Supplementary Material

Quantifying burned area of wildfires in the western United States from polar-orbiting and geostationary satellite active-fire detections

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Data Information:

VIIRS Data:

Satellite data for the 2019 fires are available through the FIREX-AQ data repository. VIIRS data for the 2020 fires were obtained from the NASA Fire Information for Resource Management System (FIRMS) data archive; data from FIRMS were verified to match the 2019 data in the FIREX-AQ data repository.

GOES-ABI FRP Data:

The WFABBA is the development version of NOAA's Operational Fire Detection and Characterization algorithm (FDC) and was used for FIREX-AQ due to better access to the data at the time of the field campaign. Versions 6_5_012g and 6_6_001g of the WFABBA differ only in mitigation for GOES-17's "loop heat pipe" (LHP) focal plane heating problem and corrections to calculations of pixel area, which affects FRP. The GOES-17 LHP mitigation allowed for a small number of additional fire detections for a short window of time a few days a year, with minimal impact on the cases examined here. The pixel area calculation change meant each pixel's FRP changed by the ratio of the new area to the old area for each pixel, a value that doesn't change over time and is basically the same for groups of neighboring pixels. This study utilized the change over time of FRP for individual fires, so the change did not affect the analysis since the relationship to VIIRS is calculated for each fire. GOES-17 provides higher spatial resolution for western wildfires due to its western location (137.2 degrees west longitude) compared to GOES-16 eastern location (75.2 degrees west longitude) and is therefore used in this study.

NIROPS Data:

NIROPS flights usually occur between 1900 and 0200 local time but may occur at other times if ordered. (Page et al. 2019). Flight times were converted from local time to UTC, and rounded to

the nearest hour, for easier comparison to accumulated burned area. Some NIROPS flight data were not included in this analysis if the time zone was not marked on flight information, there were large amounts of clouds covering the fire, or if that cloud coverage was over the active burning portion of the fire. All specific products were obtained from the National Interagency Fire Center (NIFC) FTP page (https://ftp.wildfire.gov/public/incident_specific_data/).

Comparison of Algorithm Results to Linear Interpolation Only

Tables S1-S3 can be directly compared to Tables 2-4 in the main text to determine how the inclusion of the GOES ABI FRP data generally increases the accuracy of the algorithm across fires. Comparing Table S1 to Table 2, for smaller shrink factors, a linear interpolation between VIIRS overpasses is better than the algorithm with the inclusion of the ABI FRP data. This changes, however, with the larger shrink factors. Comparing Tables S2 and S3 to Tables 3 and 4, there is little difference between the two versions of the algorithm. Because VIIRS overpasses tend to occur close to NIROPS flights, the improvement due to the inclusion of the ABI data may not be seen as readily as it is when describing periods of large growth between VIIRS overpasses and NIROPS flights.

Figure S1 also shows the comparison between the two versions of the time series with and without the ABI data (red and blue lines, respectively). While the two are largely similar over the duration of the interpolation, there are some differences where the inclusion of the ABI data may make the time series more realistic. For instance, the change in area when using FRE is steeper during the afternoon hours (typically before the NIROPS flight), which represents the typical diurnal cycle that wildfires exhibit. However, these FRE estimates are not error free and a lack of growth due to clouds obscuring the fire could be wrongly interpreted as a stop in fire growth. Strategies to tackle these issues need to be included in future applications of this approach

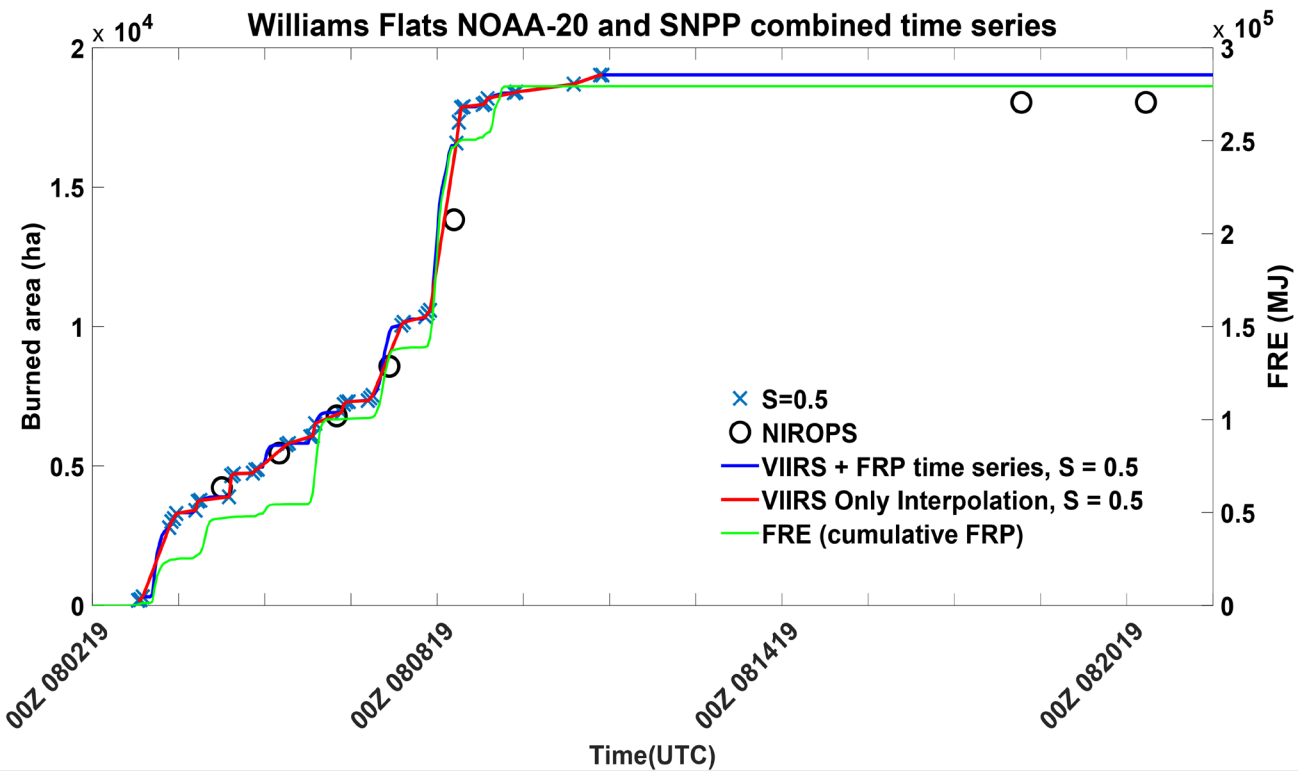


Figure S1: Integrated FRP and burned area estimate time series from VIIRS and ABI compared to a linearly interpolated time series between VIIRS detections. The blue x's are the S = 0.5 shrink factor burned area estimates for VIIRS, the black circles are the NIROPS area estimates, the blue line is the combination VIIRS and ABI time series estimates, the red line is the burned area estimates when linearly interpolating between VIIRS area estimates and the green line is the FRE.

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	1536.8	1193.4	920.0	633.8	478.8	299.9	162.1	-151.1	-438.6	-587.3
Normalized Mean Bias (%)	19.8	15.3	11.8	8.2	6.2	3.9	2.1	-1.9	-5.6	-7.6
Normalized Mean Error (%)	19.9	16.0	13.0	9.8	8.0	6.6	6.5	9.1	10.1	10.9
RMSE (ha)	2004.7	1590.6	1279.4	998.5	859.0	694.1	622.3	698.1	684.9	732.4
Mean Absolute Error (ha)	1549.0	1247.5	1011.8	764.9	623.7	516.6	502.1	705.1	786.5	846.8

Table S1: Accumulated burned area error metrics for the Williams Flats Fire for all shrink factors without ABI FRP data.

Fire	Final Size (ha)	Normalized Mean Bias	Normalized Mean Error	Correlation Coefficient	ΔBA Normalized Mean Bias	ΔBA Normalized Mean Error	ΔBA Correlation Coefficient
204 Cow	3,912	-3.3%	6.3%	0.98	5.3%	59.4%	0.40
Granite Gulch	2,246	-23.7%	23.7%	0.99	-17.9%	43.8%	0.88
Shady	2,543	-4.4%	7.4%	0.97	10.3%	55.1%	0.76
Williams Flats	17,986	-1.9%	9.1%	0.99	24.7%	24.7%	0.99
Pedro Mountain	9,472	-4.8%	12.5%	0.97	53.0%	75.7%	0.50
Walker	22,099	19.1%	19.1%	0.98	17.2%	49.4%	0.95

Table S2: Error metrics for all 2019 fires at the S = 0.8 shrink factor without ABI FRP data.

Fire	Final Size (ha)	Normalized Mean Bias	Normalized Mean Error	Correlation Coefficient	ΔBA Normalized Mean Bias	ΔBA Normalized Mean Error	ΔBA Correlation Coefficient
Bobcat	46,942	-3.2%	9.5%	0.99	-11.0%	45.0%	0.90
Cameron Peak	84,544	6.8%	7.0%	0.99	7.1%	53.0%	0.90
Creek	153,738	12.0%	12.0%	0.84	0.6%	210.4%	0.26
Dolan	50,554	0.6%	2.9%	0.99	-1.6%	35.0%	0.96
East Trouble-some	78,432	-10.1%	12.6%	0.98	-4.7%	33.6%	0.88
Holiday Farm	70,169	12.2%	12.2%	0.99	7.2%	23.4%	0.95
Lake	12,581	-40.1%	40.1%	0.98	-22.7%	65.1%	-0.08
Riverside	55,868	12.2%	12.2%	0.98	-3.3%	37.4%	0.98

Table S3: Error metrics for all 2020 fires at the S = 0.8 shrink factor without ABI FRP data.

204 Cow:

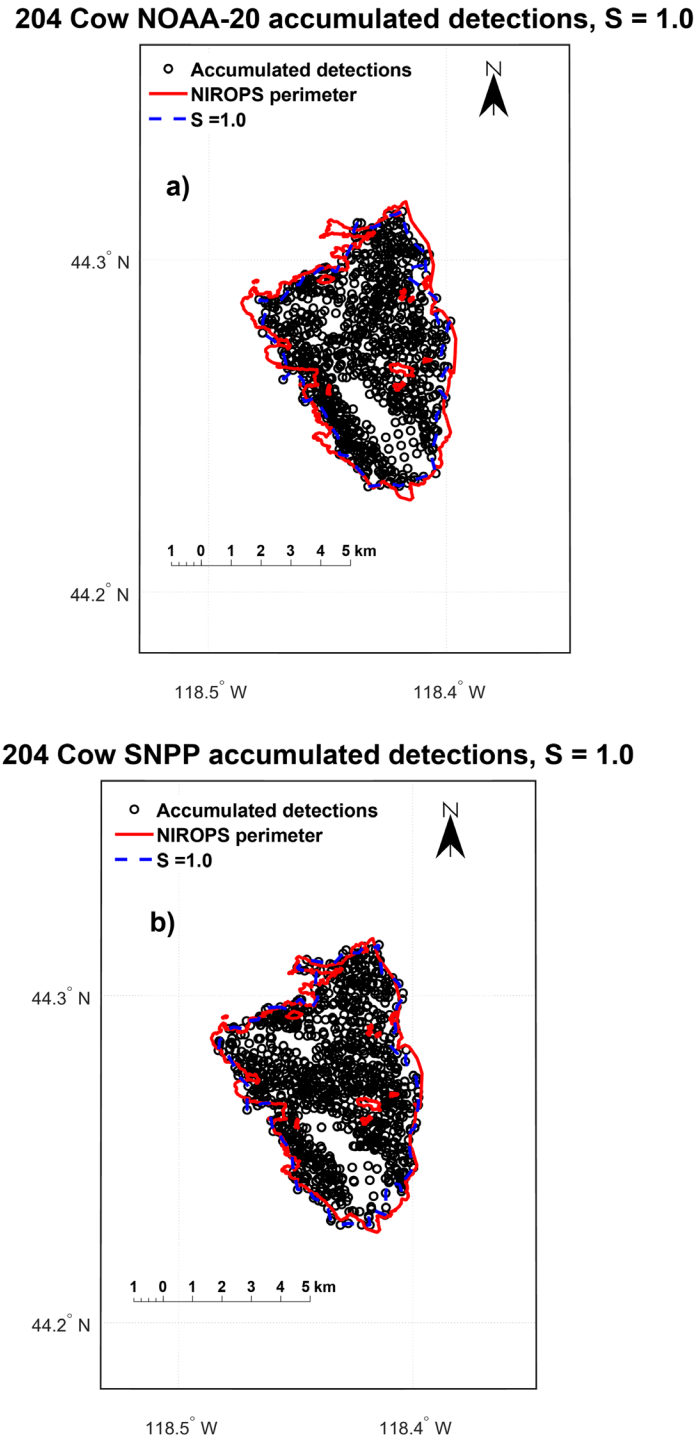


Figure S2: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the 204 Cow Fire (a/b).

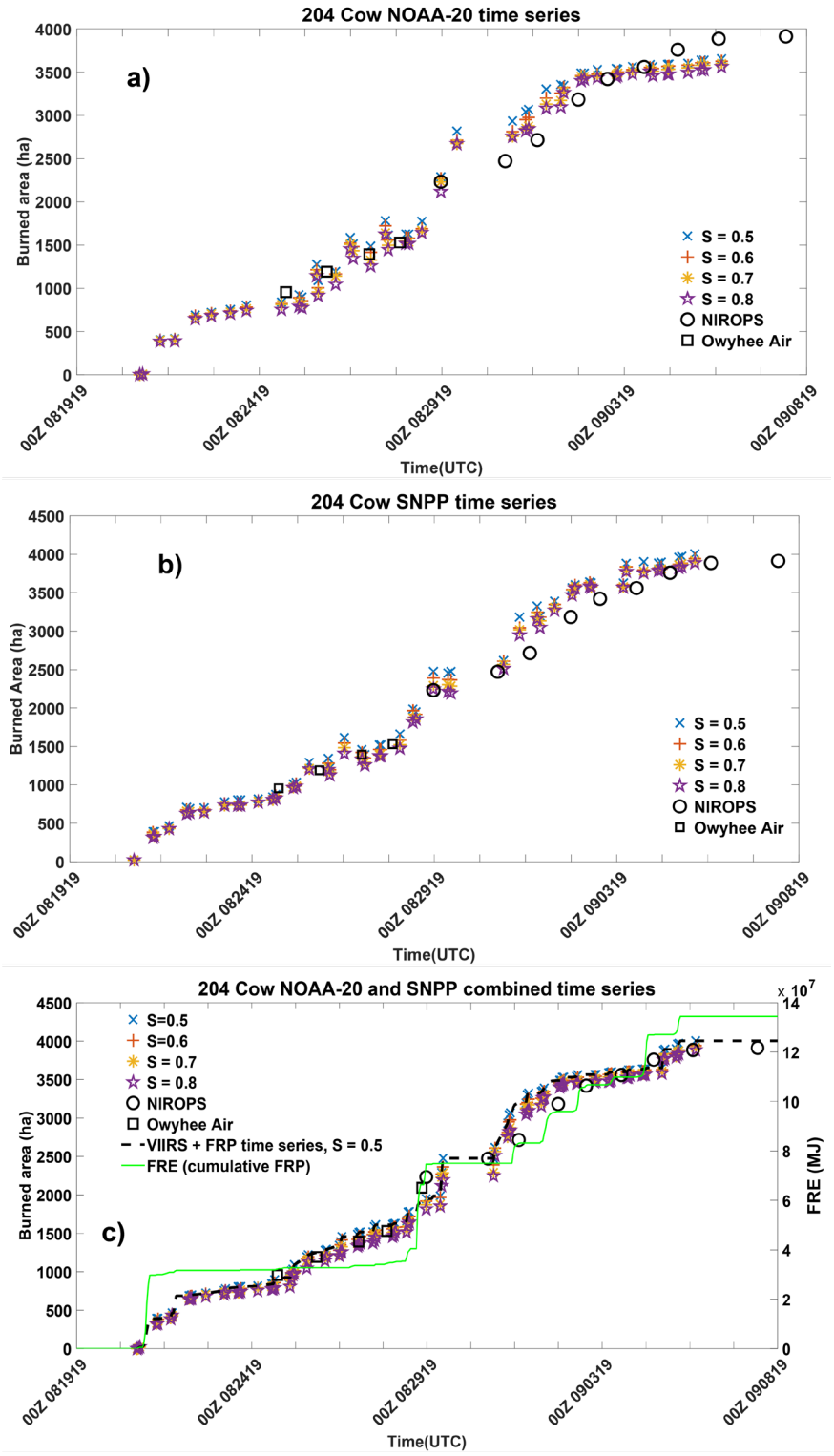
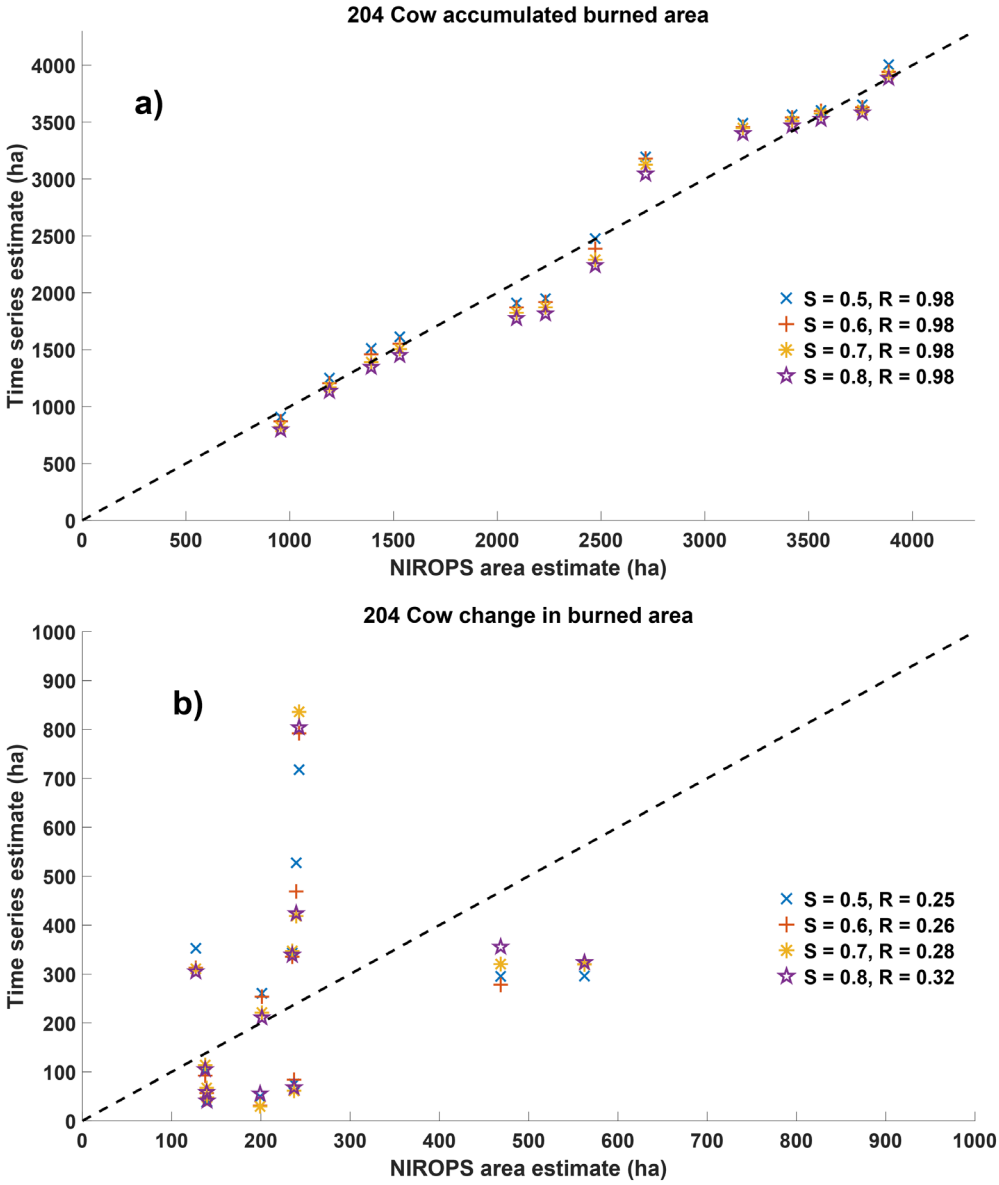


Figure S3: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c). for the 204 Cow Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors,

black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S4: Correlation scatter plots between aggregated burned area (top) and the change in



burned area between NIROPS flights (bottom) for the 204 Cow (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

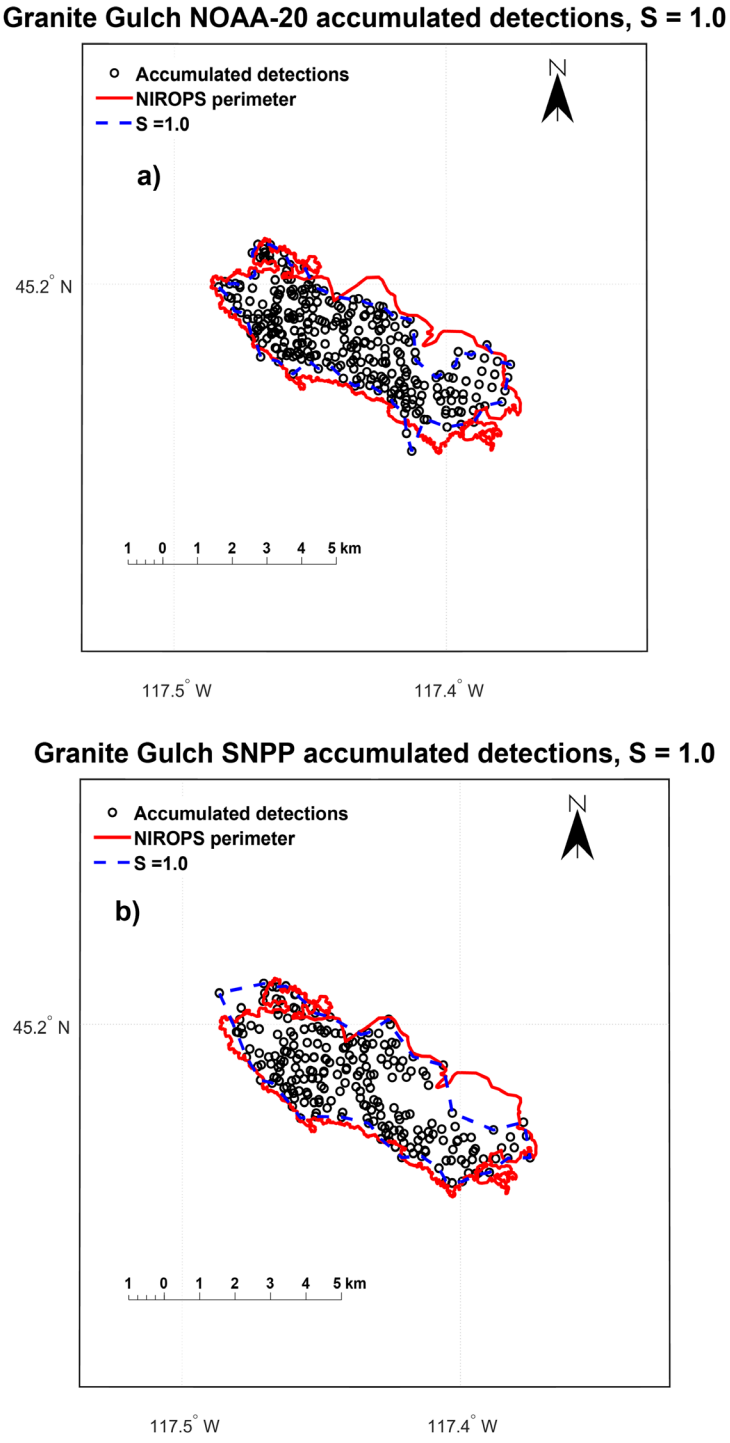
	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	388.9	278.2	184.7	110.1	56.4	16.9	-25.7	-70.7	-105.7	-145.2
Normalized Mean Bias (%)	15.6	11.2	7.4	4.4	2.3	0.7	-1.0	-2.8	-4.2	-5.8
Normalized Mean Error (%)	15.6	11.6	9.1	7.2	6.1	5.8	6.0	6.5	7.3	8.3
RMSE (ha)	443.3	347.0	274.9	226.8	198.5	194.9	201.1	206.4	219.4	251.3
Mean Absolute Error (ha)	388.9	288.2	226.7	180.3	152.2	145.5	150.5	162.2	180.8	207.4

