



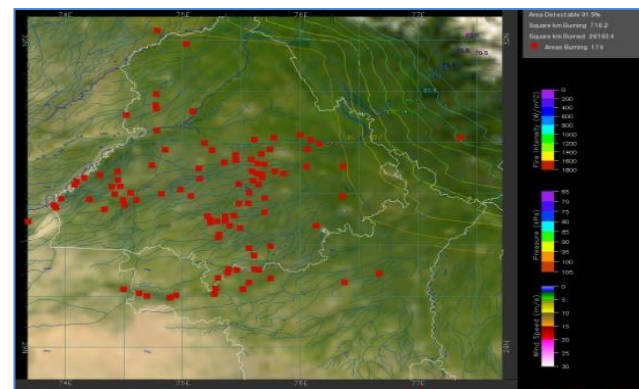
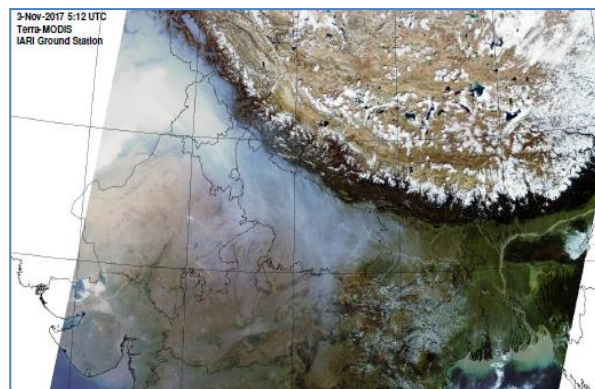
**Bulletin
No. 60**

**Events Date:
29-Nov-2019**

**Issued on:
30-Nov-2019**



MONITORING PADDY RESIDUE BURNING IN NORTH INDIA USING SATELLITE REMOTE SENSING DURING 2019



Prepared by:

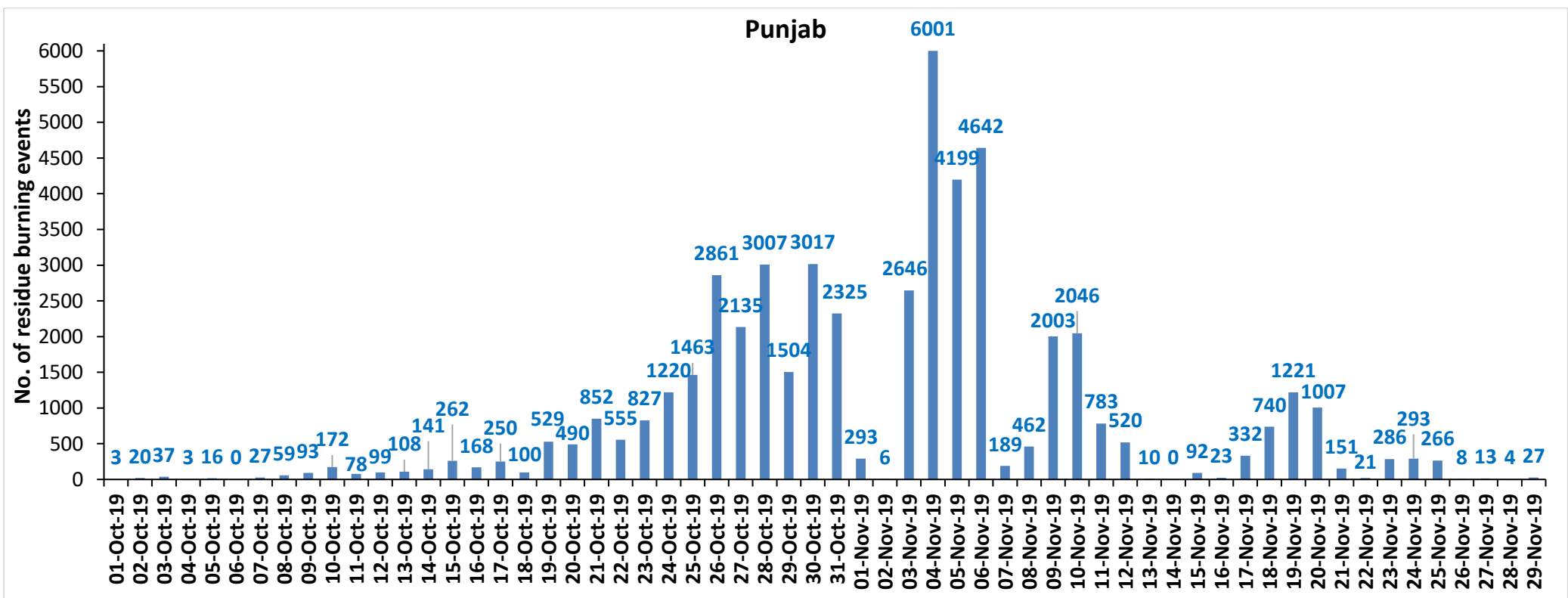
**Consortium for Research on Agroecosystem Monitoring and Modeling from Space (CREAMS) Laboratory,
Division of Agricultural Physics, ICAR – Indian Agricultural Research Institute, New Delhi – 110012**

