Public Abstract

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Title:AN EVALUATION OF HISTORICAL FIRE OCCURRENCE, DROUGHT, AND THE EL NINO SOUTHERN OSCILLATION IN THE GREATER CROSS TIMBERS REGION, U.S.A.

A concern over wildfire occurrence, and its relationship to drought and a changing climate has brought increased focus to the interface between the public and fire. Multiple factors, including an increase in fuel loading from decades of continuous fire suppression, changes in land use and ownership, and management strategies, are dampening the success of wildfire suppression rates in some ecosystems. Wildfire occurrence is influenced by many factors ranging from drought and climate oscillations at the regional level to fuel availability and land-use at the site level. This study evaluates and explores the extent, frequency, seasonality, and severity of fires across the Cross Timbers, and through time. Historical fire events were reconstructed at three new study sites in unrepresented geographic locations. Fire event chronologies were developed from fire scars spanning three centuries. These chronologies were compared with data from ten existing sites to evaluate fire regime characteristics and changes at a regional scale. Findings suggest that, while fire frequency has increased following European-American Settlement, fire severity has trended downward. Site differences in fire occurrence exist across the greater Cross Timbers region. The results of this study indicate a prevalence of dormant season fire across the greater Cross Timbers region. Fire events were 2-7 times more frequent when considered at a regional scale. Some of the strongest ENSO signals yet detected in any tree-ring data worldwide are in post oak chronologies of Texas and Oklahoma. Little is known about how the role of climate differs in driving fire occurrence at the site to regional scale. In this region, many studies have attempted to explore how climate drives fire at the site level, but inconsistencies in the results of these studies leave questions about the comparability of these conclusions, and the role of climate in altering climate activity at the regional scale. This study assessed the relationship between climate patterns on fire occurrence in the southcentral U.S. and evaluated the independent and interactive influences of drought and the ENSO on fire occurrences at both site and regional levels. The relationship between fire occurrence and drought was largely unclear at the site scale, but drought was found to be a significant driver of fire synchrony at the regional scale. Drier than expected conditions were observed in the year of fire events at the regional level. This relationship was less apparent in the post-European-American Settlement period.