Supplementary Materials for

Asymmetric risks of severe convective storms to US Agriculture

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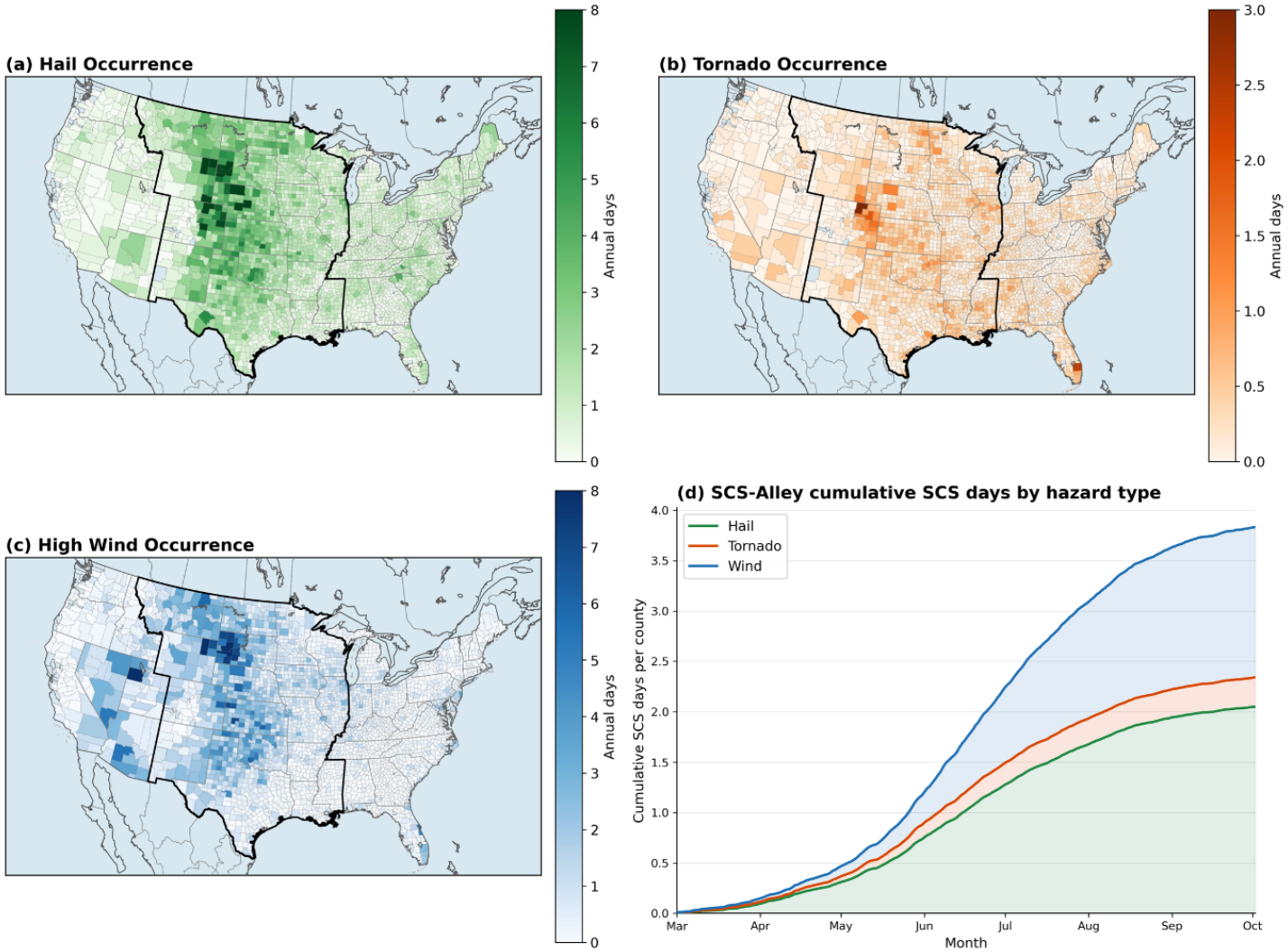

Fig. S1. Spatial distribution of the annual occurrence (from Mar to Sep) for three types of SCS: (a) hail, (b) tornado, (c) high wind; and (d) the cumulative distribution within the season.

