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LETTER

Election cycles affect deforestation within Brazil's Atlantic Forest

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Abstract

Policymakers' incentives during election campaigns can lead to decisions that significantly affect deforestation. Yet this is rarely studied. For Brazil's Atlantic Forest, a highly biodiverse tropical forest, we link federal-and-state as well as municipal elections to annual deforestation between 1991 and 2014. Across 2253 municipalities, those with higher deforestation see a significant rise in deforestation during federal-and-state election years. Municipal election years raise deforestation for locations with lower deforestation, whereas all of these increases are accentuated when there is party alignment between different levels of government. This effect of election cycles has fallen over time, to date, yet that cannot be assumed to continue. Our results highlight the need to limit opportunistic behaviors that affect natural resources and the environment with implications for biodiversity, carbon storage, and other ecosystem services.

KEYWORDS

deforestation, election cycle, elections, evaluation, political cycles

1 | INTRODUCTION

Studies of deforestation have considered a range of economic and institutional factors driving agricultural expansion, timber extraction, and infrastructure development (Busch & Ferretti-Gallon, 2017; Geist & Lambin, 2002). However, they have largely ignored roles for elections. Elections create conditions for politically motivated decisions within what often is referred to as "the political cycle" (Nordhaus, 1975), in which economic and social policy instruments are manipulated to influence the outcomes of elections (Brender & Drazen, 2005; Shi & Svensson, 2006). Recently, it has been suggested that such political dynamics affect natural resource use and management, contributing to increased deforestation (Burgess et al., 2012). Understanding such political driving forces underlying forest loss is particularly critical for the tropics, where deforestation and forest degradation contribute 7%–14% of the world's carbon emissions from human activities (Harris et al., 2012) and threaten the world's biodiversity (Venter et al., 2014).

Multiple motivations may underlie opportunistic behaviors as elections approach. Needs for financial, political, and voter support offer opportunities for corruption. Decisions that affect voters have most political weight just before elections, yet least immediately following them (Nordhaus, 1975). Decisions that are popular with voters are more common when elections are approaching, whereas unpopular decisions tend to be taken early in new terms (Nordhaus, 1975). Because officials currently in office may have greatest access to the levers of political power, such behaviors may be more evident for incumbents who seek re-election, including within their pursuits of campaign support. For instance, Burgess et al. (2012) provide evidence of a "political logging cycle" that probably transformed forests into votes, campaign funds, and political support through reduced enforcement of anti-illegal-logging measures in Indonesia.

Brazil is potentially vulnerable to political deforestation cycles, given its extensive forests and young democratic system. Further, Brazil's approach to campaign finance may blur the lines between political support, rent seeking, and corruption (Watts, 2017). Many parties lack stable mechanisms to raise funds, yet employ expensive campaigns (Samuels, 2008). A high degree of access to municipal politicians for local elites may allow corruption in municipal elections (Rose-Ackerman, 1999), although making corruption problems visible to the electorate reduces the chances of municipal incumbents being re-elected (Ferraz & Finan, 2008). Brazilian state elections have also been shown to be influenced by "vote brokerage," where local brokers are paid to raise votes for incumbents (Gingerich & Gingerich, 2014).

A link between Brazilian municipal elections, incumbents, and deforestation has already been demonstrated for the Amazon region. For 2002–2012, Pailler (2018) show that deforestation increased 8%–10% in municipal election years when the incumbent mayors ran for re-election, relative to no incumbent running 2018. Further, the rise in deforestation increased significantly, up to 40%–60%, for cases where the running incumbent was considered corrupt (i.e., their tenure was associated with significant fiscal irregularities documented by audits).

Unlike the Amazon—where abundant forests remain accessible to a dynamic timber sector and advancing agricultural frontiers, given weak environmental governance—the Atlantic Forest of southeastern Brazil features a denser human occupation that has radically modified the natural environment since colonization (Joly et al., 2014), leaving forest cover under 26% (Rezende et al., 2018) with limited ongoing agricultural expansion (Freitas et al., 2010). The region also has some of the most comprehensive forest legislation globally (Brancalion et al., 2016) and state institutions have the financial and technical resources to both implement and enforce environmental policies and legislation, as well as manage state-level protected areas. In such a context, we hypothesize that any natural resources implications of political cycles may also involve links to elections via the strongest authorities, that is, at state and federal levels.

Political alignments across these levels of authority also affect allocations of public resources and, consequently, may influence the implications for natural resources from political cycles. For example, municipalities are more likely to receive fiscal transfers from state governments when mayors belong to the same political party as a state's governor (Bugarin & Marciniuk, 2017). During elections, such political alignments can affect the fates of candidates for multiple elections at different levels (Borges & Lloyd, 2016). Political alignment can also facilitate and accelerate policy implementation, including for deregulation and permitting that can directly influence deforestation. When such activities are linked to needs for political support and campaign finance during election years, political alignments may well influence deforestation rates.

