EAST AFRICAN DROUGHT MONITORING DURING RAINY SEASONS

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ABSTRACT: East Africa have suffered severe drought, and it caused damage to agricultural sector. The severe drought during the long rain season in 2011 drove significant damage. Especially, drought monitoring over Africa is difficult due to the availability of station data. In addition, there are no starting and ending points of drought. Satellite data is useful to monitor drought because it provides spatiotemporal continuous surface data including surface temperature, vegetation, soil moisture, and evapotranspiration. Many studied were conducted to develop drought indices using satellite data. In this study, East African drought was monitored using various drought indices. We analyzed the relationship between the El Niño-Southern Oscillation (ENSO) and East African drought during the two rainy seasons using satellite and station based drought indices. Three drought indices including Standard Precipitation Index (SPI), Evaporative Stress Index (ESI), and scaled drought condition index (SDCI) were used. In this study, two interesting results were found. The relationship between the ENSO and precipitation of East Africa during the long rain season was changed in recent years, and it was identified using *in situ*, satellite, and reanalysis data. Drought is affected by regional characteristics including land cover and topography, so the detected drought is different by spatial scale (e.g., regional, local).

1. INTRODUCTION

East Africa have suffered from droughts due to deficit of precipitation during the rainy seasons. The East African rainfall is influenced by climate variability such as ENSO (Lyon 2014). Drought conditions can be diagnosed using drought indices, and satellite based drought indices have relatively high spatial resolution (~1 km). This study identified the relationship between ENSO and East African (1949-2016 and 2000-2016).

2. STUDY AREA AND DATA

East Africa (30° to 52°E and 10°S to 15°N) is called the Horn of Africa (HoA). There are two rainy seasons in East Africa, short rains (October to December) and long rains (March to May). This study used Satellite datasets (MODIS, TRMM), Observation and reanalysis datasets (GPCP, GPCC, NCEP-DOE reanalysis 2, HadISST, PDO index).

3. METHODOLODY

The relationship between the ENSO and drought was analyzed during the two rainy seasons using satellite and *in situ* based drought indices: 1) Standard Precipitation Index (SPI; Mckee), 2) Evaporative Stress Index (ESI; Anderson), and 3) scaled drought condition index (SDCI; Rhee).

4. RESULTS AND DISCUSSION

Figure 1 shows a correlation coefficient during the short rainy season with 15-year moving windows. The correlation coefficient has increased since the 2000s (positive relationship). We identified the averaged correlations between the ENSO index (December to February) and three drought indices during the long rains (Figure 2). This result also show that the relationship is positive during the long rainy season in recent years.

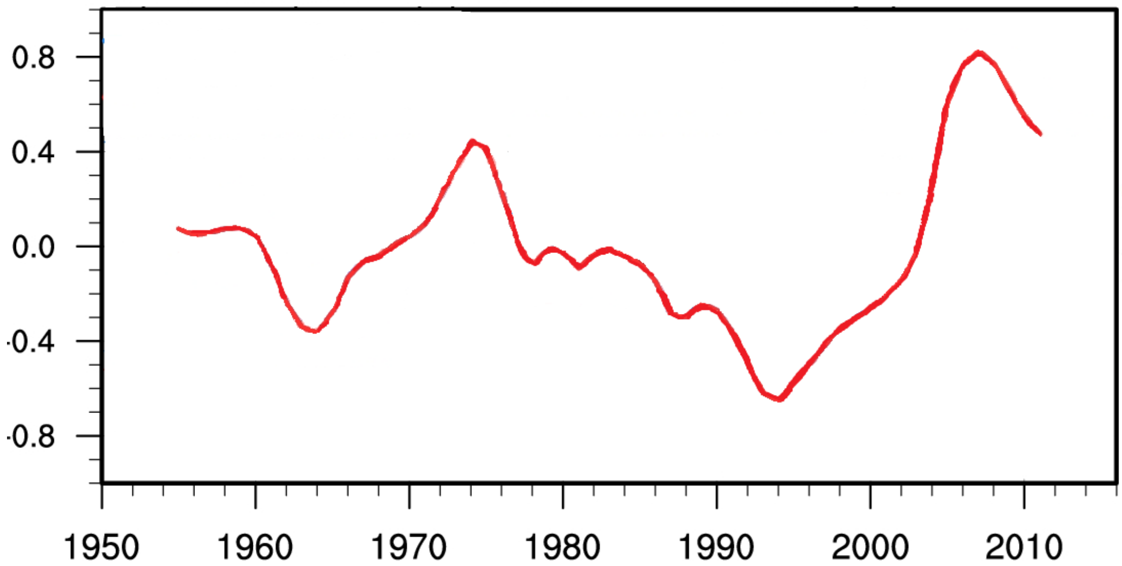

Figure 1 The correlation coefficient between the rainfall (March to May) and the ENSO (December to February) during the short rainy season with 15-year moving window for 1949-2016.

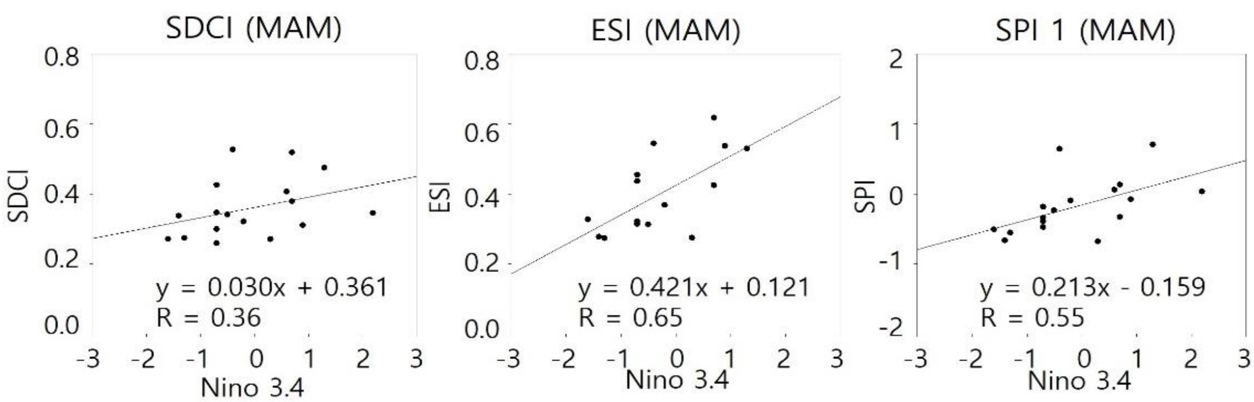

Figure 2 scatterplot between ENSO and averaged drought indices during long rains (2000-2016).

5. CONCLUSION

This study has identified the relationship between drought and ENSO. While unclear relationship between ENSO and drought during long rains was mentioned in previous studies, the relationship is positive for the last 17 years (2000-2016). Satellite-based drought indices considering surface factors as well as station-based drought index considering precipitation have highly related to ENSO.

6. REFERENCE

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