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INTRODUCTION



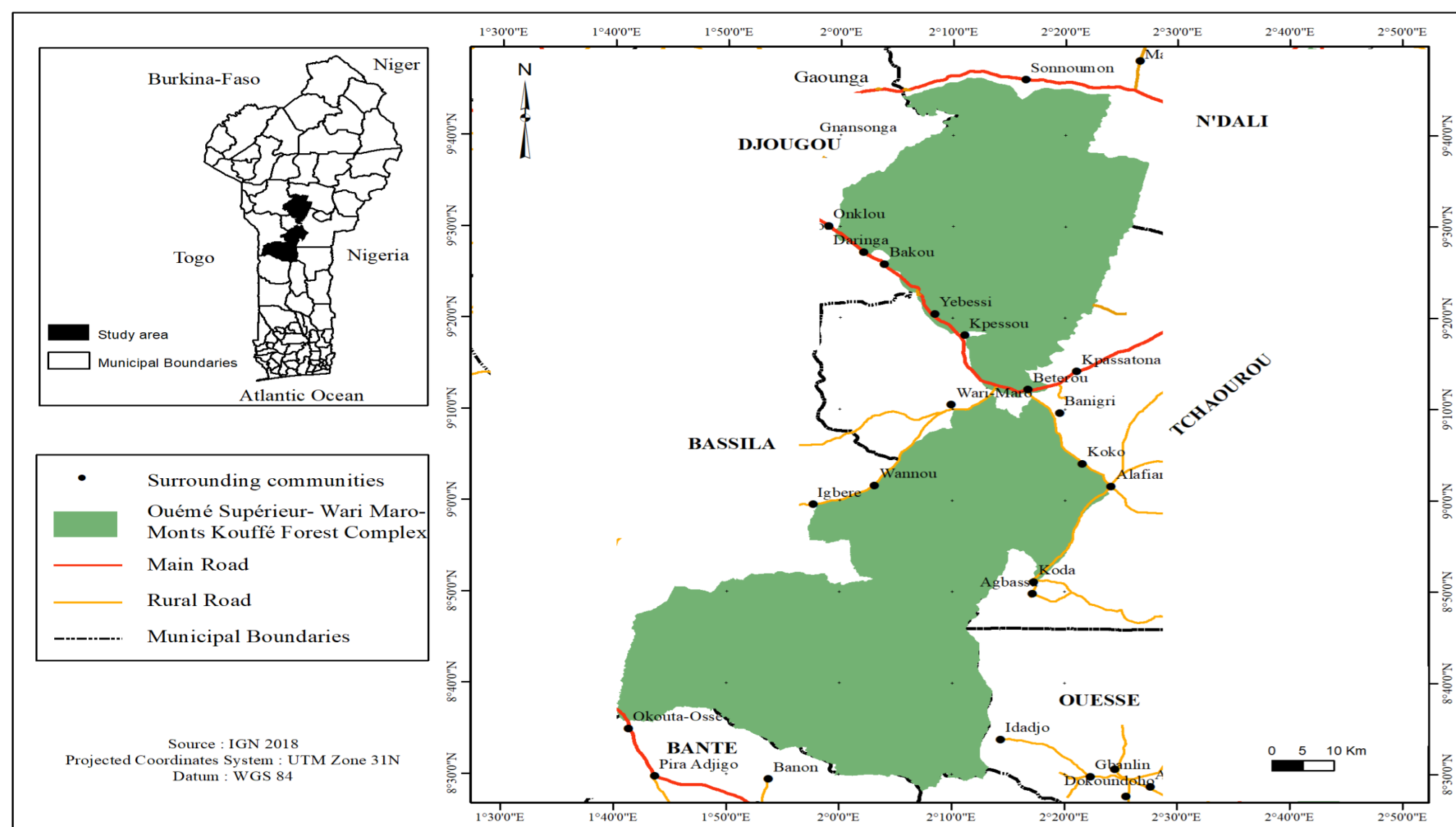
- Vegetation fires: One of the major disturbances in classified forests
- An important ecological role in certain areas (management), but causing severe environmental and socio-economic degradation in others (late-season fires)

Research objective

- Assessing the spatial and temporal dynamics of fires across the Ouémé Supérieur – Wari Maro – Monts Kouffé forest complex in northern Benin

