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Supplementary material for

Climate change projected to reduce prescribed burning opportunities in the south-eastern United States

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Supplementary Material 1 (S1): description of burn permit data

In Florida, any type of intentional burning that is not emitted through a smoke stack must be permitted by the state on a daily basis through a single statewide permitting system (Florida Statute § 590.125(3.b.4)). Florida permit data were acquired as a geodataset with information about prescribed fire requests submitted to the Florida Forest Service, from which the data were acquired. As such, this dataset can be considered a census of permitted prescribed fires in Florida. These data included permits for both broadcast burns (the burning of agricultural or natural vegetation by allowing fire to move across a predetermined area of land) and pile burns (those for which slash is gathered into piles before burning). Georgia's permitting process similarly requires managers to request authorization for any planned burn of 'woods, lands, marshes, or any flammable vegetation' (Official Code of Georgia Annotated [O.C.G.A.] § 12-6-90), but such permits are recorded only at the county level. We acquired the 2006–2016 permit data for each county as a single dataset from the Georgia Forestry Commission in the form of an Access database, which we then converted to a geodatabase of permit locations. Although the Florida and Georgia datasets contained other attributes, those pertinent to this analysis and common between the two states included date of the burn, location, type of burn (pile burn or broadcast burn), and size of the burn (or number of piles, in the case of pile burns).

Supplementary Material 2 (S2): supporting information – additional tables and figures

Table S2.1. List of Global Climate Models used in this study.

Model acronym	Model name
BCC_CSM1.1	Beijing Climate Center, Climate System Model, version 1.1
BCC_CSM1.1(m)	Beijing Climate Center, Climate System Model, version 1.1 (moderate resolution)
BNU-ESM	Beijing Normal University Earth System Model
CanESM2	Second Generation Canadian Earth System Model
CNRM-CM5	Centre National de Recherches Météorologiques Coupled Global Climate Model, version 5
CSIRO-Mk3-6-0	Commonwealth Scientific and Industrial Research Organisation Mark, version 3.6.0
GFDL-ESM2G	Geophysical Fluid Dynamics Laboratory Earth System Model with Generalized Ocean Layer Dynamics component
GFDL-ESM2M	Geophysical Fluid Dynamics Laboratory Earth System Model with Modular Ocean Model 4 component
HadGEM2-CC	Hadley Centre Global Environment Model, version 2–Carbon Cycle
HadGEM2-ES	Hadley Centre Global Environment Model, version 2–Earth System
INMCM	Institute of Numerical Mathematics Coupled Model
IPSL-CM5A-LR	L'Institut Pierre-Simon Laplace Coupled Model, version 5A, coupled with Nucleus for European Modelling of the Ocean (NEMO), low resolution
IPSL-CM5A-MR	L'Institut Pierre-Simon Laplace Coupled Model, version 5A, coupled with NEMO, mid resolution
IPSL-CM5B-LR	L'Institut Pierre-Simon Laplace Coupled Model, version 5B, coupled with NEMO, low resolution
MIROC5	Model for Interdisciplinary Research on Climate, version 5
MIROC-ESM	Model for Interdisciplinary Research on Climate, Earth System Model
MIROC-ESM-CHEM	Marine-Earth Science and Technology Earth System Model - Chemistry
MRI-CGCM3	Meteorological Research Institute Coupled Atmosphere–Ocean General Circulation Model, version 3

Table S2.2. Projected changes in the number of days during the winter (January and February), summer (June and July), and 'transitional' (March, April, May) burning seasons that fall within accepted burn window conditions. Percentage change is based on the number of suitable days for a baseline period (1976–2005) and future conditions (2070–2099).

GCM	**RCP 4.5**			**RCP 8.5**		
	Winter	Transition	Summer	Winter	Transition	Summer
BCC_CSM1.1	3.4%	-0.9%	-35.7%	5.4%	-9.3%	-76.8%
BCC_CSM1.1(m)	4.2%	-5.9%	-36.2%	6.6%	-7.1%	-67.1%
BNU-ESM	1.1%	-3.5%	-35.7%	3.6%	-9.4%	-62.0%
CanESM2	4.2%	-4.9%	-35.9%	4.7%	-12.9%	-78.1%
CNRM-CM5	3.0%	-2.5%	-32.5%	3.9%	-5.8%	-51.8%
CSIRO-Mk3-6-0	5.8%	-2.7%	-40.8%	5.8%	-11.1%	-67.1%
GFDL-ESM2G	-1.3%	-3.3%	-40.0%	5.4%	-5.6%	-60.7%
GFDL-ESM2M	0.0%	-3.7%	-36.2%	2.6%	-6.6%	-62.0%
HadGEM2-CC	2.4%	-5.9%	-52.9%	6.4%	-13.1%	-84.6%
HadGEM2-ES	5.6%	-3.3%	-53.1%	7.9%	-13.0%	-79.3%
INMCM	2.7%	-3.1%	-13.8%	2.4%	-7.7%	-37.0%
IPSL-CM5A-LR	-0.4%	-5.2%	-44.7%	2.0%	-15.0%	-72.3%
IPSL-CM5A-MR	0.7%	-4.7%	-45.6%	2.9%	-15.2%	-78.3%
IPSL-CM5B-LR	3.6%	-0.6%	-23.6%	4.2%	-5.6%	-52.3%
MIROC5	2.2%	-4.9%	-41.9%	1.8%	-11.0%	-66.5%
MIROC-ESM	-1.3%	-5.8%	-45.2%	1.7%	-14.4%	-77.7%
MIROC-ESM-CHEM	1.9%	-5.0%	-45.9%	3.7%	-17.0%	-78.8%
MRI-CGCM3	-1.5%	-5.7%	-14.6%	-1.7%	-8.8%	-40.4%

