AGU PUBLICATIONS

Supporting Information for 'Increasing Wind-Driven Wildfire Risk Across California's Sierra Nevada Mountains'

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Top 20 Largest California Wildfires					
Fire Name (Cause)	Date	County	Acres	Structures	Deaths
AUGUST COMPLEX (Under Investigation)*	August 2020	Mendocino, Humboldt, Trinity, Tehama, Glenn & Colusa	1,032,649	935	1
MENDOCINO COMPLEX (Under Investigation)	July 2018	Colusa, Lake, Mendocino & Glenn	459,123	280	1
SCU LIGHTNING COMPLEX (Under Investigation)*	August 2020	Stanislaus, Santa Clara, Alameda, Contra Costa & San Joaquin	396,624	222	0
CREEK FIRE (Under Investigation)*	September 2020	Fresno & Madera	377,693	853	0
LNU LIGHTNING COMPLEX (Under Investigation)*	August 2020	Sonoma, Lake, Napa, Yolo, & Solano	363,220	1,491	6
NORTH COMPLEX (Under Investigation)*	August 2020	Butte, Plumas, & Yuba	318,930	2,352	15
THOMAS (Powerlines)	December 2017	Ventura & Santa Barbara	281,893	1,063	2
CEDAR (Human Related)	October 2003	San Diego	273,246	2,820	15
RUSH (Lightning)	August 2012	Lassen	271,911 CA / 43,666 NV	0	0
RIM (Human Related)	August 2013	Tuolumne	257,314	112	0
ZACA (Human Related)	July 2007	Santa Barbara	240,207	1	0
CARR (Human Related)	July 2018	Shasta County & Trinity	229,651	1,614	8
MATILIJA (Undetermined)	September 1932	Ventura	220,000	0	0
WITCH (Powerlines)	October 2007	San Diego	197,990	1,650	2
KLAMATH THEATER COMPLEX (Lightning)	June 2008	Siskiyou	192,038	0	2
MARBLE CONE (Lightning)	July 1977	Monterey	177,866	0	0
LAGUNA (Powerlines)	September 1970	San Diego	175,425	382	5
SQF Complex (Lightning)	August 2020	Tulare	170,384	228	0
BASIN Complex (Lightning)	June 2008	Monterey	162,818	58	0
DAY FIRE (Human Related)	September 2006	Ventura	162,702	11	0

Table S1. Top 20 Largest California Wildfires as of 19 October 2020 according to the California Department of Forestry and Fire Protection (CAL FIRE): https://www.fire.ca.gov/media/11416/top20_acres.pdf. Astericks indicate numbers are not final.

Top 20 Deadliest California Wildfires					
Fire Name (Cause)	Date	County	Acres	Structures	Deaths
CAMP FIRE (Powerlines)	November 2018	Butte	153,336	18,804	85
GRIFFITH PARK (Unknown)	October 1933	Los Angeles	47	0	29
TUNNEL - OAKLAND HILLS (Rekindle)	October 1991	Alameda	1,600	2,900	25
TUBBS (Electrical)	October 2017	Napa & Sonoma	36,807	5,643	22
NORTH COMPLEX (Under Investigation)*	August 2020	Butte, Plumas, & Yuba	318,935	2,352	15
CEDAR (Human Related)	October 2003	San Diego	273,246	2,820	15
RATTLESNAKE (Arson)	July 1953	Glenn	1,340	0	15
LOOP (Unknown)	November 1966	Los Angeles	2,028	0	12
HAUSER CREEK (Human Related)	October 1943	San Diego	13,145	0	11
INAJA (Human Related)	November 1956	San Diego	43,904	0	11
IRON ALPS COMPLEX (Lightning)	August 2008	Trinity	105,855	10	10
REDWOOD VALLEY (Power Lines)	October 2017	Mendocino	36,523	544	9
HARRIS (Undetermined)	October 2007	San Diego	90,440	548	8
CANYON (Unknown)	August 1968	Los Angeles	22,197	0	8
CARR (Human Related)	July 2018	Shasta County, Trinity	229,651	1,614	8
LNU Lightning Complex (Under Investigation)*	August 2020	Napa/Sonoma/Yolo/Stanislaus/ Lake	363,220	1,491	6
ATLAS (Powerline)	October 2017	Napa & Solano	51,624	781	6
OLD (Human Related)	October 2003	San Bernardino	91,281	1,003	6
DECKER (Vehicle)	August 1959	Riverside	1,425	1	6
HACIENDA (Unknown)	September 1955	Los Angeles	1,150	0	6

Table S2. Top 20 Deadliest California Wildfires as of 19 October 2020 according to the California Department of Forestry and Fire Protection (CAL FIRE): https://www.fire.ca284.gov/media/5512/top20_deadliest.pdf. Astericks indicate numbers are not final.