<http://creams.iari.res.in>

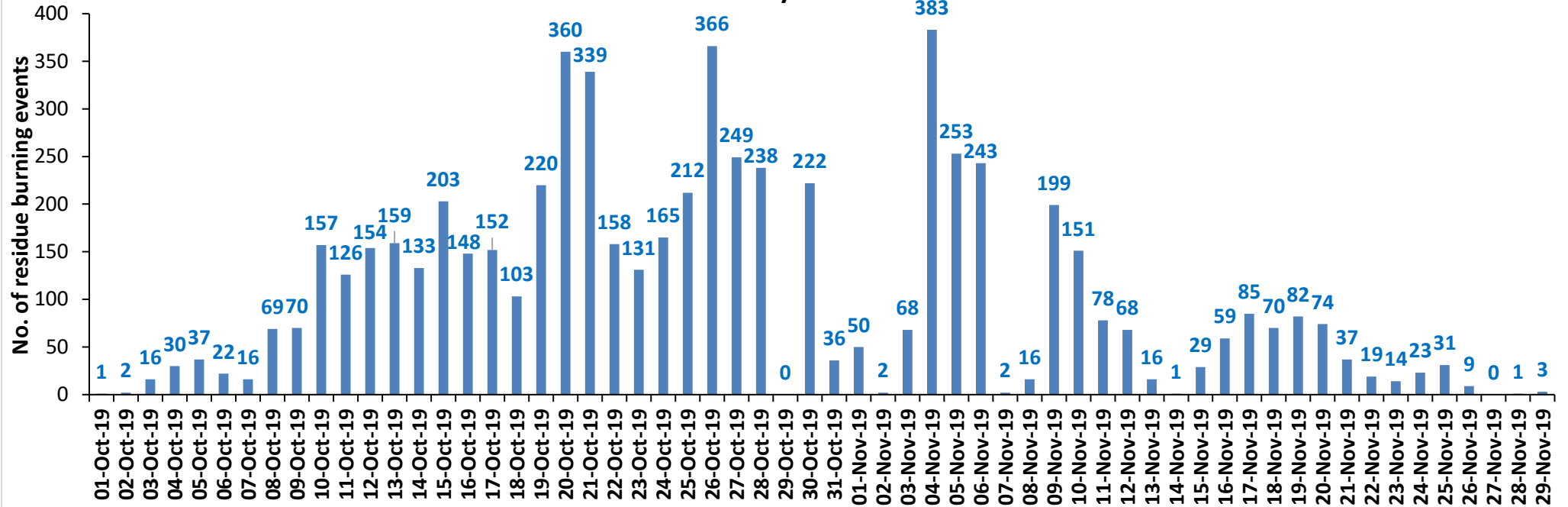
Highlights for 29-November-2019

- Satellites detected **67** residue burning events in the three study States on **29-Nov-2019**.
- The burning events detected on **29-Nov-2019** are **27, 03** and **37** in Punjab, Haryana and UP, respectively.
- The number of events has decreased from **155** on **28-Nov-2019** to **67** on **29-Nov-2019** in the three states.
- Total **61261** burning events were detected in the three States between **01-Oct-2019** and **29-Nov-2019**, which are distributed as **50705, 6360** and **4196** in Punjab, Haryana and UP, respectively.
- Overall, the total burning events recorded in the three states are **18.7%** less than in 2018 till date. UP recorded **35.5%** reduction, Haryana recorded **30.8%** reduction, and Punjab recorded **15.0%** reduction, respectively, in the current season than in 2018.

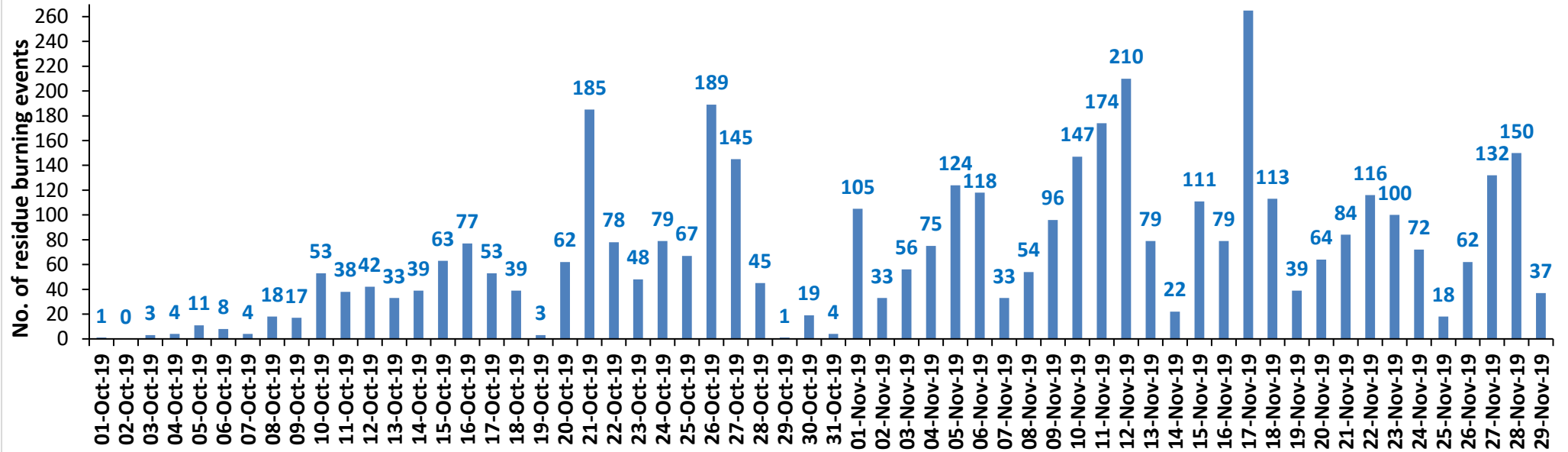
Temporal distribution of residue burning events for the three study States in 2019



