Supplementary Materials

Table S1. Acquired Sentinel 2 L1C level images from *Earth Explorer* summary.

Wildfire	Type	Product ID	Cloud cover (%)
Site 1	Pre	L1C_T13QEG_A010377_20190302T174157	0.00
	Post	L1C_T13QEG_A011807_20190610T174426	23.40
Site 2	Pre	L1C_T13QDG_A010377_20190302T174157	0.00
	Post	L1C_T13QDG_A020930_20190625T173920	5.60
Site 3	Pre	L1C_T13RDJ_A010377_20190302T174157	0.00
	Post	L1C_T13RDJ_A011378_20190511T174054	0.6

Table S2. Sentinel-L2A imagery period window for GEE composites indices calculation.

Wildfire	Composite length (months)	Pre-fire	Post-fire
Site 1	1	2019/03/20–2019/04/20	2019/06/01–2019/07/01
	3	2019/01/20–2019/04/20	2019/06/01–2019/09/01
Site 2	1	2019/04/13–2019/05/13	2019/06/29–2019/07/29
	3	2019/02/13–2019/05/13	2019/06/29–2019/09/29
Site 3	1	2019/03/10–2019/04/10	2019/05/10–2019/06/10
	3	2019/01/10–2019/04/10	2019/05/10–2019/08/10

Table S3. Coefficient of Determination (R^2) and RMSE (θ) of univariate linear models between spectral indices (Table 3) (paired single day images) and field-based severity variables in the three wildfires of Durango, Mexico.

Paired Spectral Indices	Field-based severity indices and fire severity per strata																	
	FSI		FSI$_2$		wFSI		wFSI$_2$		OCS		CCS		SCS		UCS		SSI	
	R^2	θ	R^2	θ	R^2	θ	R^2	θ	R^2	θ	R^2	θ	R^2	θ	R^2	θ	R^2	θ
dNBR1c	0.756	62	0.758	61	0.721	66	0.739	64	0.685	71	0.674	72	0.676	72	0.639	75	0.645	74
dNBR2c	0.695	97	0.696	97	0.683	99	0.680	99	0.661	104	0.636	107	0.663	104	0.561	116	0.598	111
dNBR3c	0.766	138	0.767	138	0.742	145	0.749	143	0.715	155	0.691	161	0.713	156	0.631	173	0.651	169
dNBR4nc	0.721	94	0.722	94	0.705	97	0.704	97	0.689	101	0.662	105	0.691	101	0.574	116	0.616	110
dNBR5nc	0.782	134	0.784	134	0.754	142	0.763	140	0.733	151	0.710	157	0.732	152	0.638	173	0.660	167
RBR1c	0.784	46	0.787	46	0.739	51	0.763	48	0.715	53	0.705	54	0.703	55	0.661	58	0.657	58
RBR2c	0.764	85	0.765	85	0.723	93	0.736	90	0.730	93	0.709	96	0.723	94	0.616	109	0.625	108
RBR3c	0.841	92	0.841	92	0.780	108	0.809	101	0.789	107	0.771	112	0.778	110	0.691	128	0.678	131
RBR4nc	0.786	77	0.787	77	0.741	85	0.756	83	0.753	84	0.729	88	0.748	85	0.624	103	0.645	100
RBR5nc	0.850	86	**0.851**	86	0.786	103	0.816	95	0.800	100	0.782	105	0.791	103	0.691	124	0.685	125
dBAIS21c	0.762	41	0.766	41	0.745	43	0.748	42	0.727	45	0.710	46	0.725	45	0.596	54	0.655	50
dBAIS22c	0.820	57	0.824	56	0.777	63	0.799	60	0.775	64	0.772	65	0.764	66	0.657	78	0.671	77
dBAIS23nc	0.793	38	0.796	37	0.777	39	0.777	39	0.759	41	0.742	43	0.757	42	0.614	51	0.673	47
dBAIS24nc	0.829	55	0.834	54	0.780	62	0.805	58	0.793	61	0.790	61	0.780	63	0.659	77	0.667	76
dCIrec	0.493	367	0.492	367	0.498	365	0.494	366	0.452	388	0.417	400	0.467	387	0.406	397	0.462	378
dND1rec	0.538	89	0.541	89	0.554	88	0.549	88	0.503	94	0.479	96	0.514	93	0.425	100	0.492	94
dND2rec	0.451	94	0.456	94	0.477	92	0.468	92	0.419	98	0.402	99	0.439	97	0.359	101	0.439	95
dNDVI1rec	0.592	73	0.593	73	0.598	72	0.595	72	0.558	77	0.520	80	0.574	76	0.480	82	0.525	78
dNDVI2rec	0.608	76	0.609	76	0.602	76	0.606	76	0.577	80	0.543	83	0.595	79	0.492	86	0.536	82
dNDVI3c	0.642	100	0.644	100	0.647	100	0.639	101	0.604	107	0.572	111	0.618	106	0.529	115	0.558	111
dNDVI4rec	0.569	73	0.571	72	0.564	73	0.571	72	0.526	77	0.492	80	0.548	76	0.480	80	0.515	77
dNDVI5rec	0.235	18	0.235	18	0.237	18	0.221	18	0.280	18	0.276	18	0.265	18	0.121	20	0.171	19
dNDVI6nc	0.646	94	0.648	94	0.651	94	0.642	95	0.612	100	0.578	104	0.627	99	0.528	109	0.560	105
dNDVI7renc	0.572	68	0.574	68	0.570	68	0.575	68	0.536	72	0.499	75	0.559	71	0.476	75	0.521	72
dNDVI8renc	0.358	16	0.36	16	0.340	16	0.338	16	0.386	16	0.392	16	0.369	16	0.236	18	0.253	17
dMSR1rec	0.519	166	0.520	166	0.517	166	0.522	165	0.472	176	0.438	182	0.492	175	0.444	178	0.480	172
dMSR2rec	0.242	26	0.242	26	0.244	26	0.226	27	0.286	26	0.281	26	0.270	26	0.125	28	0.178	28
dMSR3renc	0.522	168	0.523	168	0.526	167	0.526	168	0.481	178	0.443	185	0.502	177	0.437	183	0.489	174
dMSR4renc	0.361	25	0.363	25	0.343	26	0.340	26	0.388	25	0.395	25	0.370	25	0.238	28	0.254	27