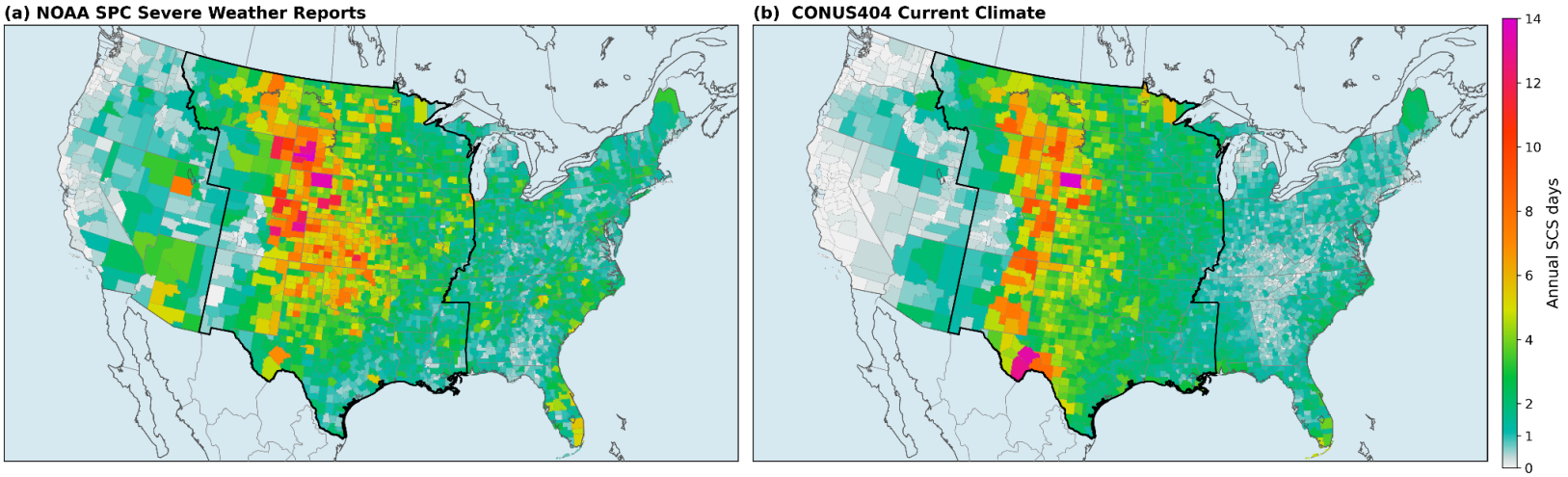

Fig. S2. Same with Fig. 1(a-b) but for the entire 2000-2020 period. The spatial distribution of severe convective storms (SCS) in the United States during the primary growing season (March–September), based on NOAA SPC severe weather reports and C404 convection-permitting climate simulation. **(a)** County-level mean SCS days from NOAA SPC observations. **(b)** County-level mean SCS days from C404 current climate. The black state-level boundary outlines the Central US SCS Alley.

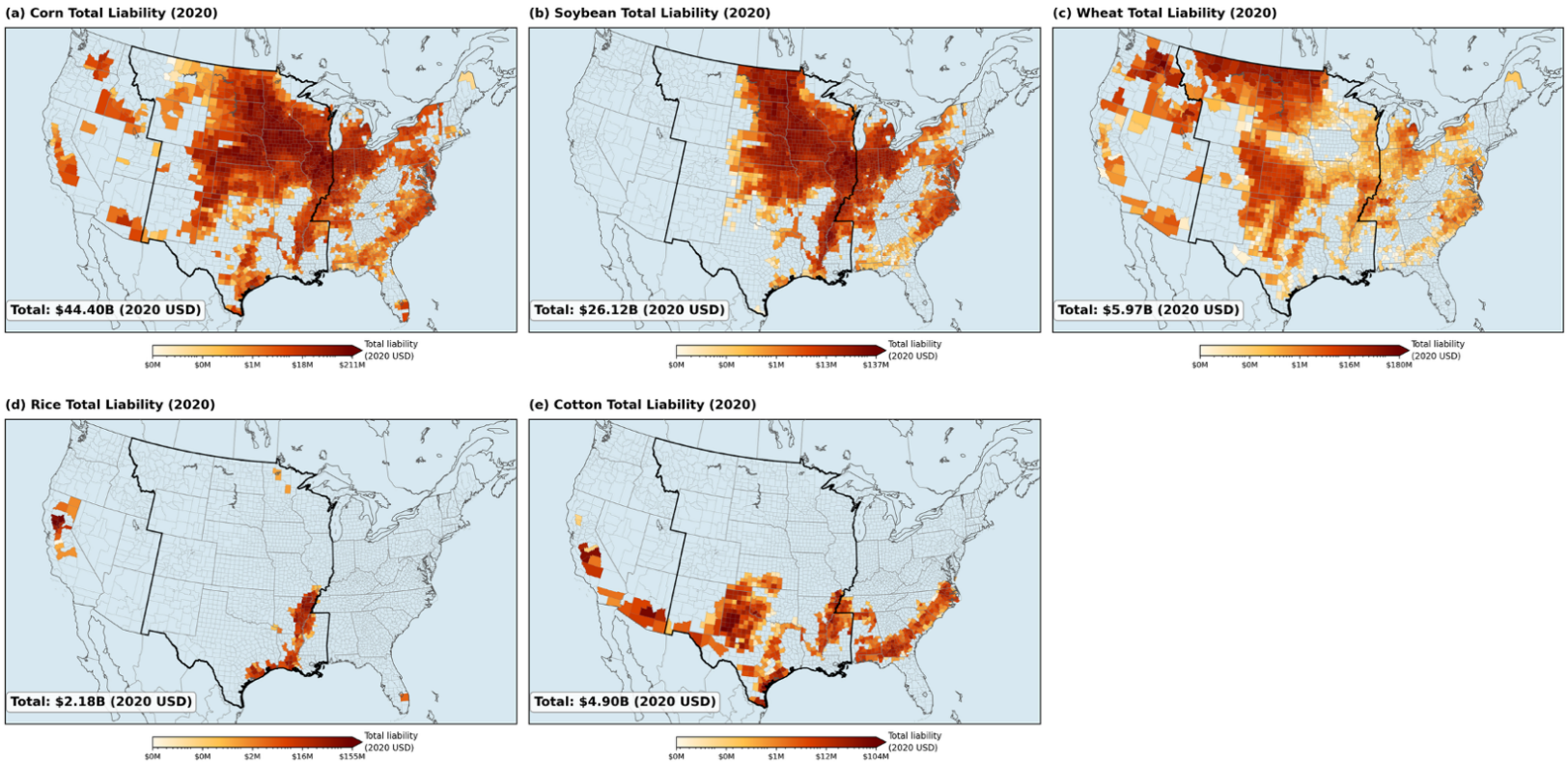

Fig. S3. Insured liability in 2020 for five major crop types in the US: (a) corn, (b) soybean, (c) wheat, (d) rice, (e) cotton.

