Rainfall and Sea Surface Temperature (SST) Analysis of Eastern and Western Regions of Kenya

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Background

- Around 26% of Kenya's GDP comes from agriculture activity[1]
- Agriculture makes up 75% of the jobs within Kenya[1]
- Major and minor droughts occur each decade, leaving millions of civilians without food[2]
- Drying trends have been observed in Eastern regions of Kenya[3]
- Sea surface temperature (SST) has been shown to affect some regions of Africa[4]

Purpose

- Identify and categorize differences in rainfall trends of various regions in Kenya
- Analyze precipitation trends and correlations with SST anomalies
- Improve predictions of long and short wet season rainfall in different regions

Methodology

- Gridded precipitation[5] data was chosen over raw station data after graphical comparison
- Two regions were established: Eastern Kenya and the Rift Valley
- A gridded data set computed rainfall values; trends and inter-annual values were compared for 1979-2012
- Seasonal cycles for each region were computed and rainfall trends for1979-2012 were calculated
- Rainfall anomalies were correlated with SST for two west seasons

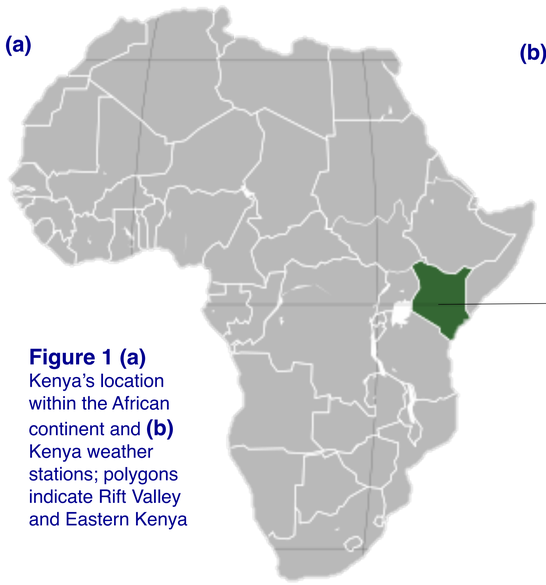
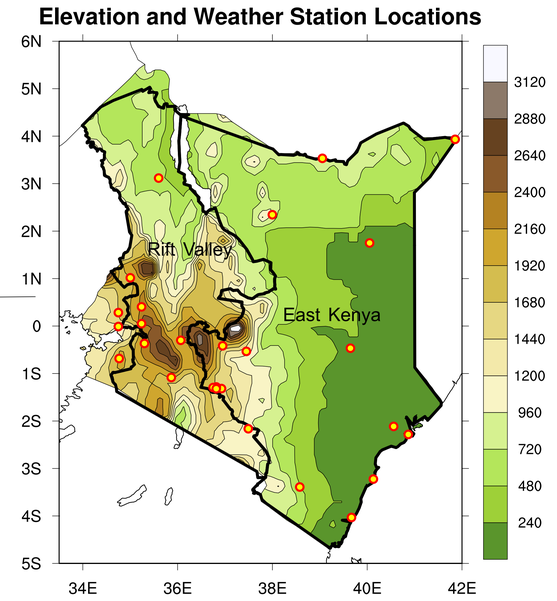


Figure 1 (a) Kenya's location within the African continent and **(b)** Kenya weather stations; polygons indicate Rift Valley and Eastern Kenya



Rift Valley Rainfall

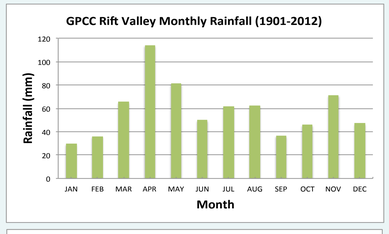


Figure 2. Seasonal cycle trend of Kenya Rift Valley precipitation calculated from 1901-2012; two wet seasons are observed