R^2 = Coefficient of determination, θ = Root mean square error, **Suffixes:** *n = NIR narrow B8a, re = red-edge bands from S2 (B5,B6,B7) c = phenological correction [73,* **Field-based severity indices:** *FSI= Fire Severity Index, FSI$_2$= Fire Severity Index 2, wFSI = weighted Fire Severity Index, wFSI$_2$ = weighted Fire Severity Index 2, OCS = Overstory Crown Scorch volume, CCS = Canopy Crown Scorch volume, SCS = Subcanopy Crown Scorch volume, UCS = Understory Crown Scorch volume and SSI = Soil burn Severity Index. The model with highest correspondence is marked in bold.*

Table S4. *GEE Composites Index* fire severity thresholds obtained using equations from table for FSI$_2$ (%) levels where: Very Low/unburned (< 10), Low (10-30), Moderate (30-60), High (60-90) and Extreme (>90).

GEE Composite	Very Low	Low	Moderate	High	Extreme
RBRrc_AA1	<44	44–152	152–315	315–478	>478
RBRrc_AM1	<41	41–157	157–331	331–506	>506
RBRrc_MM1	<38	38–156	156–332	332–508	>508
RBRrc_AA3	<38	38–127	127–259	259–392	>392
RBRrc_AM3	<27	27–122	122–263	263–405	>405
RBRrc_MM3	<29	29–131	131–283	283–436	>436
RBRc_AA1	<68	68–168	168–318	318–468	>468
RBRc_AM1	<61	61–170	170–334	334–497	>497
RBRc_MM1	<62	62–172	172–337	337–502	>502
RBRc_AA3	<79	79–164	164–291	291–419	>419
RBRc_AM3	<69	69–165	165–308	308–451	>451
RBRc_MM3	<64	64–162	162–310	310–457	>457
dNBRrc_AA1	<50	50–180	180–375	375–570	>570
dNBRrc_AM1	<45	45–184	184–393	393–602	>602
dNBRrc_MM1	<41	41–179	179–388	388–596	>596
dNBRrc_AA3	<45	45–155	155–321	321–487	>487
dNBRrc_AM3	<32	32–148	148–322	322–496	>496
dNBRrc_MM3	<33	33–148	148–321	321–493	>493
dNBRc_AA1	<84	84–203	203–380	380–557	>557
dNBRc_AM1	<73	73–203	203–397	397–592	>592
dNBRc_MM1	<73	73–202	202–395	395–589	>589
dNBRc_AA3	<104	104–209	209–366	366–523	>523
dNBRc_AM3	<97	97–213	213–387	387–561	>561
dNBRc_MM3	<83	83–192	192–357	357–522	>522