SON	1979-1983	1984-1988	1989-1993	1994-1998	1999-2003	2004-2008	2009-2013	2014-2018
1979-1983	1	0.3472	0	0.02	0	0	0	0
1984-1988	0.3472	1	0.0001	0.0386	0	0	0.0019	0
1989-1993	0	0.0001	1	0.043	0.1604	0.5759	0.4049	0.0215
1994-1998	0.002	0.0386	0.043	1	0.0009	0.0141	0.2606	0
1999-2003	0	0	0.1604	0.0009	1	0.43	0.0319	0.4291
2004-2008	0	0	0.5759	0.0141	0.43	1	0.1856	0.1088
2009-2013	0	0.0019	0.4049	0.2606	0.0319	0.1856	1	0.0024
2014-2018	0	0	0.0215	0	0.4291	0.1088	0.0024	1

Table S3. P-values for Student t-tests on the difference in 5-year SON statewide averages of the Canadian Fire Weather Index between 1979-1983 and 2014-2018 in Figure 4d.

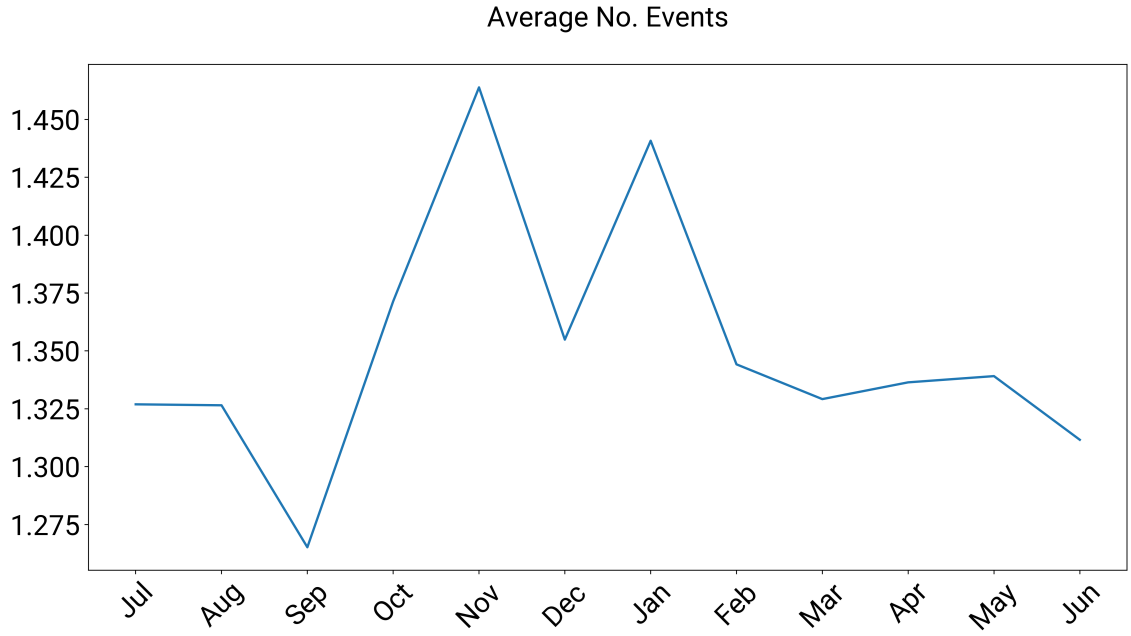

Figure S1. Monthly average number of Hazardous Wind Events within California over 1979-2019.