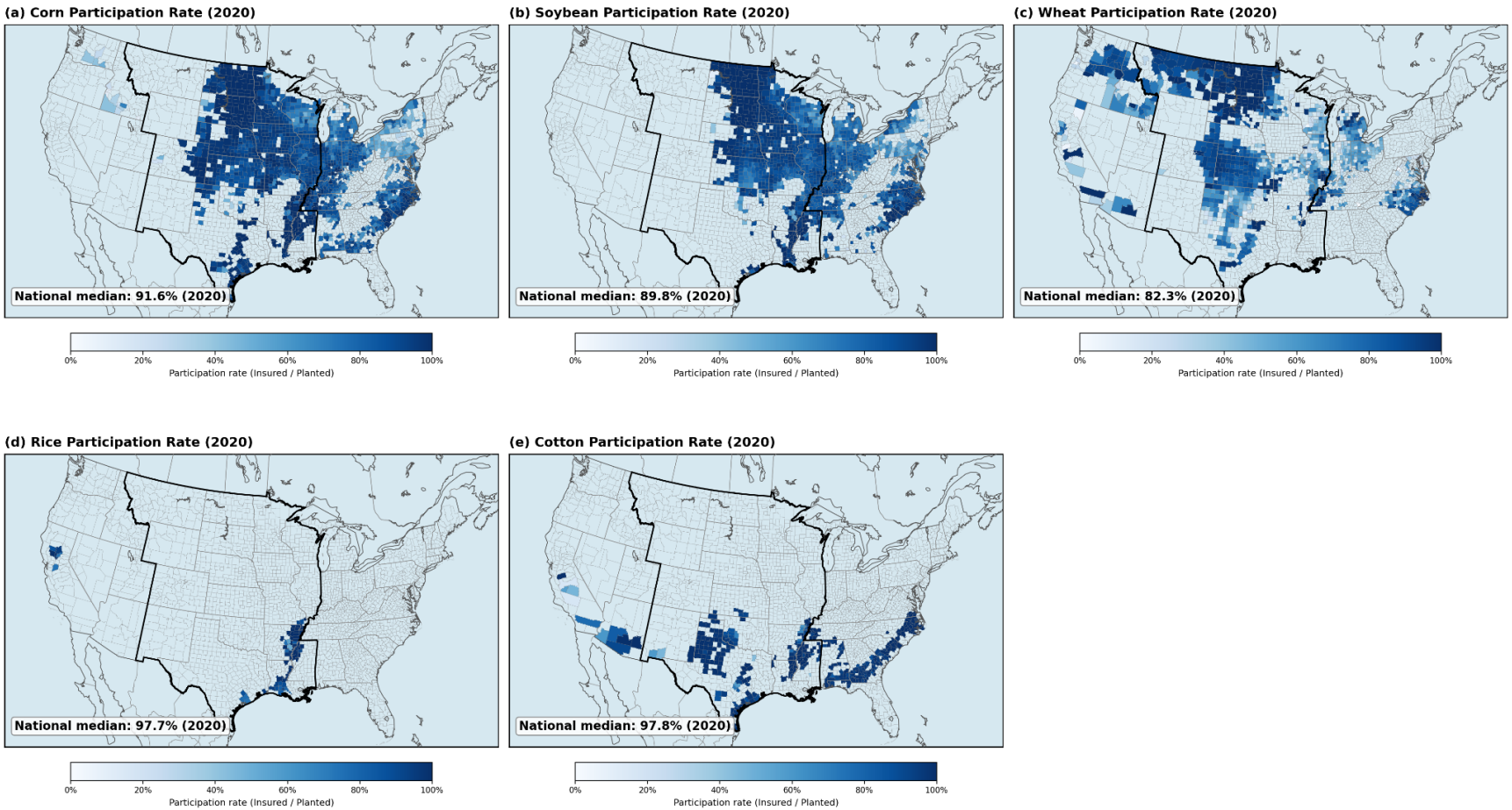

Fig. S4. FCIP participation (insured acre/planted acre) in 2020 for five major crop types in the US: (a) corn, (b) soybean, (c) wheat, (d) rice, (e) cotton.

