

Exploring the dynamics of shifting fire regimes in Northern Ghana's Savannah Landscapes: Interactions of Space, Time, and Discourse

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Research Summary

Introduction

In Northern Ghana's savannah landscapes, the use of fire has been a subject of debate among stakeholders, each holding varying viewpoints regarding its use and management. This prevailing argument suggests that policy knowledge is deeply ingrained in institutional structures linked to political, economic interests, and prestige (Keeley & Scoones, 2003). This also allows certain perspectives to prevail even when confronted with contradictory evidence. While most studies attribute climate and land use changes to shifting fire regimes, there is limited studies exploring the role of power dynamics in this process.

Aim

To investigate the drivers of shifting fire regimes.

Approach

- The study first employs remote sensing to analyse trends of burned area, fire seasonality, rainfall, and land cover in Northern Ghana's savannah woodland from 2000 to 2021.
- Second, the study undertakes a critical discourse analysis within a political ecology framework to explore how these shifting fire regimes have been influenced by discourse surrounding traditional fire practices.

Methodology

Variable	Dataset	Data collection	Analyses
Fire regime	MODIS Fire products (Burned area and active fire, 500m resolution) Landsat Global Annual Burned Area Mapping (30m resolution)	Image collection from Google Earth Engine	Remote sensing and statistical analysis
Land Use Land Cover (LULC)	Global Land and Aridity Discovery LULC (Landsat, 30m resolution)		
Power dynamics	Texts from institutional interviews and fire related policy document	Institutional interviews [(national level institutions (n=4), local level institutions (n=8), academia (n=2) and NGOs (n=2)), policy review (n=10)]	Discourse and thematic analysis