Haryana



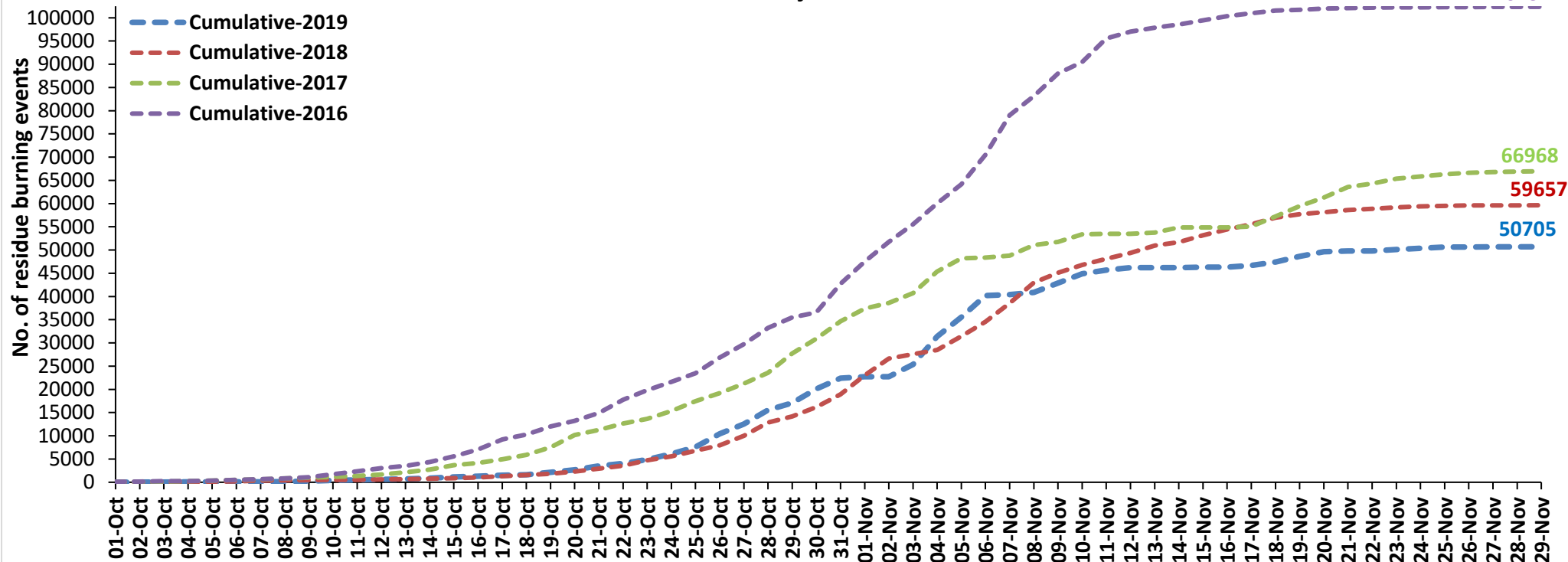
UP



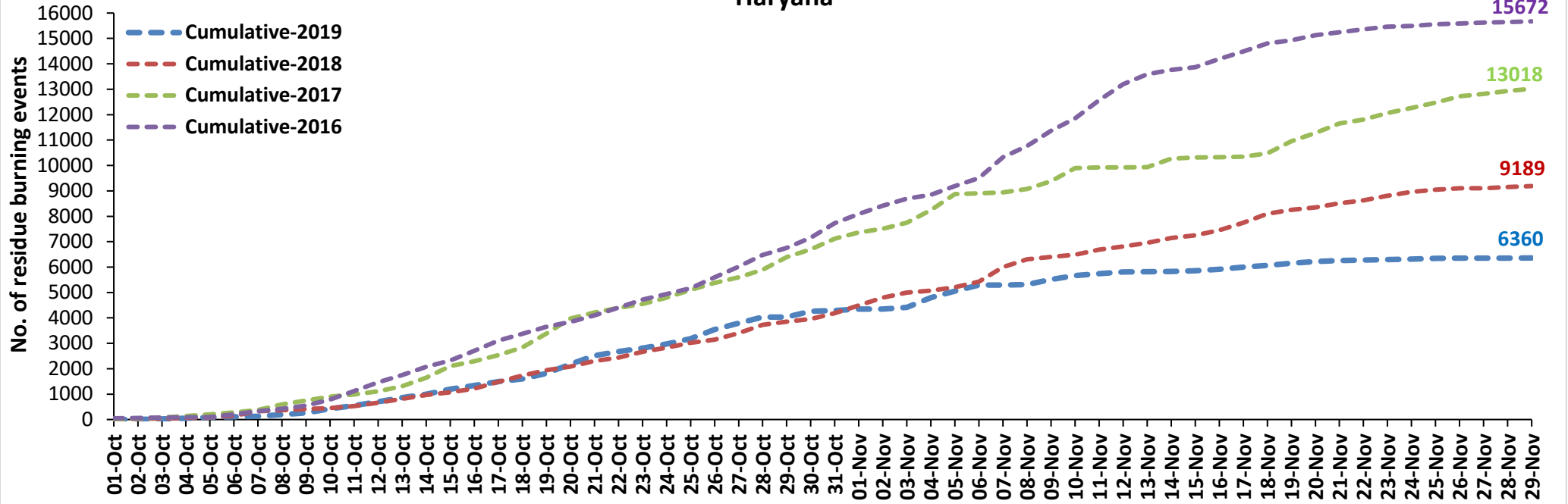
Comparison of residue burning events in current year (2019) with previous years (2018, 2017 & 2016) for the three study States

(01-Oct to 29-Nov)