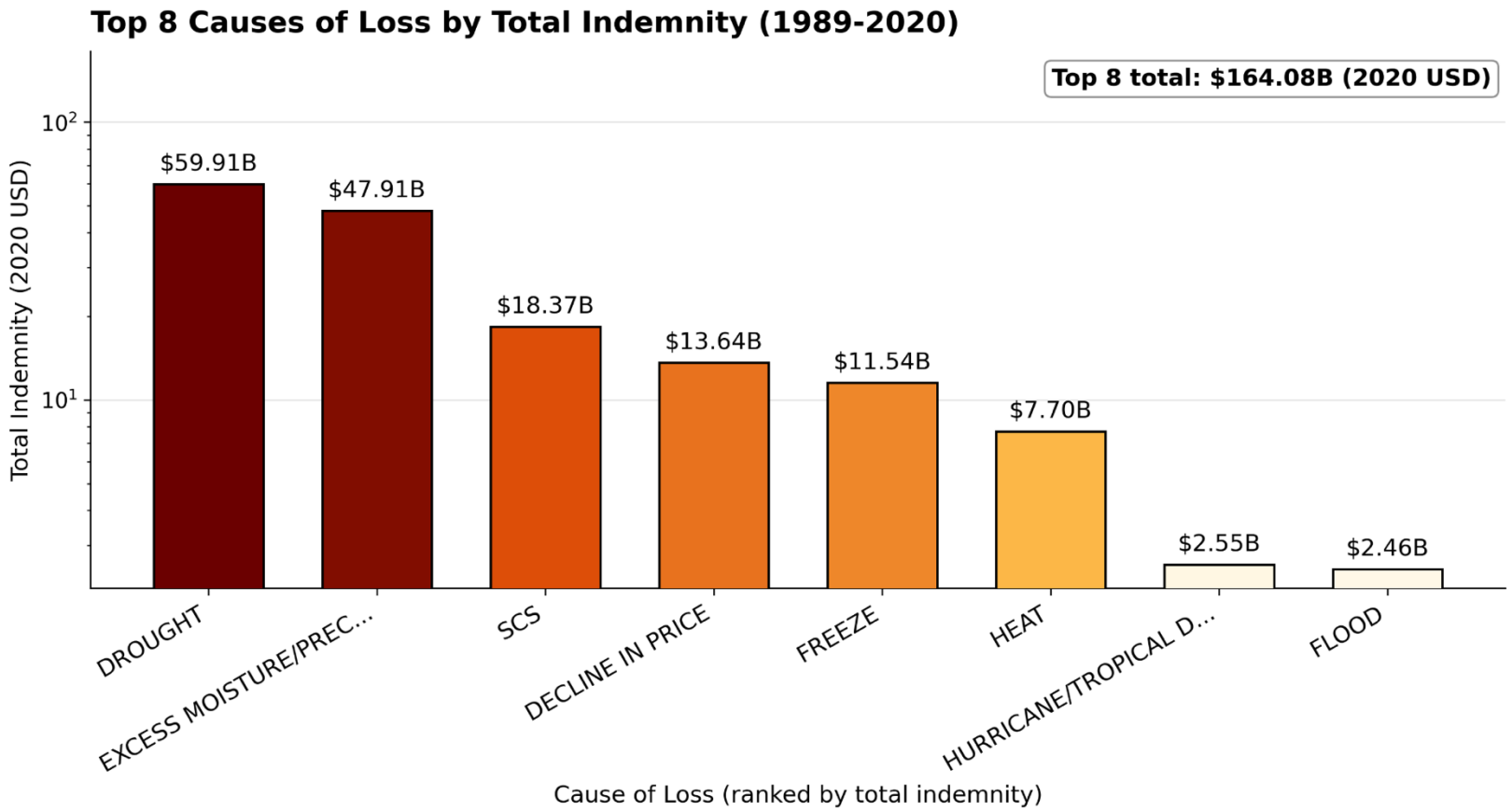

Fig. S5. Total crop insurance indemnity ranking by top 8 perils in the US.

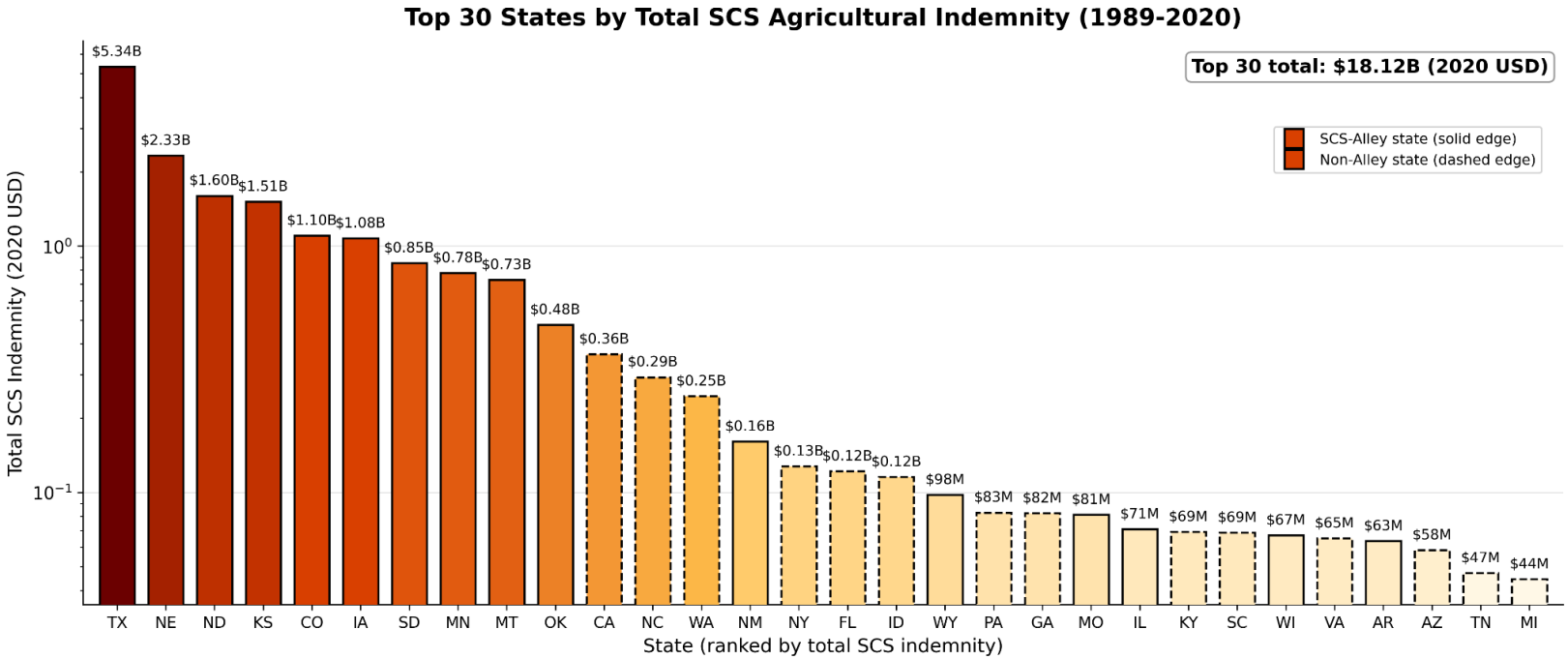

Fig. S6. Total SCS indemnity ranking for the top 30 states in the US. Solid bars for states within the SCS Alley and dashed line bars are outside the SCS Alley.