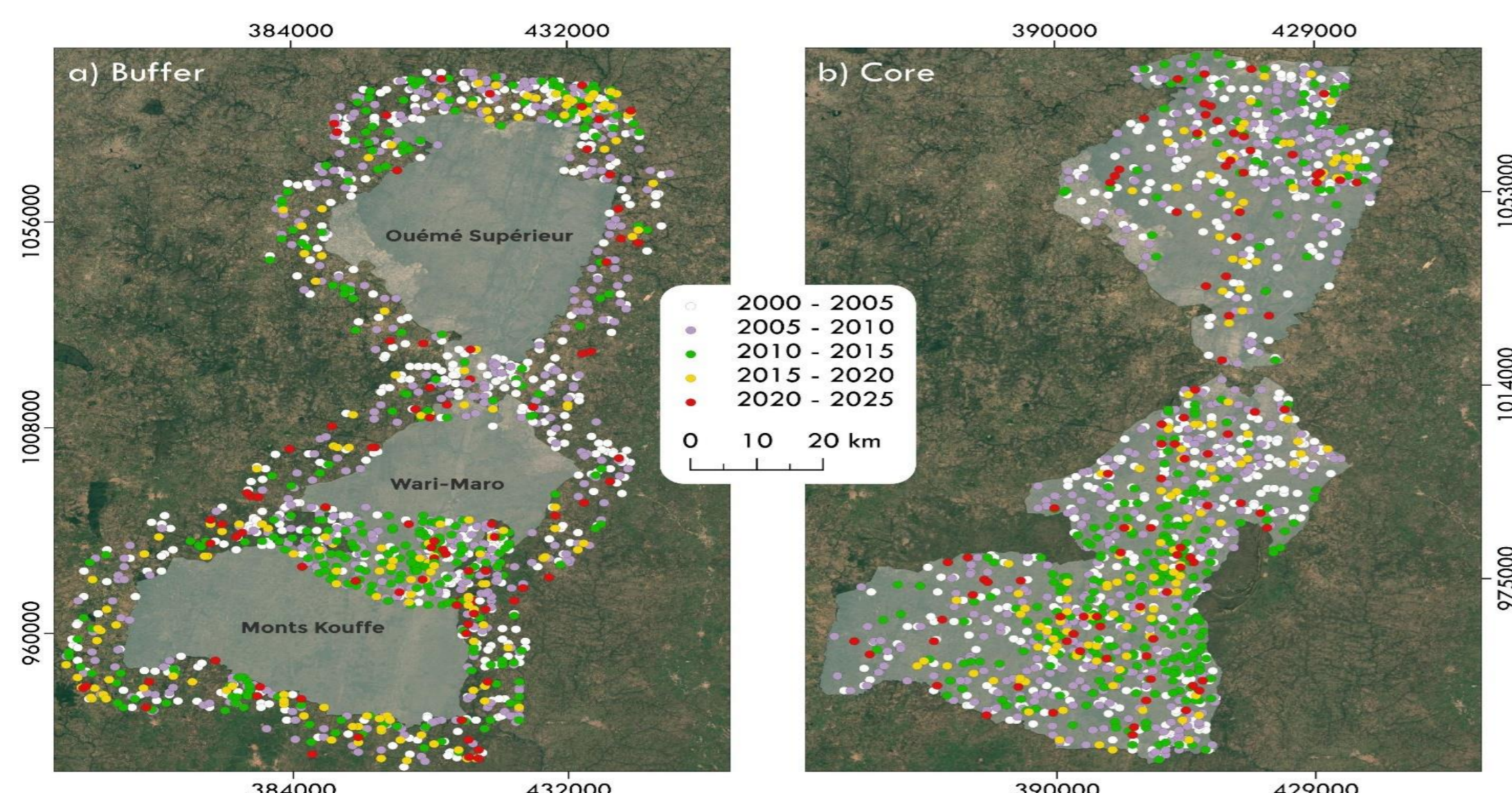
METHOD

Study area



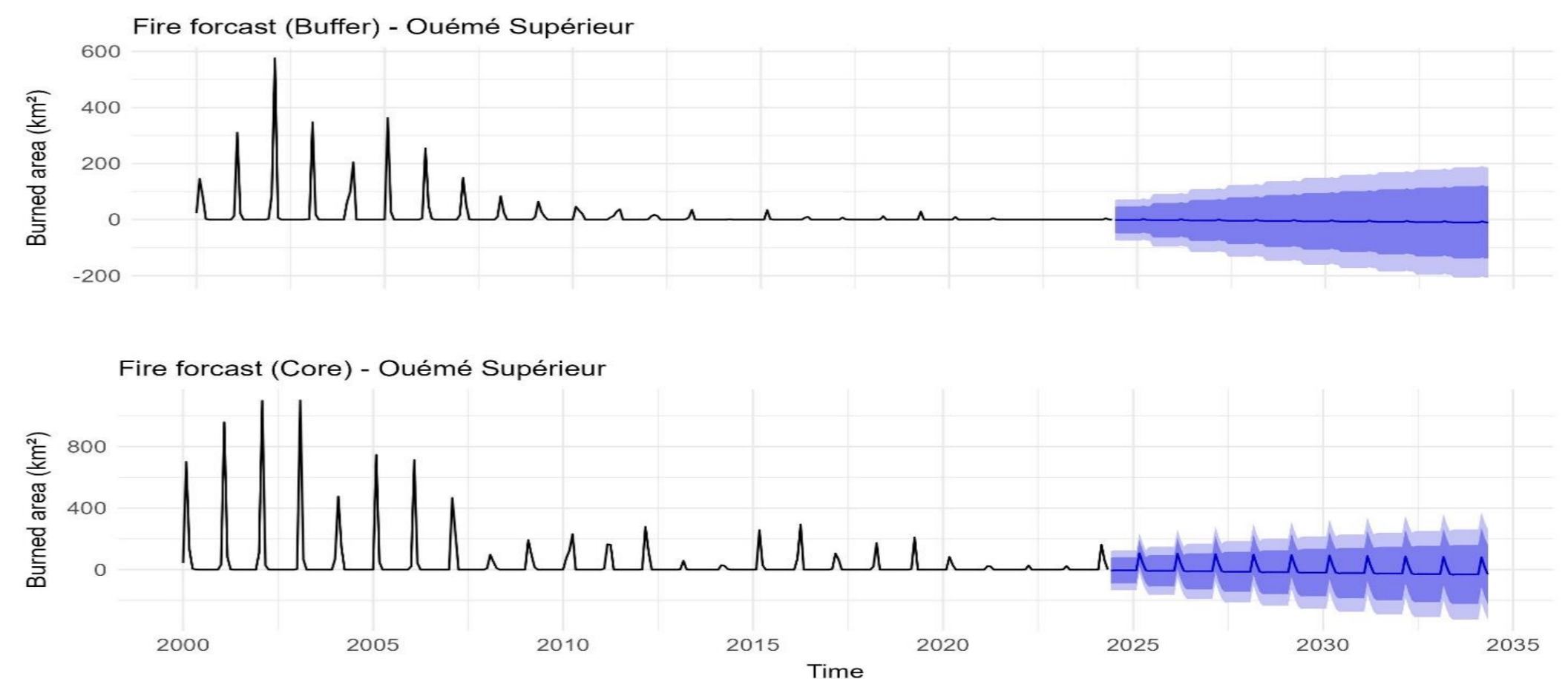
Data collection and Analysis

- Analysis of fire detections from the MOD14A1 Version 6.1 dataset over a 25-year period (from January 2000 to June 2025).
- Consideration of core areas and 10 km buffer zones around each classified forest.
- Analysis of spatial and temporal patterns in Google Earth Engine.
- Monthly time series constructed in R to model burned area rates through ARIMA models incorporating seasonal components.