We examine the evidence for deforestation cycles—for both federal-and-state and municipal election years, for Brazil's Atlantic Forest region, and allowing for such political alignments. We created a longitudinal database, with 2253 municipalities from seven states in south and southeastern Brazil (Figure 1), by combining deforestation data with electoral data. We then implemented panel-data quantile regressions for deforestation. These compare election with nonelection years, adding a variable for the (non) alignments between political parties.

2 | METHODS

2.1 | Panel data

We combined municipal-level annual deforestation data with information on the timing of and results for federal, state, and municipal elections from 1991 to 2014, for 2253 municipalities in seven states located inside Brazil's Atlantic Forest region (Minas Gerais, Rio de Janeiro, Espírito Santo, São Paulo, Paraná, Santa Catarina, Rio Grande do Sul) (Figure 1 and Supporting Information).

2.1.1 | Deforestation

We used land-cover data from the MapBiomas project (MapBiomas, 2020), annual cloud-free and automatically classified data based on Landsat images at a 30-m spatial resolution for 1985–2017. We discarded the three initial and final years of the data for deforestation due to a possible mapping inaccuracy. The global mapping accuracy for MapBiomas' Collection 5 is estimated to be 93% on average for the whole Brazil, and 85.5% for the Atlantic Forest region at the observed scale (Supporting Information), which is satisfactory for a Thematic Mapper classification (Rosa et al., 2021). We obtained forest transition matrices