Study Area

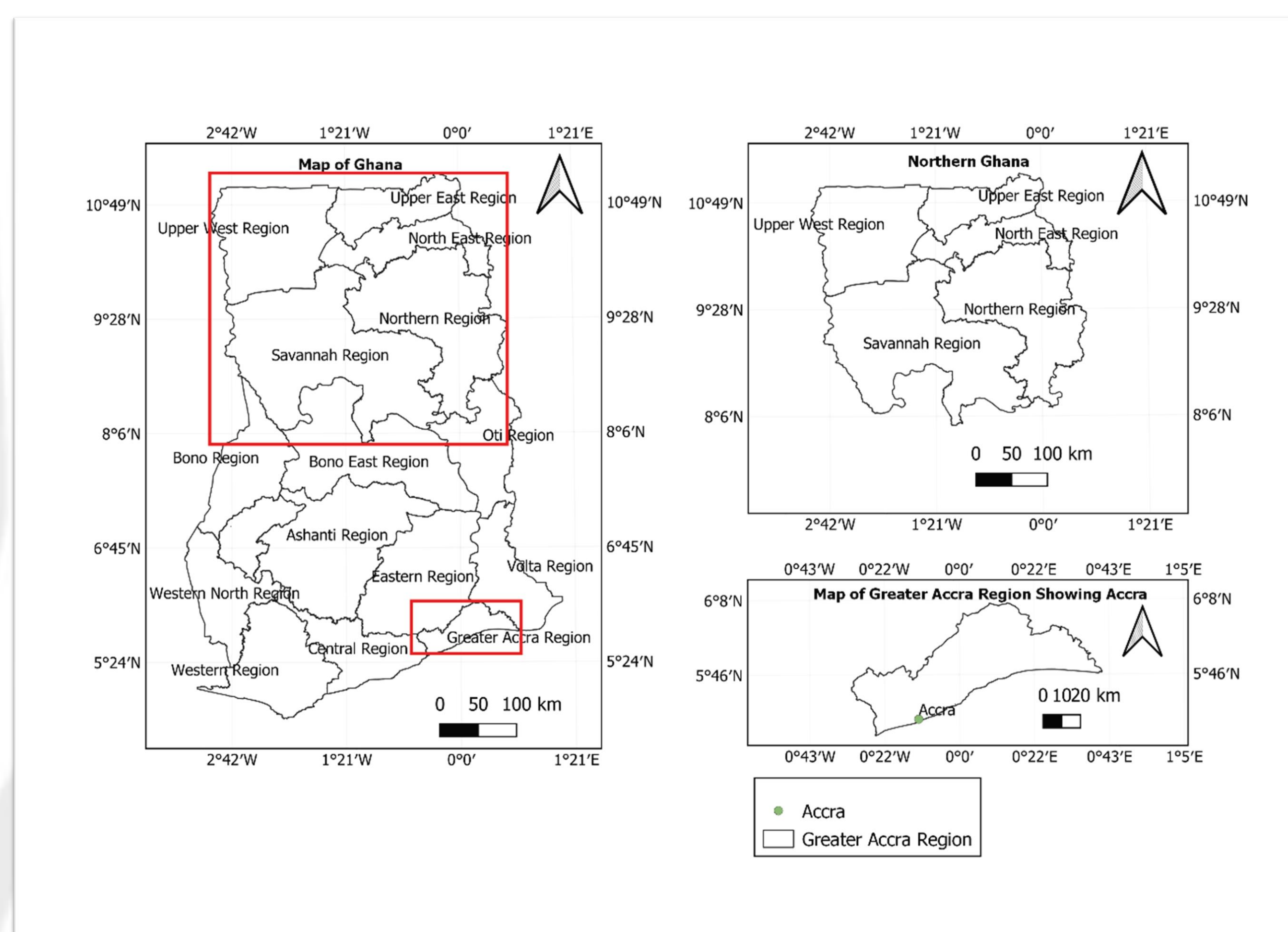


Figure 1: Map of Ghana showing where the participants for the institutional interviews were drawn from.



Figure 4: Burnt vegetation aftermath in Lawra, Northern Ghana.

Discussions/Conclusion

- The difference in burned area trends (figure 2) is influenced by fire types and spectral heterogeneity relative to resolution (Laris, 2005).
- The year-to-year variations of FRP (figure 4) results from shifts in the on-set and off-set of rainfall.
- The narratives of soil infertility and land degradation have intensified the need for fire suppression.
- The ecological benefits of traditional burning practices are 'black-boxed' (Latour, 1987).
- The struggle of the control of this debate is seen further in the establishment of community fire volunteers and the development of community by laws to regulate fire use.
- These actions have the tendency of creating 'environmental subjects' (Agrawal, 2005), transforming the way communities use and relate to fires with implications for changing fire regimes.
- The implications of these debates are closely linked to the need to improve agriculture productivity, forestry and biodiversity conservation.

Results: Discourse

Local communities have often been implicated for the poor productivity of agricultural lands. For instance, the 2007 Food and Agriculture Sector Development Policy (FASDEP) highlighted that:

"Traditional practices such as bush burning, and misuse of agrochemicals leads to severe land erosion coming at a cost of 2% of Gross Domestic Product (GDP). Although the problem is in all agro-ecological zones, the savannah regions are affected the most."

FASDEP II (page 6).

Another significant narrative highlights a crisis of land degradation in the Northern Ghana. To quote from the National Biodiversity and Strategy Plan (NBSAP) document:

"The Northern Savannah is characterised by rapid deforestation caused by high intensity of wildfires, wood fuel production... The trend has also led to loss of habitats, declines in species populations, local species extinctions, increasing vulnerability to climate change impacts."

(NBSAP, page 8)

Despite limited comprehensive data, bushfires have been linked to increasing levels of greenhouse gas emissions in the country as emphasized in the 2006 wildfire policy:

A recent assessment by the Environmental Protection Agency (EPA) revealed that Ghana's share of greenhouse gas emissions comes from carbon dioxide, primarily due to woody biomass emissions resulting from fuel combustions during annual fires."

(2006 Ghana Wildfire Policy, page 1)

Scientific knowledge dominated other sources.