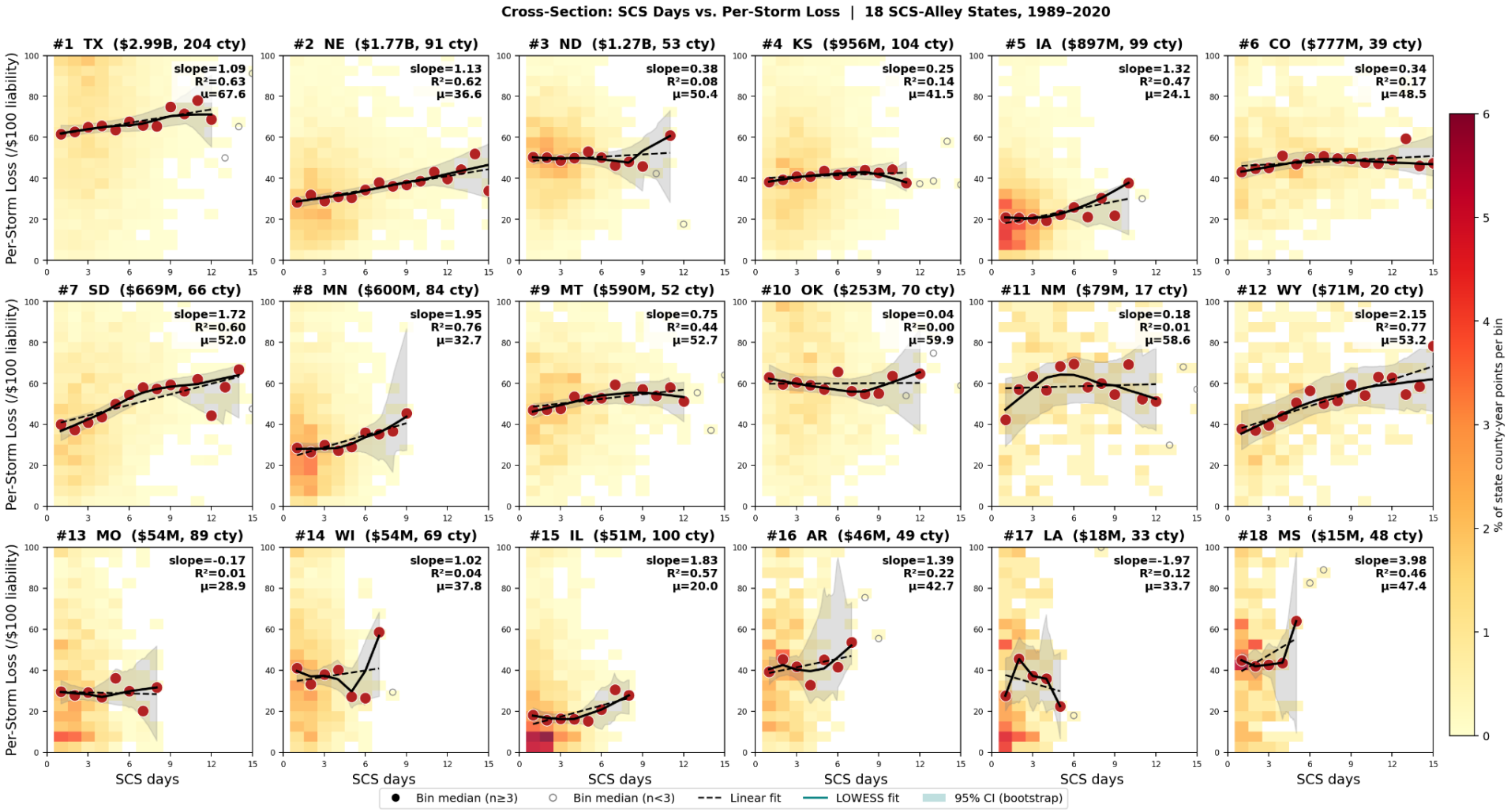

Fig. S7. Cross-sectional scatter plot for state-level SCS days and per-storm loss, bin-median linear regression showing the slope, R2, and mean per-storm loss, for the 18 states in the SCS Alley.