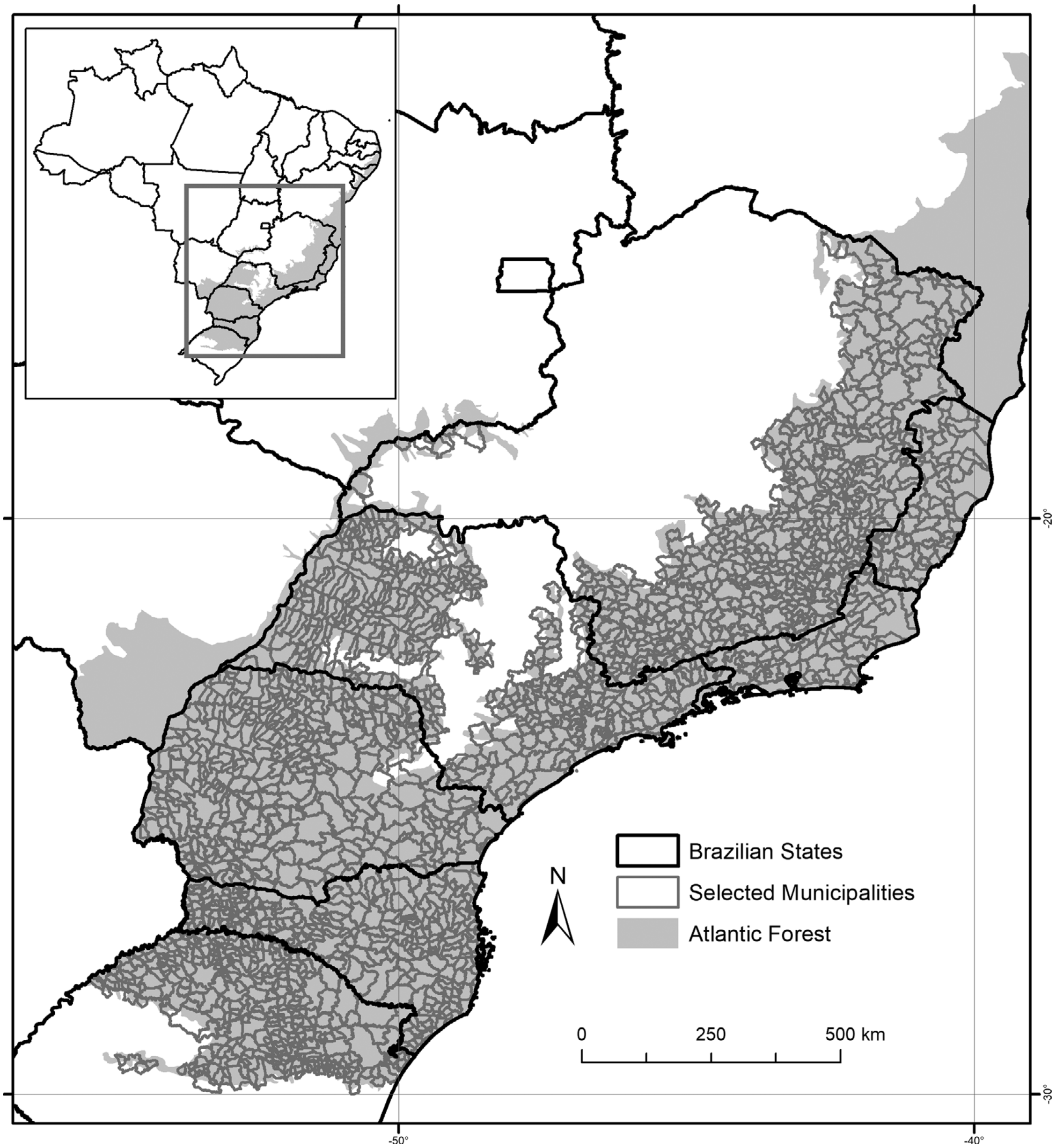

FIGURE 1 Study region: Biome, states, and municipalities.

from the annual mapping product, distinguishing areas that transitioned from forest to deforested at pixel scale. We represented deforestation as the percentage loss of previous forested area, per municipality (Supporting Information).

2.1.2 | Elections

Electoral data for Brazil are available online at *Tribunal Superior Eleitoral* (National Electoral Office). We collected federal, state, and municipal election results for all municipalities, from 1991 to 2014 (TSE, n.d.). We obtained the percent of valid votes for each candidate from the first round of the election, plus the party coalition represented (Supporting Information). When a second round occurred, we collected the identity and the party of the final winner.

For political alignment between state and federal levels, for each state and each election, we verified whether the party of the governor belonged to the presidential party coalition running for re-election at the national level (Supporting Information). For alignments between the state and municipal levels, we observed whether the governor's party belonged to the same party of the municipal mayor. In this case, we looked for influences in "both directions," that is, whether the party running for reelection was running in the state or in the municipal elections. The whole observed period (1991–2014) was considered in the main empirical model testing the effect of election years. However, given data limitations, we only considered the period of 1997–2014 for our analyses of political alignments (Supporting Information).

2.1.3 | Control variables

We obtained data on agricultural production, cattle breeding, and human population from the *Instituto Brasileiro de Geografia e Estatística* (IBGE) (National Institute of Geography and Statistics) online (SIDRA; IBGE, n.d.) for 1991–2014. We divided human population by municipal area for average population density and used squared population density to test possible decreasing or increasing marginal effects. We used the annual average precipitation for each municipality from CHIRPS, through the Columbia University database (IRI, n.d.), to control for possible variation in the Landsat mapping related to differences between dry and rainy years. Human population and precipitation were included in all our models as control variables; however, we did not include agricultural production and cattle breeding in our final models (although we check if results are robust to their inclusion), because they may be affected by political decisions in a cyclic way implying that endogeneity may be present in these cases.

2.2 | Empirical approach

To test for a political deforestation cycle, we searched for temporal patterns associated with political elections. We defined a categorical variable *cycle* distinguishing years of municipal elections from years of federal-and-state elections and interelection years. To test the idea that election years result in significantly higher deforestation, we examined the effects of election year (municipal or federal-and-state) upon different quantiles of the distribution of the rate of deforestation. This means that all locations are ranked in terms of their deforestation outcome, then quantile regressions allow us to observe if different effects occur for different quantiles of this distribution. That is useful because we expect that the effect of elections on deforestation will be more significant for high deforestation pressures. Following the regression technique of Koenker (2004) for longitudinal data 2004, we estimated the general equation:

$$Qy_{m,t}(\tau|X_{m,t}) = \alpha_m + \delta_s t + cycle^{\mathrm{T}}_{m,t}\beta_1(\tau) + X^{\mathrm{T}}_{m.t}\beta_2(\tau), \quad (1)$$

where y is deforestation—as a fraction of standing forest in each municipality m in each year t—for quantile *tau*, *cycle* is the variable for (non) election years, X is the co-variate matrix, and δ_s is a vector of coefficients on time, allowing each state to have its own linear trend.

To test the alignment hypothesis, we considered the following possibilities: for a federal–state election year, we can have (i) fed–state alignment alone (not aligned with muni), (ii) fed–state–muni (triple) alignment, (iii) state–muni alone (not aligned with fed), and [iv] no alignment at all; and for municipal election years, we can have (v) muni–state alignment and (vi) no alignment. Finally, of course we have the control years, (vii) no election years. This specification allows us to account for a bidirectional possibility for the alignment of governors and mayors. We add to (1) to arrive at the following equation:

$$Qy_{m,t}(\tau|X_{m,t}) = \alpha_m + \delta_s t + alignment^{\mathrm{T}}_{m,t}\beta_1(\tau) + X^{\mathrm{T}}_{m.t}\beta_2(\tau), \quad (2)$$

where categorical *alignment* extends *cycle* in using all the possibilities described above for all election years and also nonelection years as the reference level, and X are control variables.