Table S4: 204 Cow Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	15.8	15.1	12.7	9.3	14.0	11.9	13.7	13.4	15.1	14.7
Normalized Mean Bias (%)	6.5	6.2	5.2	3.8	5.7	4.9	5.6	5.5	6.2	6.0
Normalized Mean Error (%)	90.3	84.9	81.8	76.9	73.2	71.4	68.7	65.3	62.5	63.9
RMSE (ha)	259.0	241.4	235.3	223.3	213.2	217.2	220.9	209.7	204.2	210.1
Mean Absolute Error (ha)	220.6	207.3	199.6	187.8	178.7	174.4	167.6	159.5	152.6	156.0

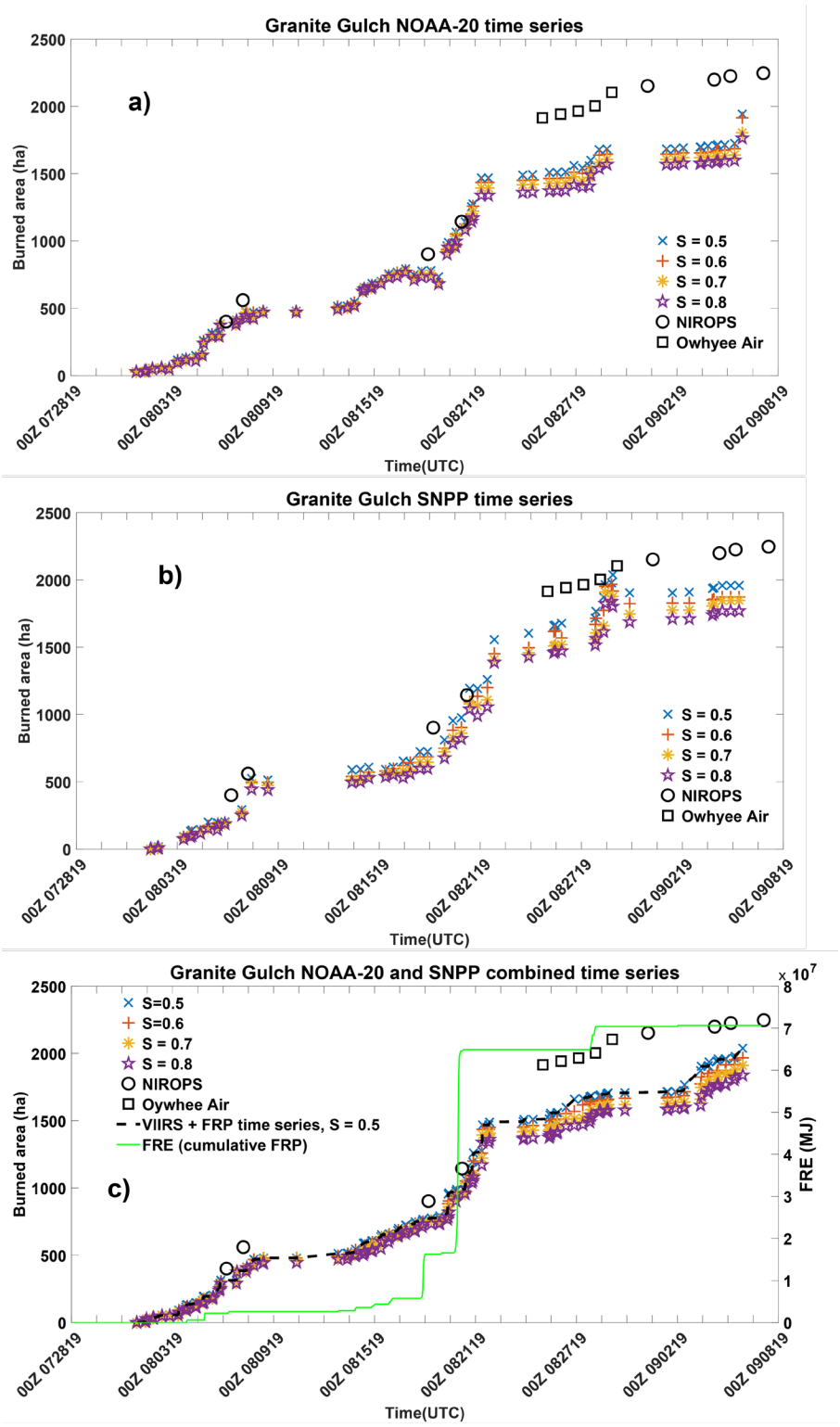
Table S5: 204 Cow Fire change in burned area statistics for all shrink factors

95 Granite Gulch:



96 Figure S5: Accumulated active fire detections (black circles) compared to most compact, S = 1.0,

97 shrink factor (blue dashed line) for the Granite Gulch Fire (a/b).



98 Figure S6: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated

99 FRP and burned area estimate time series from VIIRS and ABI (c) for the Granite Gulch Fire.

100 The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink

factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

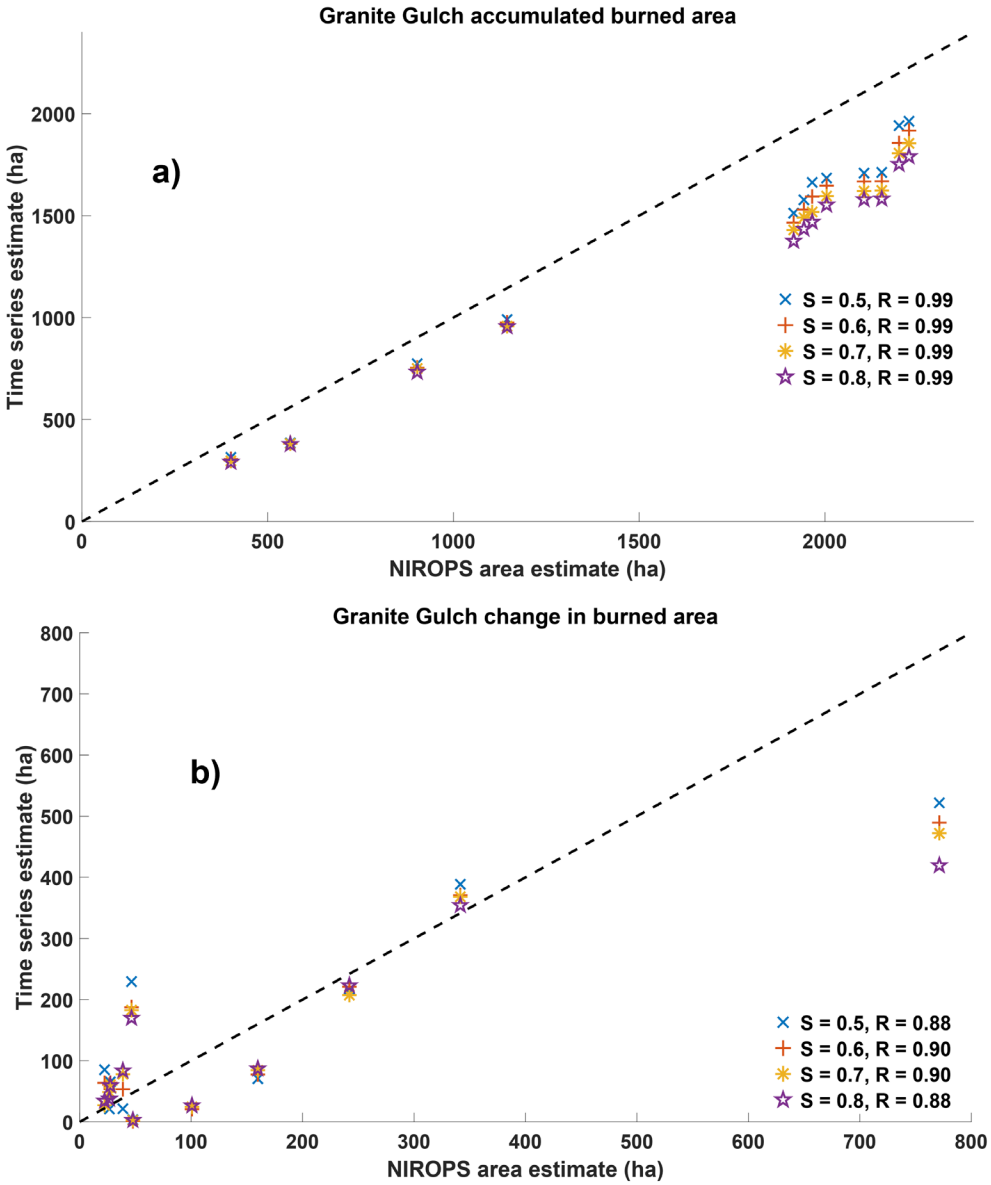


Figure S7: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Granite Gulch (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	-5.3	-91.5	-152.9	-221.2	-274.7	-313.0	-349.7	-385.6	-418.6	-456.4
Normalized Mean Bias (%)	-0.3	-5.6	-9.4	-13.6	-16.9	-19.2	-21.5	-23.7	-25.7	-28.1
Normalized Mean Error (%)	4.3	6.1	9.4	13.6	16.9	19.2	21.5	23.7	25.7	28.1
RMSE (ha)	85.5	115.0	163.8	239.6	296.8	337.9	378.4	418.7	454.5	497.2
Mean Absolute Error (ha)	70.2	99.2	152.9	221.2	274.7	313.0	349.7	385.6	418.6	456.4

Table S6: Granite Gulch Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	17.6	9.8	-0.8	-5.4	-14.8	-17.9	-22.3	-27.3	-32.8	-38.1
Normalized Mean Bias (%)	11.6	6.4	-0.5	-3.5	-9.7	-11.7	-14.7	-17.9	-21.6	-25.0
Normalized Mean Error (%)	40.5	45.1	34.9	41.2	45.9	44.3	43.5	43.8	38.4	37.0
RMSE (ha)	78.8	90.9	75.5	92.8	104.5	104.6	107.3	119.0	112.3	119.8
Mean Absolute Error (ha)	61.6	68.6	53.0	62.6	69.9	67.4	66.1	66.6	58.4	56.2

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110 Table S7: Granite Gulch Fire change in burned area statistics for all shrink factors

Pedro Mountain:

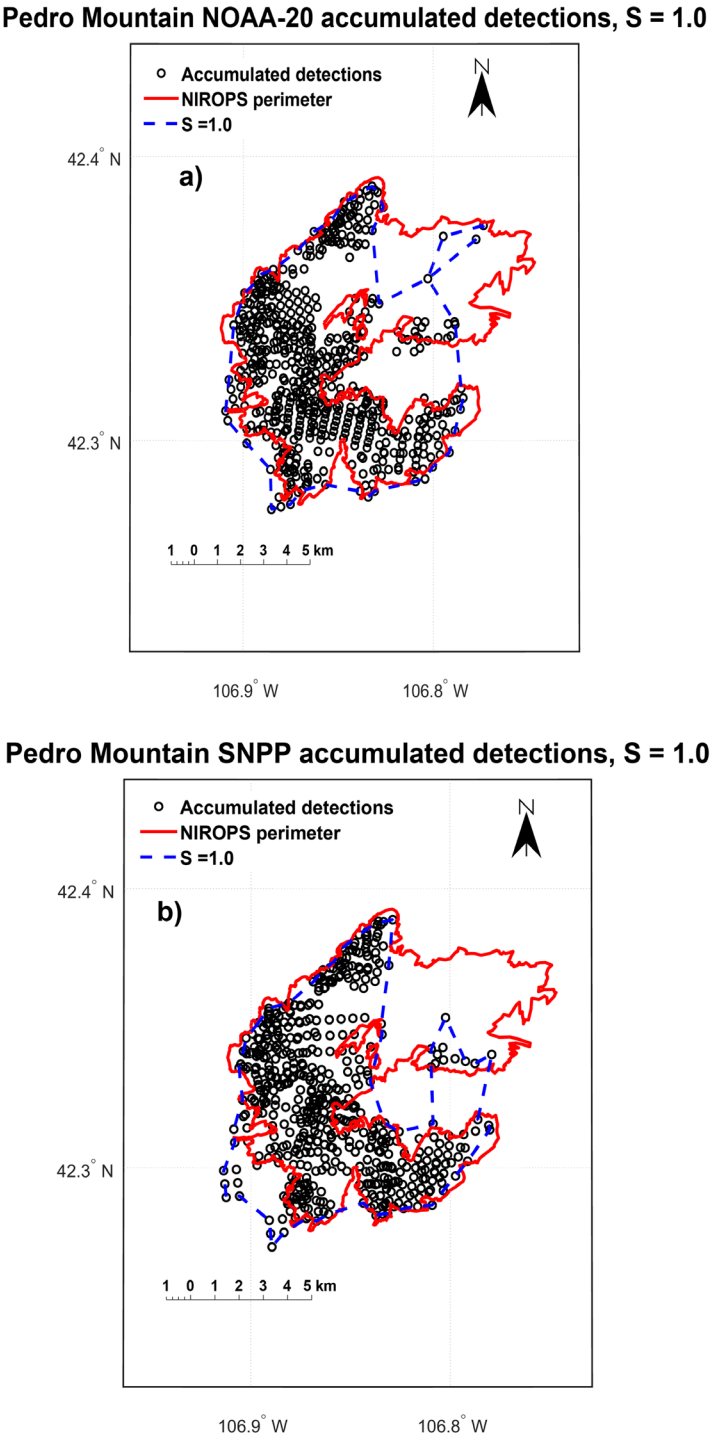
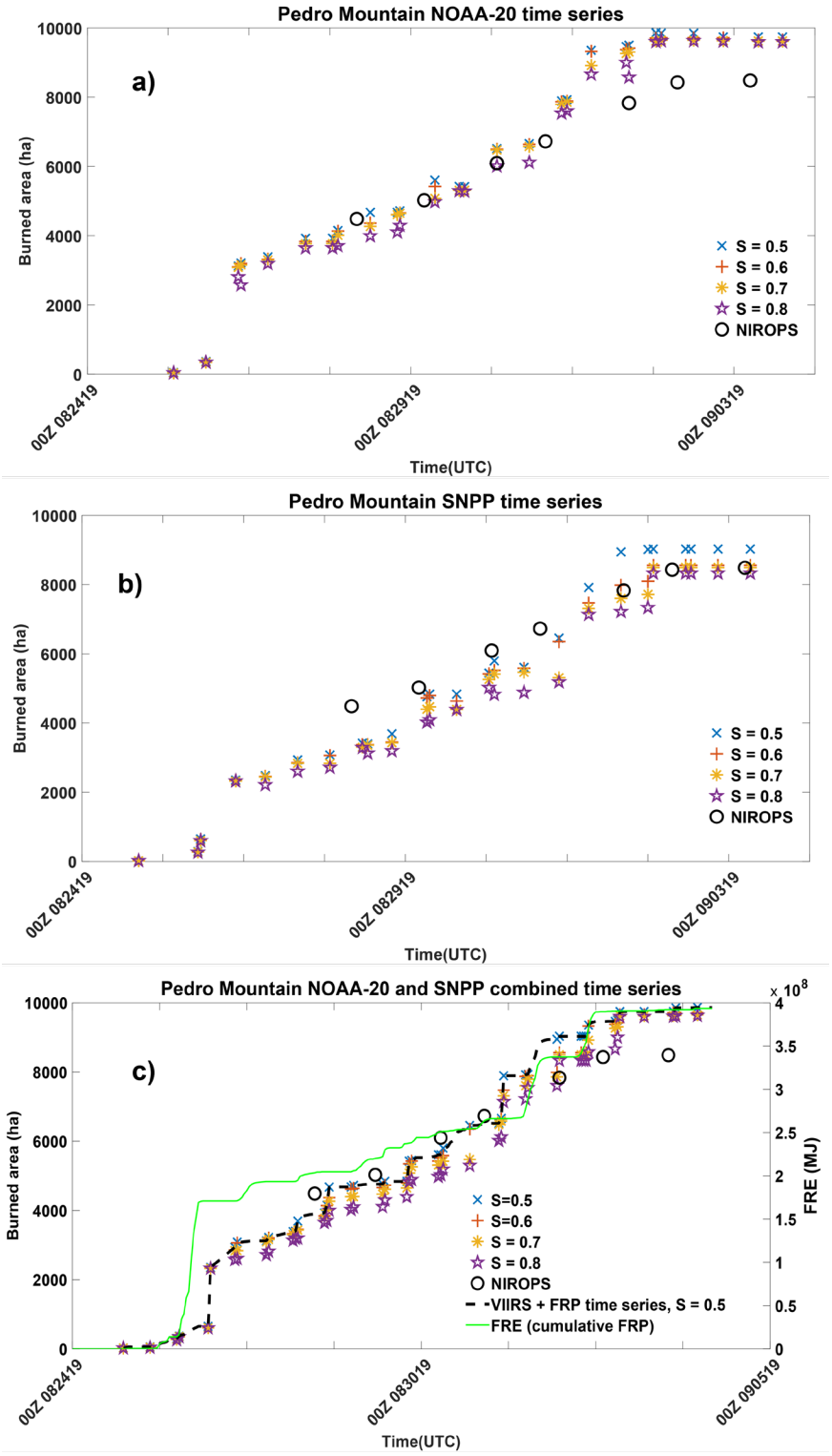


Figure S8: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Pedro Mountain Fire (a/b).



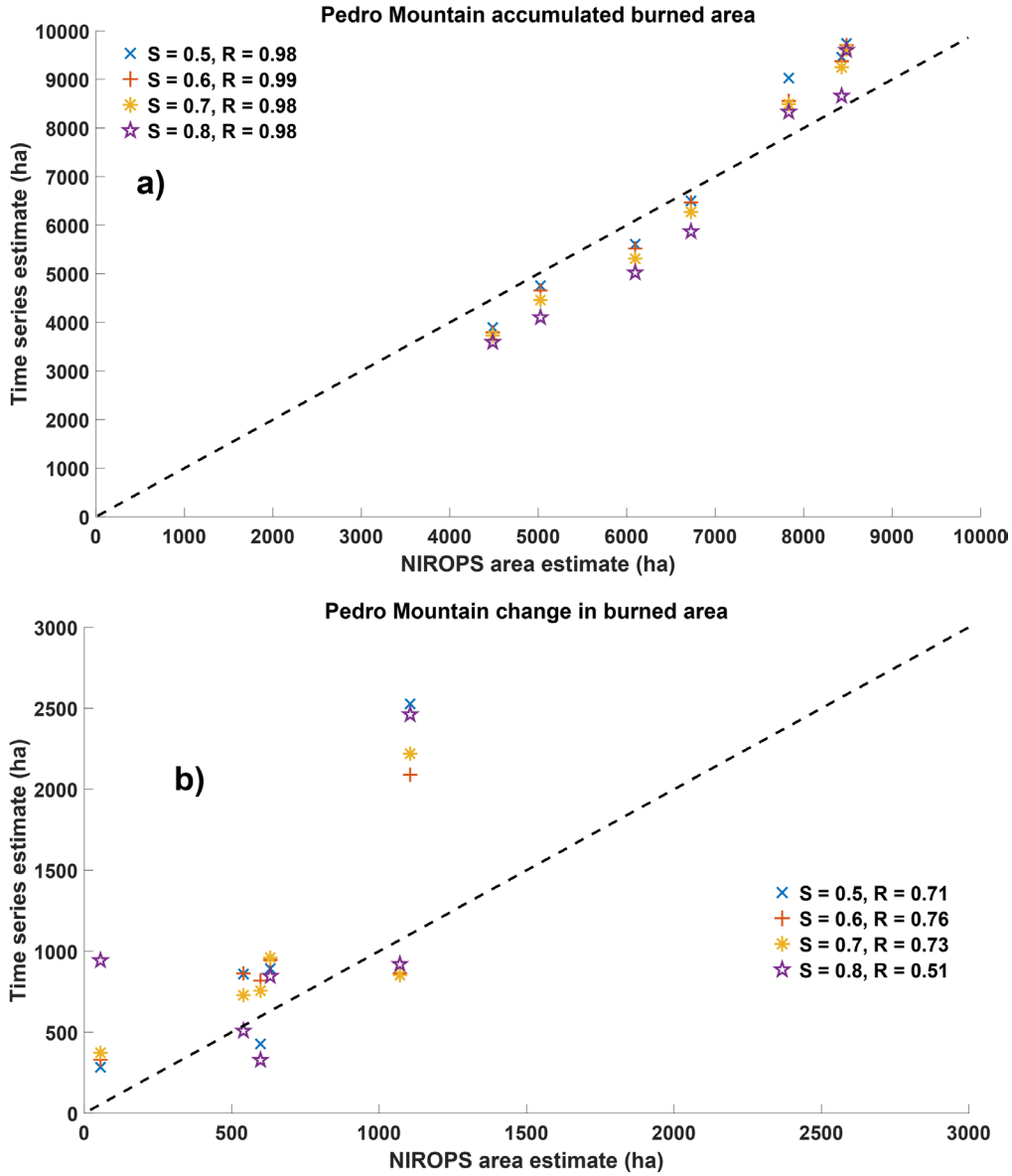
115 Figure S9: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated

116 FRP and burned area estimate time series from VIIRS and ABI (c) for the Pedro Mountain Fire.

117 The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink

factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S10: Correlation scatter plots between aggregated burned area (top) and the change in



burned area between NIROPS flights (bottom) for the Pedro Mountain (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Table S8: Pedro Mountain Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	1098.3	918.4	805.8	548.8	273.1	142.8	9.3	-270.3	-723.1	-1102.3
Normalized Mean Bias (%)	16.3	13.7	12.0	8.2	4.1	2.1	0.1	-4.0	-10.8	-16.4
Normalized Mean Error (%)	16.3	13.9	12.5	9.8	10.7	10.2	11.0	11.9	13.7	16.9
RMSE (ha)	1368.4	1234.1	1125.6	891.7	826.3	748.9	766.7	851.8	1075.5	1358.8
Mean Absolute Error (ha)	1098.3	935.8	840.8	656.9	721.9	683.9	739.5	798.5	924.2	1134.5

Table S9: Pedro Mountain Fire change in burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	313.0	341.7	333.5	301.1	307.8	319.0	315.5	334.9	350.0	313.9
Normalized Mean Bias (%)	47.0	51.3	50.0	45.2	46.2	47.9	47.3	50.2	52.5	47.1
Normalized Mean Error (%)	51.6	55.6	57.0	70.4	65.5	58.1	58.2	72.8	65.5	62.7
RMSE (ha)	641.0	579.1	584.7	586.5	622.2	472.5	509.9	679.5	536.7	622.7
Mean Absolute Error (ha)	343.9	370.5	379.9	469.1	436.7	387.5	388.0	485.0	436.4	417.6

Shady:

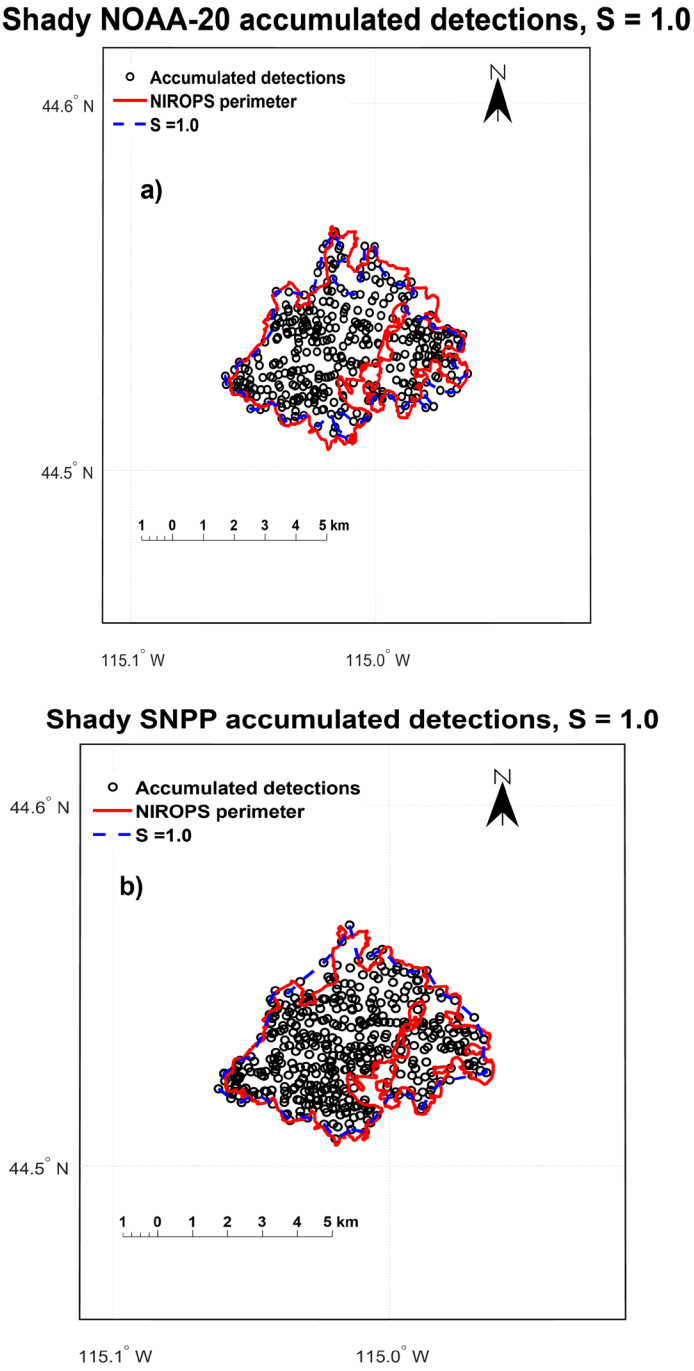


Figure S11: Accumulated active fire detections (black circles) compared to most compact, S = 1

1.0, shrink factor (blue dashed line) for the Shady Fire (a/b).