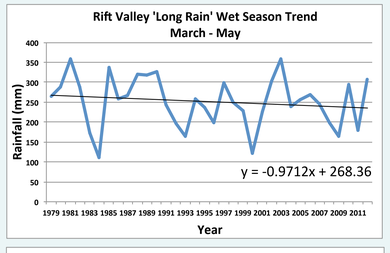


Figure 3. 'Long rain' wet season total of Kenya Rift Valley precipitation calculated from GPCC data from1979-2012; a slight decrease in rainfall per year is observed

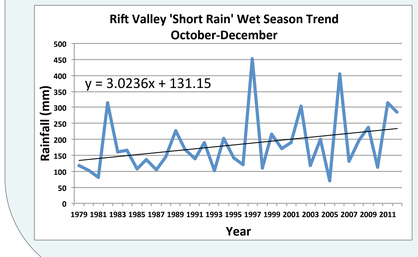


Figure 4. 'Short rain' wet season total precipitation of Kenya Rift Valley calculated from GPCC data from1979-2012; an increase in rainfall per year is observed

Correlations with SST Anomalies

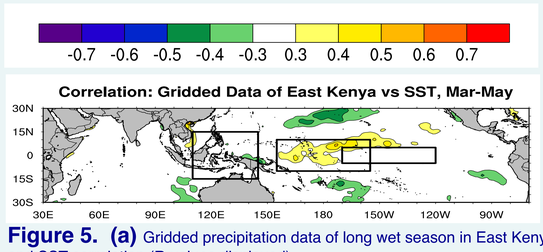


Figure 5. **(a)** Gridded precipitation data of long wet season in East Kenya and SST correlation (R-values displayed)

(b) Gridded precipitation data of short wet season in East Kenya and SST correlation (R-values displayed)

(c) Gridded precipitation data of long wet season in Rift Valley and SST correlation (R-values displayed)

(d) Gridded precipitation data of short wet season in Rift Valley and SST correlation (R-values displayed)

East Kenya Rainfall

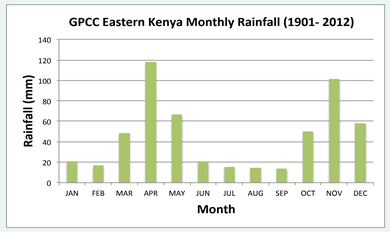


Figure 6. GPCC seasonal cycle trend of Eastern Kenya precipitation calculated from 1901-2012; two wet seasons are observed

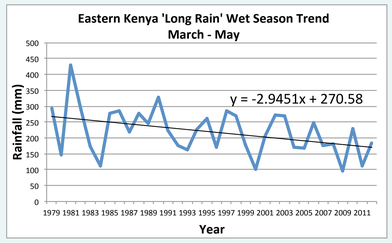


Figure 7. 'Long rain' wet season total precipitation of East Kenya from1979-2012; a declining trend of mm of rainfall per year is observed

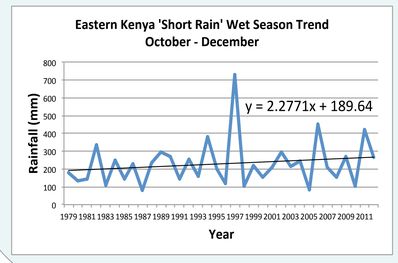


Figure 8. 'Short rain' wet season total precipitation of East Kenya from1979-2012; an increasing trend in mm of rainfall per year is observed

Uncertainty Analysis

- Precipitation data set was derived from yearly values with varying degrees of completeness

Discussion

- Two distinct climates, with distinct seasonal cycles, exist for the Rift Valley and East Kenya (Figure 2,6)
- Rift Valley trends display a slight decline in rainfall in long rainy season and an increase in rain during short rainy season (Figure 3,4)
- East Kenya trends display a loss of rain during the long rainy season and increased rain during short rainy season (Figure 7,8)
- Rainfall anomalies and SST correlation for long rainy seasons had little correlation in both regions (Figure 5a, 5c)
- Strong positive correlation between rainfall and SST in Indian Ocean is observed for both regions during short wet season (Figure 5b, 5d)

References

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