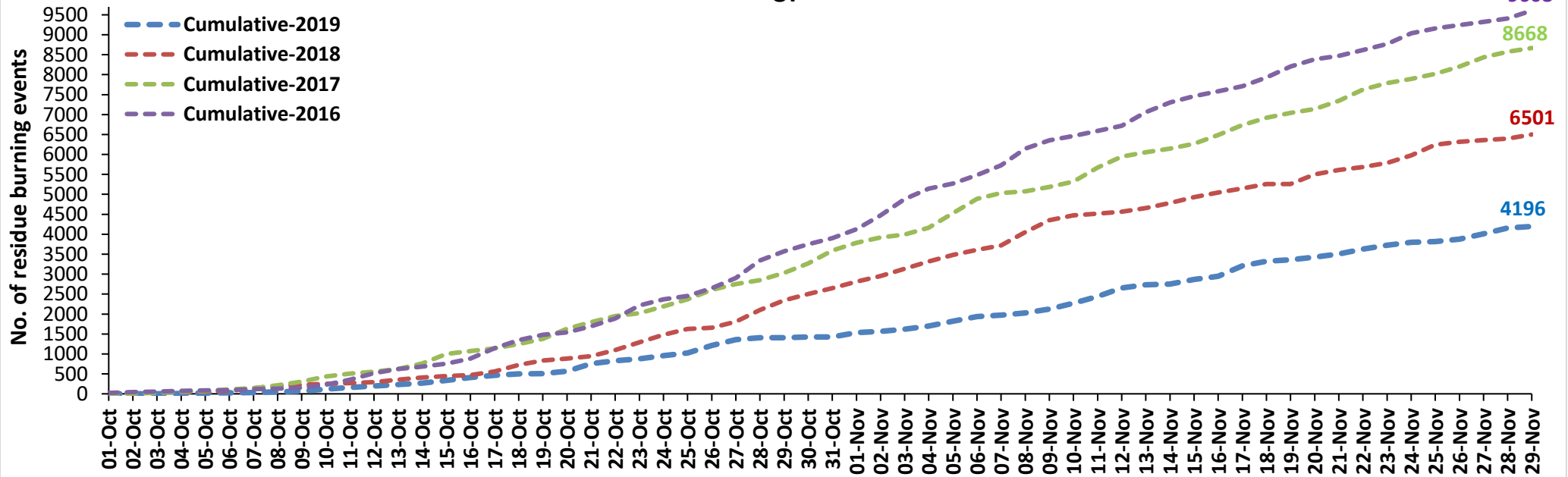
Punjab



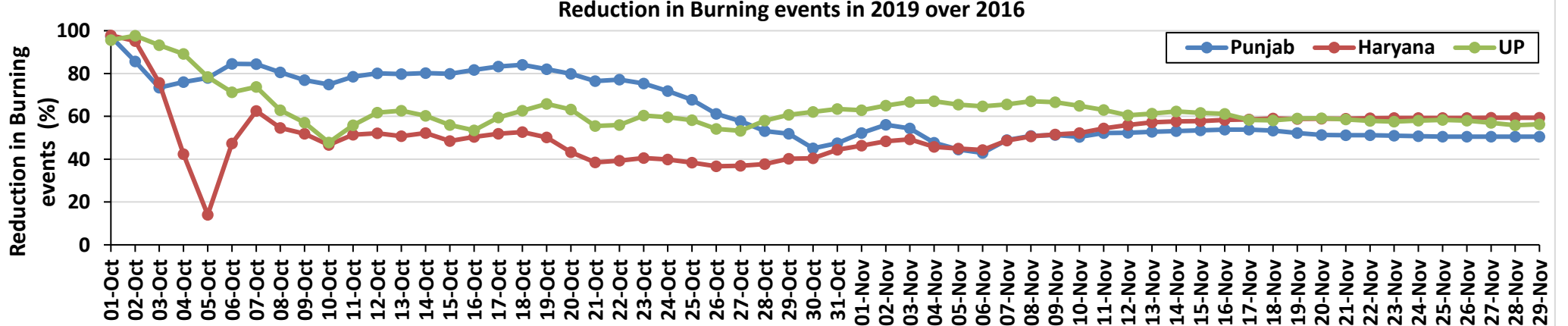
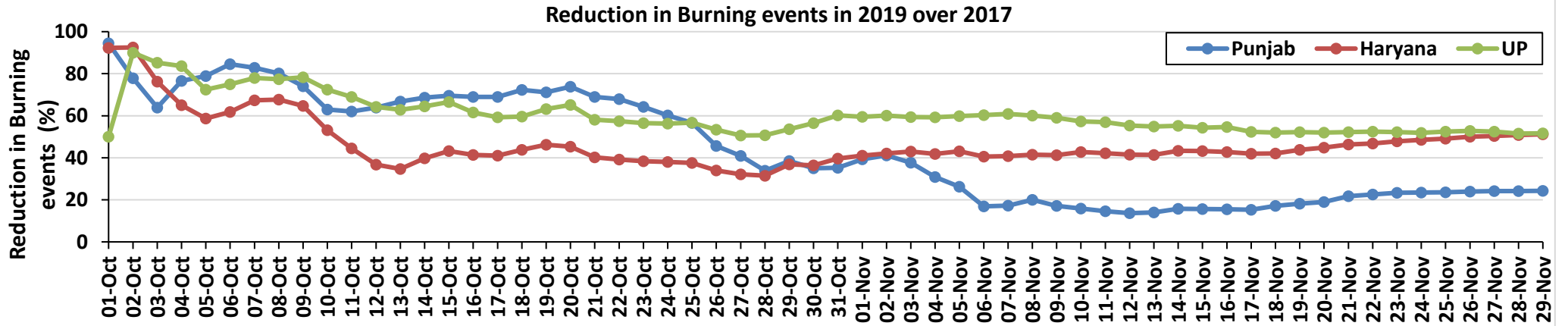
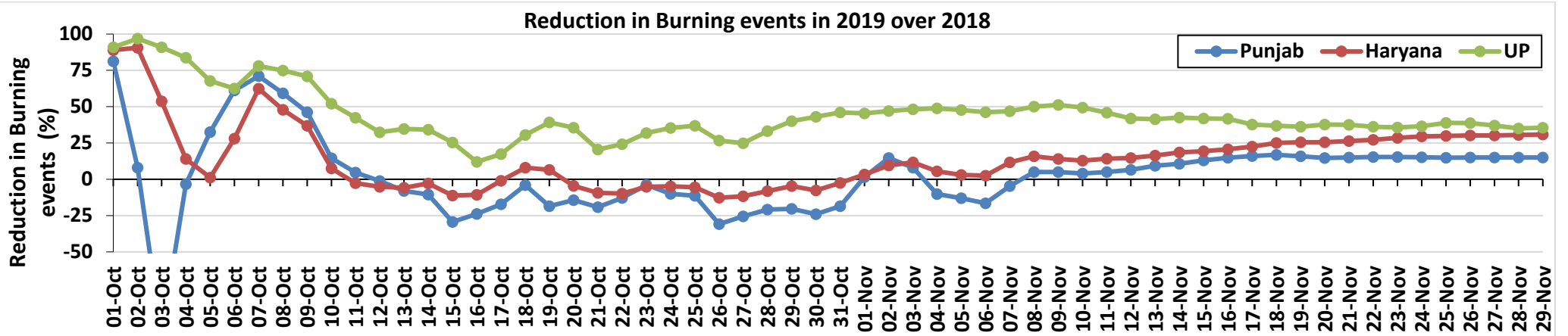
Haryana