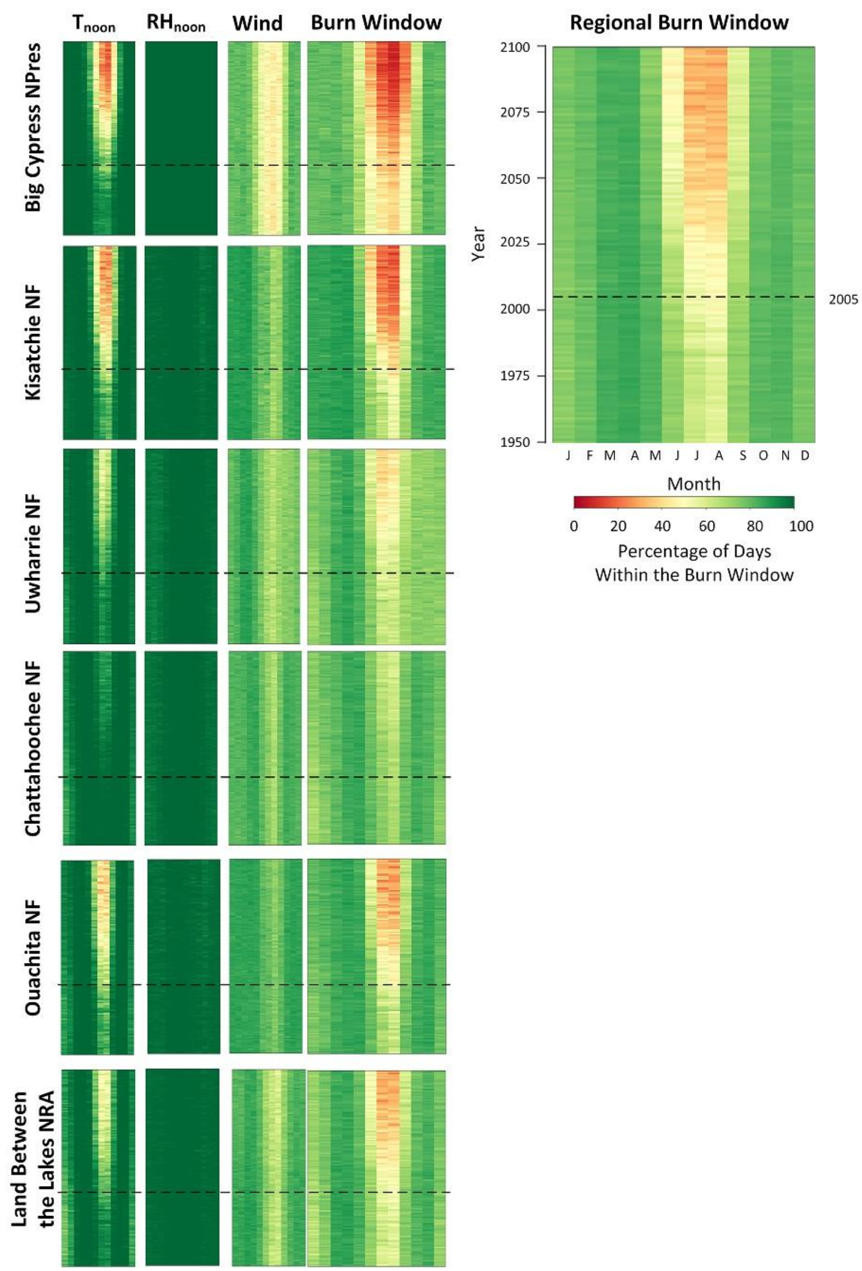

Figure S2.1. Percentage of days per month meeting suitable burn criteria for three weather variables individually and collectively at six management units. Values represent averages based on 18 global climate models under Representative Concentration Pathway 4.5. Accepted burn intervals were: 1200 hours temperature (0 to 32.5°C), 1200 hours relative humidity (> 30%), and mean daily wind speed (2.25 to 8.0 m sec^{-1}). The regional burn window represents values for all pixels within the study region.