We use municipality fixed effects α_m to control for time-invariant municipality differences. We also compare quantile regression coefficients to mean conditional coefficients obtained through ordinary least square panel regressions. As a robustness check, we (i) varied the period analyzed; (ii) modified the sample, for instance setting aside states; and (iii) tested for randomly assigned political alignments. All procedures were conducted in R (Version 3.6.3) (R Core Team, 2020), using the PLM package (Version 1.6-6) for mean conditional panel regressions (Croissant & Millo, 2008) and the RQPD package (Version 0.6/r10) for quantile regression analyses (Koenker & Bache, 2014).

3 | RESULTS

We found higher deforestation with elections than without. For years with federal-and-state elections, such a rise in deforestation occurs for municipalities within the median-or-higher quantiles of deforestation pressure (Figures 2 and 3; Table 1). For municipalities with lower deforestation pressure (quantile 0.25), federal-and-state election years have little or no effect, whereas municipal election years do. For intermediate quantiles, any election event, both federal-and-state and municipal election years impact deforestation rates (Table 1; Figure 3). Compared to nonelection years, an election year experiences an additional deforested area equal to 3652 ha for a federal-and-state election year and 4409 ha for a municipal election year for the whole studied area (Supporting Information, section

TABLE 1 Election years effects on deforestation

Total deforestation	Quantiles									
	0.25	**0.50**	**0.60**	**0.65**	**0.70**	**0.75**	**0.80**	**0.85**	**0.90**	**0.95**
Federal–state election years	0.003*	0.016***	0.021***	0.026***	0.028***	0.041***	0.057***	0.072***	0.096***	0.256***
	(0.002)	(0.002)	(0.003)	(0.004)	(0.005)	(0.007)	(0.008)	(0.011)	(0.015)	(0.034)
Municipal election years	0.005**	0.011***	0.013**	0.014***	0.011*	0.011.	0.006	0.001	−0.019	−0.040
	(0.002)	(0.003)	(0.004)	(0.004)	(0.005)	(0.006)	(0.008)	(0.010)	(0.014)	(0.028)
Control variables										
Population density	<0.001.	<0.001**	<0.001*	<0.001*	<0.001*	<0.001.	<0.001.	<0.001	<0.001	<0.001
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Squared population density	<0.001**	<0.001***	<0.001**	<0.001**	<0.001*	<0.001.	<0.001	<0.001	<0.001	<0.001
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Precipitation	−0.001***	−0.001***	−0.002***	−0.002***	−0.002***	−0.003***	−0.004***	−0.004***	−0.006***	−0.010***
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Time trends	−0.002*	−0.005**	−0.008*	−0.010**	−0.011**	−0.014**	−0.016**	−0.029***	−0.040***	−0.064***
	(0.001)	(0.002)	(0.003)	(0.004)	(0.004)	(0.005)	(0.006)	(0.008)	(0.009)	(0.019)
Constant	5.192**	11.135**	18.566**	22.523**	24.814**	29.958**	34.275**	61.550***	84.447***	133.29***
	(1.900)	(3.438)	(6.472)	(7.272)	(8.531)	(9.192)	(11.872)	(16.968)	(18.618)	(38.436)

Note: Quantile regression was used to estimate the effect of municipal and federal–state election years, compared to nonelection in-between years, on total deforestation per municipality. Quantile regression coefficients (standard errors) are presented for 10 quantiles regarding the distribution of the deforestation outcome. Control variables coefficients are also presented below. All regressions include state - time fixed effects, as well as controls according to Section 2.

***$p < 0.001$

**$p < 0.01$

*$p < 0.05$; . $p < 0.1$.