Results

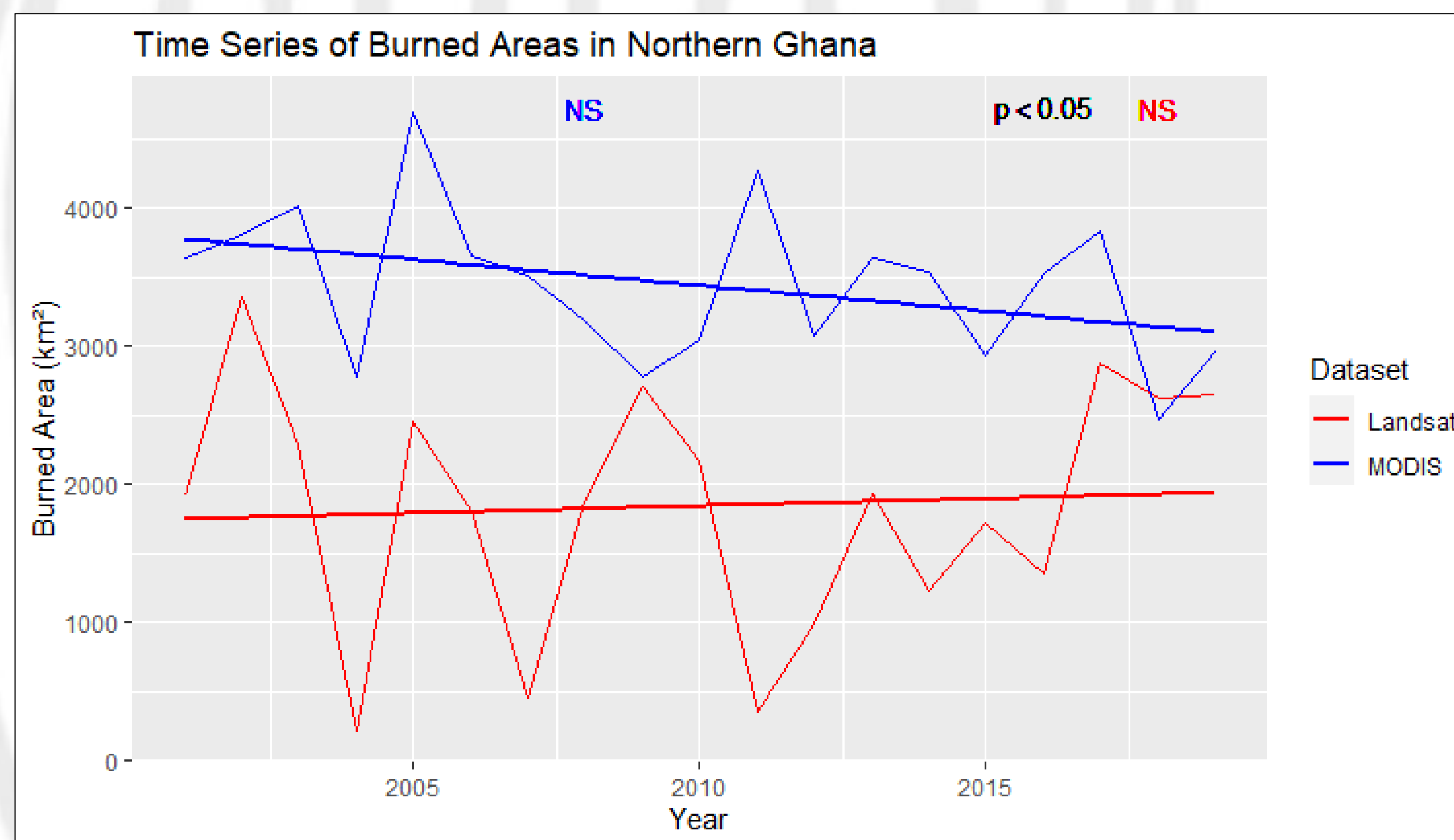


Figure 2: Time series of mean MODIS and Landsat burned areas in Northern Ghana

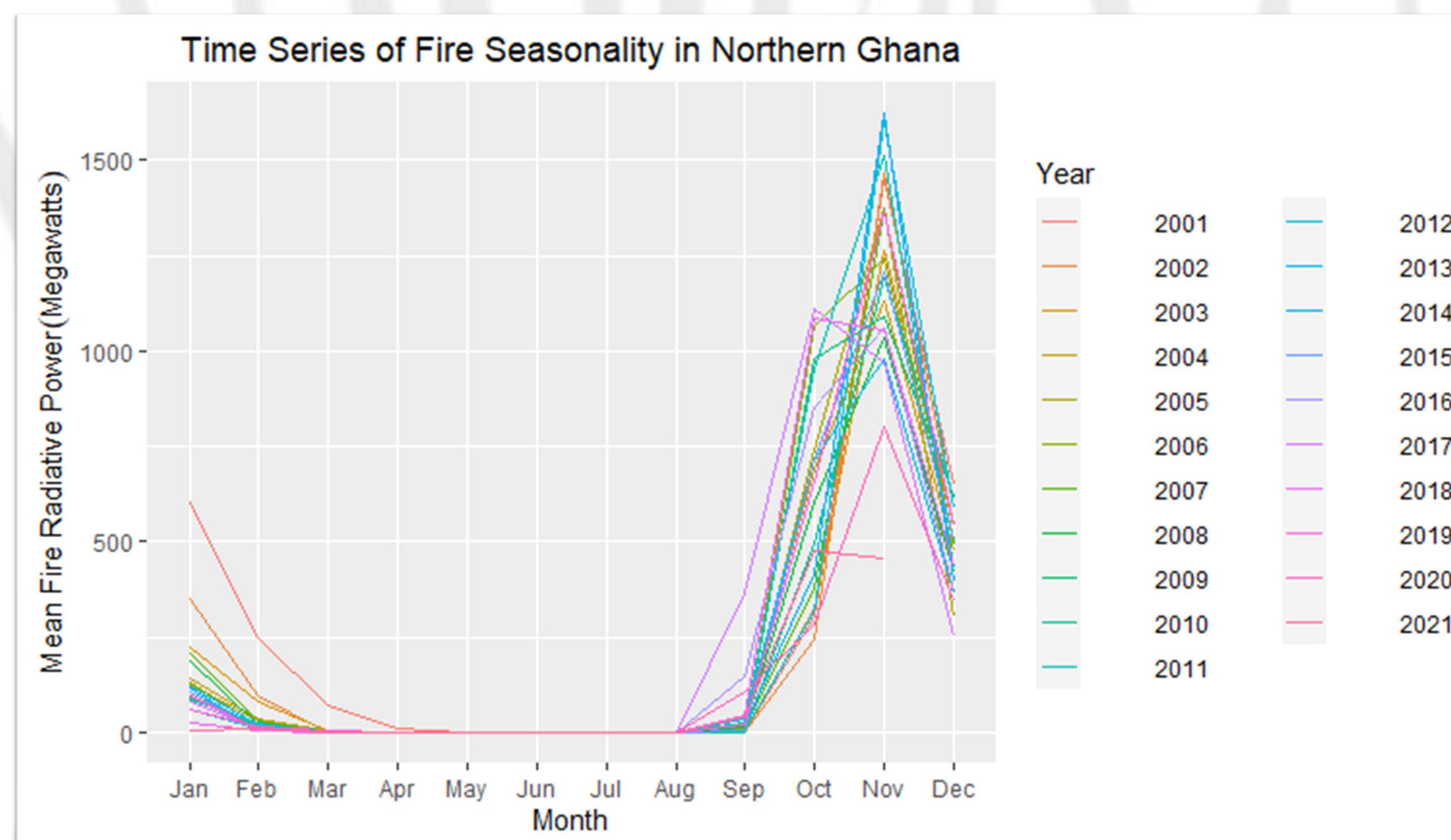


Figure 3: Trends of mean fire radiative power and fire seasonality in Northern Ghana

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