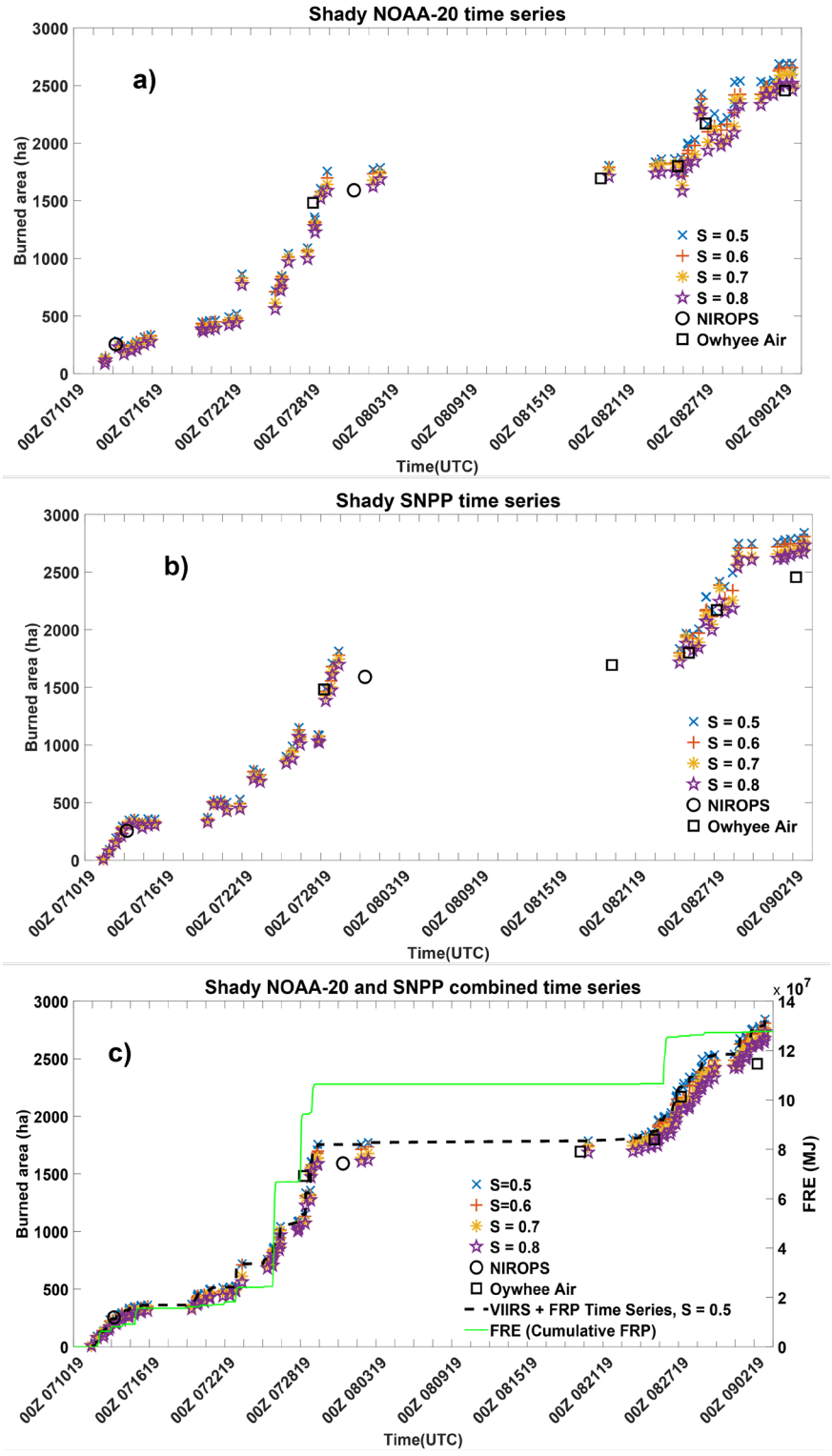


Figure S12: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Shady Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink

factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

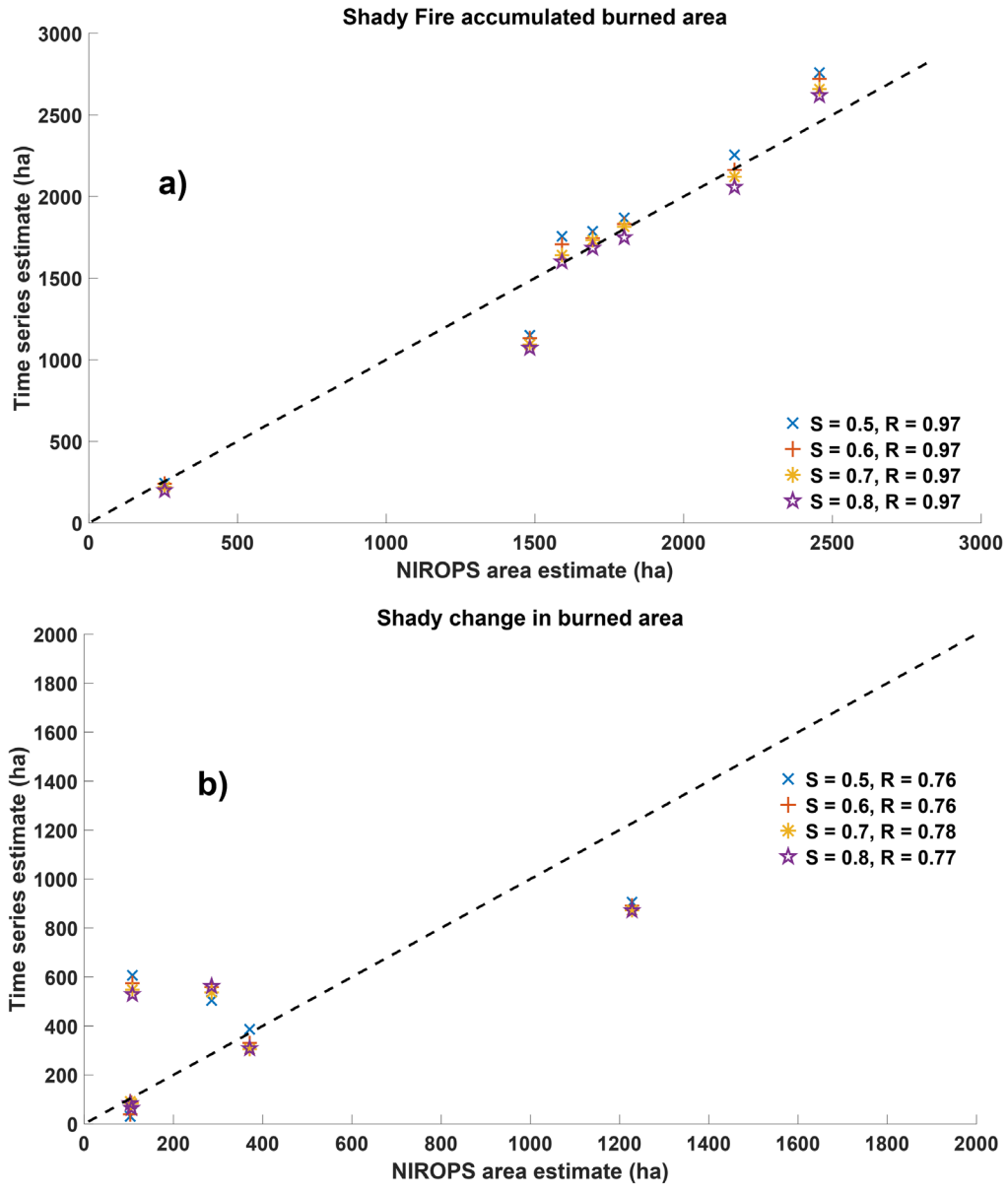


Figure S13: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Shady (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	316.4	241.3	166.5	101.3	52.4	12.9	-24.5	-66.8	-109.3	-139.8
Normalized Mean Bias (%)	19.3	14.8	10.2	6.2	3.2	0.8	-1.5	-4.1	-6.7	-8.5
Normalized Mean Error (%)	21.8	18.3	14.3	11.7	9.2	7.3	6.8	7.1	8.9	10.0
RMSE (ha)	395.2	326.9	254.9	217.5	189.1	173.4	169.2	175.0	198.5	210.2
Mean Absolute Error (ha)	355.8	300.0	234.0	192.0	151.0	119.7	111.3	116.2	145.9	163.6

Table S10: Shady Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	85.4	72.8	59.9	52.3	52.3	46.5	39.4	36.3	34.9	28.4
Normalized Mean Bias (%)	23.3	19.8	16.3	14.3	14.3	12.7	10.7	9.9	9.5	7.7
Normalized Mean Error (%)	53.6	47.6	50.5	54.0	52.3	54.5	52.1	53.5	59.6	57.8
RMSE (ha)	282.5	264.8	256.0	271.4	260.2	262.0	254.2	254.0	271.7	262.6
Mean Absolute Error (ha)	196.7	174.6	185.1	198.0	191.9	200.1	191.1	196.3	218.8	212.1

Table S11: Shady Fire change in burned area statistics for all shrink factors

Walker:

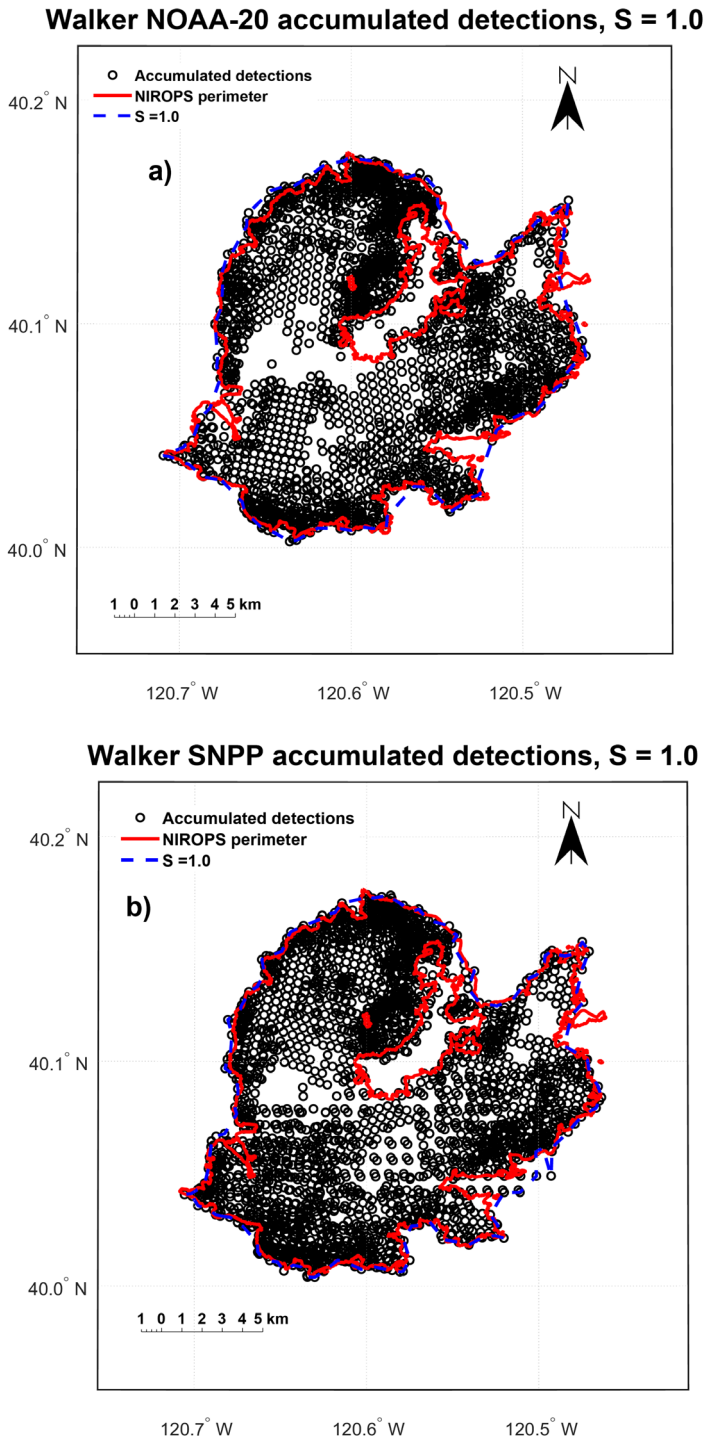


Figure S14: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Walker Fire (a/b).

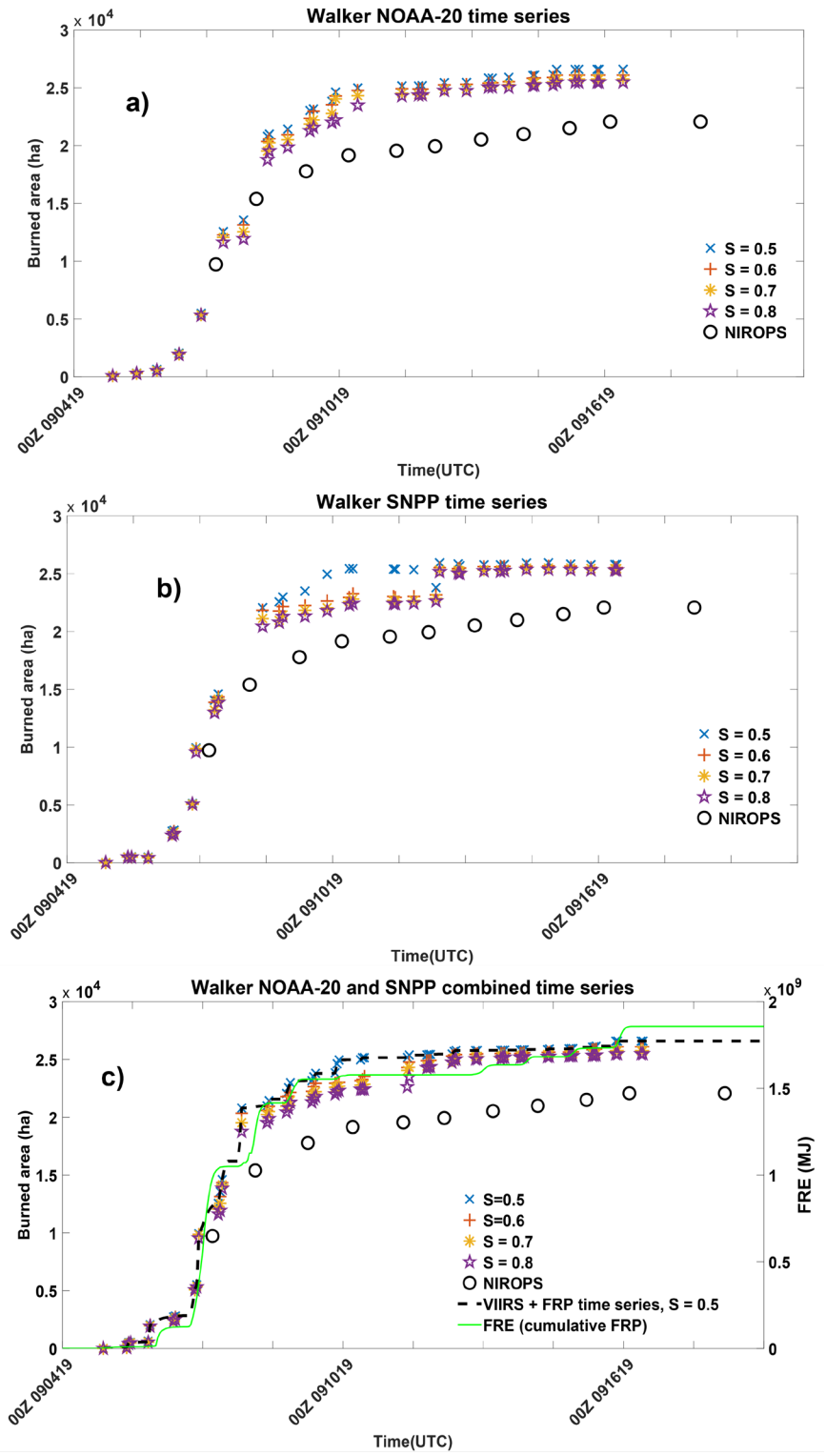


Figure S15: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Walker Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors,

black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

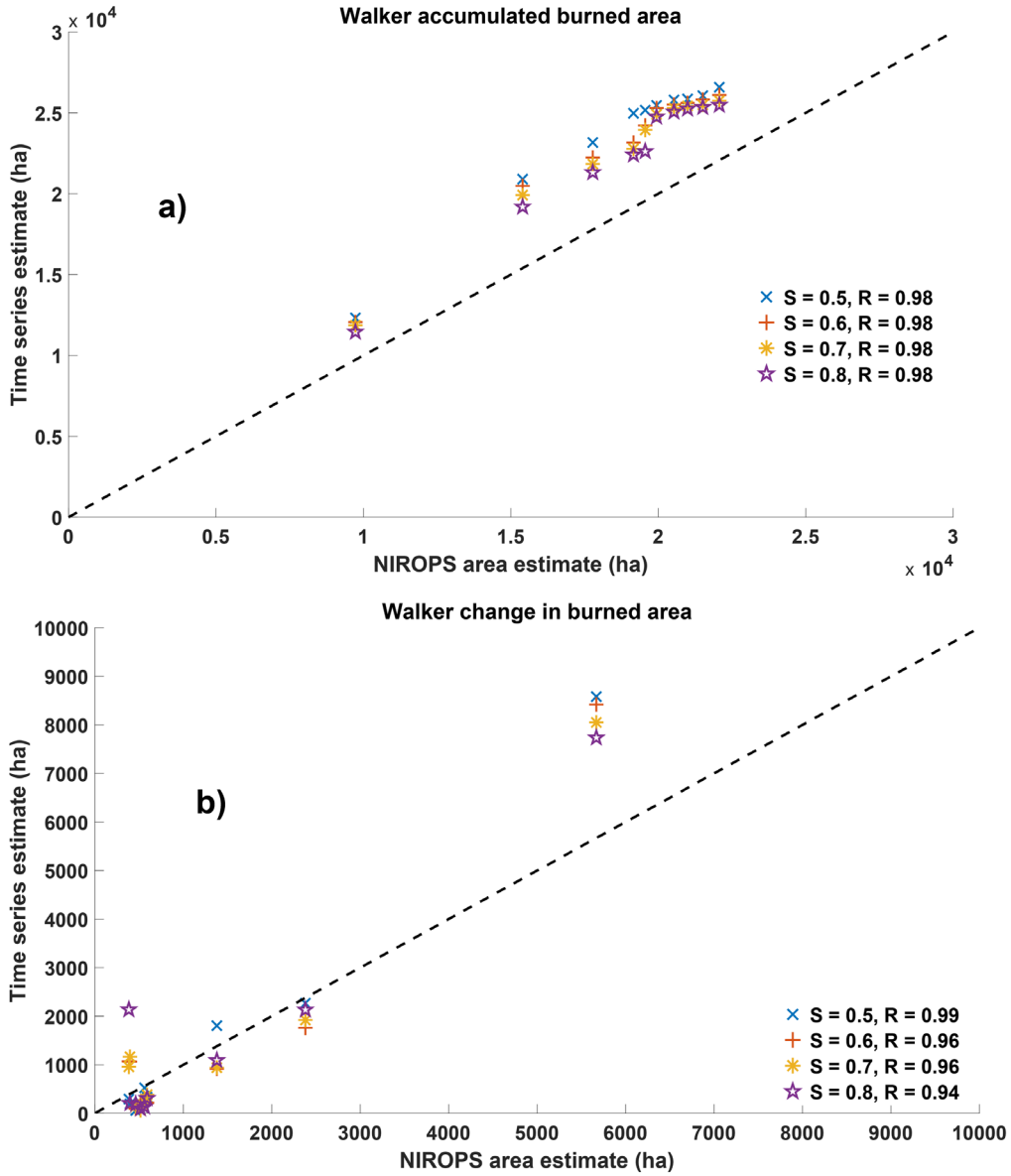


Figure S16: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Walker (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	7786.2	6908.4	6079.8	5479.4	4963.2	4385.9	4053.9	3621.4	3407.6	2957.2
Normalized Mean Bias (%)	41.7	37.0	32.6	29.4	26.6	23.5	21.7	19.4	18.3	15.8
Normalized Mean Error (%)	41.7	37.0	32.6	29.4	26.6	23.5	21.7	19.4	18.3	15.8
RMSE (ha)	7911.5	7017.8	6174.7	5570.1	5043.5	4458.4	4124.9	3714.6	3530.2	3073.2
Mean Absolute Error (ha)	7786.2	6908.4	6079.8	5479.4	4963.2	4385.9	4053.9	3621.4	3407.6	2957.2