UP

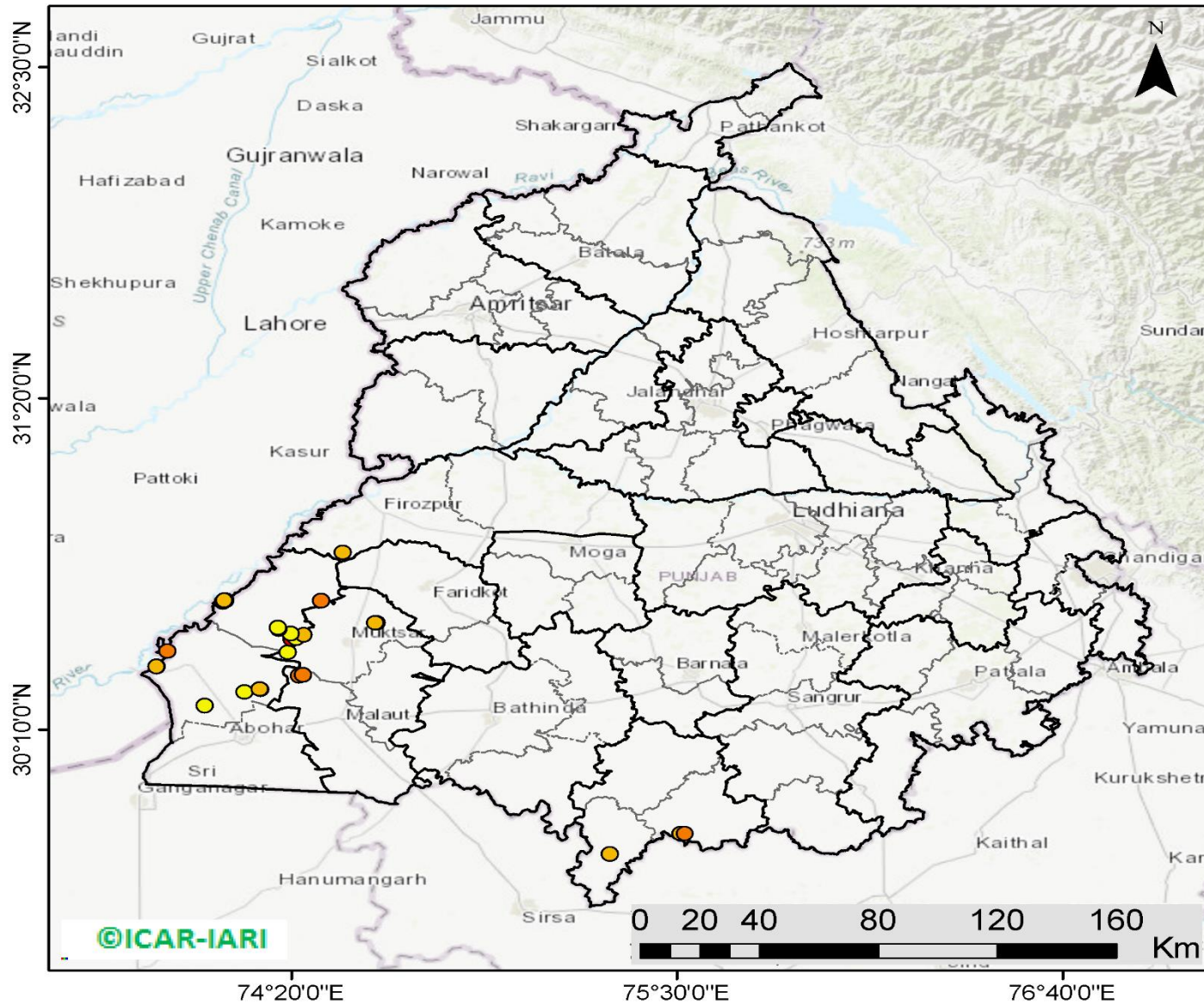


Percent Reduction in Burning events in 2019 over 2018, 2017 and 2016 (Daily Cumulative)