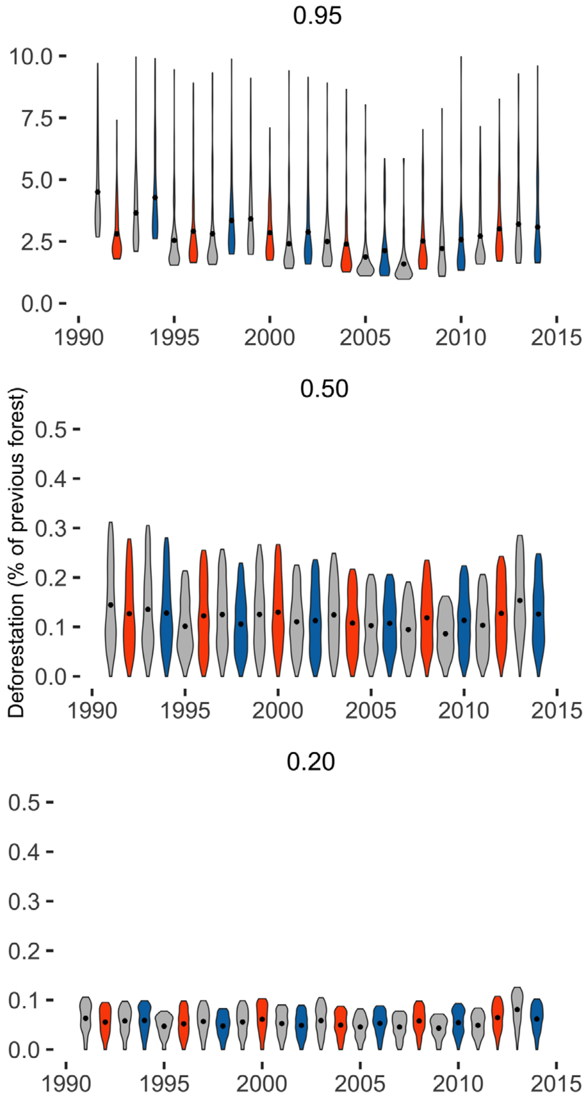

FIGURE 2 Violin plots for deforestation as a percentage of previously existing forest in municipalities in quantiles 0.95, 0.50, and 0.20 (i.e., municipalities with high, medium, and low deforestation, respectively).
Note: Outliers municipalities with deforested area above 10 % are not shown in quantile 0.95. Note that *y*-axis scale in quantile 0.95 (municipalities with high deforestation) is 20 times greater than *y*-axis in the other two graphs. Dark points represent the mean value. Blue violins refer to years with federal and state elections and orange violins refer to municipal election years.

with average effects),[1] whereas the average total deforested area per year during the observed period is 136,486 ha (Supporting Information). These effects fell over time, for this time period in which environmental governance trended upward, as effects are present earlier (1991–2003) but not clearly present more recently (2004–2014) (Figure 4). Intermediate periods (1995–2010) show a moderate effect (Figure S8).

Concerning political alignments, we show that the rise in deforestation rates is higher during federal-and-state election years for those cases with state–federal alignment (Table 2), that is, in which the governor's party belongs to the president incumbent coalition (Table 2 and Figure 3). Also, at a smaller scale, the election-linked rise in deforestation is higher in municipalities with lower deforestation pressure when the mayor and the governor belong to the same party. If we look instead for a common effect of the mayor–governor link during federal-and-state as well as municipal election years, for the higher deforestation pressure (quantiles 0.7 and 0.9) for which we had found federal-and-state election effects previously, we see local alignment matters here as well (Table 2). Given such alignment, the effect is more persistent over time and still present in the last period analyzed (2007–2014) (Figure 4 and Figure S10).

Municipal election years are distinct from state-and-federal election years, whereas municipal governments are less responsible for forest governance policies. We found that municipal elections have influence on deforestation in those municipalities facing lower deforestation pressures, that is, where federal-and-state election years have had less impact (Table 1; Figure 3). We also found more influence of municipal elections for the cases of party alignment with the state government (Table 2; Figure 3). Yet these results for municipal election years may be less robust than for federal-and-state election years (Supporting Information).

4 | DISCUSSION

Contributing to a sparse literature on political deforestation cycles, our results suggest that elections have affected deforestation in Brazil's Atlantic Forest region. Federal-and-state years are particularly impactful for those municipalities with higher deforestation pressure, especially given political alignments, whereas municipal election years raise deforestation in those municipalities with lower deforestation pressures. Both stories have varied across time.

Federal and state resources and institutions are quite plausible factors in forest governance for the Atlantic Forest. So too is coordination between politically aligned levels of government, especially for concurrent races such as state and federal elections in Brazil (Borges & Lloyd, 2016). When potentially dominant federal and state inter-

[1] Eighty percent of the Atlantic Forest forest remnants are currently smaller than 50 ha (Ribeiro et al. 2009). All of the quantiles in our sample include municipalities with small, intermediate, and large forest remnants, with a similar distribution (Figure S7). In very few cases (~7 municipality-by-year events), deforestation rates reach 20%, and in particular most of the time municipalities that have low forest cover have lower deforestation rates (Figure S5). Thus, areas affected by election cycles are not necessarily and exclusively the smallest ones (Figures S5–S7).