Table S12: Walker Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	296.6	317.9	266.3	257.3	214.0	188.0	171.6	187.5	217.9	242.4
Normalized Mean Bias (%)	21.6	23.2	19.4	18.8	15.6	13.7	12.5	13.7	15.9	17.7
Normalized Mean Error (%)	66.2	58.6	49.7	46.7	38.5	52.7	47.8	48.2	49.8	44.9
RMSE (ha)	1814.6	1637.8	1432.8	1267.6	1003.0	1028.2	909.2	944.5	1001.5	936.5
Mean Absolute Error (ha)	908.4	803.9	681.7	641.0	527.8	723.3	656.0	660.7	683.2	616.0

Table S13: Walker Fire change in burned area statistics for all shrink factors

Williams Flats:

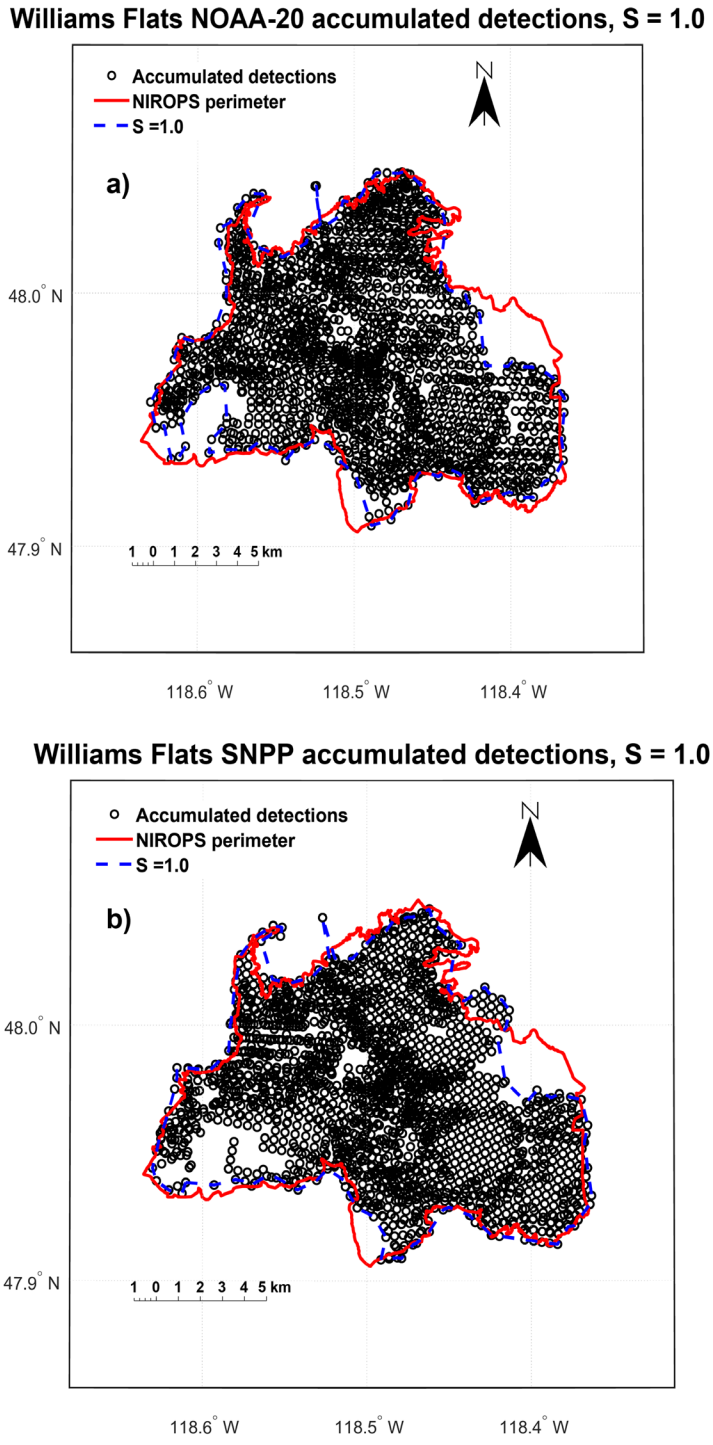


Figure S17: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Williams Flats Fire (a/b).

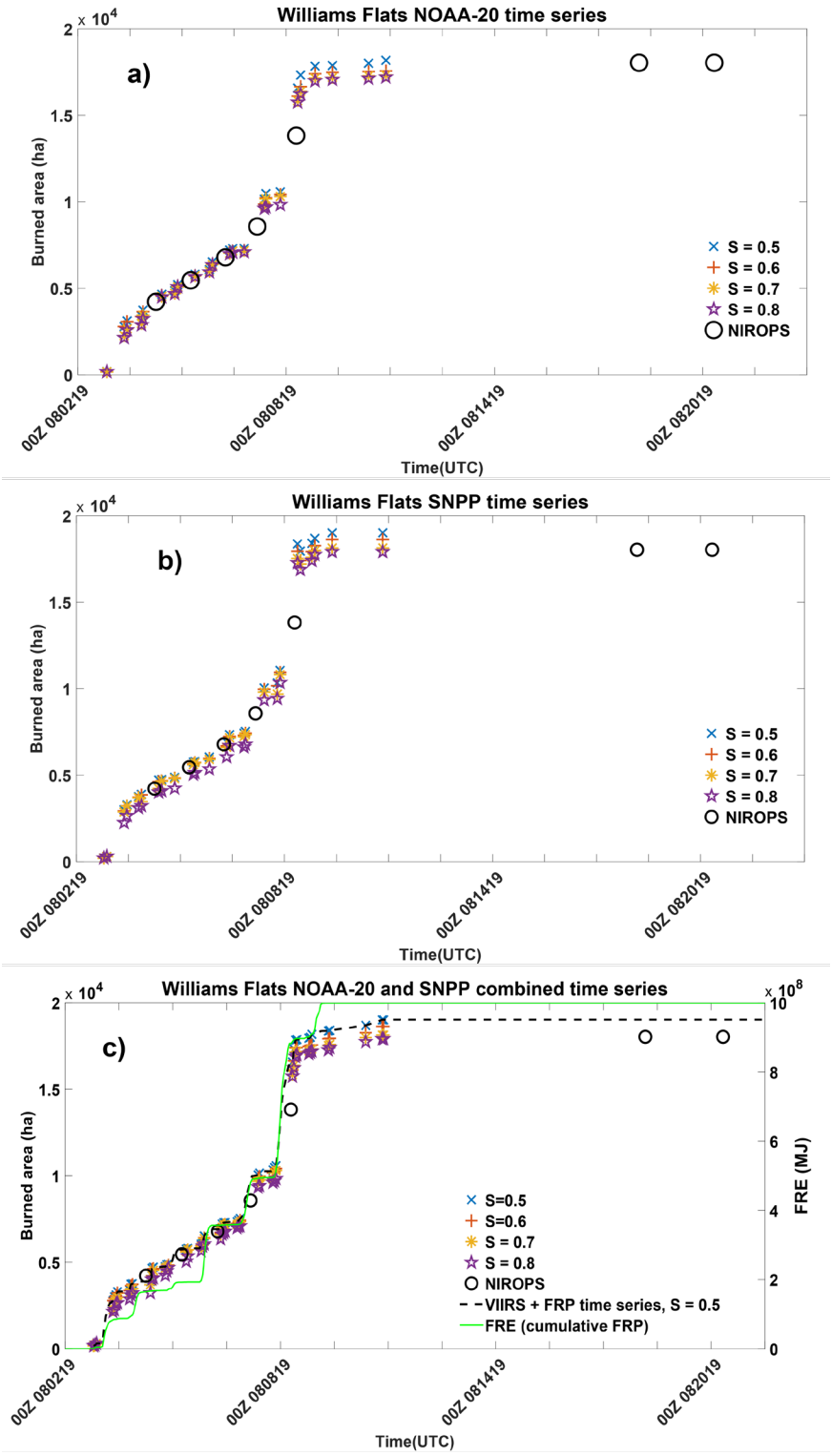


Figure S18: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Williams Flats Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series

shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

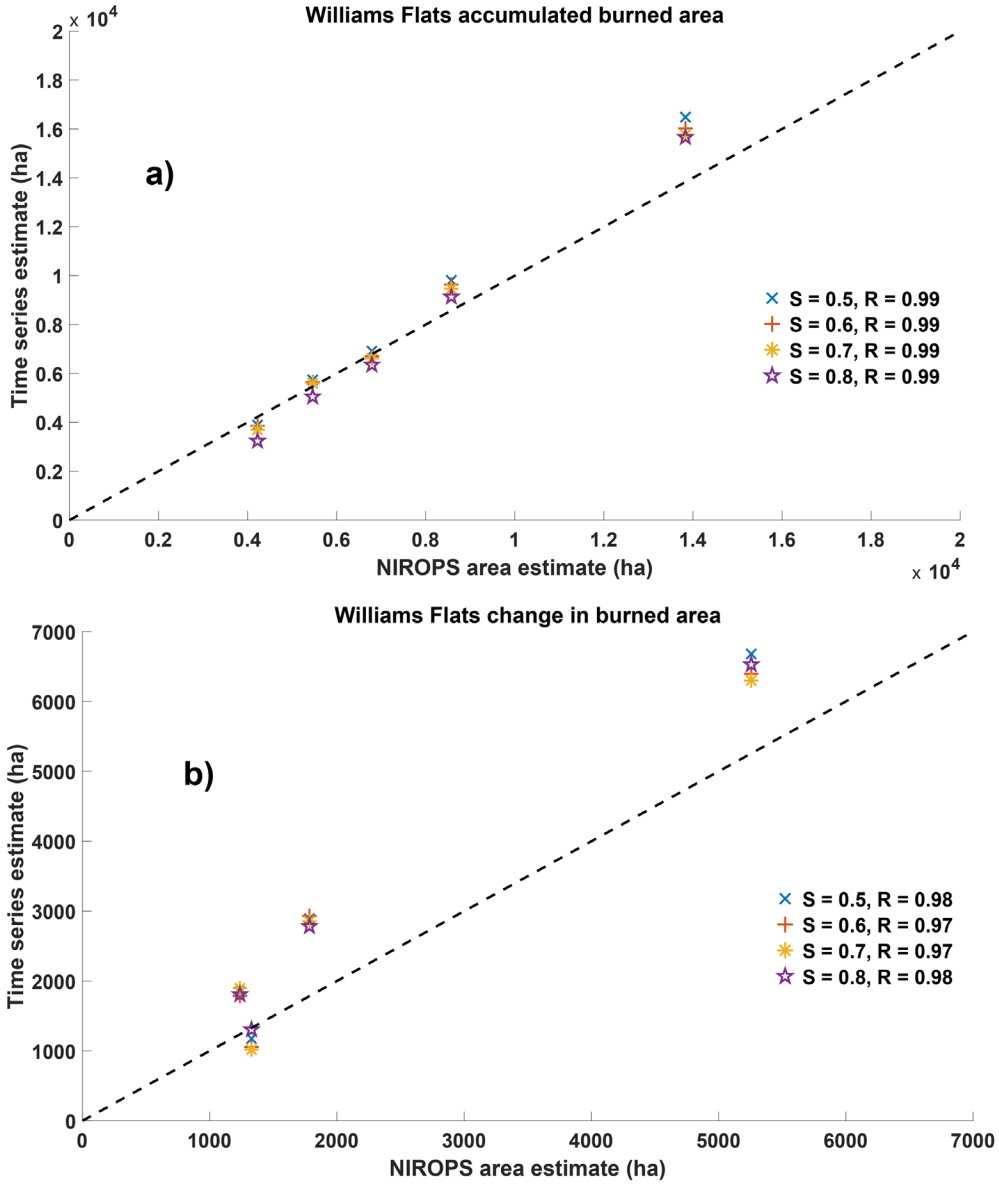


Figure S19: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Williams Flats (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	1920.1	1548.7	1263.1	949.2	787.4	593.3	447.9	107.4	-193.0	-324.3
Normalized Mean Bias (%)	24.7	19.9	16.2	12.2	10.1	7.6	5.8	1.4	-2.5	-4.2
Normalized Mean Error (%)	24.8	20.5	17.3	13.8	11.8	10.0	9.4	10.8	9.9	9.7
RMSE (ha)	2779.5	2253.6	1871.5	1510.0	1320.9	1103.3	984.8	999.1	873.8	855.2
Mean Absolute Error (ha)	1927.1	1592.5	1344.9	1070.8	920.8	775.7	730.5	843.7	772.7	752.9

Table S14: Williams Flats Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	1404.8	1158.5	978.2	825.8	746.8	640.3	616.2	704.5	594.9	557.0
Normalized Mean Bias (%)	58.5	48.2	40.7	34.4	31.1	26.7	25.7	29.3	24.8	23.2
Normalized Mean Error (%)	58.5	48.2	43.7	39.2	34.3	32.3	32.1	29.8	31.3	29.1
RMSE (ha)	1806.7	1467.7	1240.2	1069.2	955.8	864.3	831.3	858.8	820.1	765.3
Mean Absolute Error (ha)	1404.8	1158.5	1050.6	941.6	823.1	776.9	770.5	716.4	750.7	699.4

Table S15: Williams Flats Fire change in burned area statistics for all shrink factors

Bobcat:

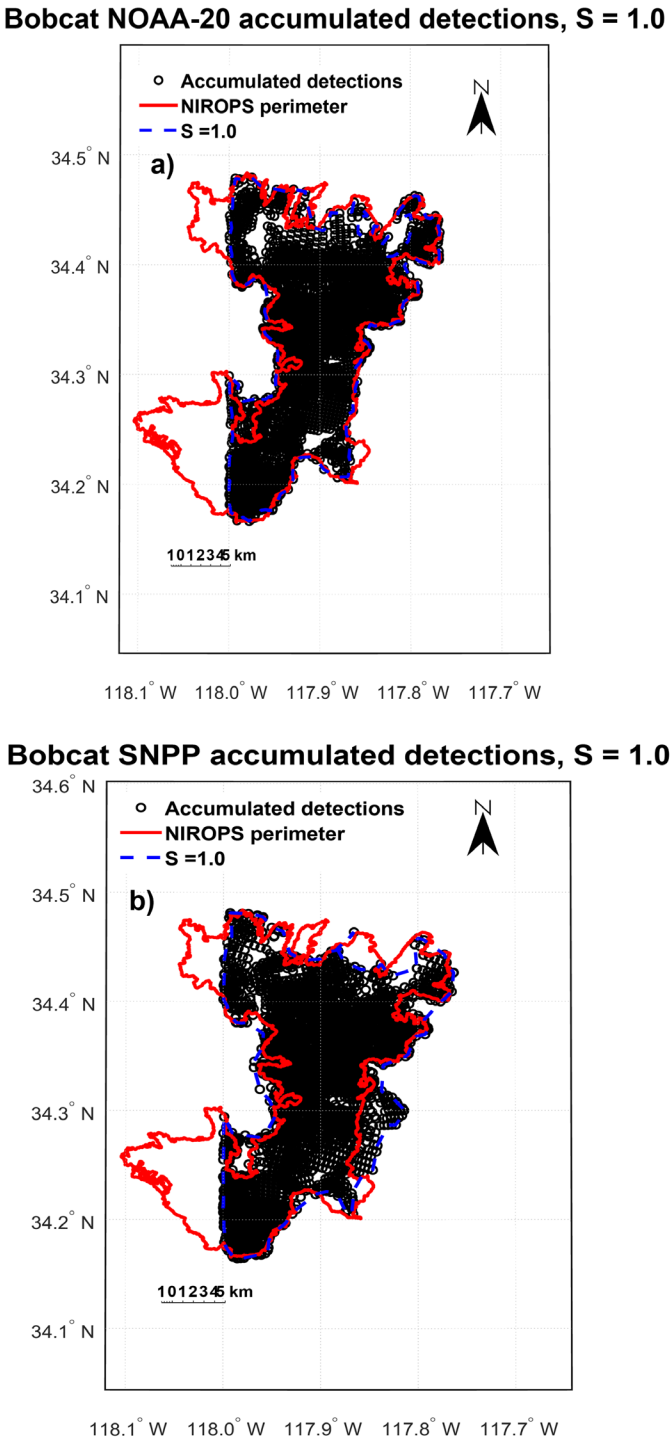


Figure S20: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Bobcat Fire (a/b).

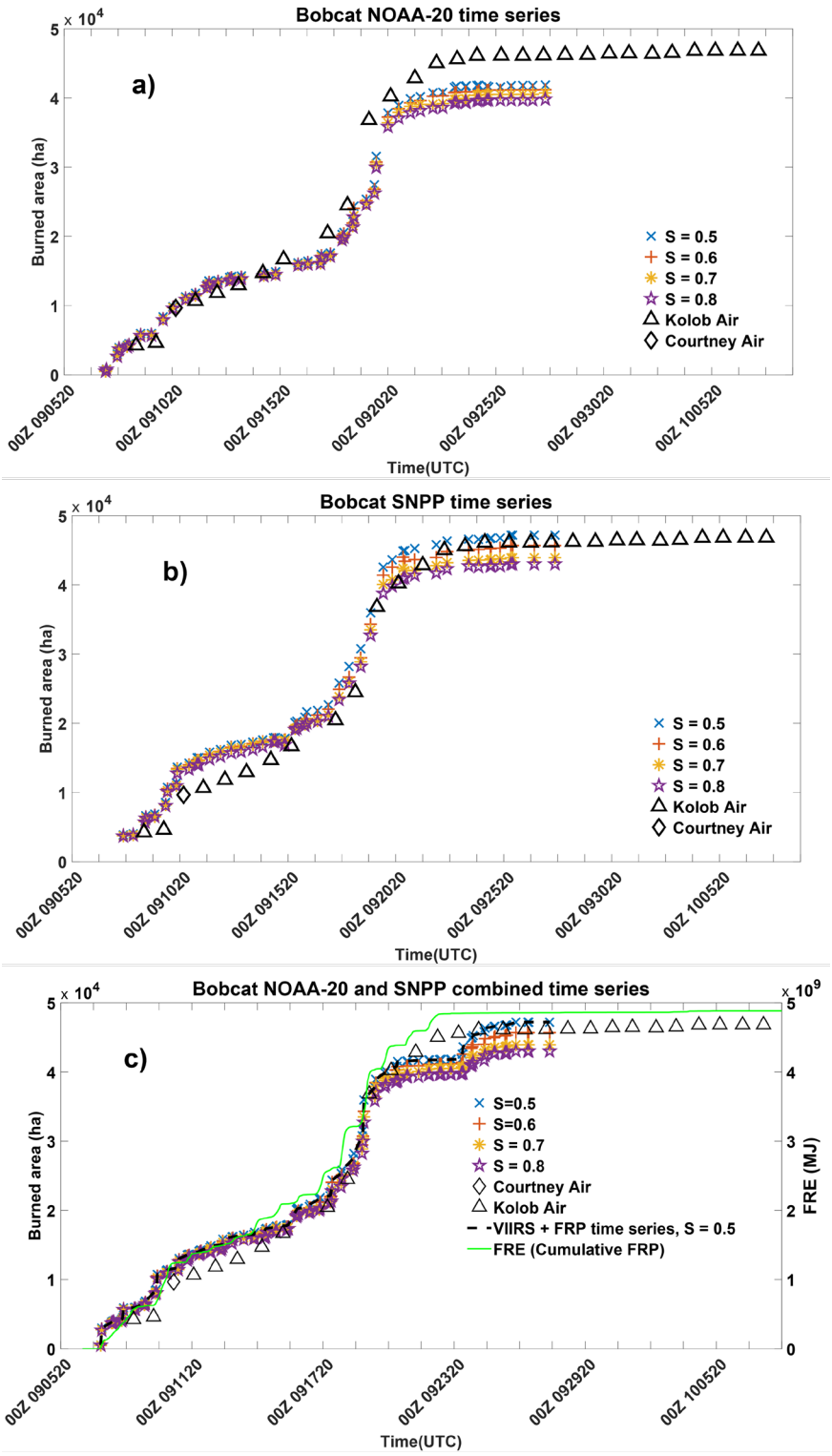


Figure S21: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Bobcat Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors,

black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

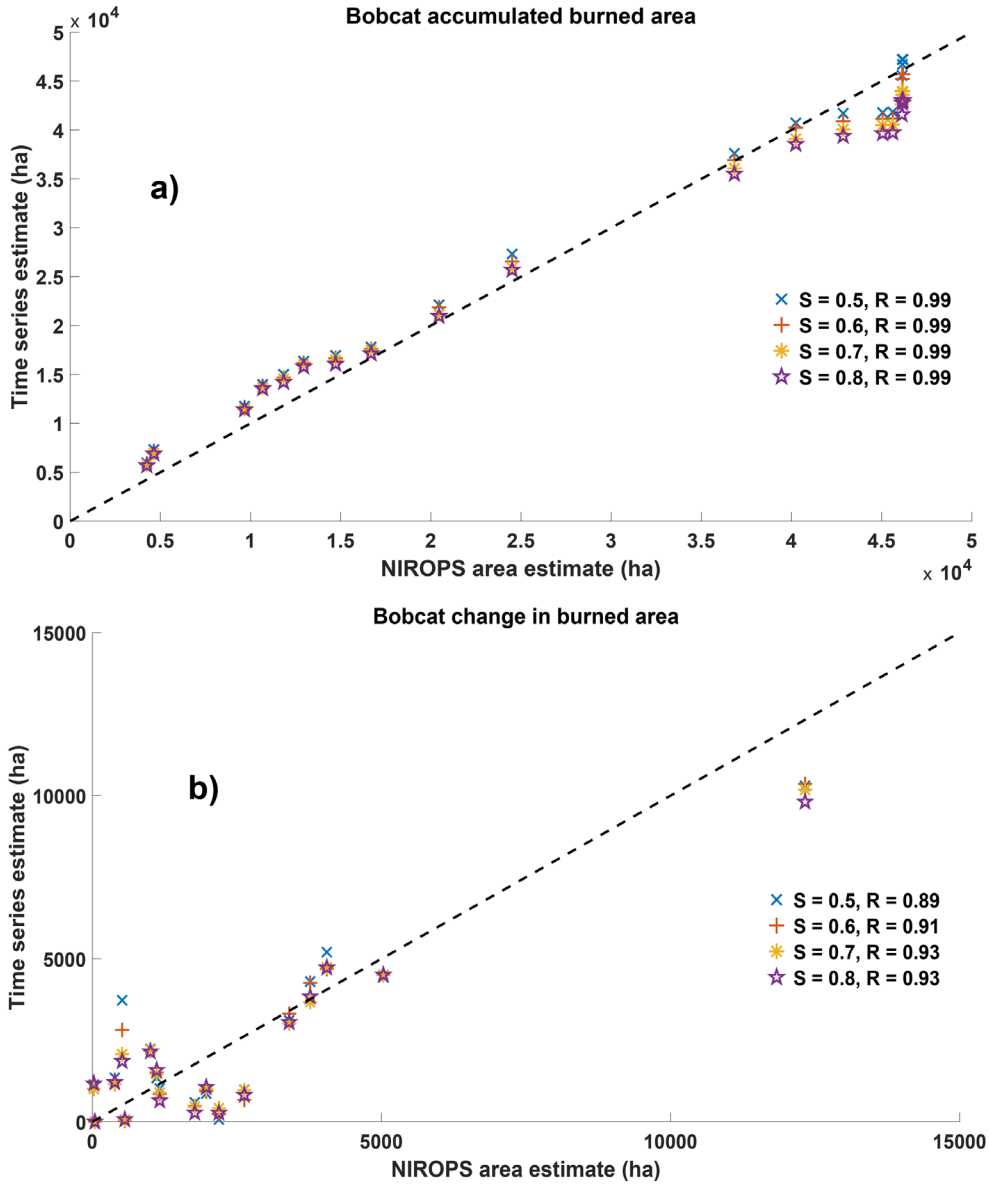


Figure S22: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Bobcat (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	6508.7	5157.5	3431.8	2111.7	1018.8	394.2	-294.6	-786.8	-1183.7	-1508.1
Normalized Mean Bias (%)	23.5	18.6	12.4	7.6	3.7	1.4	-1.1	-2.8	-4.3	-5.5
Normalized Mean Error (%)	23.5	18.6	12.4	9.2	7.0	6.9	8.4	9.3	9.9	10.2
RMSE (ha)	7028.9	5630.8	3857.6	2680.9	2222.2	2256.6	2595.9	2978.6	3277.9	3499.6
Mean Absolute Error (ha)	6508.7	5157.5	3436.2	2540.5	1940.4	1896.4	2314.4	2582.5	2742.5	2825.6