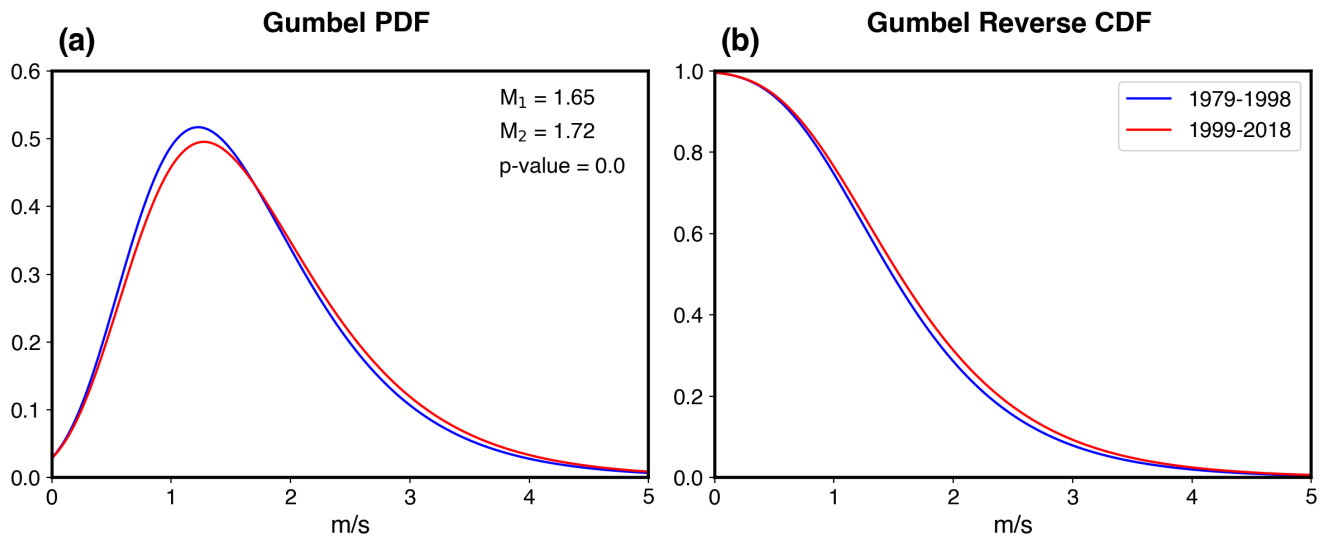

Figure S2. Fitted Gumbel probability distribution function (a) and reversed cumulative distribution function (b) of SON wind speeds at statistically significant grid points over the Sierra Nevada Mountains (38.5–36.25 N and 117.5–120.5 W) during 1979–1998 (blue) and 1999–2018 (red). M1 and M2 denote the 1979–1998 and 1999–2018 distributions means, respectively. The p-value corresponds to a one sided t-test for identical sample means.