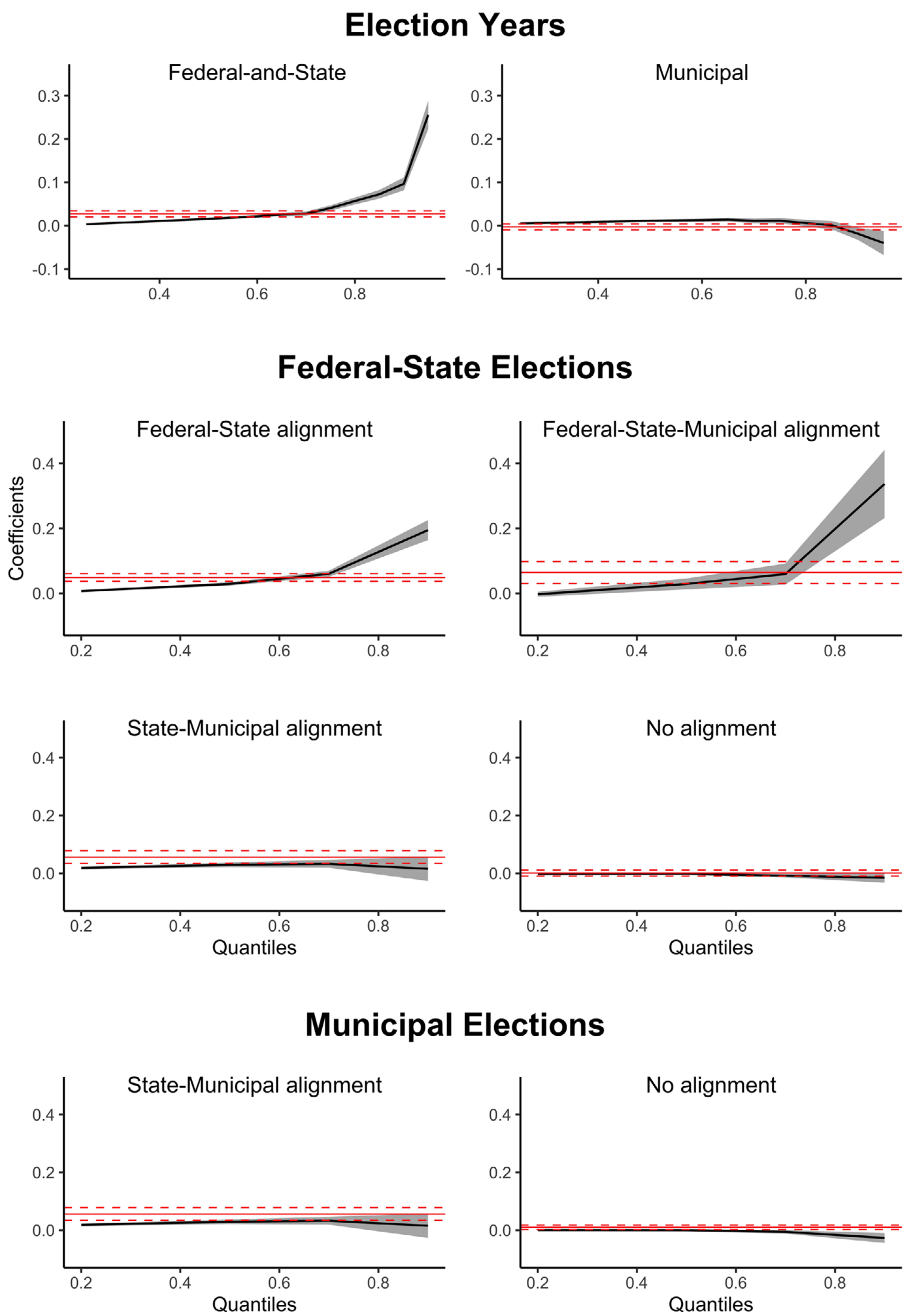

FIGURE 3 Effect of election deforestation cycles. Quantile coefficients for election years effect (first row), political alignment during federal-and-state elections (second and third row), and political alignment during municipal elections (fourth row). Confidence intervals (0.95) in gray. Red lines represent the conditional mean coefficients and red dashed lines confidence interval(s) (0.95) (see Supporting Information).

ests are less involved, municipalities can have more influence, including in the Brazilian Amazon (Pailler, 2018). For municipalities under intermediate pressure of deforestation in the Atlantic Forest, our results show that both federal-and-state election years and municipal election years affect the rates of forest loss.