(a) Punjab

RICE RESIDUE BURNING IN PUNJAB



27 burning events detected in Punjab on 29th November 2019

Fire Intensity (W/m²)

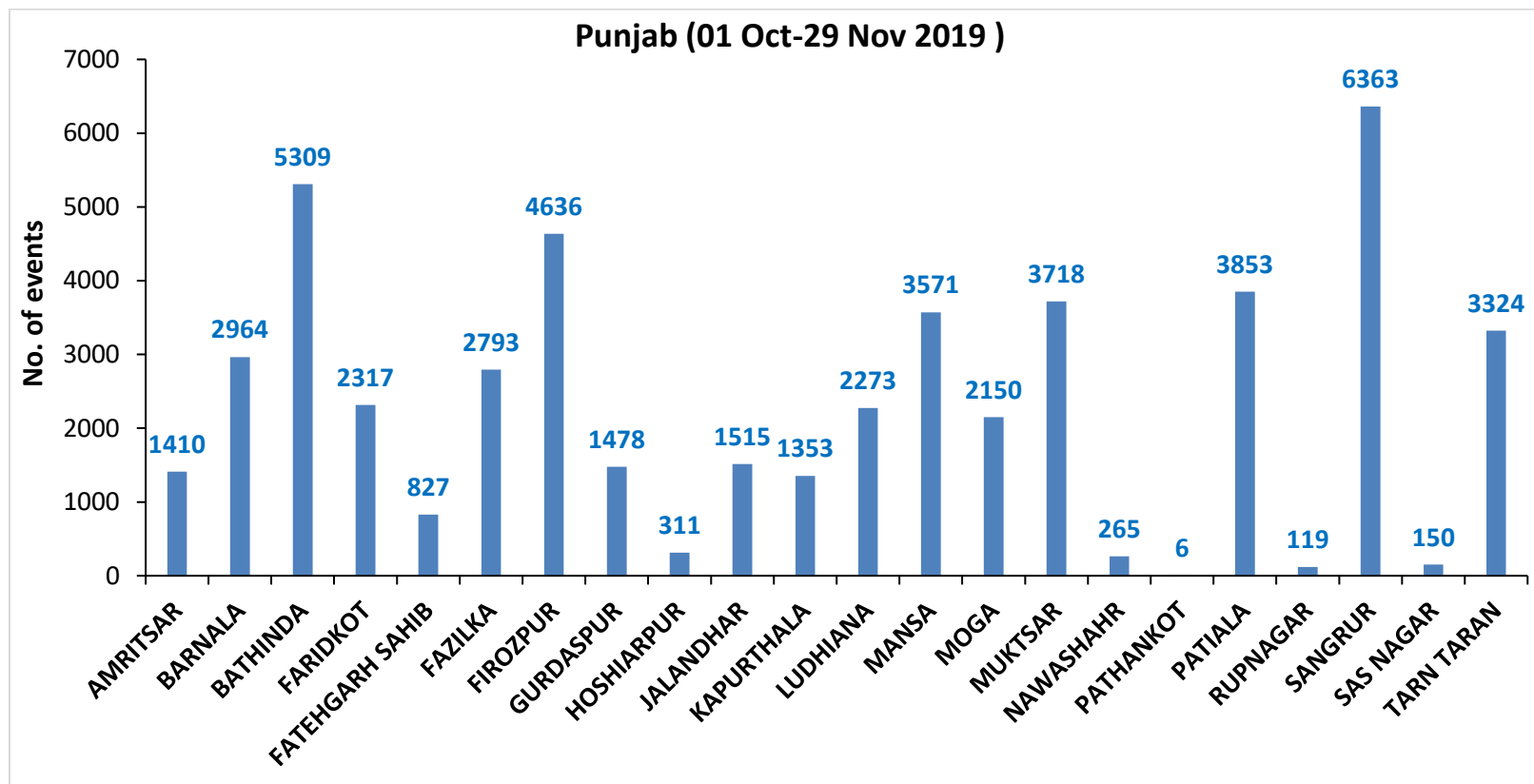
- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- >20