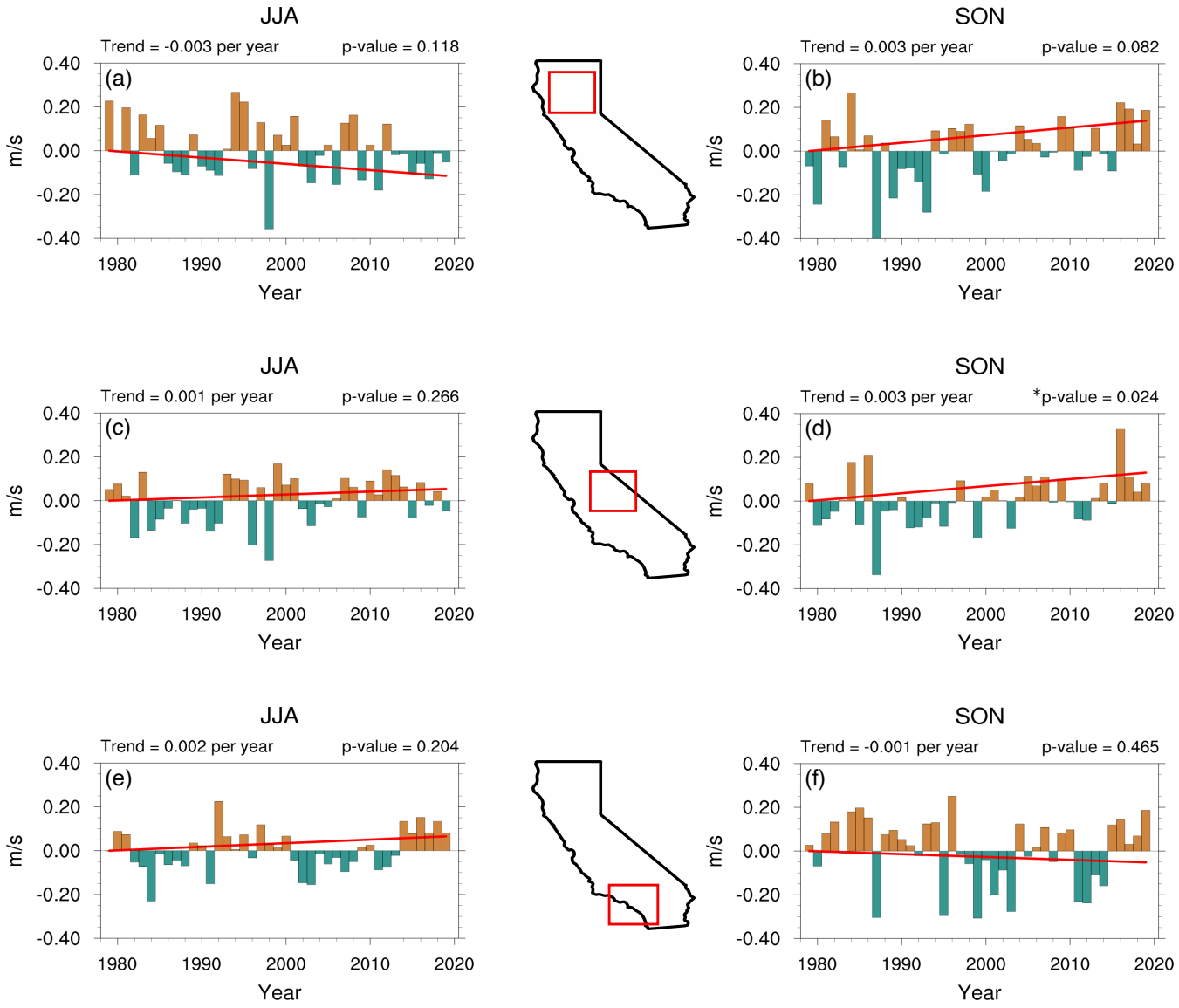

Figure S3. Anomalies in seasonally averages of daily maximum winds by region for JJA (left column) and SON (right column) over 1979–2019. Years of above average and below average maximum wind speeds are colored in brown and teal, respectively. Corresponding Theil-Sen linear trends (red lines) and their Mann-Kendall test p-values are annotated on the top left and top right of each subplot, respectively. Red boxes represent the three target regions of interest defined in the text.