Our results suggest further investigation of some mechanisms that may underpin such effects, which may also differ between federal, state, and municipal levels of governance. First, policymakers can promote activities that directly lead to deforestation, including extension of credit and relaxation of permitting requirements for

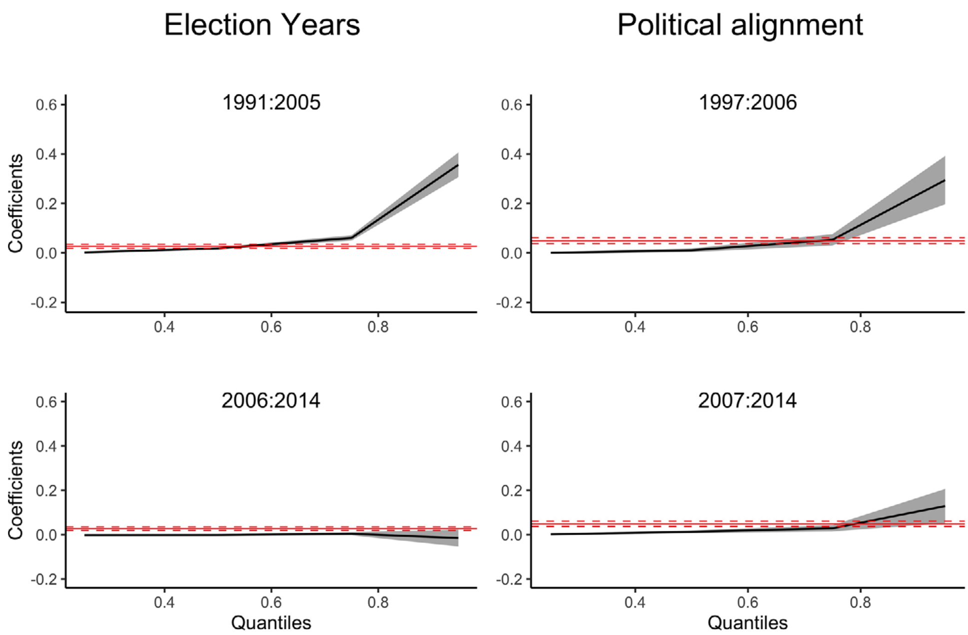

FIGURE 4 Election year and political alignment effect for different periods. Coefficients (*Y*-axis) for federal-and-state election year effect (left) and federal-state political alignment effect (right) for observed quantiles (*X*-axis) for different observed periods. Confidence intervals (0.95) in gray. Red lines represent the conditional mean coefficients and red dashed lines confidence interval(s) (0.95) for the whole observed period. (See Supporting Information for more detailed period division.)

TABLE 2 Political alignment effects on deforestation

Total deforestation	Quantiles			
	0.20	0.50	0.70	0.90
Federal–State election years				
Fed–State aligned	0.007* (0.003)	0.029*** (0.005)	0.060*** (0.009)	0.195*** (0.029)
Fed–State–Muni aligned	−0.003 (0.007)	0.029. (0.017)	0.059. (0.031)	0.337*** (0.097)
State–Muni aligned	0.004 (0.005)	0.024** (0.007)	0.046*** (0.012)	0.081* (0.033)
No alignment	0.001 (0.002)	< 0.001 (0.004)	−0.006 (0.006)	−0.027 (0.017)
Municipal election years				
Muni–State aligned	0.019*** (0.004)	0.029*** (0.008)	0.033* (0.013)	0.015 (0.042)
No alignment	−0.003 (0.002)	−0.002 (0.003)	−0.008 (0.005)	−0.016 (0.017)
Control variables	Yes	Yes	Yes	Yes

Note: Quantile regression was used to estimate the effect of political alignment between different levels of government during election years. For federal and state levels, we considered the alignment between federal coalitions running for re-election and the party running the state government on total municipal deforestation; for state and municipal levels, we considered parties running the state government and party at the municipal office (see Supporting Information). Quantile regression coefficients (standard errors) are presented for each quantile of the deforestation outcome. All regressions include state - time fixed effects, as well as controls according to Section 2.

***$p < 0.001$
**$p < 0.01$
*$p < 0.05$; . $p < 0.1$.

the agriculture, mining, and real-estate sectors. Second, policymakers can reduce forest protection through the downgrading, downsizing, and degazettement of protected areas (Bernard et al., 2014; Keles et al., 2020). They can also reduce surveillance and defund field efforts by the environmental police, signaling impunity for illegal deforestation. Some of these activities stimulate authorized deforestation but most simply lessen the level of state control and thus could increase illegal forest loss. They are expected to be mainly pushed by federal and/or state governments.