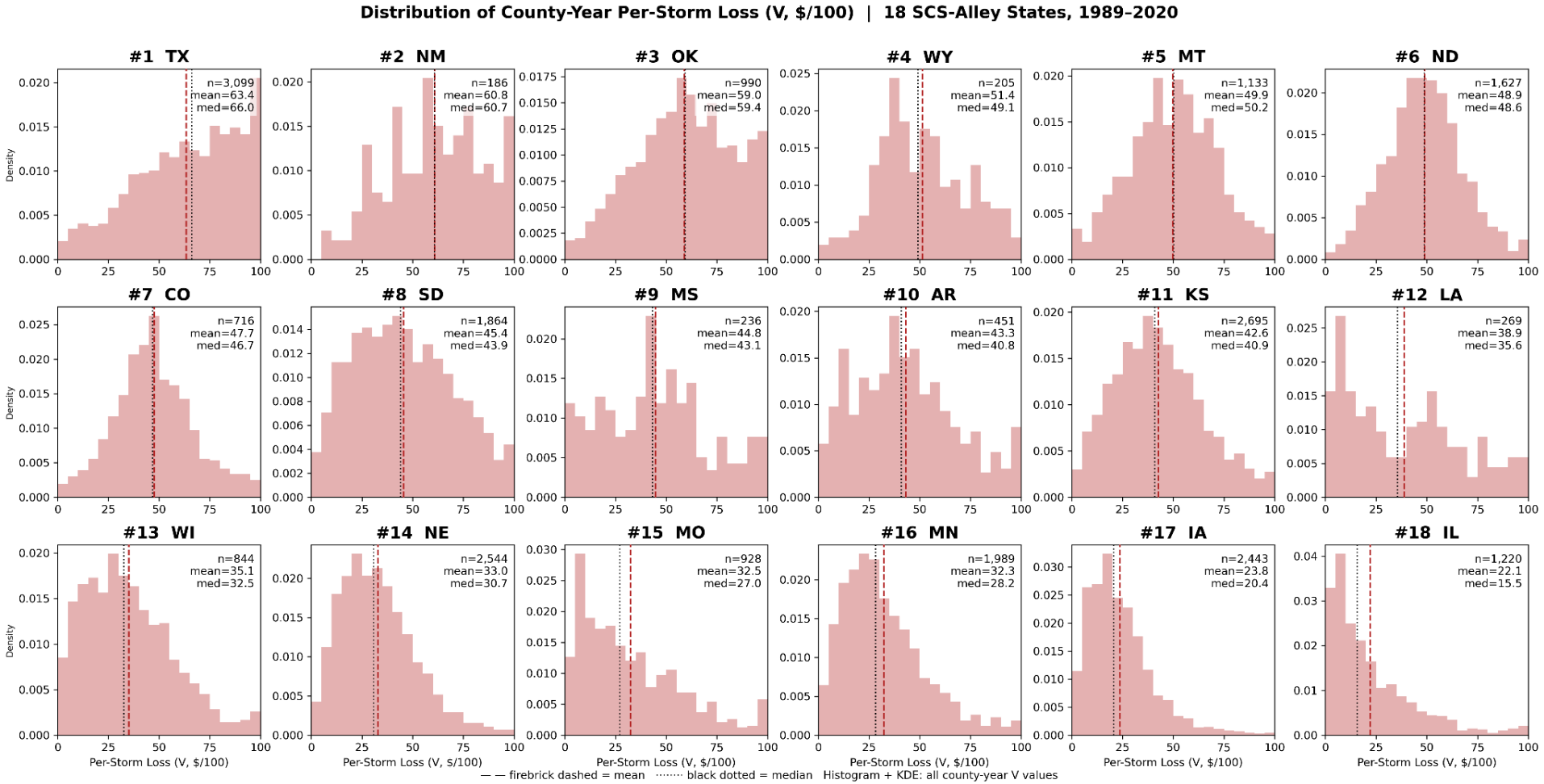

Fig. S8. County-year distribution for per-storm loss (Vulnerability, $/100 insured liability) for the 18 states in the SCS Alley.