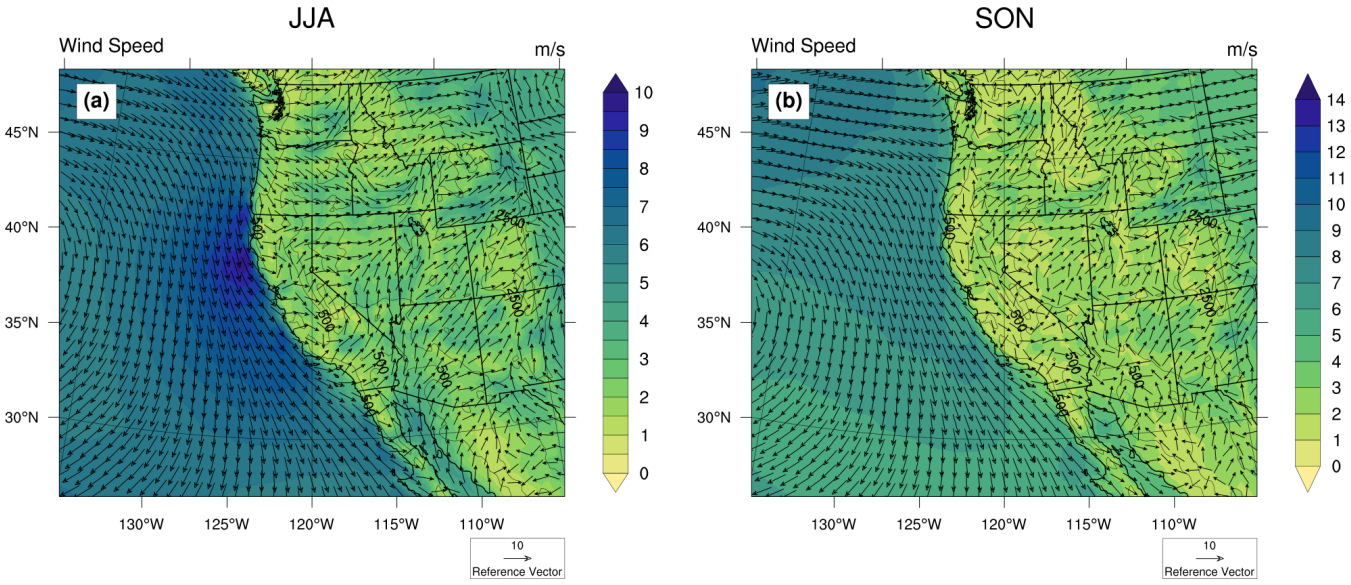

Figure S4. Seasonal average ERA5 10-m wind speed (solid colors) and seasonal average zonal and meridional wind components (arrows) for JJA (a) and SON (b) over 1979–2019. Note the different color bars for each subplot.