However, a more decentralized process may take place at the municipal level where corruption may occur at the bottom of bureaucratic pyramids (Rose-Ackerman, 2010). Possibly related to multiple such dynamics, private land speculation has been described as a driving force of deforestation in the Amazon (Bastiaan et al., 2020). Finally, if the expectation of punishment is low, political instability or changes may alone encourage land-use decisions toward deforestation (Rodrigues-Filho et al., 2015).

Of additional concern, it appears that the forest removed during election-driven deforestation is old, established, and primary forest (Rosa et al., 2021)—the small remnants of which can be crucial to biodiversity conservation within this threatened biome (Martins et al., 2015). Although the magnitude of this election cycle impact (~4000 ha) is small compared to the average loss per year (~136,000 ha), this is enough forest for politicians to be doing real damage. They can cancel out the gains from conservation policies. For instance, programs of payment for ecosystem services employ multiple managers and technical officers to engage landowners to shift their decisions toward conservation, yet such payments in two of the municipalities in the Atlantic Forest region contributed 3.74 ha/year/municipality after 5 years of dedicated implementation (Ruggiero et al., 2019) and, over 5 years, this could be cancelled out by one municipal and one federal-and-state election cycle. Thus, a few politicians can override entire policy programs.

As to why election impacts have fallen to date for the Atlantic Forest region, one story is that "democratic learning" accumulates across electoral events, with increasing knowledge based on transparency allowing voters to distinguish competence from opportunism (Akhmedov & Zhuravskaya, 2004; Brender & Drazen, 2005). And for the Brazilian Atlantic Forest, in the past there has been some consolidation of deforestation frontiers over time (Calaboni et al., 2018; Costa et al., 2017). That could reduce space for politically motivated forest loss later in our period, including through policies to counter illegal deforestation (Abman, 2014; Assunção et al., 2015; Burgess et al., 2019). The Atlantic Forest region has a currently robust set of environmental regulations and overall high level of regional environmental governance based upon increasing pressures from society to improve environmental protection (Pinto et al., 2014). Data on land-use and forest cover changes are increasingly available through remote sensing images in recent years, making deforestation more visible and allowing society to improve surveillance over forests.

However, we would stress that environmental governance trended up at the national scale during the time period we study. None of this occurs in a political vacuum. It is now well-established that environmental legislation, secure land tenure, a robust civil society, and robust and enforceable rule of law all interact to affect deforestation rates (Wehkamp et al., 2018). Protected areas are less vulnerable to losses of forest in countries with low levels of corruption, greater protection of property rights, and more democratic institutions (Abman, 2018). Yet democratic governance is not always consistent over time, for example, environment may raise as a priority for some time and then later fall (Barbosa et al., 2021). Indeed, that seems to be the case in multiple countries at this time, including due to COVID-19 national priorities.

Brazil is experiencing degradation of its environmental and social policies and institutions (Abessa et al., 2019; Ferrante & Fearnside, 2019; Oliveira & Araújo, 2020), including all of the downgrading, downsizing, and degazettement of protected areas (Bernard et al., 2014), reduced environmental license requirements (Fearnside, 2016), dismantling of enforcement (Boadle & Paraguassu, 2019), and signaling to both private and public sector actors that deforestation is allowed (Rochedo et al., 2018). Coming back to our results that elections breed opportunistic deforestation, such political deforestation cycles may be actively reduced through real-time monitoring of forests and making data broadly available to voters during election campaigns. Yet with political change and instability, Brazil may instead be heading back to the situation in which political deforestation cycles will generate great magnitudes of tropical forest loss.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. The views and opinions expressed in this article are those of the authors and do not reflect an official position of any agency of the U.S. Government.

4.1 | DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in public sites. Deforestation data can be downloaded from MabBiomas Project Collection 5 (www.mapbiomas.org), electoral data are available at the Brazilian National Electoral Office (https://www.tse.jus.br/eleicoes/estatisticas/repositorio-de-dados-eleitorais-1), precipitation data are available at the Columbia University IRI Library Database (https://iri.columbia.edu/resources/data-library/), and other municipal data are available at the Brazilian National Institute of Geography and Statistics website (https://sidra.ibge.gov.br/home/pimpfbr/brasil).

AUTHOR CONTRIBUTION

P.R. originally conceived the study, assembled and analyzed the data, and wrote the manuscript. A.P. helped conceive the study, contributed to empirical approach, and wrote the manuscript. M.R. processed deforestation data and contributed figures and Supporting Information. E.N. contributed ideas and edited the manuscript. J.M. helped conceive the study, contributed ideas, and edited the manuscript.

ETHICS

The authors conducted no data collection or scientific inquiry that required ethics considerations. The manuscript complies with proper ethical scientific standards.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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