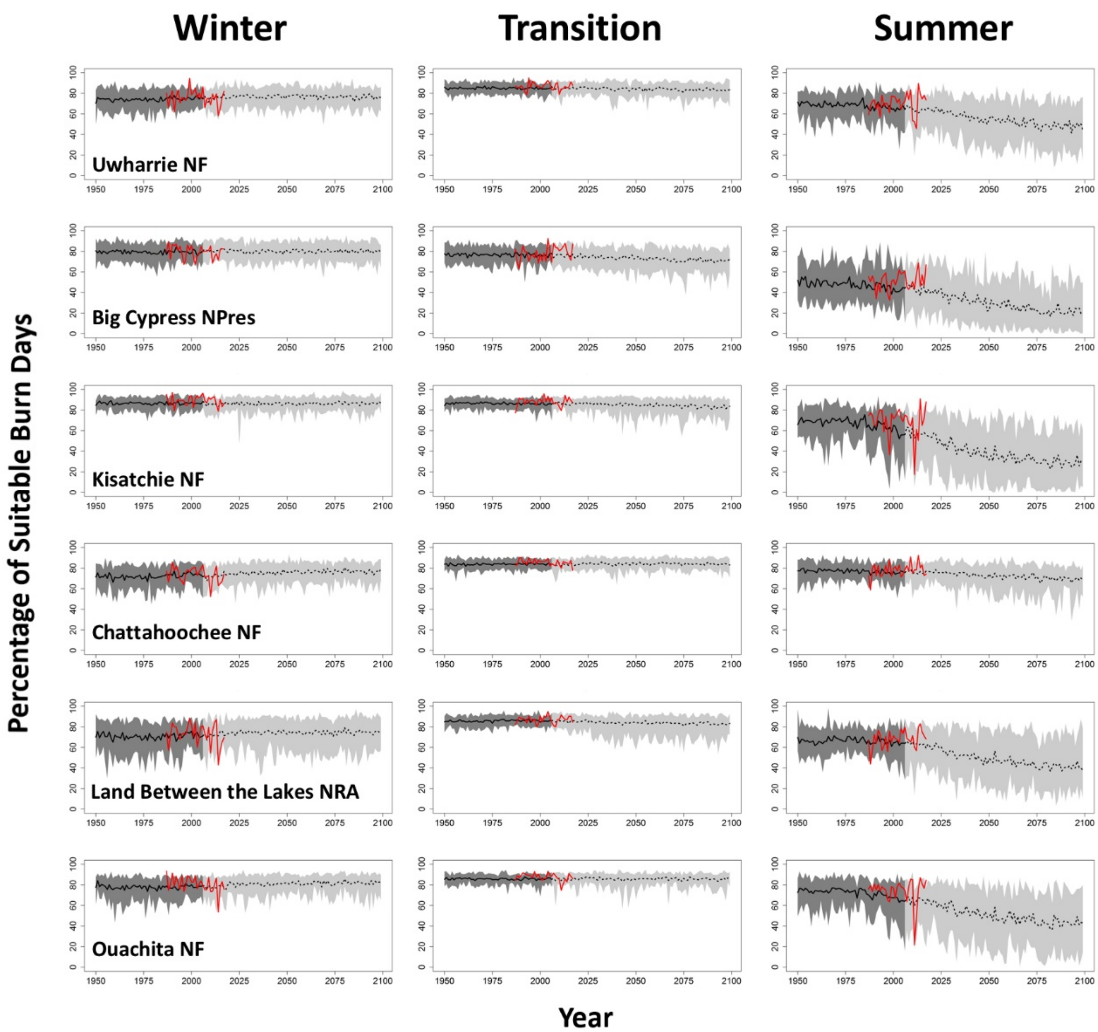

Figure S2.2. Time series of percentage days considered suitable for prescribed burning at six management units in the region for three burning seasons: winter (January, February), transition (March, April, May), and summer (June, July) burn seasons. The red line indicates observed conditions over the period 1987–2017 based on surface meteorological data from the gridMET dataset. Dark and light gray shading represent the range of results from 18 GCMs under Representative Concentration Pathway (RCP) 4.5. The solid (historical) and dashed (future) black lines are the multi-model mean value from all 18 GCMs. Differences in shading distinguish bounds for the CMIP5 historical simulation period (1950–2005: darker) from the future simulation period (2006–2099: lighter).