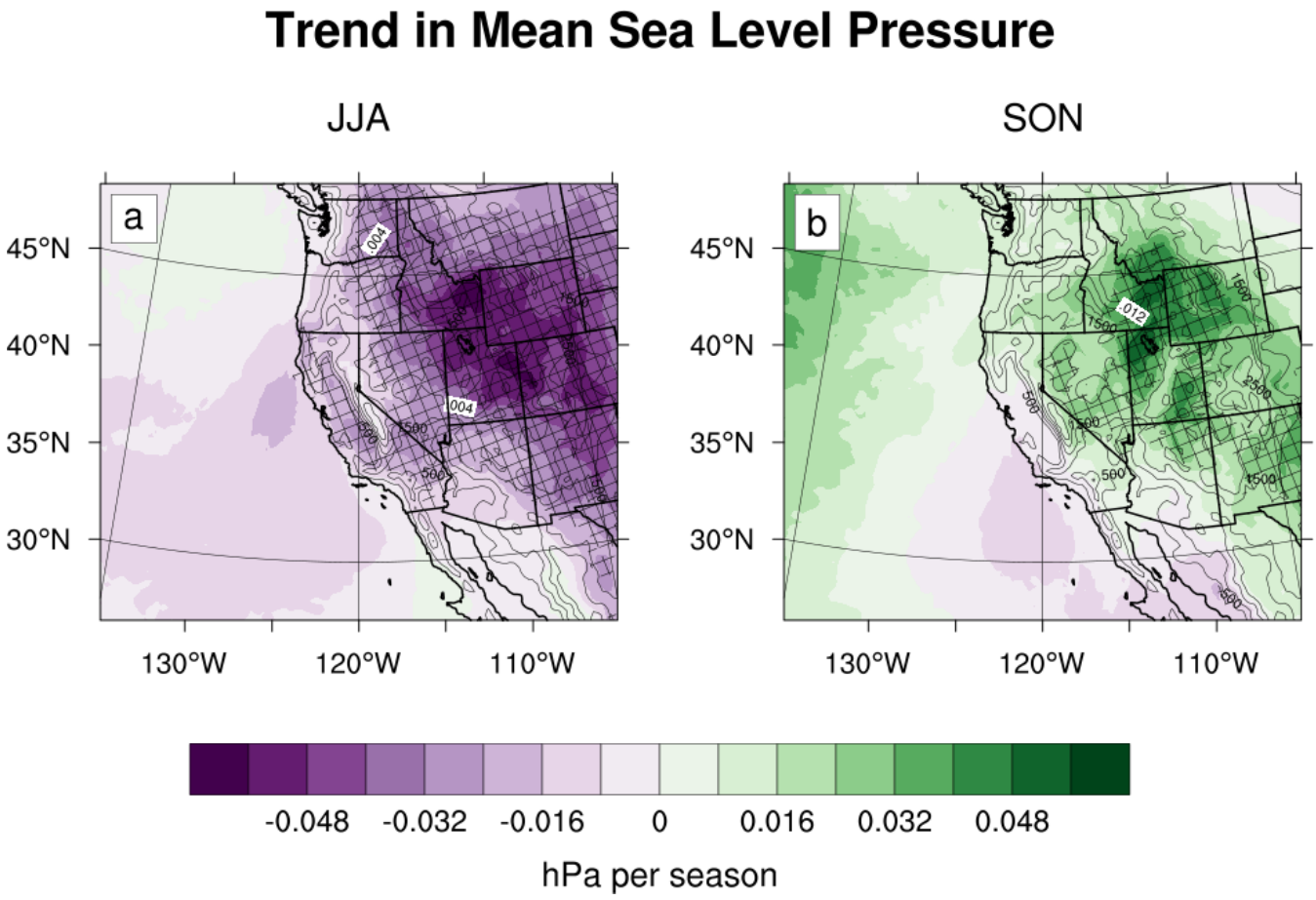

Figure S5. Trend in seasonally averaged mean sea level pressure (solid colors) over 1979–2019 for JJA (a) and SON (b). Hatching denotes statistical significant trends at the 95% significance level from Mann-Kendall testing. Black contours show ERA5 orography.

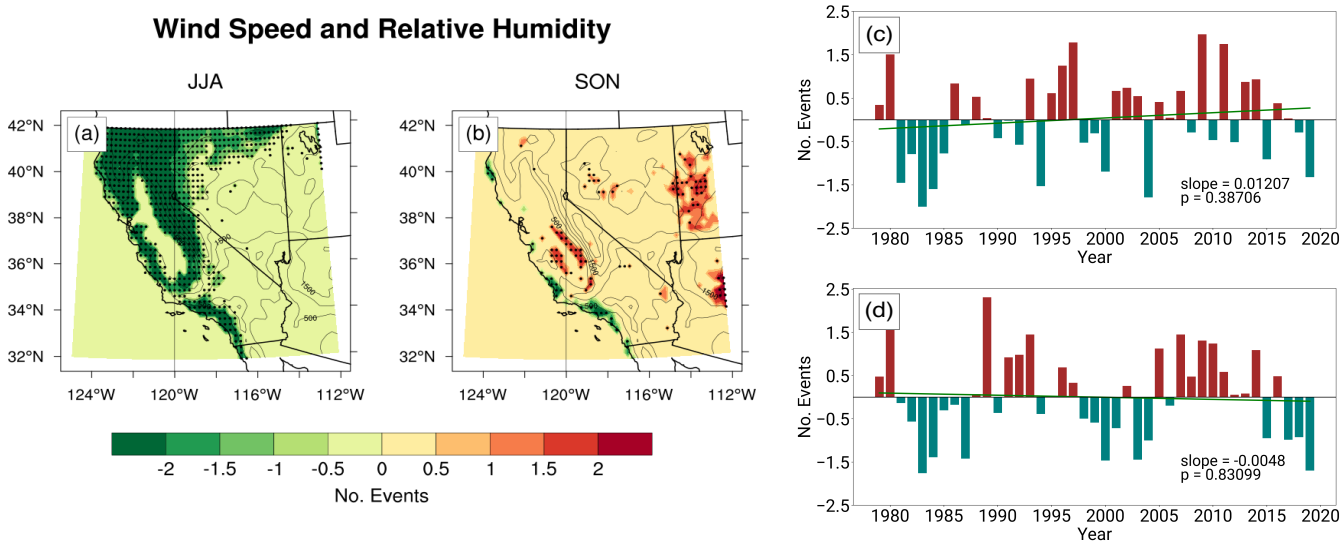

Figure S6. Left horizontal panels show trends in the number of strong, dry wind events during JJA (a) and SON (b) (solid colors). Black dots indicate statistically significant trends at the 95% significance level. Black contours show ERA5 orography. Right vertical panels show trends in the standardized number of Hazardous Wind Events during SON for the Sierra Nevada Mountains (c) and Southern California (d). Time series entries were calculated by averaging the number of Hazardous Wind Events during SON for each year during 1979–2019. Time series were then standardized by subtracting its mean and dividing by its standard deviation. Green lines denote the Theil-Sen trends.

