TETFUND). Prof Lupo research Lab and SNR contributed immensely to this research.