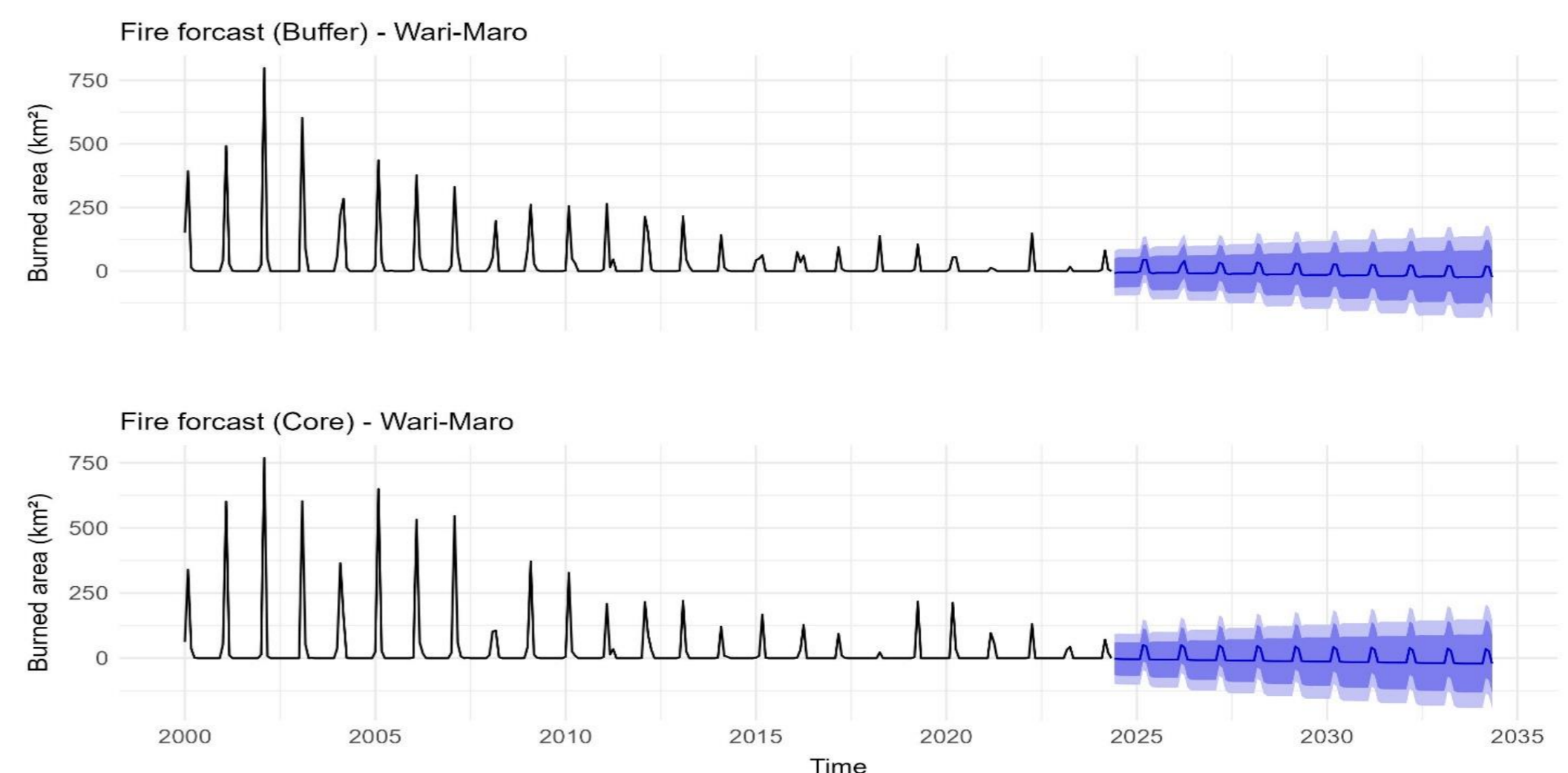


Spatial distribution of active fire detections from 2000 to 2025 across buffer (a) and core (b) zones of the Monts Kouffé, Wari-Marou, and Ouémé Supérieur classified forests in Benin. Each point represents the centroid of a 1 km² MODIS pixel (MOD14A1 v061 product), color-coded by detection year group