Table S16: Bobcat Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	392.6	371.6	222.0	88.5	-37.7	-115.8	-210.5	-255.5	-276.6	-290.7
Normalized Mean Bias (%)	16.9	16.0	9.5	3.8	-1.6	-5.0	-9.0	-11.0	-11.9	-12.5
Normalized Mean Error (%)	53.9	51.6	48.0	46.5	44.3	41.2	37.1	39.4	38.7	40.3
RMSE (ha)	1646.6	1683.9	1644.0	1453.5	1302.2	1173.7	1055.3	1133.0	1104.5	1168.9
Mean Absolute Error (ha)	1256.0	1201.4	1118.2	1084.1	1032.9	959.8	865.3	918.0	901.1	939.9

Table S17: Bobcat Fire change in burned area statistics for all shrink factors

Cameron Peak:

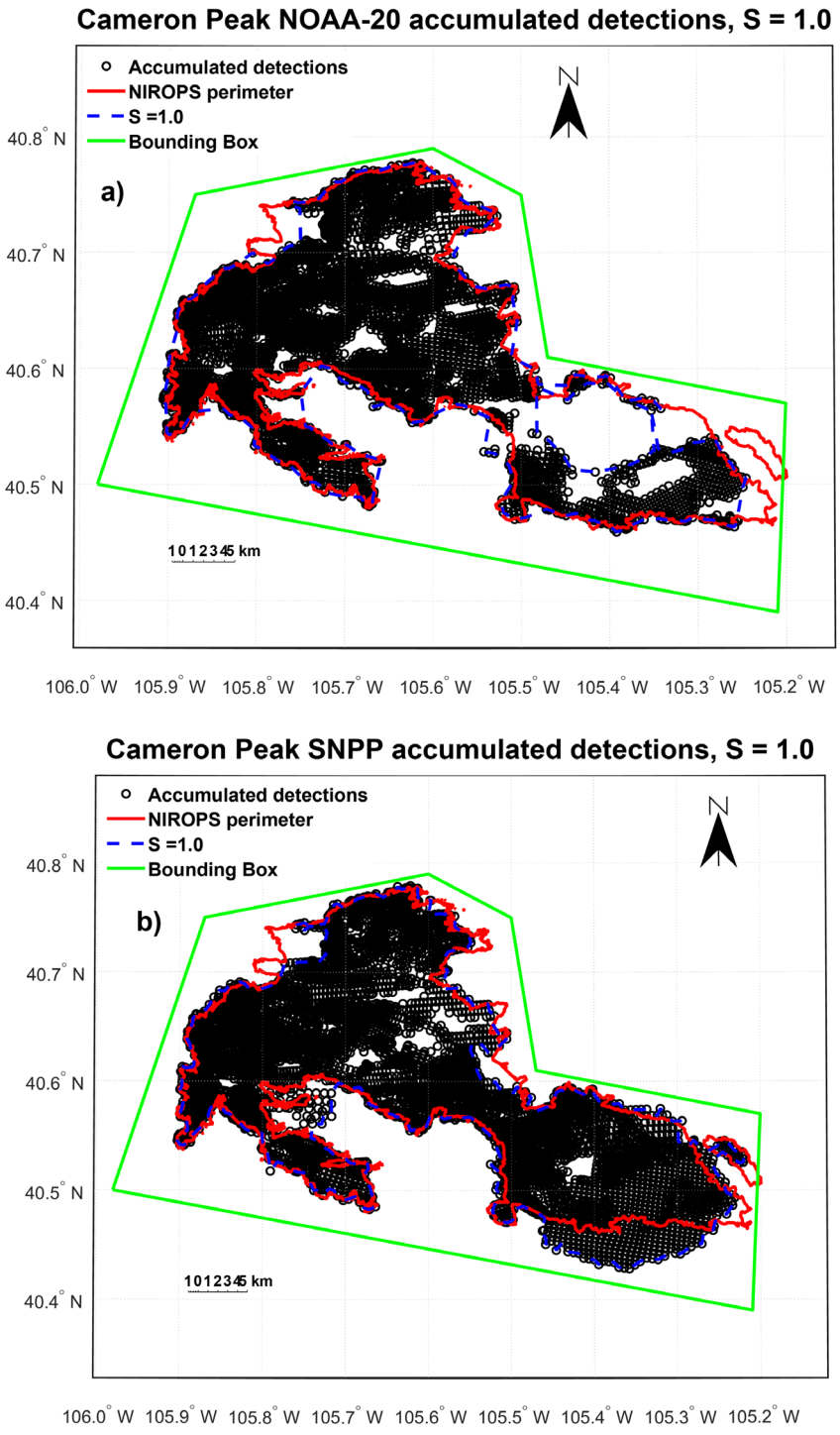


Figure S23: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Cameron Peak Fire (a/b). The secondary bounding box is shown in green.

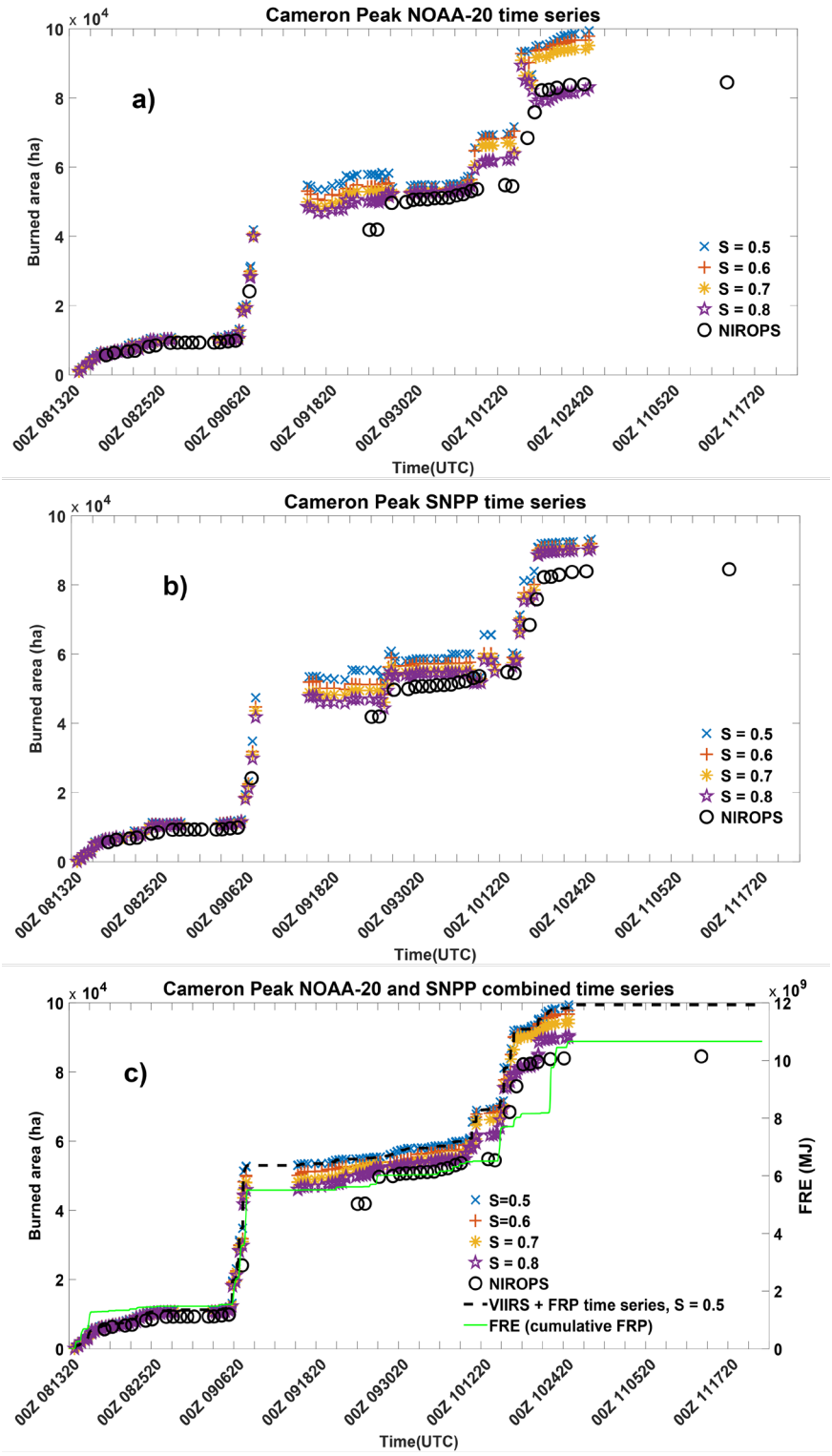
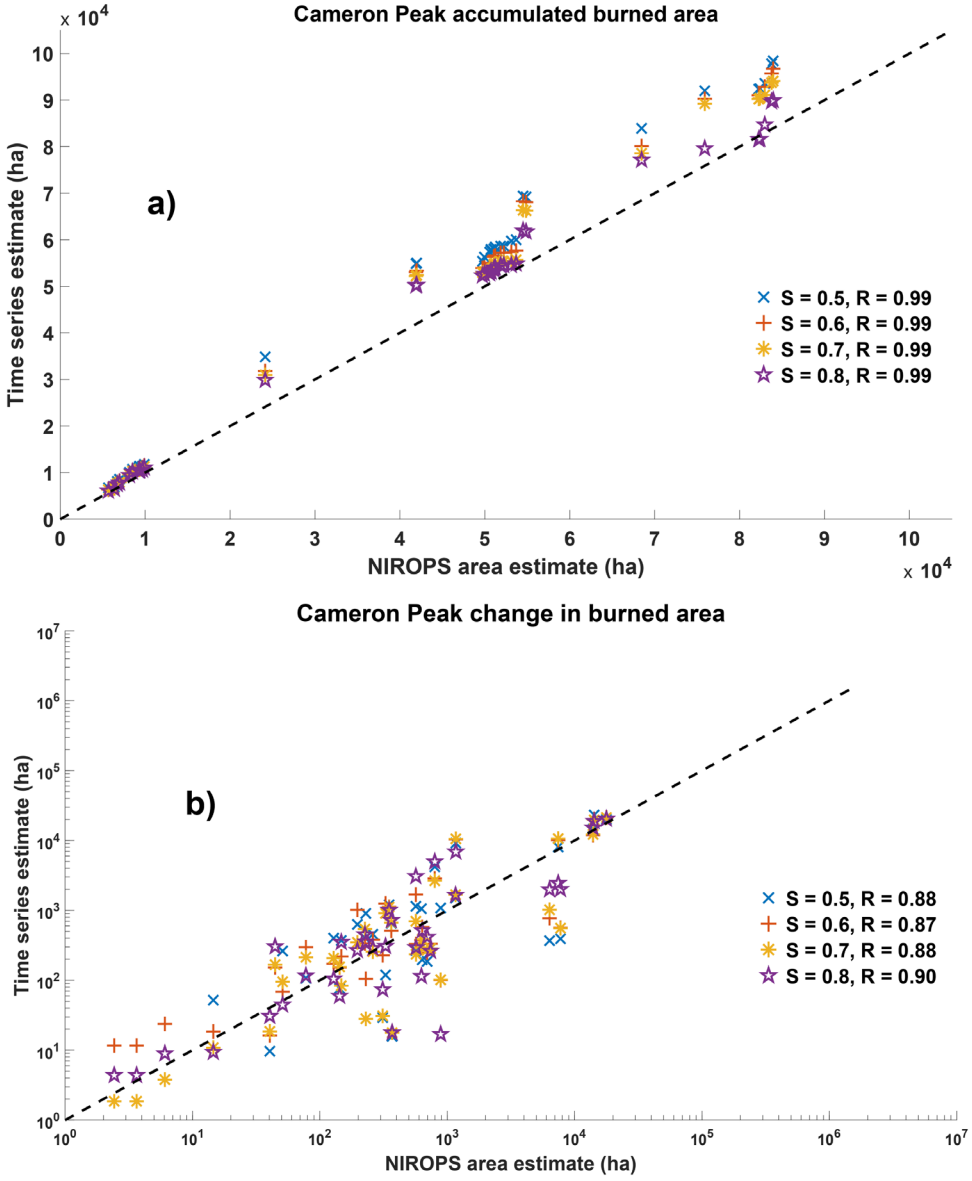


Figure S24: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Cameron Peak Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink

factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S25: Correlation scatter plots between aggregated burned area (top) and the change in



burned area between NIROPS flights (bottom) for the Cameron Peak (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	18783.2	13822.4	10336.7	8210.4	6733.3	5419.9	4434.2	2676.0	1874.9	1234.8
Normalized Mean Bias (%)	48.2	35.5	26.5	21.1	17.3	13.9	11.4	6.9	4.8	3.2
Normalized Mean Error (%)	48.2	35.5	26.5	21.1	17.3	13.9	11.4	7.1	5.4	4.7
RMSE (ha)	22014.0	16360.9	12259.9	9832.5	8297.3	6916.6	5875.1	3660.3	2855.5	2547.9
Mean Absolute Error (ha)	18783.2	13822.4	10336.7	8210.4	6733.3	5419.9	4434.2	2750.3	2116.0	1837.8

Table S18: Cameron Peak Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	784.9	690.0	482.3	396.4	353.6	315.3	250.2	147.1	131.0	122.7
Normalized Mean Bias (%)	38.1	33.5	23.4	19.2	17.2	15.3	12.1	7.1	6.4	6.0
Normalized Mean Error (%)	67.4	71.2	65.1	59.3	58.2	60.4	57.6	54.1	48.9	47.3
RMSE (ha)	3823.8	3287.5	2760.2	2535.2	2586.8	2508.7	2461.9	2085.4	1871.8	2080.5
Mean Absolute Error (ha)	1389.1	1467.7	1341.6	1221.3	1198.4	1244.0	1186.2	1114.0	1007.9	974.5

Table S19: Cameron Peak Fire change in burned area statistics for all shrink factors

Creek:

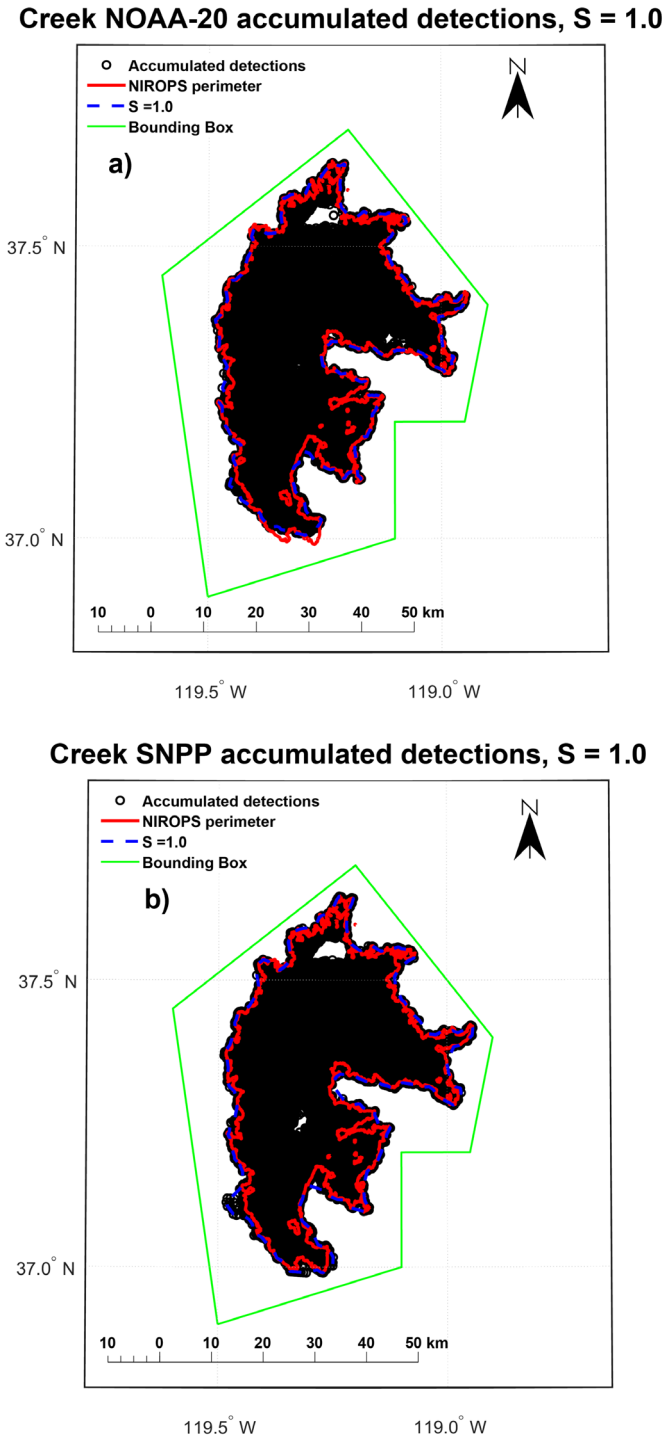


Figure S26: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Creek Fire (a/b). The secondary bounding box is shown in green.

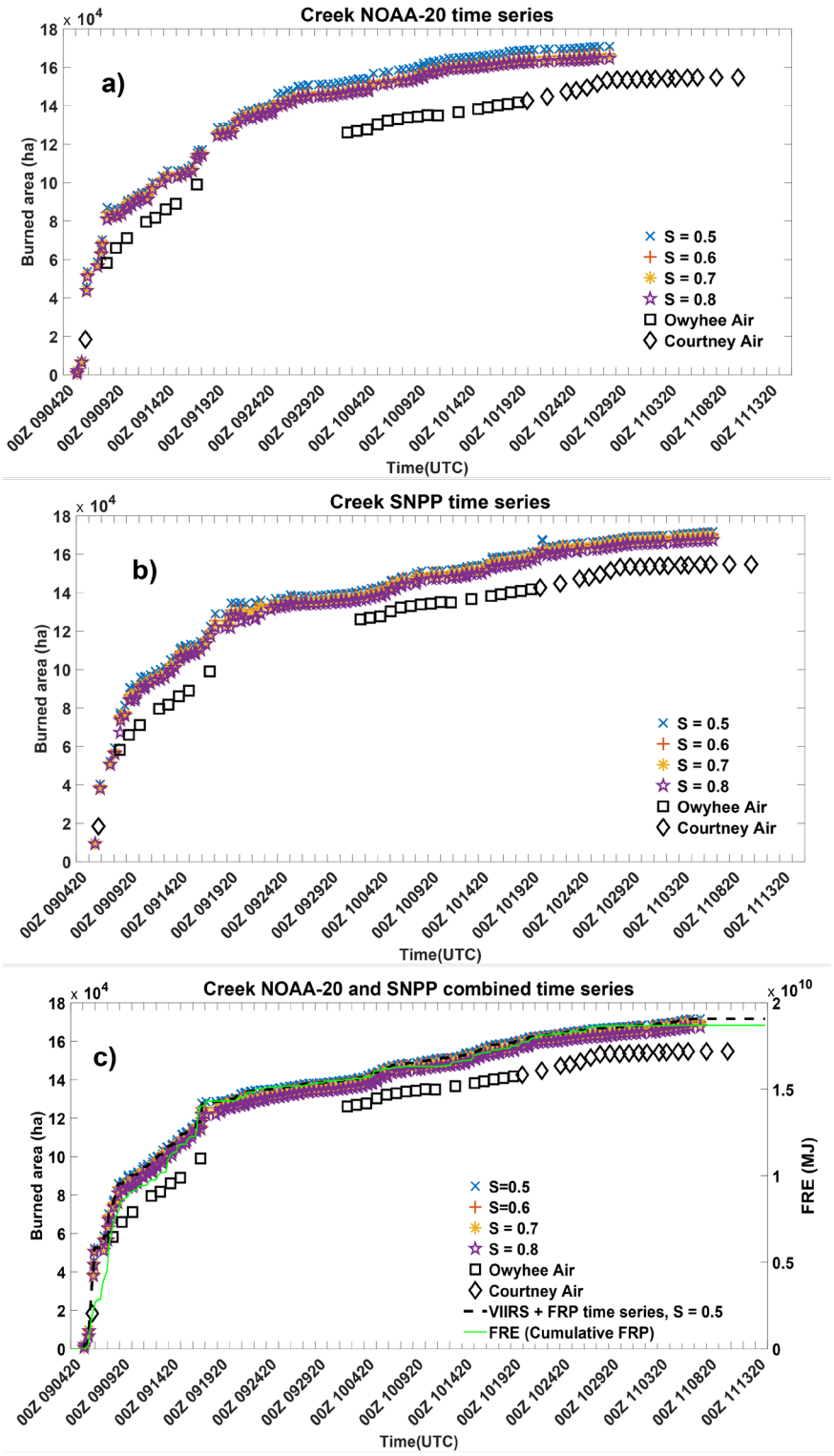


Figure S27: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Creek Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors,

black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

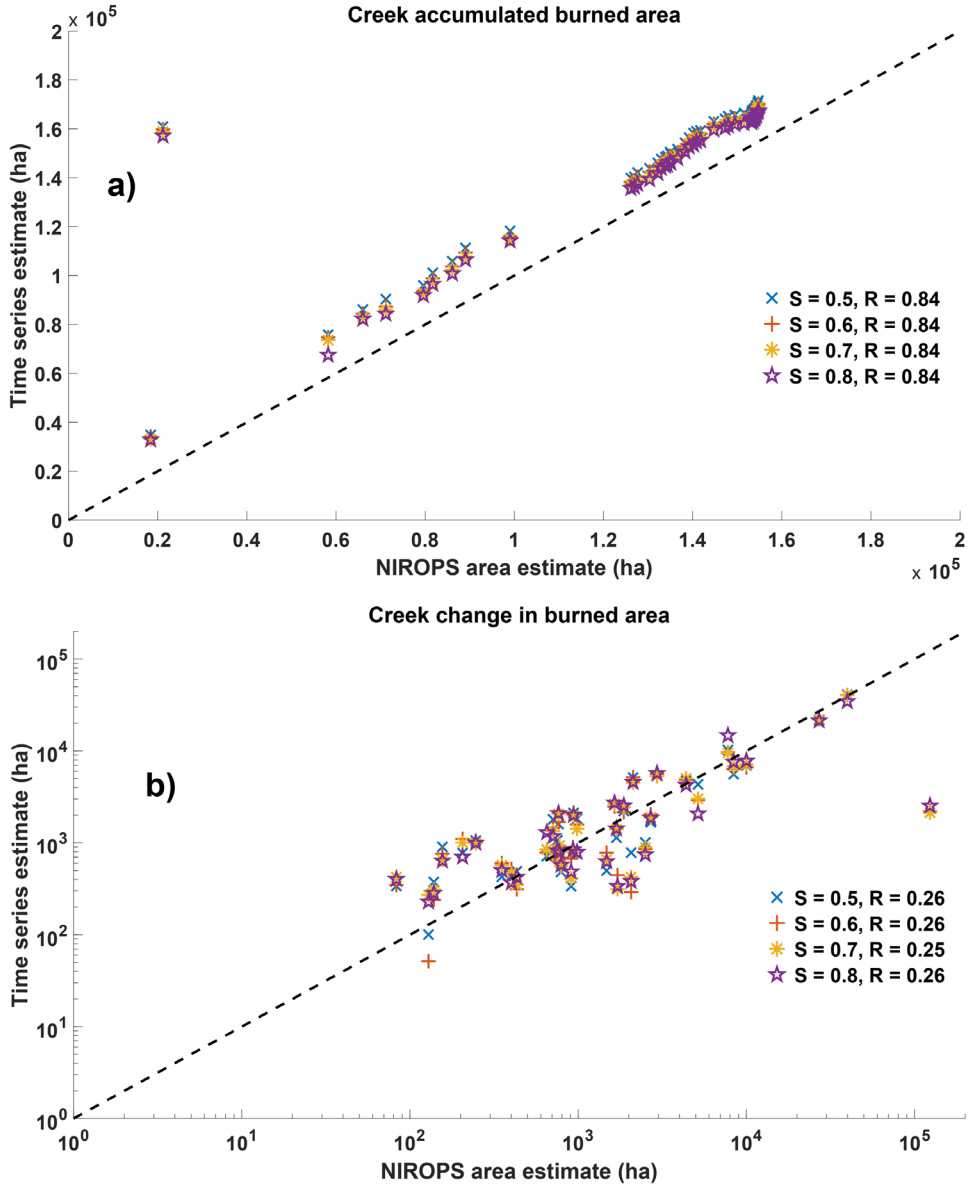


Figure S28: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Creek (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Table S20: Creek Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	50081.4	37373.3	28305.9	23112.4	19148.4	17643.7	16557.9	15054.3	14155.5	13285.2
Normalized Mean Bias (%)	40.2	30.0	22.7	18.6	15.4	14.2	13.3	12.1	11.4	10.7
Normalized Mean Error (%)	40.2	30.0	22.7	18.6	15.4	14.2	13.3	12.1	11.4	10.7
RMSE (ha)	54297.8	42258.8	34305.7	30075.2	27107.3	26098.4	25398.0	24423.8	23892.6	23335.5
Mean Absolute Error (ha)	50081.4	37373.3	28305.9	23112.4	19148.4	17643.7	16557.9	15054.3	14155.5	13285.2