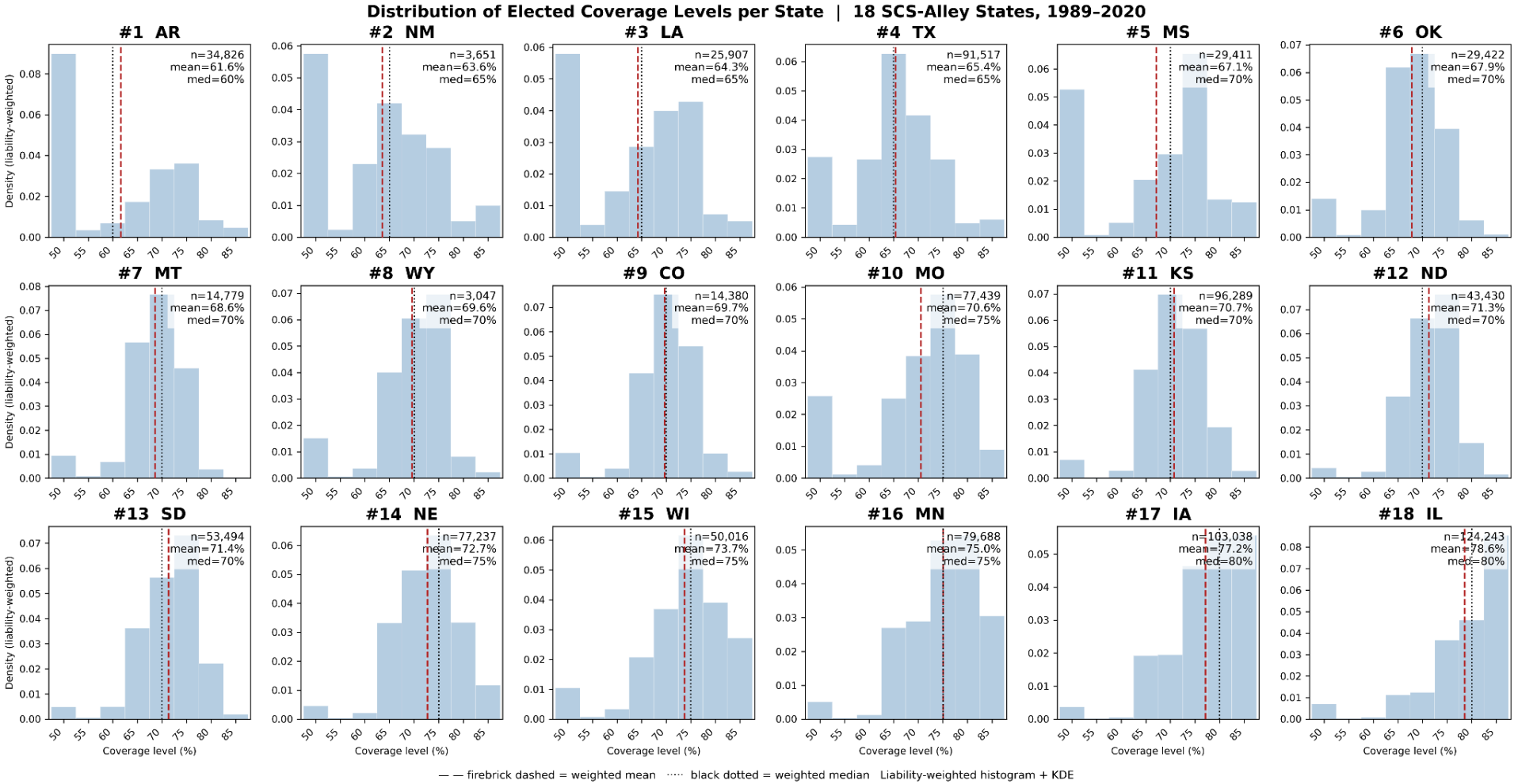

Fig. S9. County-year distribution for coverage level for the 18 states in the SCS Alley. The coverage level distribution is weighted on liability per coverage level bin.

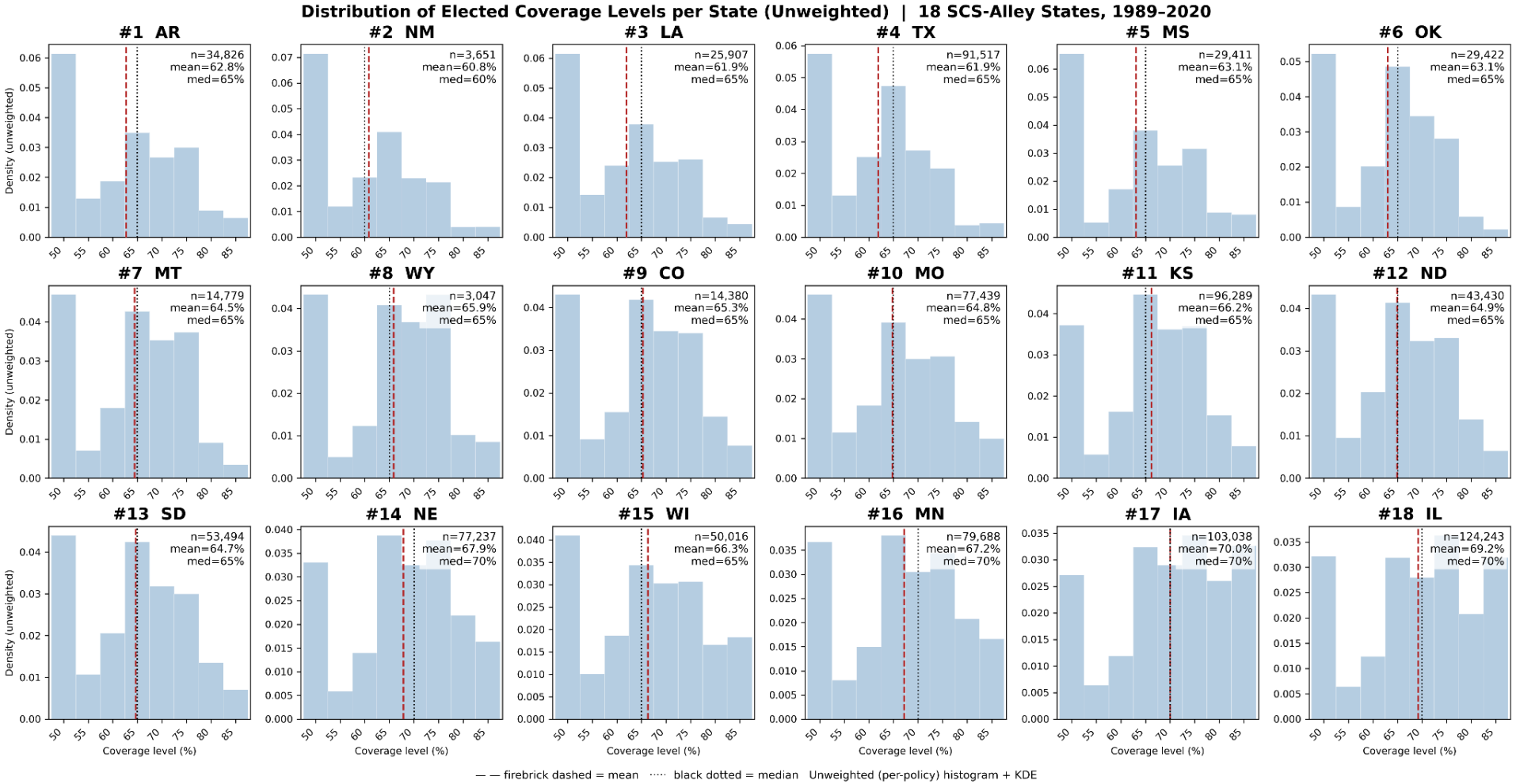

Fig. S10. Same as the Fig. S7 and County-year distribution for coverage level for the 18 states in the SCS Alley. The coverage level distribution is unweighted on liability per coverage level bin. Unweighting the liability will change the coverage level towards the lower side for many states.