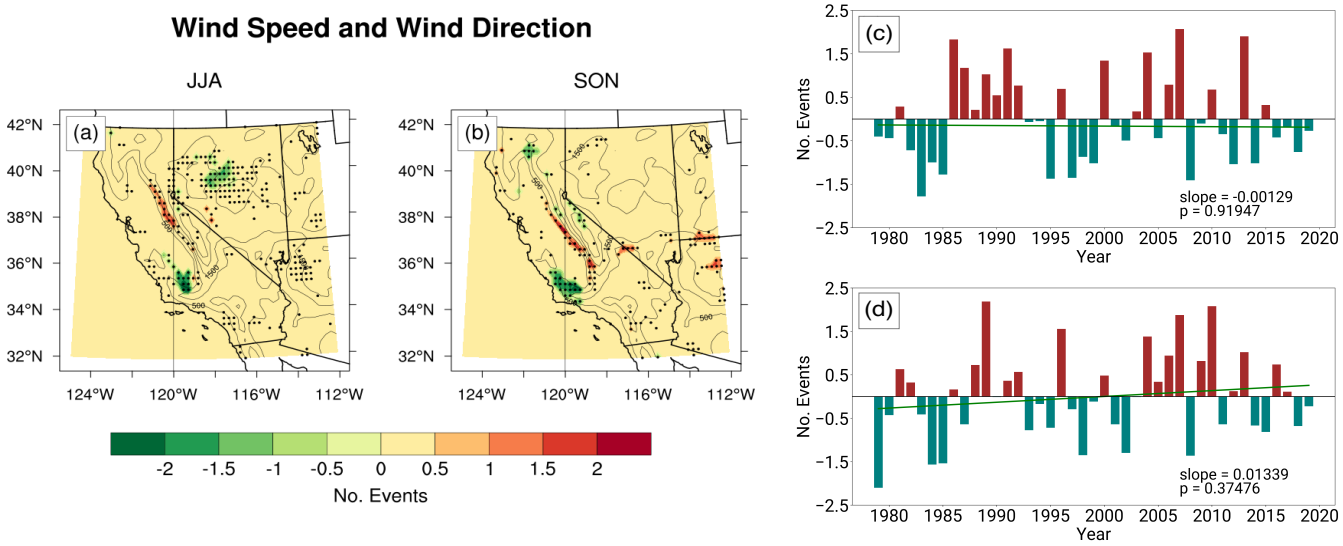

Figure S7. As in Figure S6, but for strong, northeasterly wind events.