Table S21: Creek Fire change in burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	973.5	449.3	218.4	111.4	10.9	-6.5	-8.3	-45.4	-55.4	-70.1
Normalized Mean Bias (%)	28.6	13.2	6.4	3.3	0.3	-0.2	-0.2	-1.3	-1.6	-2.1
Normalized Mean Error (%)	227.3	213.3	206.4	210.1	207.8	206.4	206.0	212.6	212.1	213.0
RMSE (ha)	27315.5	27323.5	27229.8	27224.4	27282.4	27282.7	27339.2	27294.2	27305.4	27250.3
Mean Absolute Error (ha)	7745.4	7269.4	7034.8	7159.5	7081.1	7033.6	7019.7	7246.4	7228.1	7259.5

Dolan:

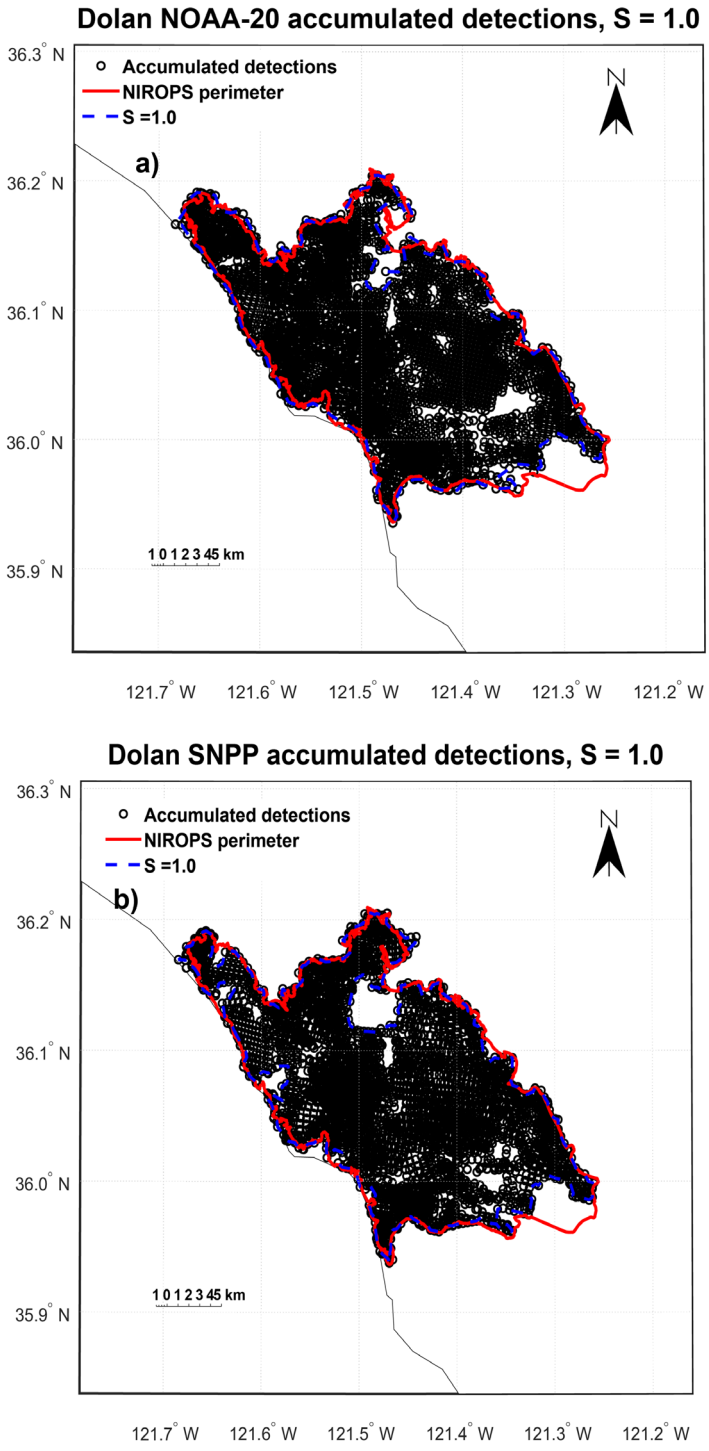


Figure S29: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Dolan Fire (a/b).

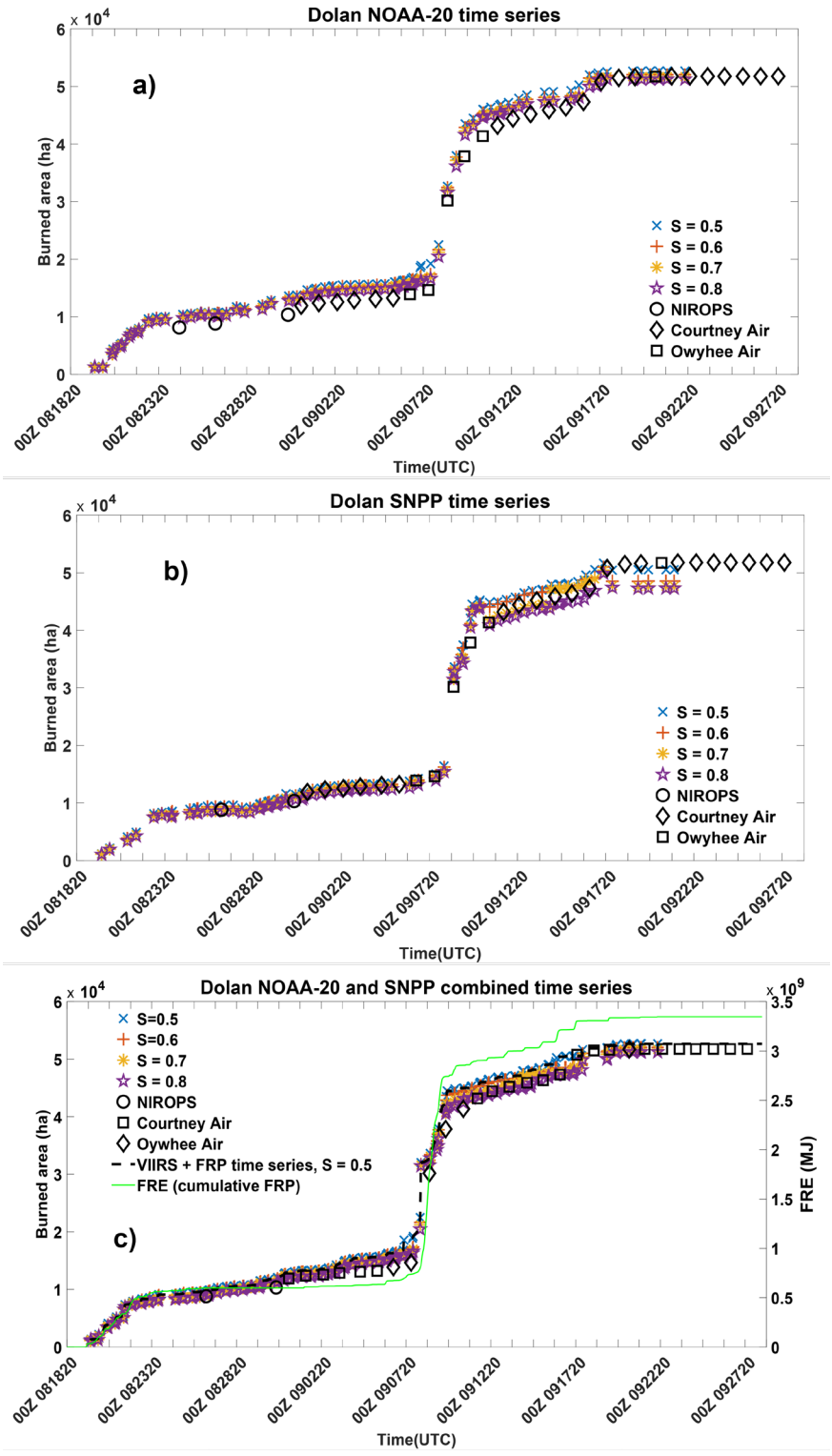


Figure S30: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Dolan Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink

factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

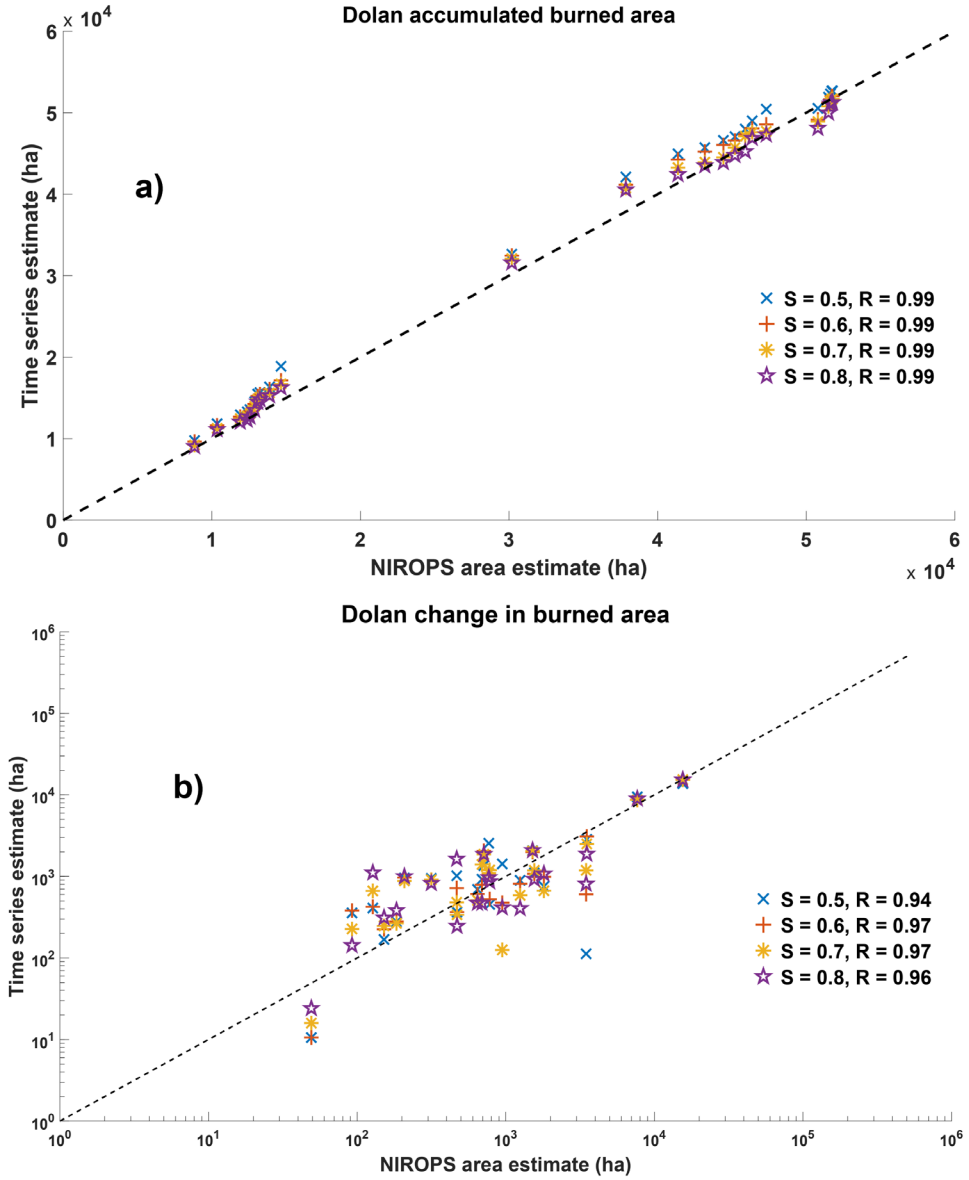


Figure S31: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Dolan (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Table S22: Dolan Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	7795.0	5205.1	3838.4	2651.6	1911.7	1305.6	803.3	273.2	-138.4	-669.0
Normalized Mean Bias (%)	24.5	16.4	12.1	8.3	6.0	4.1	2.5	0.9	-0.4	-2.1
Normalized Mean Error (%)	24.5	16.4	12.1	8.3	6.1	4.6	3.3	2.8	3.2	4.0
RMSE (ha)	8177.6	5474.3	4051.0	2875.6	2228.0	1692.3	1297.5	1153.0	1276.7	1637.0
Mean Absolute Error (ha)	7795.0	5205.1	3838.4	2651.6	1932.0	1463.8	1045.6	886.2	1012.2	1265.8

Table S23: Dolan Fire change in burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	347.3	153.4	103.6	32.9	-0.4	-22.8	-20.3	-30.9	-75.2	-114.7
Normalized Mean Bias (%)	18.6	8.2	5.6	1.8	0.0	-1.2	-1.1	-1.7	-4.0	-6.1
Normalized Mean Error (%)	41.2	40.0	40.1	38.0	37.8	27.5	30.3	35.0	31.5	31.2
RMSE (ha)	1257.3	1190.3	1068.6	1031.0	1047.7	787.3	762.9	896.7	873.1	828.3
Mean Absolute Error (ha)	769.4	746.5	749.1	708.4	706.0	512.4	566.1	653.9	587.3	582.9

East Troublesome:

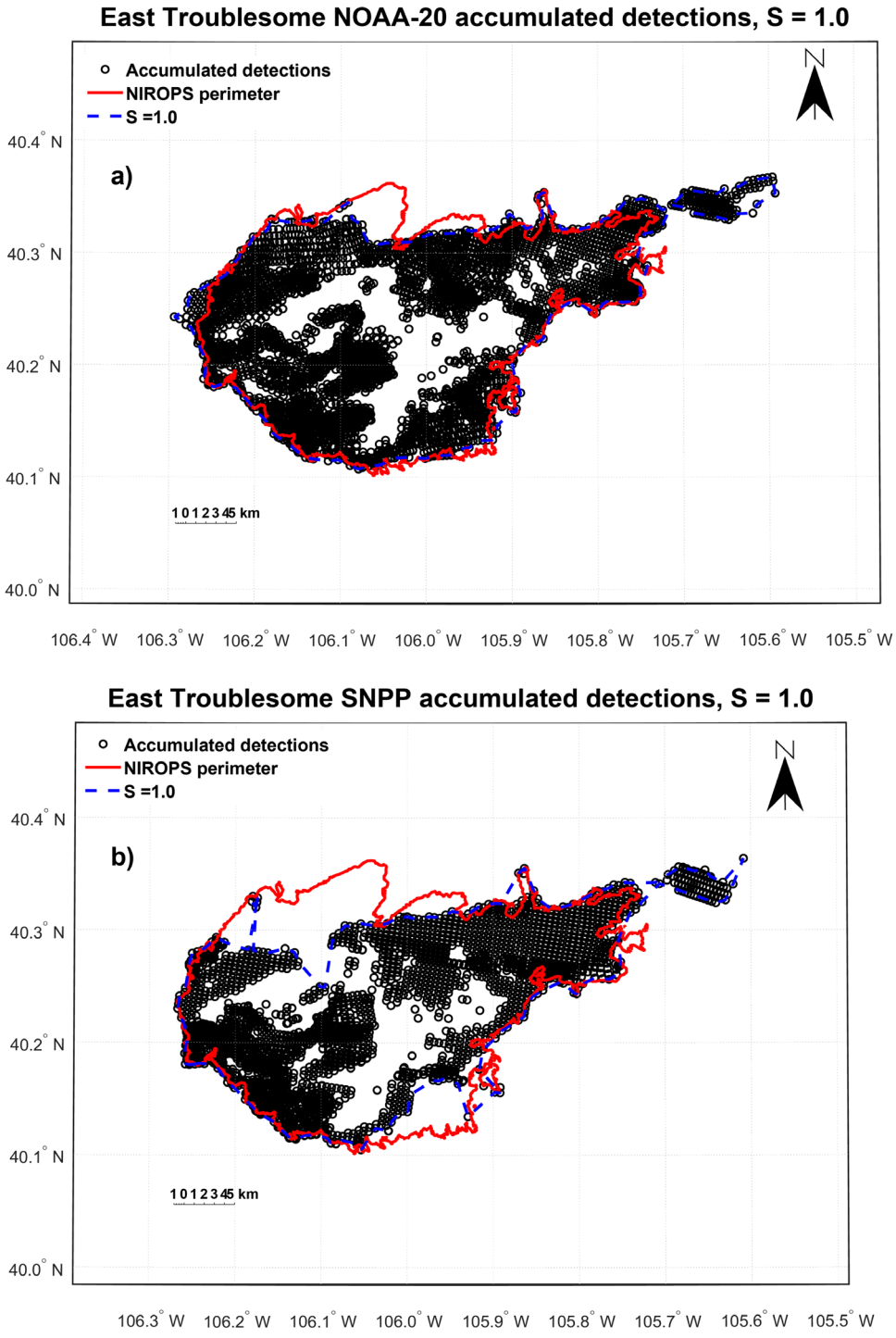


Figure S32: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the East Troublesome Fire (a/b).