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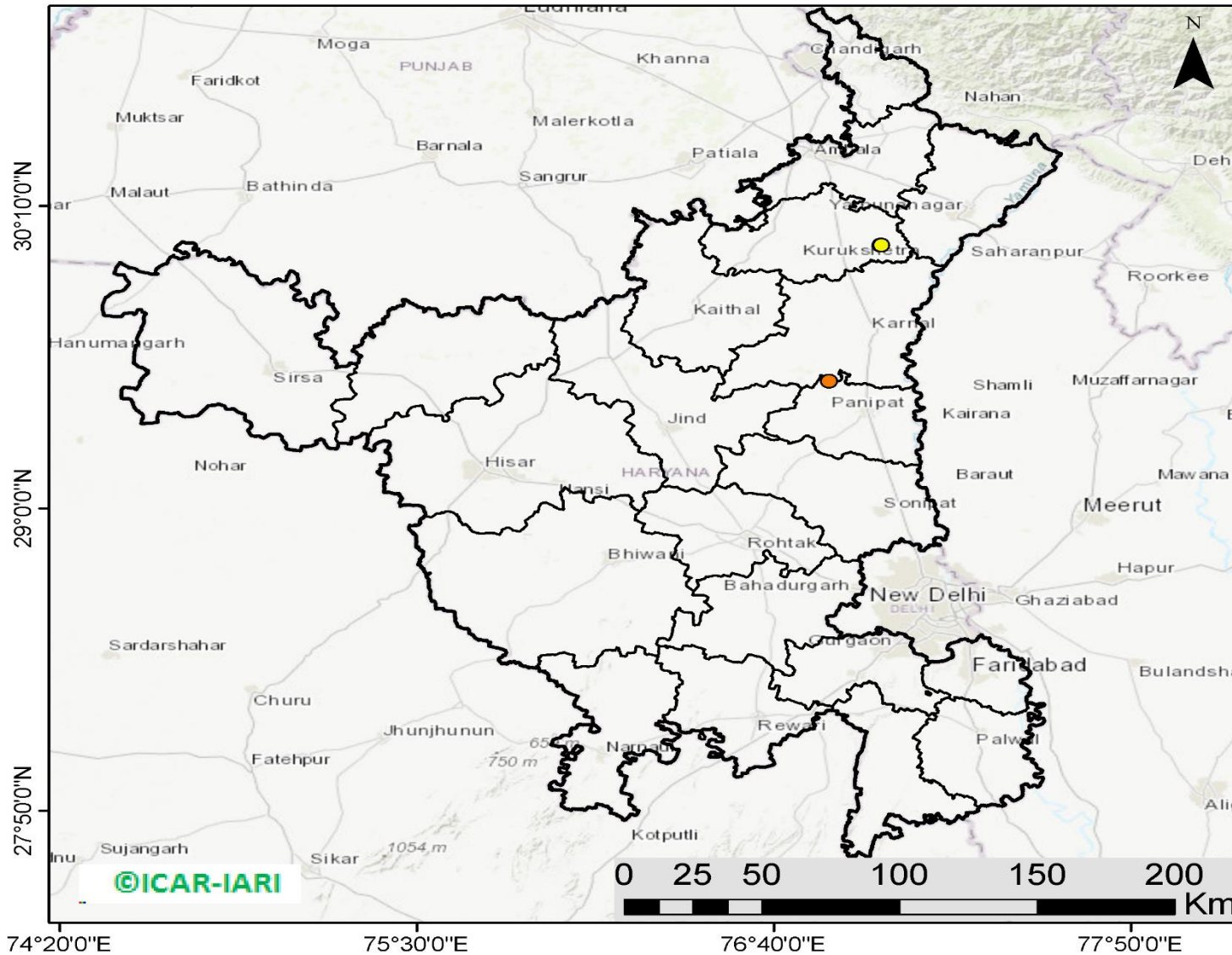
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District-wise cumulative number of residues burning events in Punjab (01 Oct to 29-Nov 2019)



(b) Haryana

RICE RESIDUE BURNING IN HARYANA



03 burning events detected in Haryana on 29th November 2019

Fire Intensity (W/m²)

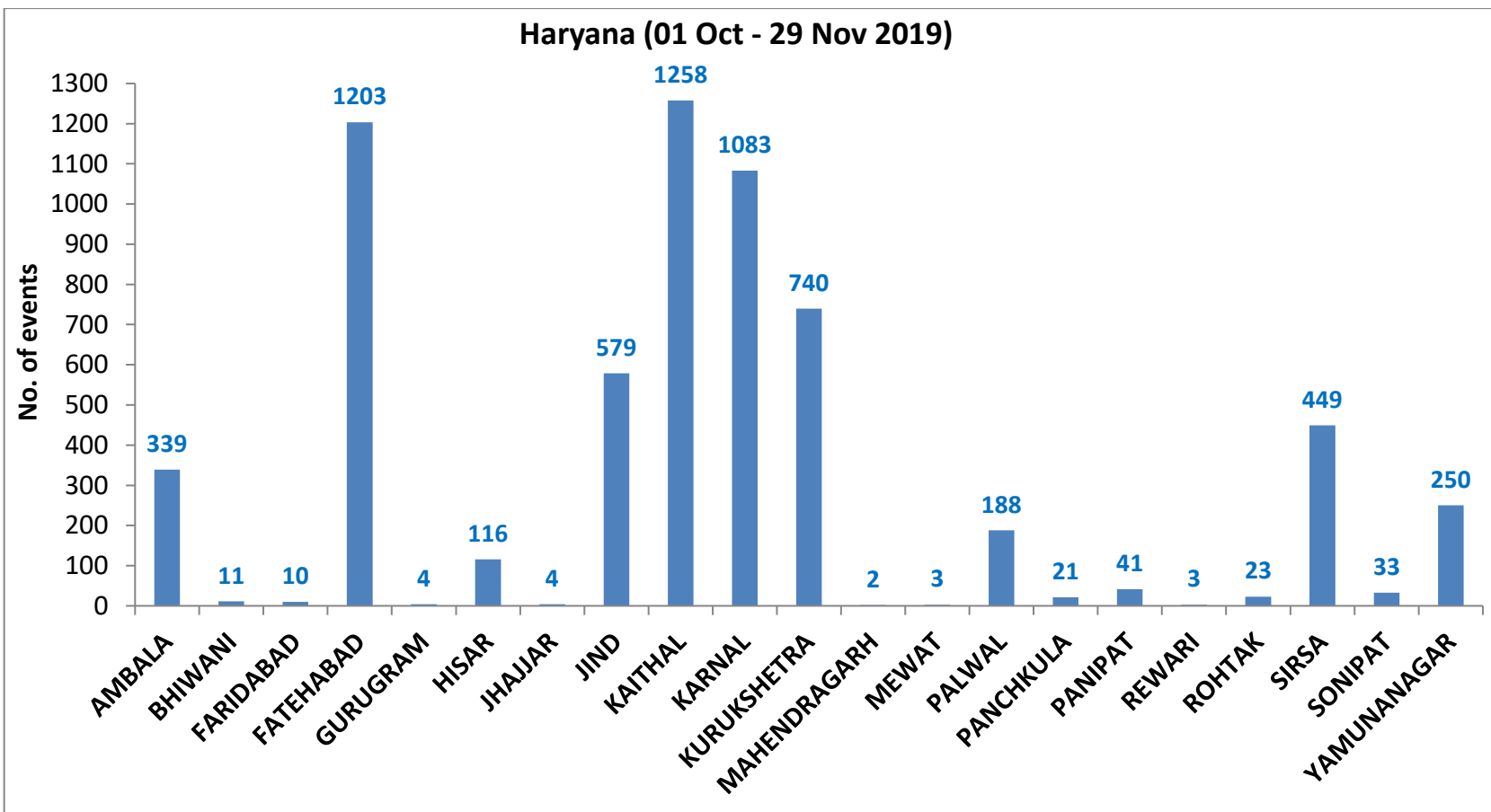
- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- >20