GEE Composite = Google Earth Engine Composite Index, produced with S2-L2A level imagery, **Suffix:** *c* = constant phenological correction, *rc* = relative phenological correction, **Composite technique:** *AA = Average in pre and post fire composites, AM = Average (pre) and Minimum (post), MM = Minimum (pre and post)* and **Time window:** 1 and 3 months.
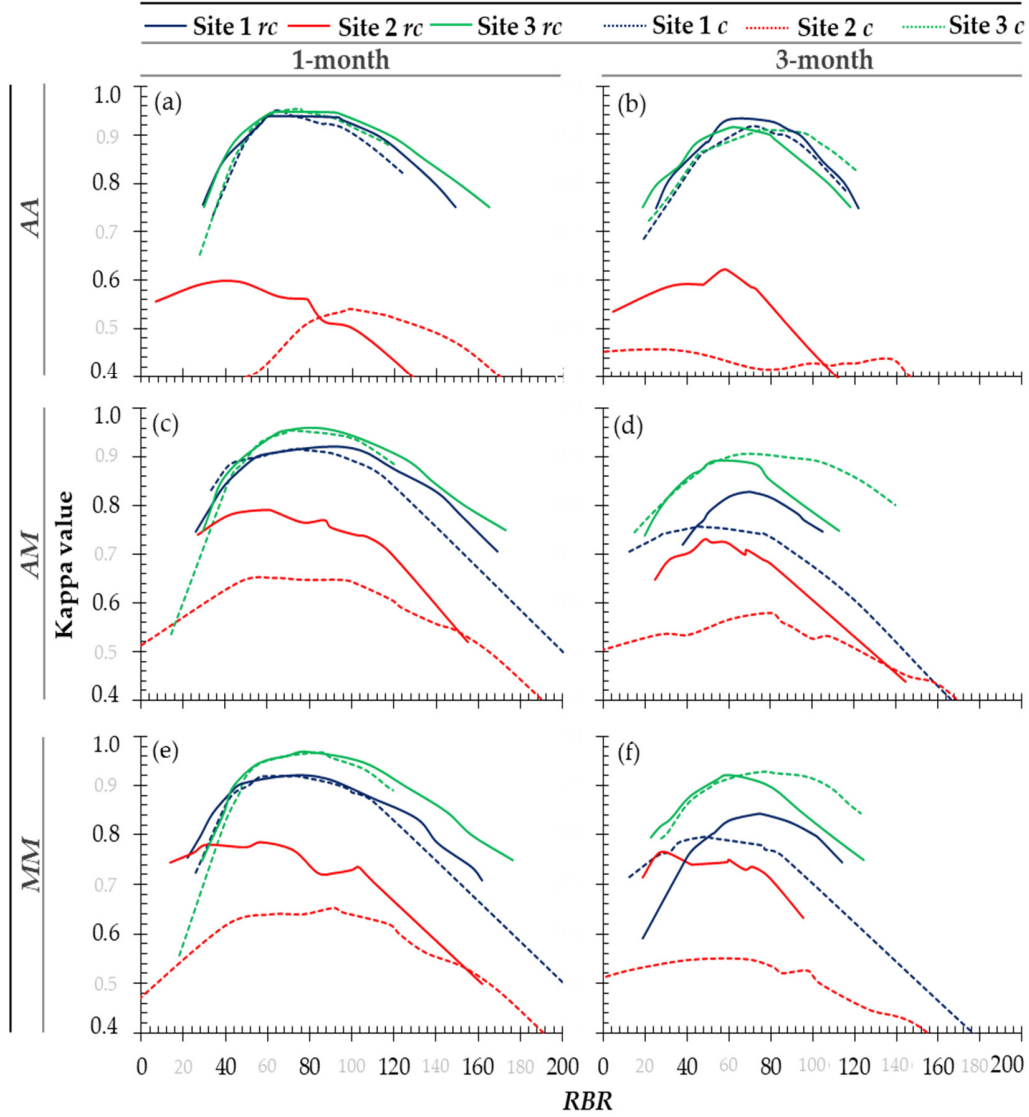
Figure S1. Kappa value across *RBR* values tested as candidate burned area thresholds for each wildfire (sites 1,2,3). Where: **Phenological correction:** *c = constant offset phenological correction* [73], *rc = relative phenological correction* (proposed in this study), **Composite technique:** *AA = Average in pre and post fire composites* (Figs. 7 a-b), *AM = Average (pre) and Minimum (post)* (Figs. 7 c-d), *MM = Minimum (pre and post)* (Figs. 7 e-f) and **Time-window:** *1 month (left column) and 3 months (right column).*