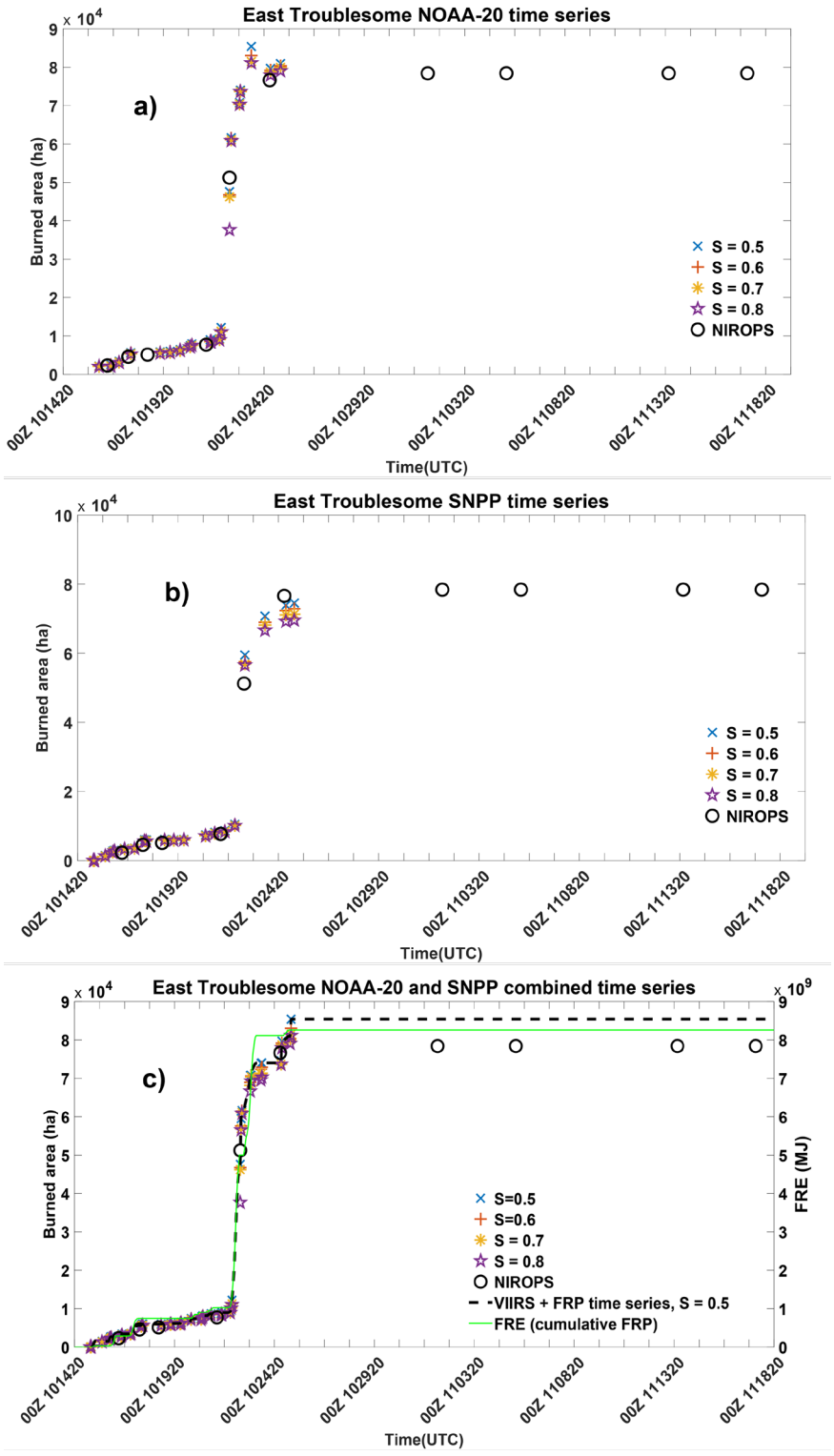


Figure S33: NOAA-20 and SNPP accumulated burned area estimates time s eries (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the East Troublesome Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink

factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

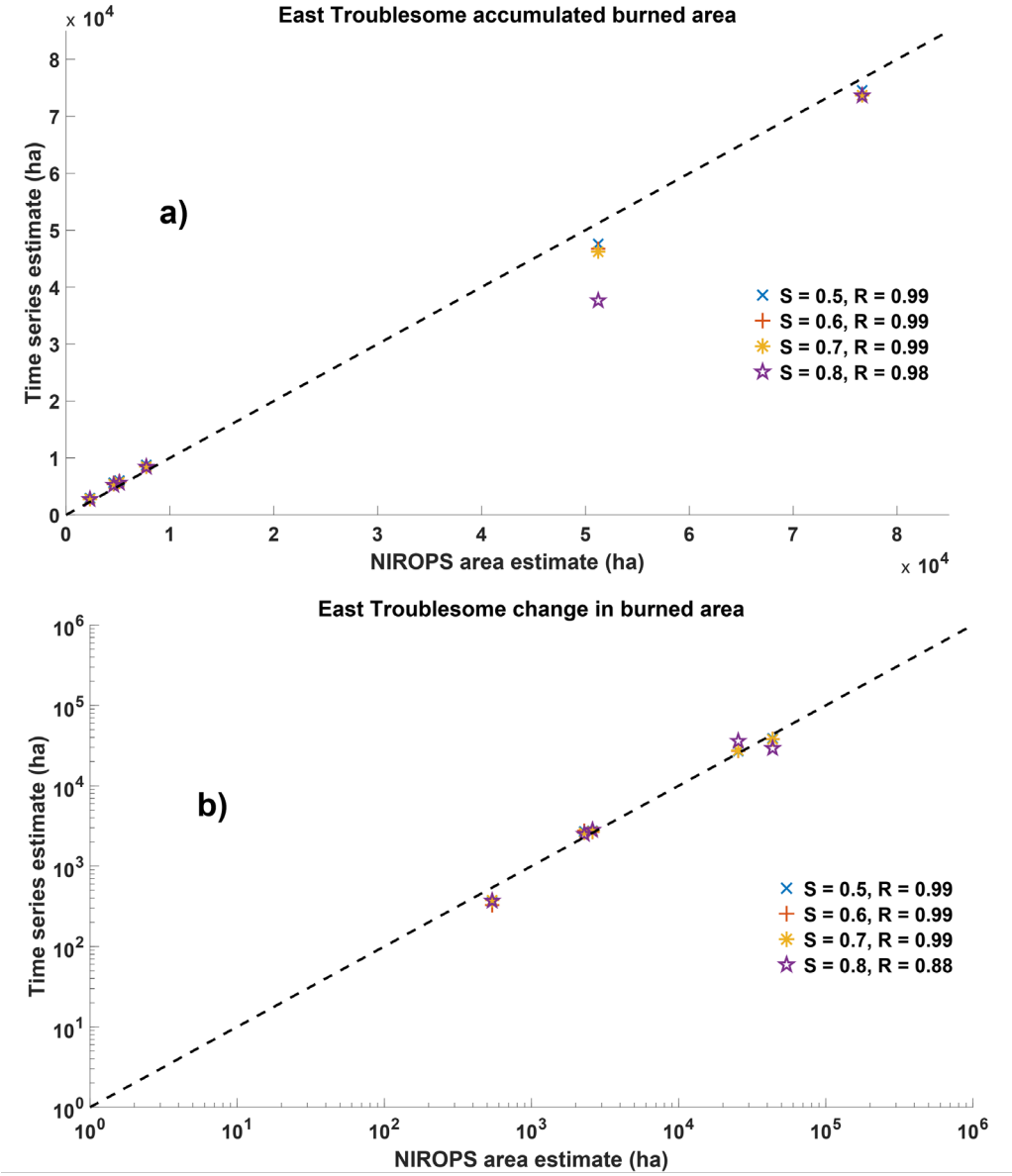


Figure S34: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the East Troublesome (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Table S24: East Troublesome Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	4604.8	3202.4	1705.0	328.4	-363.6	-695.1	-892.7	-2391.1	-2612.6	-3274.7
Normalized Mean Bias (%)	18.7	13.0	6.9	1.3	-1.5	-2.8	-3.6	-9.7	-10.6	-13.3
Normalized Mean Error (%)	18.7	13.0	7.7	5.2	6.3	7.0	7.2	12.8	13.3	15.6
RMSE (ha)	5948.2	4093.6	2283.9	1532.7	1869.3	2254.7	2439.6	5705.3	6059.8	7475.1
Mean Absolute Error (ha)	4604.8	3202.4	1895.6	1280.9	1549.4	1731.4	1766.5	3148.1	3271.3	3846.9

Table S25: East Troublesome Fire change in burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	2198.1	1435.7	683.4	-174.7	-544.3	-658.9	-687.5	-692.3	-712.1	-750.8
Normalized Mean Bias (%)	14.8	9.7	4.6	-1.2	-3.7	-4.4	-4.6	-4.7	-4.8	-5.0
Normalized Mean Error (%)	22.2	17.8	12.4	10.8	9.4	10.5	11.3	34.2	36.1	44.9
RMSE (ha)	4746.8	3698.2	2589.1	2319.3	2213.1	2519.3	2736.9	7948.9	8399.5	10512.0
Mean Absolute Error (ha)	3298.4	2647.4	1837.6	1610.7	1396.8	1562.6	1679.1	5089.7	5369.1	6673.1

Holiday Farm:

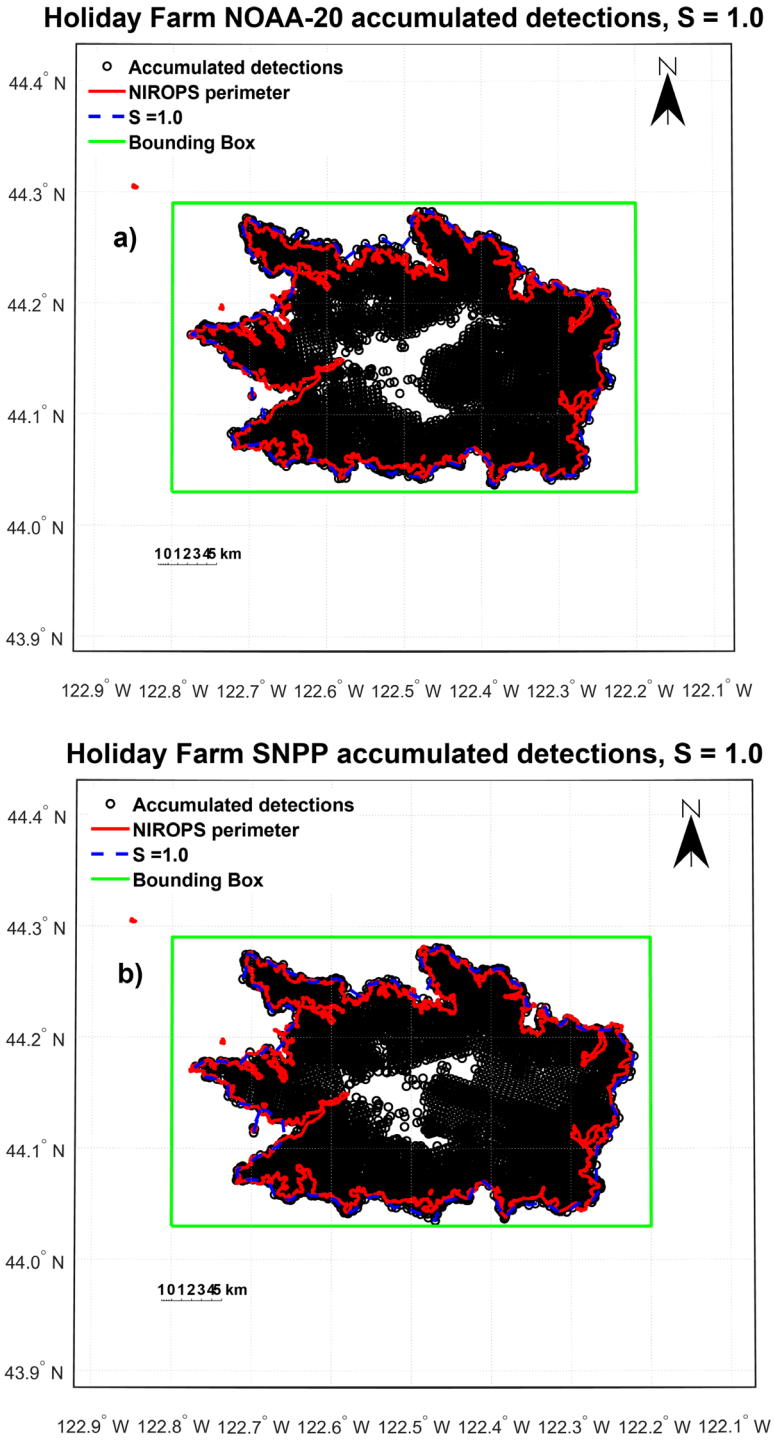


Figure S35: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Holiday Farm Fire (a/b). The secondary bounding box is shown in green.

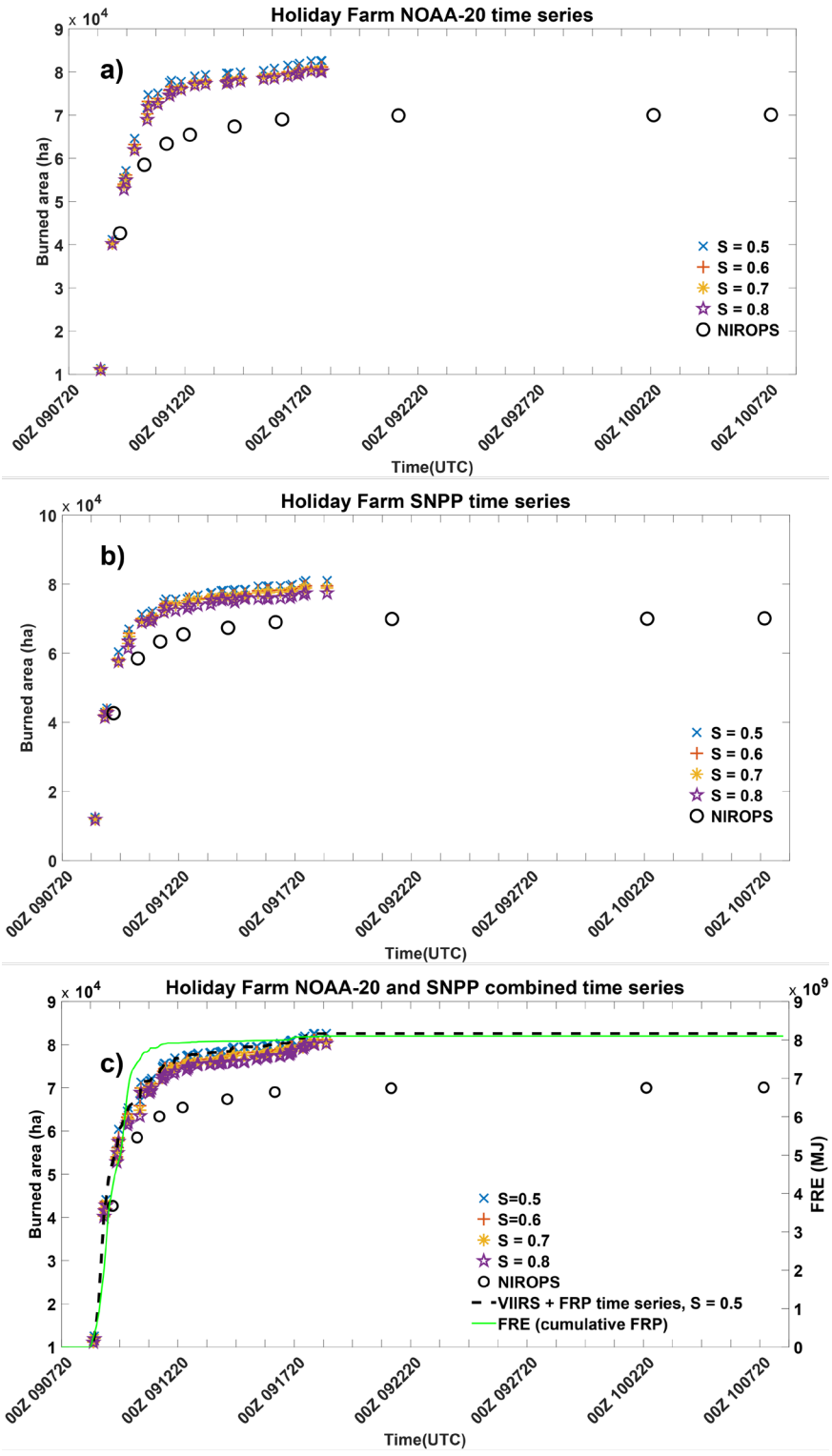


Figure S36: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Holiday Farm Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink

factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

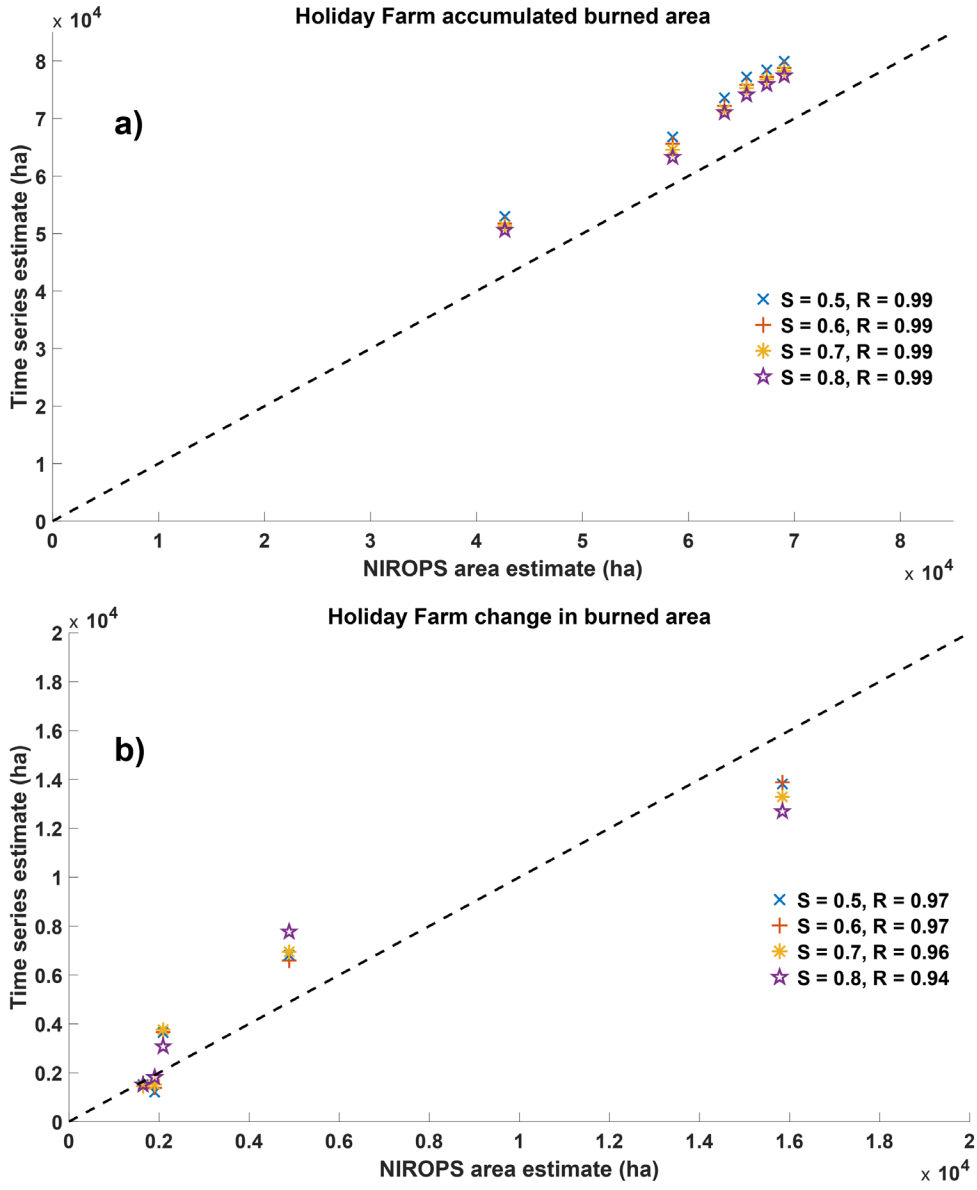


Figure S37: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Holiday Farm (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Table S26: Holiday Farm Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	20441.1	17614.7	14623.2	12121.4	10415.6	9148.9	8534.0	7656.8	7048.1	6499.4
Normalized Mean Bias (%)	33.5	28.8	23.9	19.8	17.1	15.0	14.0	12.5	11.5	10.6
Normalized Mean Error (%)	33.5	28.8	23.9	19.8	17.1	15.0	14.0	12.5	11.5	10.6
RMSE (ha)	20547.9	17683.6	14634.2	12180.9	10472.2	9209.7	8622.6	7772.3	7176.5	6640.7
Mean Absolute Error (ha)	20441.1	17614.7	14623.2	12121.4	10415.6	9148.9	8534.0	7656.8	7048.1	6499.4

Table S27: Holiday Farm Fire change in burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	1128.2	771.9	259.2	391.6	124.9	143.2	120.5	97.2	44.3	-29.3
Normalized Mean Bias (%)	21.4	14.6	4.9	7.4	2.4	2.7	2.3	1.8	0.8	-0.6
Normalized Mean Error (%)	23.7	22.1	9.0	17.3	24.0	22.1	26.0	27.5	31.3	31.6
RMSE (ha)	1678.4	1321.6	557.6	1089.7	1463.4	1376.7	1658.2	1959.6	2070.0	2182.4
Mean Absolute Error (ha)	1251.0	1163.0	473.7	913.9	1265.4	1164.3	1372.6	1448.2	1650.1	1666.5

Lake:

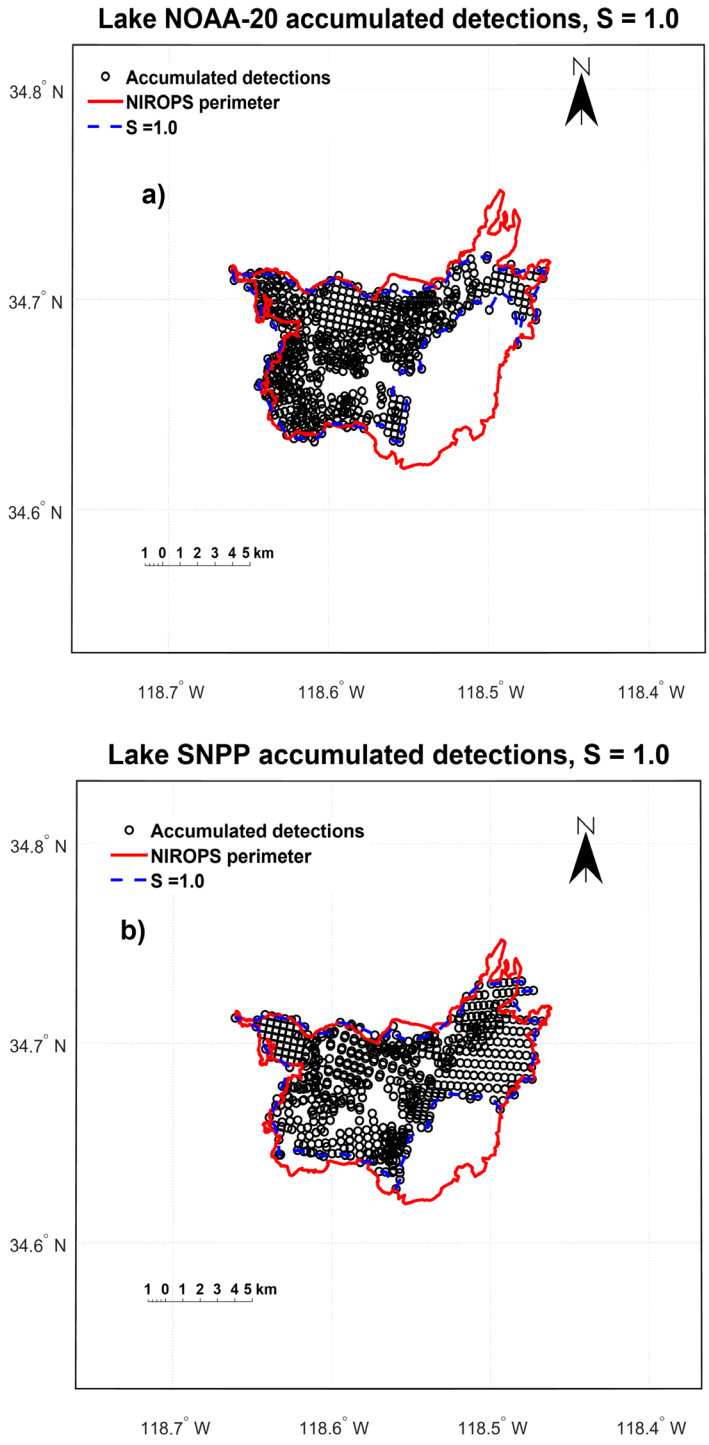


Figure S38: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Lake Fire (a/b).