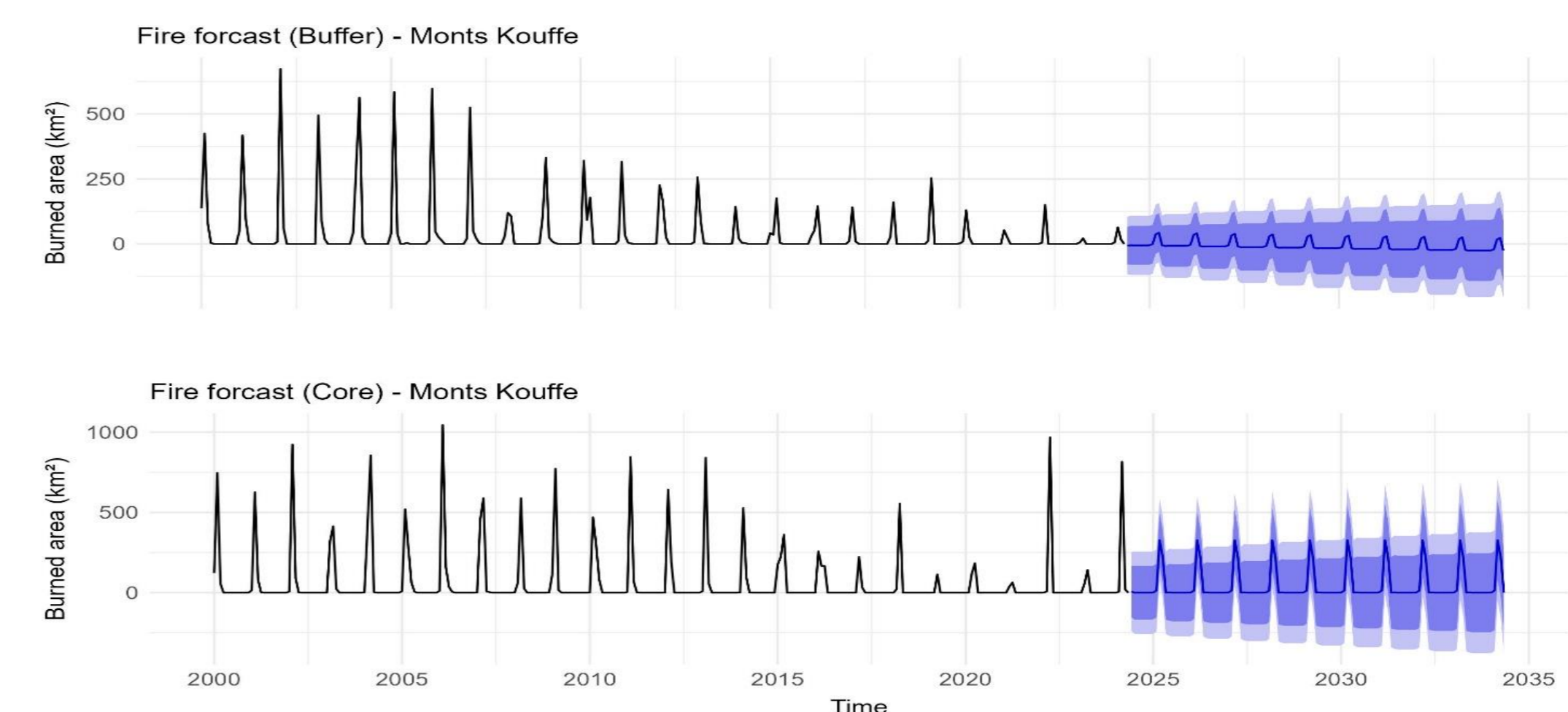
RESULTS



Forecasted monthly burned area (in km²) in the buffer and core zones of Ouémé Supérieur Forest from 2025 to 2035 using ARIMA models. The top panel displays the buffer zone forecast, and the bottom panel shows the core zone forecast. Solid black lines represent historical data; blue lines show forecasts, and shaded bands indicate 80% and 95% confidence intervals.



Forecasted monthly burned area (in km²) in the buffer and core zones of Wari Marou forest from 2025 to 2035 using ARIMA models. The top panel displays the buffer zone forecast, and the bottom panel shows the core zone forecast. Solid black lines represent historical data; blue lines show forecasts, and shaded bands indicate 80% and 95% confidence intervals



Forecasted monthly burned area (in km²) in the buffer and core zones of Monts Kouffé forest from 2025 to 2035 using ARIMA models. The top panel displays the buffer zone forecast, and the bottom panel shows the core zone forecast. Solid black lines represent historical data; blue lines show forecasts, and shaded bands indicate 80% and 95% confidence intervals

CONCLUSION

From 2000 to 2025, a clear decline in burned areas was observed, likely reflecting the efforts of local NGOs promoting improved fire management in surrounding communities. The ARIMA models revealed distinct temporal structures and prediction accuracies between buffer and core zones. These findings highlight the need for zone-specific management strategies aligned with local ecological pressures.

ACKNOWLEDGEMENTS



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