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# Effects of ENSO-related Precipitation on East Africa

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**ClimateMatch**  
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# Introduction

Precipitation patterns in East Africa are impacted by:

- El Niño Southern Oscillation (ENSO)
- Indian Ocean Dipole (IOD), etc.

All of these phenomena can cause extreme precipitation anomalies in Equatorial and South East Africa. Our group is interested in how ENSO impacts precipitation anomalies in these regions.



# Hypothesis

- **Research question:** How strongly does the ENSO index correlate with precipitation anomalies in various regions of East Africa?
- **Hypothesis:**

	Precipitation anomalies correlation to ENSO
Equatorial East Africa	+
Southeast Africa	-



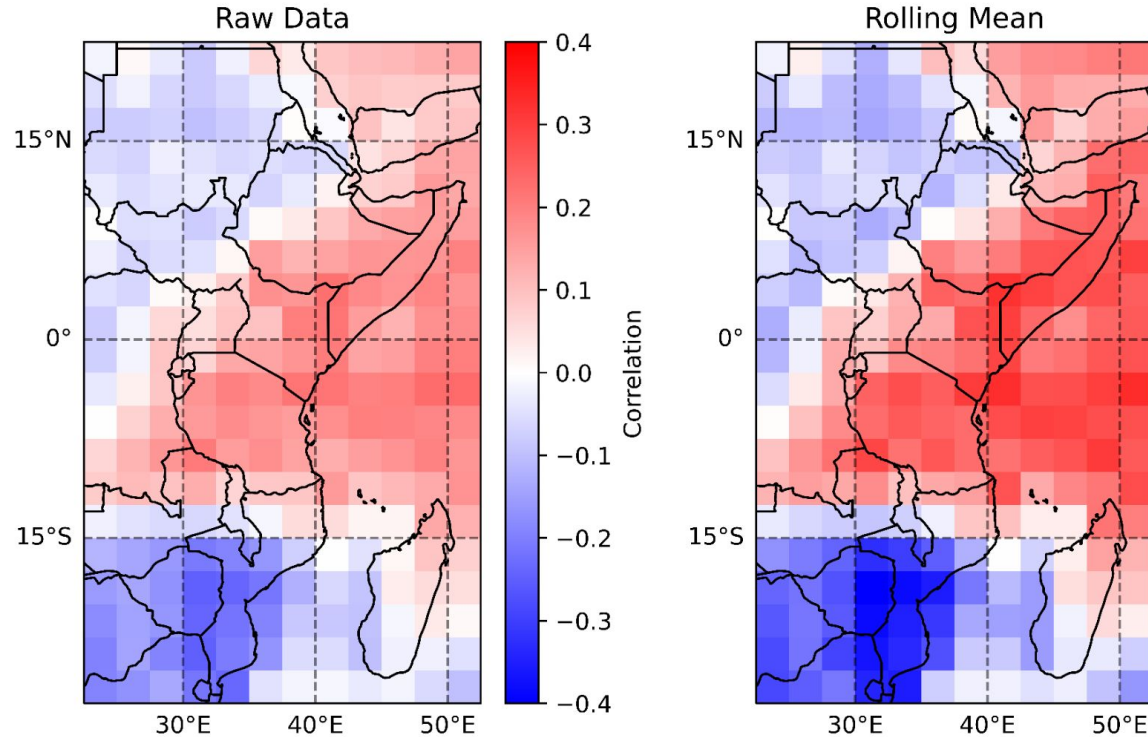
# Results



# General Trends

## ENSO/Precipitation Correlation in East Africa

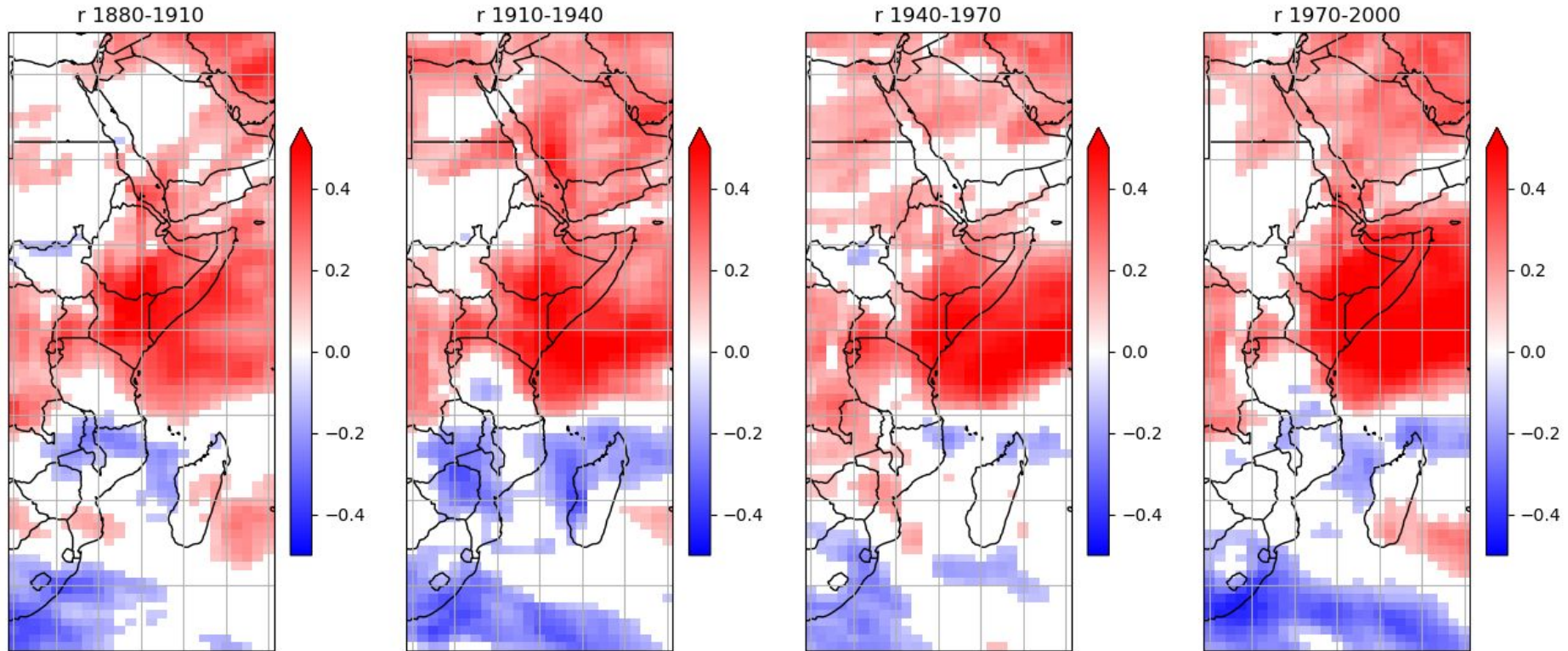
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# Decadal Climate Variability

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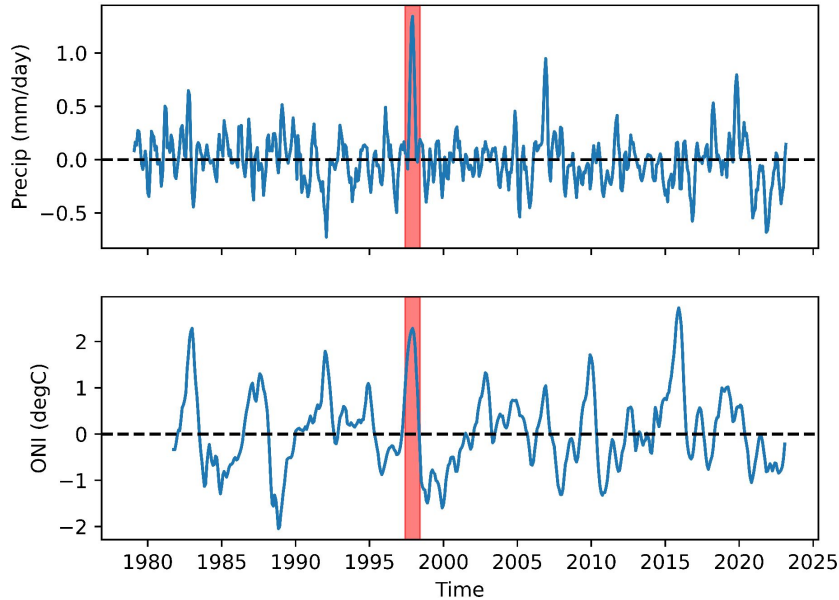
Correlation coefficient from 1880-1910 to 1970-2000



# A Significant Event: El Niño & IOD 1997/98

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GPCP Precipitation Anomaly v.s. Oceanic Niño Index in East Africa



- 1997/98: anomalously heavy rains, especially in Equatorial E. Africa
- Correlation: 0.62
- p-value: 0.022
- Caused disease outbreak, flooding, and food production disruption
- The 1997/98 El Niño event coincided with a positive IOD event, intensifying the effects of both



# Socioeconomic Impacts

ENSO-related droughts and over-precipitation can have significant socioeconomic impacts specifically on Kenya and Somalia during extreme La Niña events and on South Africa during El Niño events, including:

- **Impacts on water quality and availability**
- **Infrastructure damage**
- **Destruction of ecosystems**
- **Increased risk of water-borne diseases and malnutrition**
- **Usability of arable land**
- **Migration and displacement**





# Conclusions

- Precipitation anomalies in equatorial East Africa are positively correlated with ENSO, while precipitation anomalies in Southeast Africa are negatively correlated with ENSO.
- Other areas of East Africa may switch between positive correlation, negative correlation, and no correlation on decadal timescales.
- ENSO combined with the IOD can cause extreme precipitation events.
- Kenya and Somalia may experience more severe droughts during increasingly severe La Niña events while South Africa may experience more severe droughts during increasingly severe El Niño events.