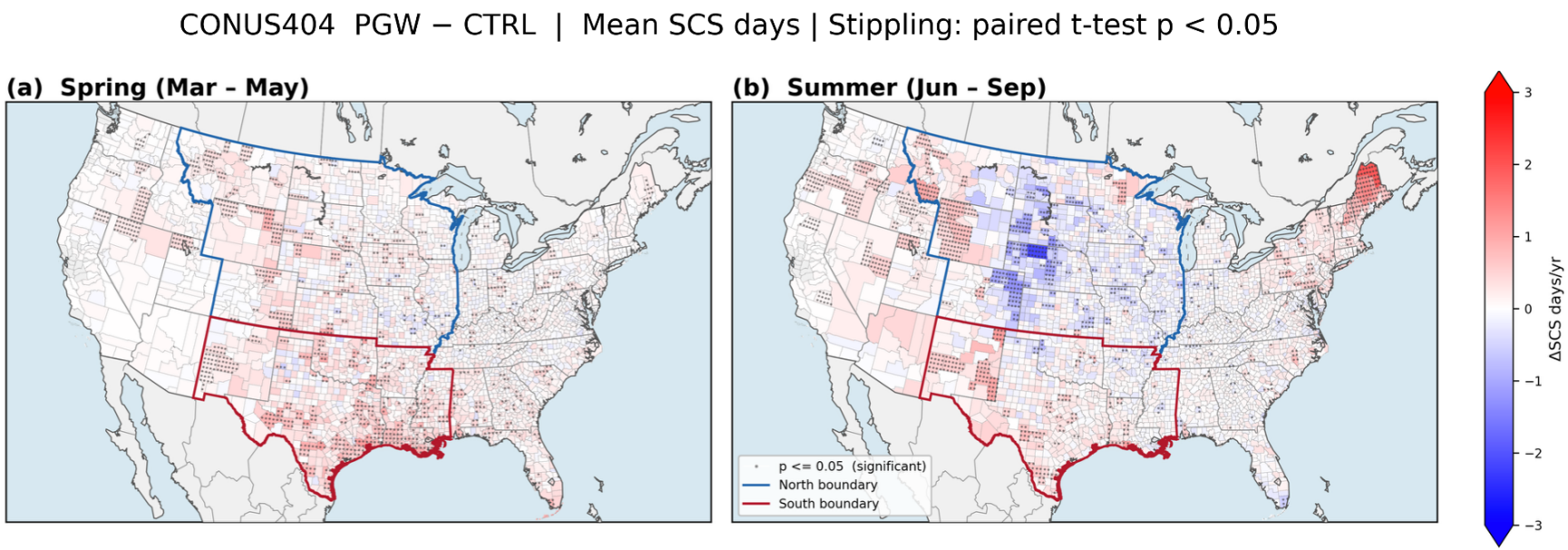

Fig. S11. Future projections for future (PGW) change of SCS days differ from current climate (CTRL), for two seasons: (a) spring (Mar - May) and (b) summer (Jun - Sep).

Table S1.

Cross-sectional bin-median linear regression for national level (SCS Alley) and state-level, between SCS days and per-storm loss. Table shows the linear regression slope, intercept, R2, *p* (** for statistically significant student's t-test), and median value per-storm loss per bin SCS days, for the 18-state pool together and each individual state.

Level	Slope	intercept	R2	*p*	y1	y2	y3	y4	y5	y6	y7	y8	y9	y10	y11	y12	y13	y14	y15
SCS Alley	1.19	38.79	0.70	**	39.34	38.65	41.20	43.11	45.21	48.82	48.67	51.01	51.70	50.89	54.26	49.70	53.53	58.32	47.51
TX	1.09	60.53	0.63	**	61.62	62.88	64.94	65.74	63.78	67.69	65.93	65.55	75.01	71.58	78.04	68.88			
NE	1.13	27.58	0.62	**	28.45	31.90	29.13	31.15	30.58	34.49	38.00	36.16	37.01	38.79	43.16	39.82	44.26	51.97	34.06
ND	0.38	48.25	0.08	**	50.37	50.14	48.82	50.00	53.04	50.12	46.35	48.06	45.98		61.07				
KS	0.25	40.02	0.14	**	38.31	39.48	40.92	41.06	43.60	41.78	42.71	44.05	42.83	44.45	37.76				
IA	1.32	16.83	0.47	**	20.93	20.82	20.31	19.48	22.36	25.89	21.19	30.48	21.75	37.85					
CO	0.34	45.77	0.17	**	43.23	44.70	45.16	51.03	47.15	49.66	50.77	49.66	49.54	47.68	47.21	49.08	59.38	46.06	47.51
SD	1.72	39.11	0.60	**	40.07	37.31	40.88	43.55	49.82	54.34	58.03	57.34	59.40	56.23	61.93	44.18	58.32	66.73	
MN	1.95	22.91	0.76	**	28.54	26.44	29.81	27.25	28.99	35.90	35.32	36.52	45.37						
MT	0.75	47.88	0.44	**	47.06	47.13	47.71	53.38	52.34	52.88	59.26	52.90	57.03	54.01	58.04	51.18			
OK	0.04	59.69	0.00	**	63.01	59.51	60.43	59.07	57.13	65.62	56.16	54.80	55.01	63.64		64.83			
NM	0.18	57.40	0.01	**	42.21	57.01	63.40	56.69	68.31	69.48	58.29	60.05	54.67	69.27	52.28	51.20			
WY	2.15	35.95	0.77	**	37.76	37.14	39.56	44.01	50.64	56.48	50.17	51.35	59.34	54.08	63.24	62.63	54.65	58.32	78.30
MO	-0.17	29.61	0.01		29.65	27.84	29.03	26.85	36.20	29.69	20.10	31.55							
WI	1.02	33.70	0.04		41.02	33.16	37.96	40.07	27.07	26.51	58.57								
IL	1.83	11.80	0.57	**	18.07	15.70	16.25	16.15	15.08	20.74	30.43	27.68							
AR	1.39	37.20	0.22		39.34	45.30	41.62	32.70	45.11	41.41	53.71								
LA	-1.97	39.59	0.12		27.50	45.45	37.14	35.80	22.47										

MS	3.98	35.44	0.46		44.85	41.89	42.66	43.62	63.89									