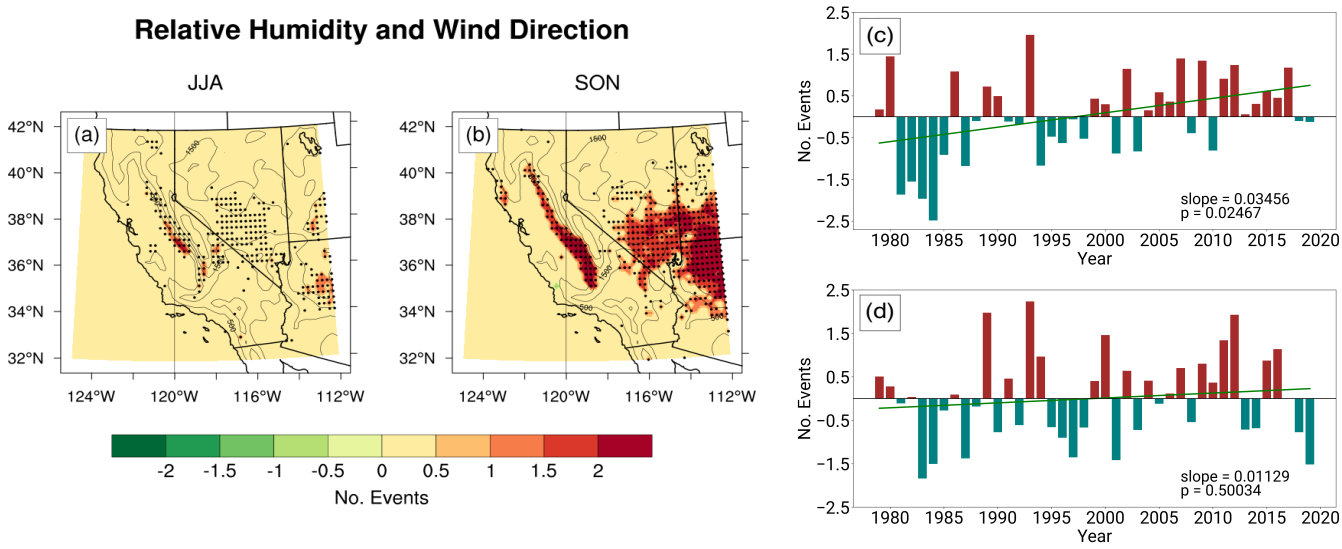

Figure S8. As in Figure S6, but for dry, northeasterly wind events.

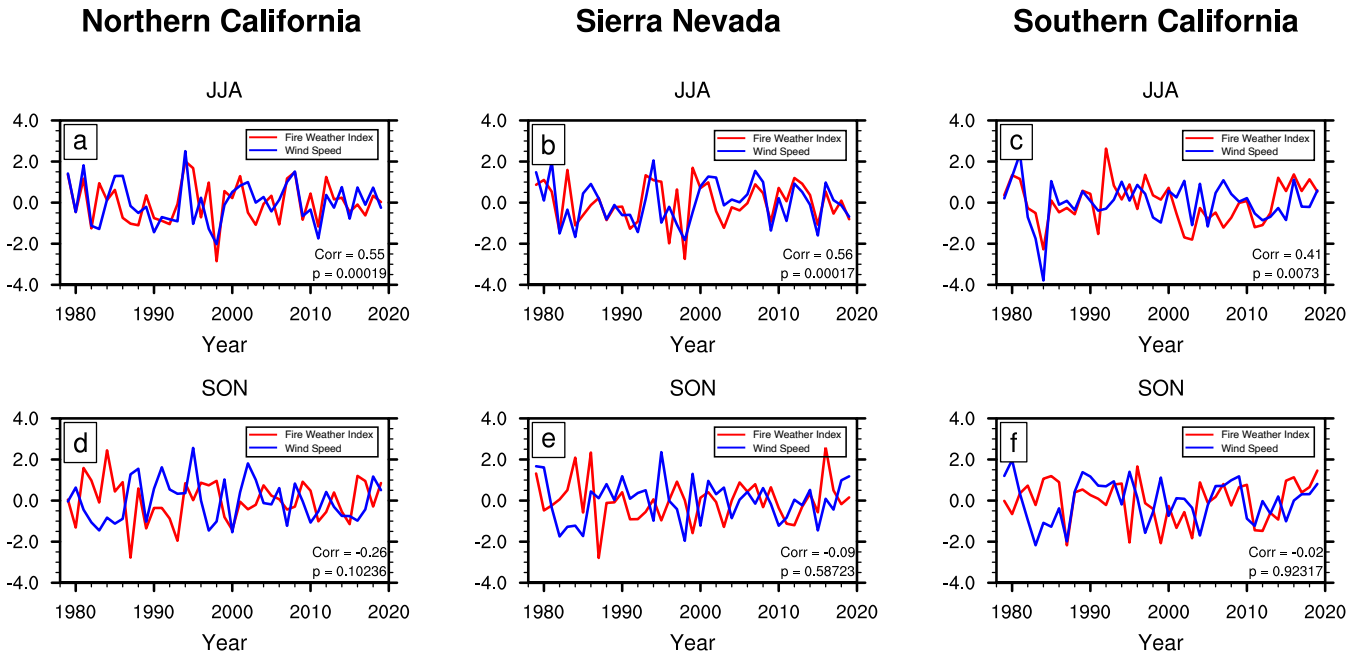

Figure S9. Seasonal average 10-m wind speed and seasonal average Fire Weather Index and their Pearson correlation for Northern California (39–41.5 N and 120.5–123.5 W), the Sierra Nevada Mountains (36.25–38.5 N and 117.5–120 W), and Southern California (32.7–35 N and 115–119 W) for JJA (a–c) and SON (d–f) during 1979–2019.