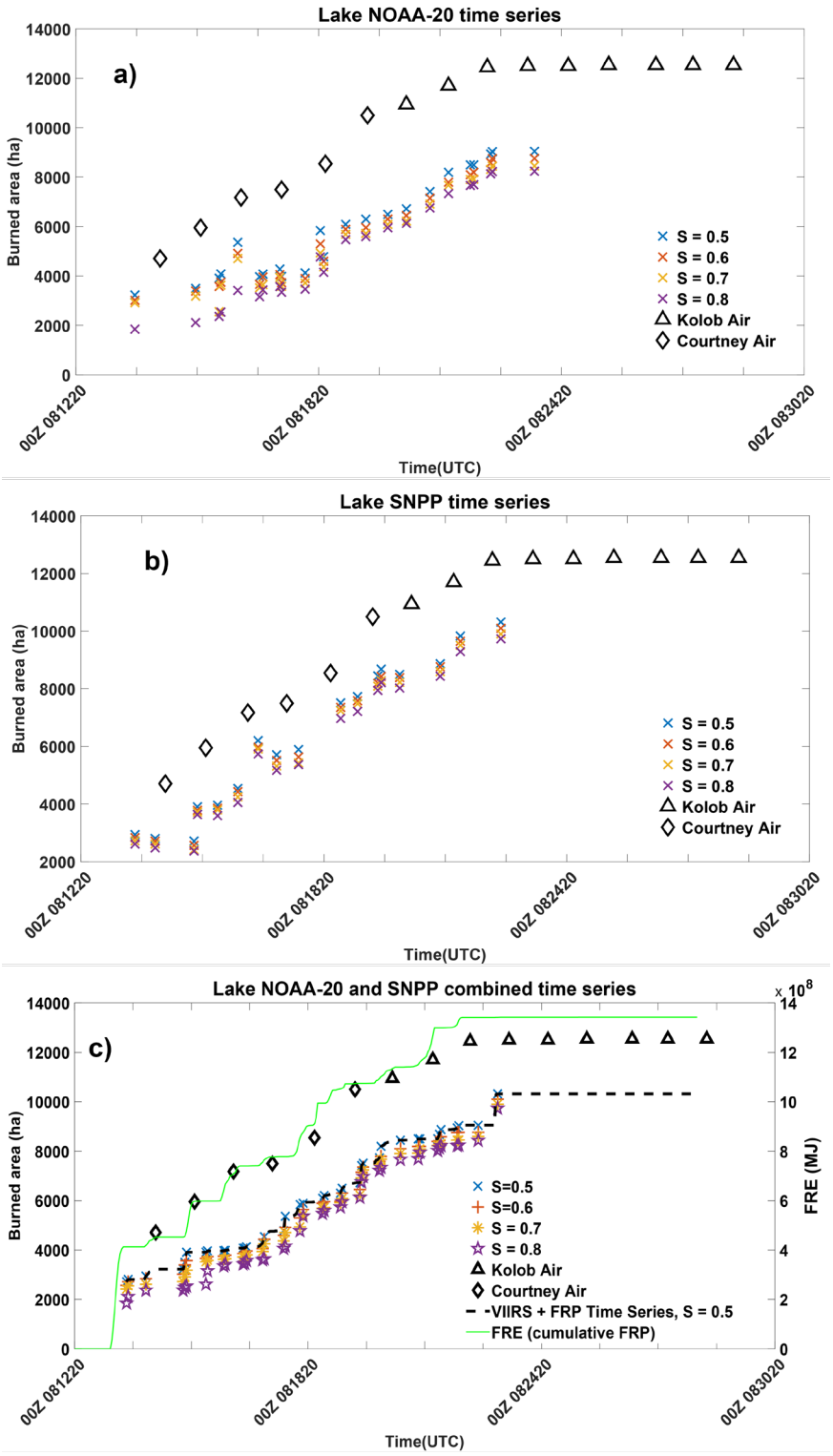
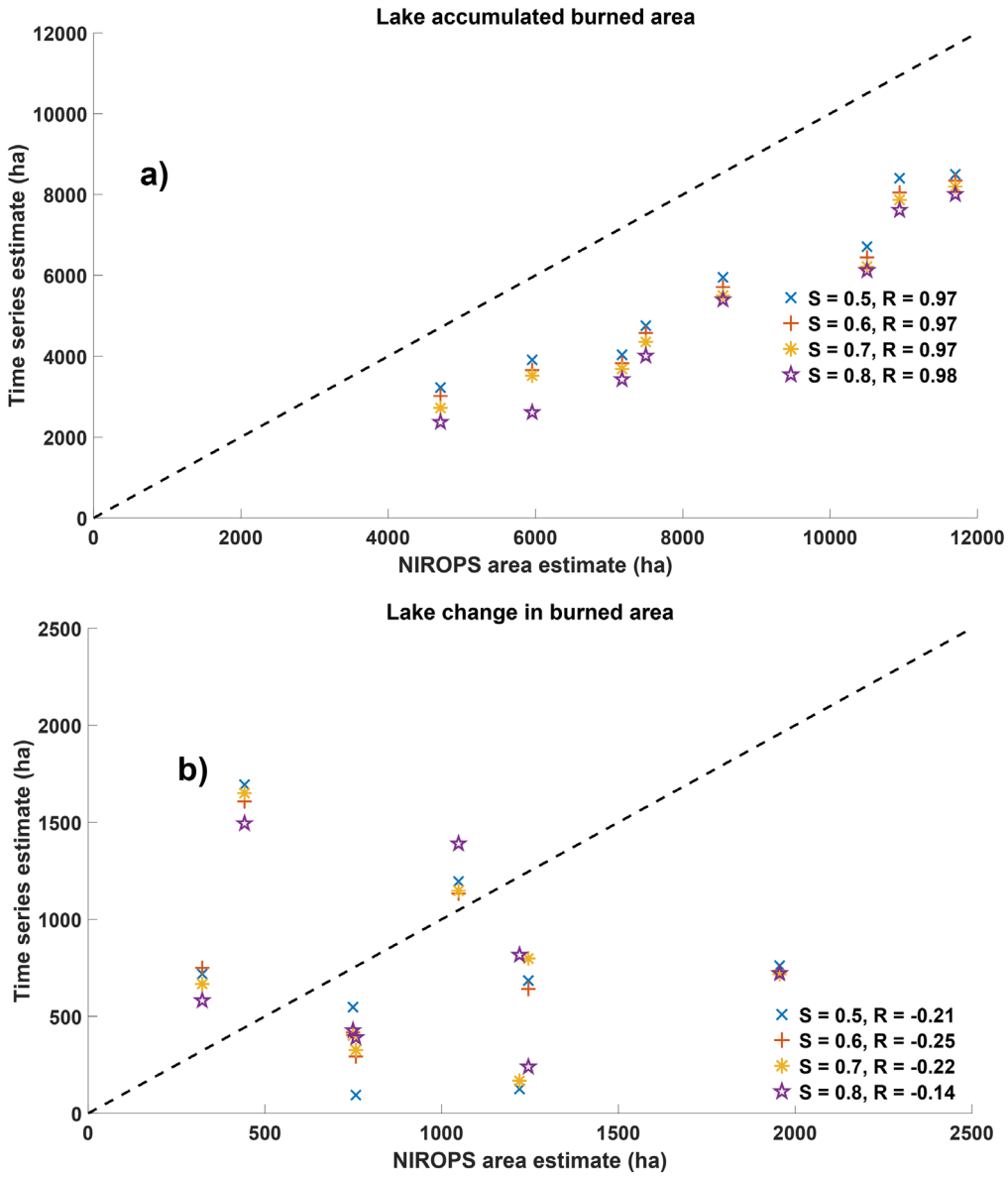


Figure S39: NOAA-20 and SNPP accumulated burned area estimates time s eries (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Lake Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors.

black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S40: Correlation scatter plots between aggregated burned area (top) and the change in



burned area between NIROPS flights (bottom) for the Lake (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Table S28: Lake Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	-735.8	-1362.8	-1981.8	-2455.5	-2771.1	-3009.9	-3202.5	-3498.0	-3642.1	-3754.1
Normalized Mean Bias (%)	-8.3	-15.4	-22.4	-27.8	-31.4	-34.1	-36.3	-39.6	-41.2	-42.5
Normalized Mean Error (%)	8.3	15.4	22.4	27.8	31.4	34.1	36.3	39.6	41.2	42.5
RMSE (ha)	825.9	1420.0	2033.5	2537.9	2850.7	3084.6	3269.0	3540.2	3681.6	3793.8
Mean Absolute Error (ha)	735.8	1362.8	1981.8	2455.5	2771.1	3009.9	3202.5	3498.0	3642.1	3754.1

Table S29: Lake Fire change in burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	66.0	0.0	-86.7	-196.4	-240.0	-249.6	-233.2	-209.7	-209.1	-210.2
Normalized Mean Bias (%)	6.8	0.0	-9.0	-20.3	-24.8	-25.8	-24.1	-21.7	-21.6	-21.7
Normalized Mean Error (%)	40.9	48.3	61.2	71.8	71.2	69.2	66.8	64.4	57.0	57.7
RMSE (ha)	447.8	530.5	640.1	848.0	803.4	777.9	769.6	726.7	654.7	650.5
Mean Absolute	395.5	467.7	592.1	694.9	688.6	669.2	646.2	623.0	551.2	558.6

Riverside:

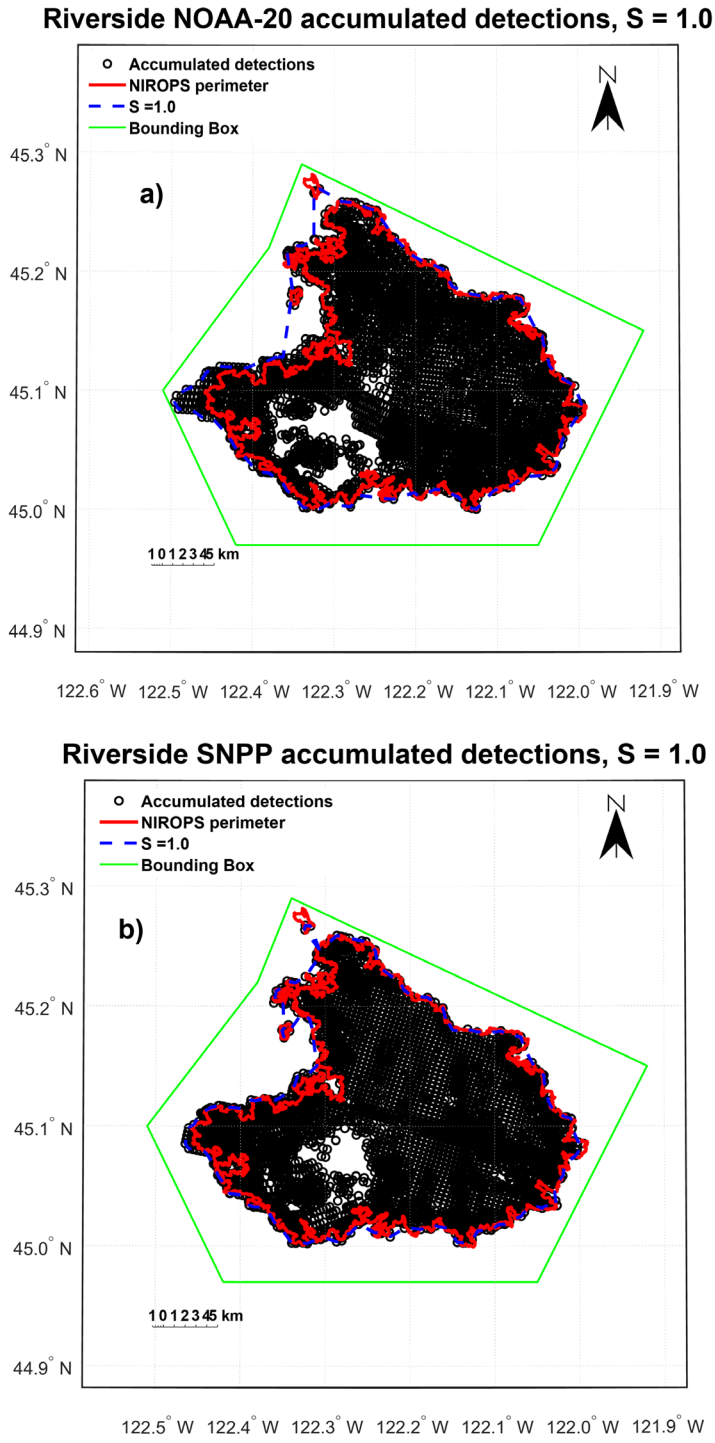


Figure S41: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Riverside Fire (a/b). The secondary bounding box is shown in green.

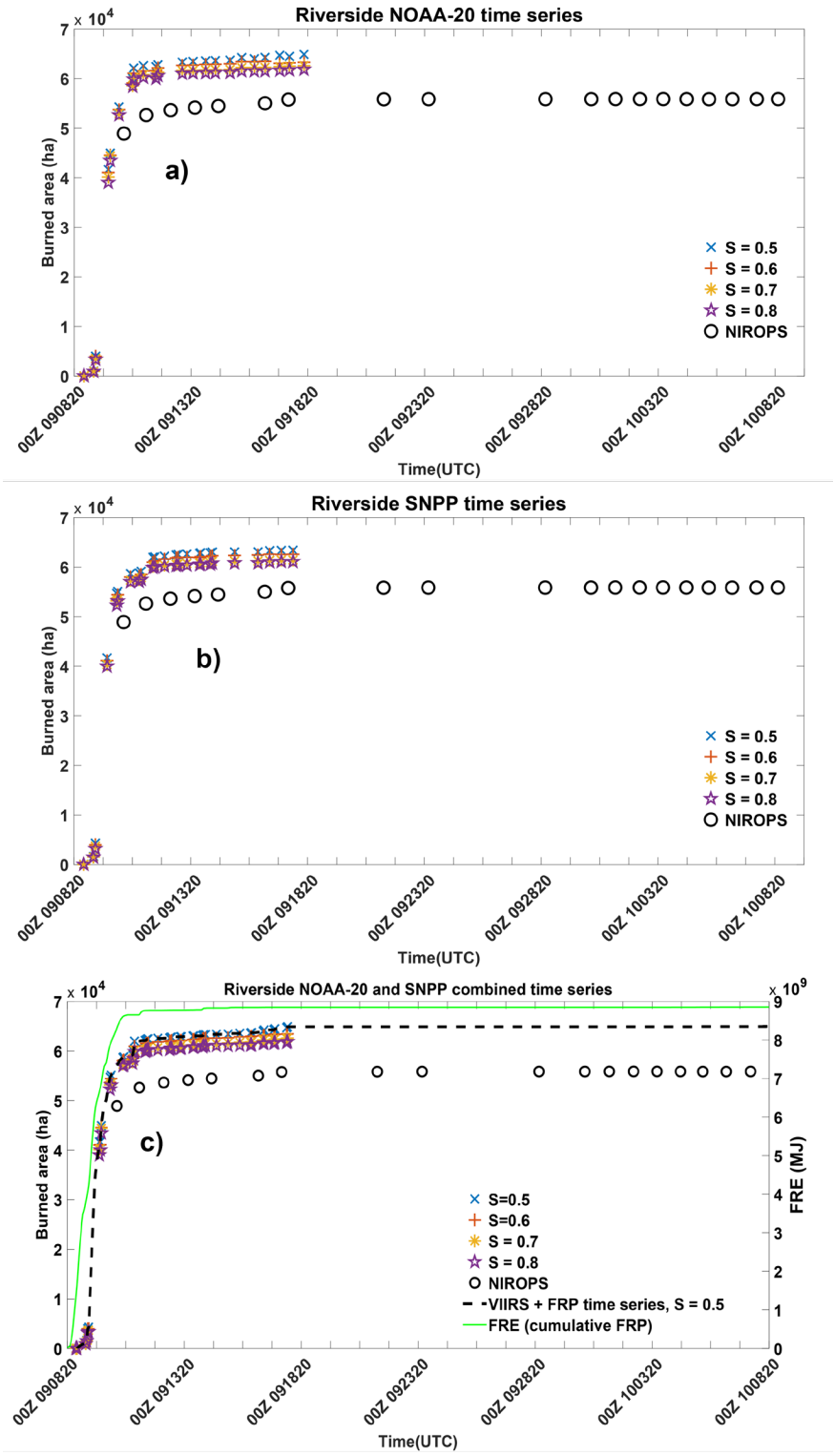


Figure S42: NOAA-20 and SNPP accumulated burned area estimates time s eries (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Riverside Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors,

black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

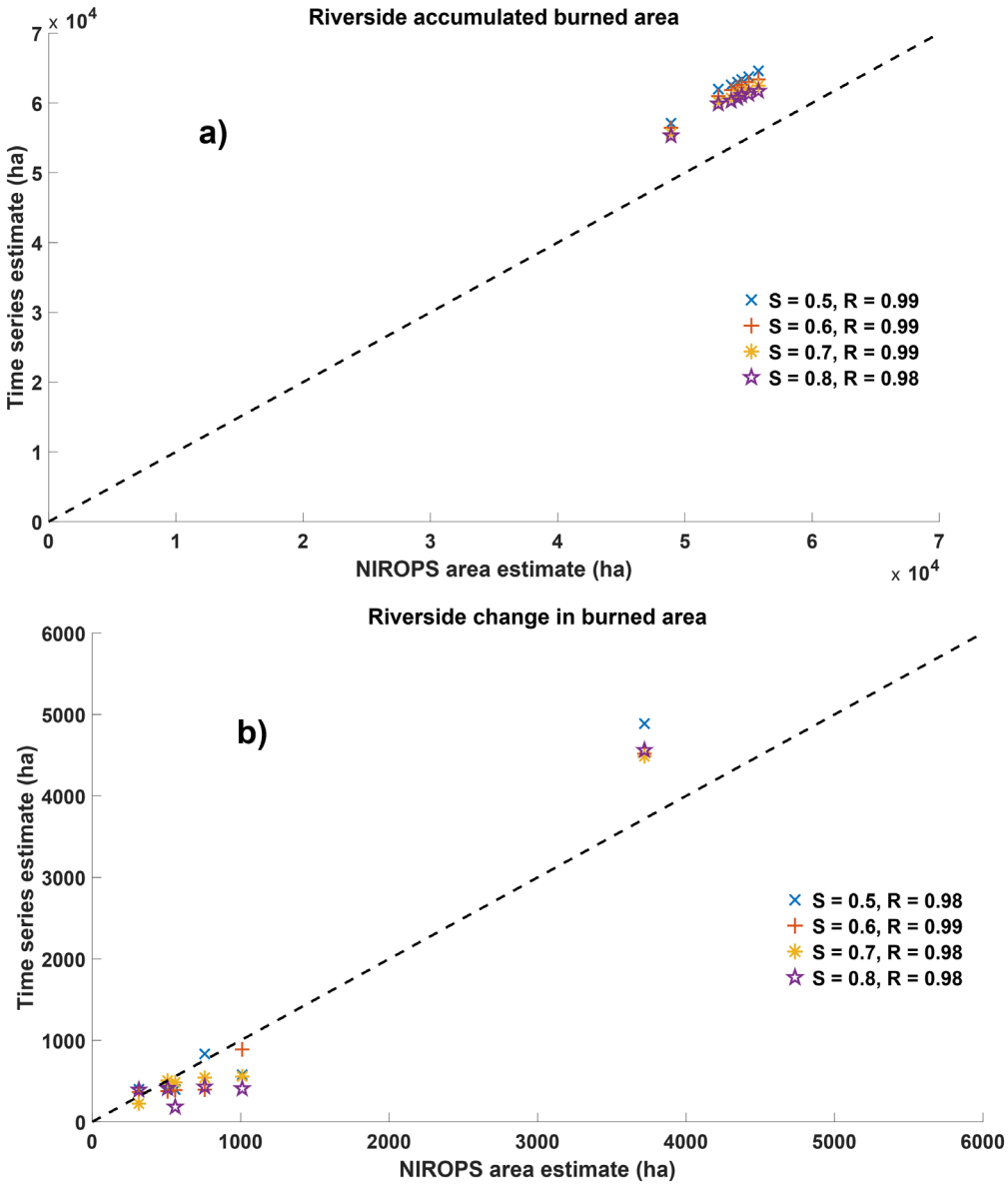


Figure S43: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Riverside (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Table S30: Riverside Fire accumulated burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias	15959.2	14231.4	11829.5	10193.4	8825.9	7992.4	6993.2	6529.4	6098.5	5821.0
Normalized Mean Bias	29.8	26.6	22.1	19.0	16.5	14.9	13.1	12.2	11.4	10.9
Normalized Mean Error	29.8	26.6	22.1	19.0	16.5	14.9	13.1	12.2	11.4	10.9
RMSE	15981.7	14260.7	11861.2	10207.0	8831.7	7997.3	6997.8	6540.3	6101.7	5825.2
Mean Absolute Error	15959.2	14231.4	11829.5	10193.4	8825.9	7992.4	6993.2	6529.4	6098.5	5821.0

Table S31: Riverside Fire change in burned area statistics for all shrink factors

	S=0.1	S=0.2	S=0.3	S=0.4	S=0.5	S=0.6	S=0.7	S=0.8	S=0.9	S=1.0
Mean Bias (ha)	412.2	430.0	332.1	158.9	104.4	12.1	-10.7	-79.7	-40.3	-41.7
Normalized Mean Bias (%)	36.0	37.6	29.0	13.9	9.1	1.1	-0.9	-7.0	-3.5	-3.6
Normalized Mean Error (%)	49.9	50.0	52.0	37.7	29.7	23.7	23.3	33.8	18.9	27.7
RMSE (ha)	973.7	1138.1	1027.5	667.5	517.1	372.0	377.0	471.6	278.7	335.6
Mean Absolute Error (ha)	571.0	572.2	595.7	431.2	339.5	271.6	266.4	386.7	216.7	316.7

Figure Captions:

Figure S1: Integrated FRP and burned area estimate time series from VIIRS and ABI compared to a linearly interpolated time series between VIIRS detections. The blue x's are the S = 0.5 shrink factor burned area estimates for VIIRS, the black circles are the NIROPS area estimates, the blue line is the combination VIIRS and ABI time series estimates, the red line is the burned area estimates when linearly interpolating between VIIRS area estimates and the green line is the FRE.

Figure S2: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the 204 Cow Fire (a/b).

Figure S3: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the 204 Cow Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S4: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the 204 Cow (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S5: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Granite Gulch Fire (a/b).

Figure S6: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Granite Gulch Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S7: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Granite Gulch (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S8: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Pedro Mountain Fire (a/b).

Figure 97: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) and correlation scatter plots between accumulated burned area (d) and change in burned area (e) for the Pedro Mountain Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S10: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Pedro Mountain (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S11: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Shady Fire (a/b).

Figure S12: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Shady Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S13: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for Shady (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S14: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Walker Fire (a/b).

Figure S15: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Walker Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S16: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Walker (a/b) Fire. S = 0.5 to S = 0.8 shrink

factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S17: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Williams Flats Fire (a/b).

Figure S18: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Williams Flats Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S19: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Williams Flats (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S20: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Bobcat Fire (a/b).

Figure S21: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Bobcat Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S22: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Bobcat (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S23: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Cameron Peak Fire (a/b). The secondary bounding box is shown in green.

Figure S24: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Cameron Peak Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure 25: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Cameron Peak (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S26: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Creek Fire (a/b). The secondary bounding box is shown in green.

Figure S27: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Creek Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors,

black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S28: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Creek (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S29: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Dolan Fire (a/b).

Figure S30: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Dolan Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S31: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Dolan (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S32: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the East Troublesome Fire (a/b).

Figure S33: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the East Troublesome Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S34: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the East Troublesome (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S35: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Holiday Farm Fire (a/b). The secondary bounding box is shown in green.

Figure S36: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Holiday Farm Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure 37: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Holiday Farm (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S38: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Lake Fire (a/b).

Figure 397: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Lake Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S40: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Lake (a/b) Fire. S = 0.5 to S = 0.8 shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

Figure S41: Accumulated active fire detections (black circles) compared to final NIROPS heat perimeters (red solid line) and most compact, S = 1.0, shrink factor (blue dashed line) for the Riverside Fire (a/b). The secondary bounding box is shown in green.

Figure S42: NOAA-20 and SNPP accumulated burned area estimates time series (a/b), integrated FRP and burned area estimate time series from VIIRS and ABI (c) for the Riverside Fire. The rainbow-colored symbols represent the S = 0.5 to S = 0.8 combined time series shrink factors, black circles are NIROPS data, black dashed line is the interpolated burned area estimate for the S = 0.5 shrink factor, the aggregated FRP is the solid green line.

Figure S43: Correlation scatter plots between aggregated burned area (top) and the change in burned area between NIROPS flights (bottom) for the Riverside (a/b) Fire. S = 0.5 to S = 0.8

shrink factors are compared in both plots to the NIROPS area estimates and the change in burned area between NIROPS estimates, respectively.

References:

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