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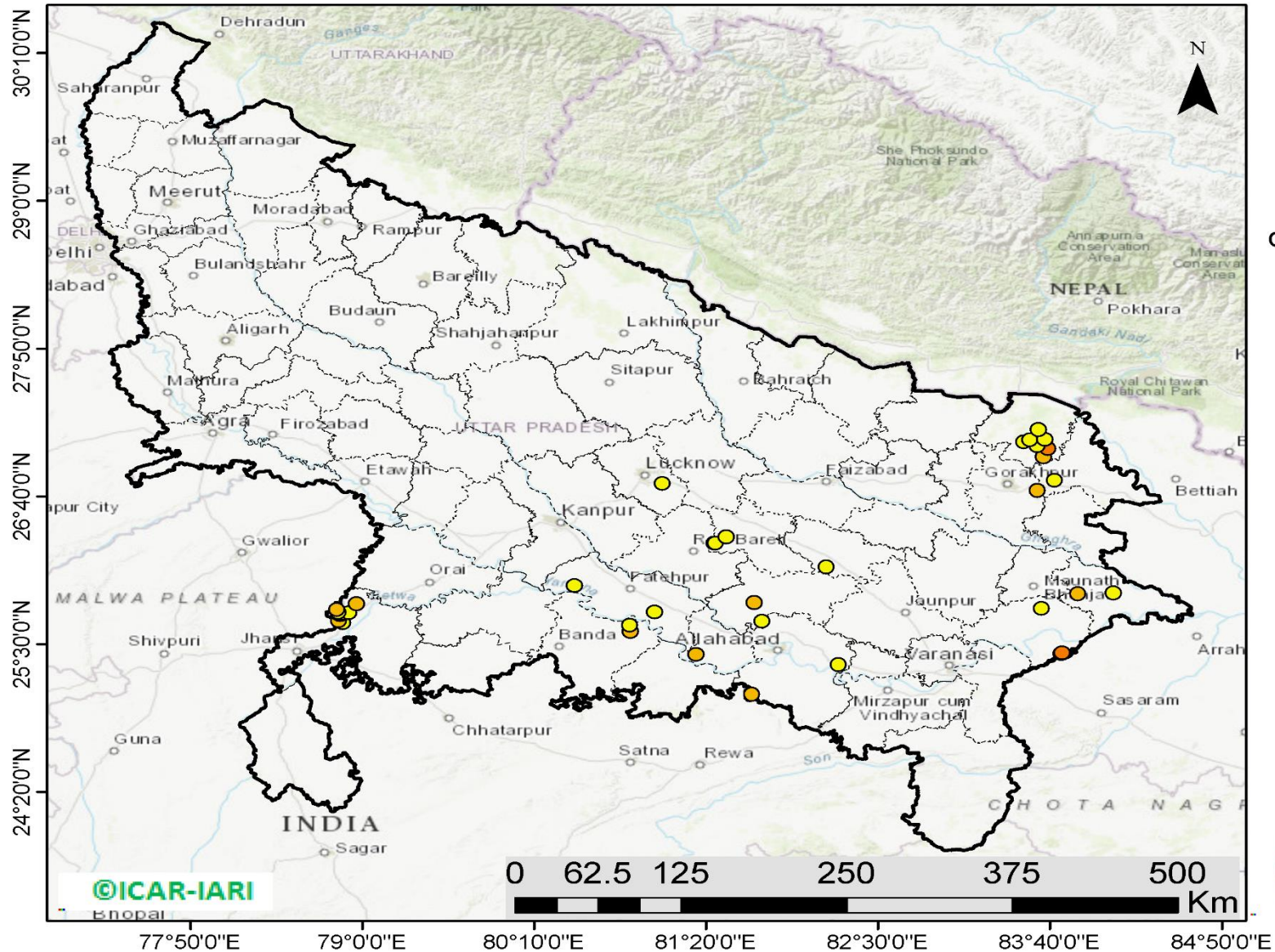
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District-wise cumulative number of residues burning events in Haryana (01 Oct to 29-Nov 2019)



(c) UP

RICE RESIDUE BURNING IN UTTAR PRADESH



37 burning events detected in Uttar Pradesh on 29th November 2019

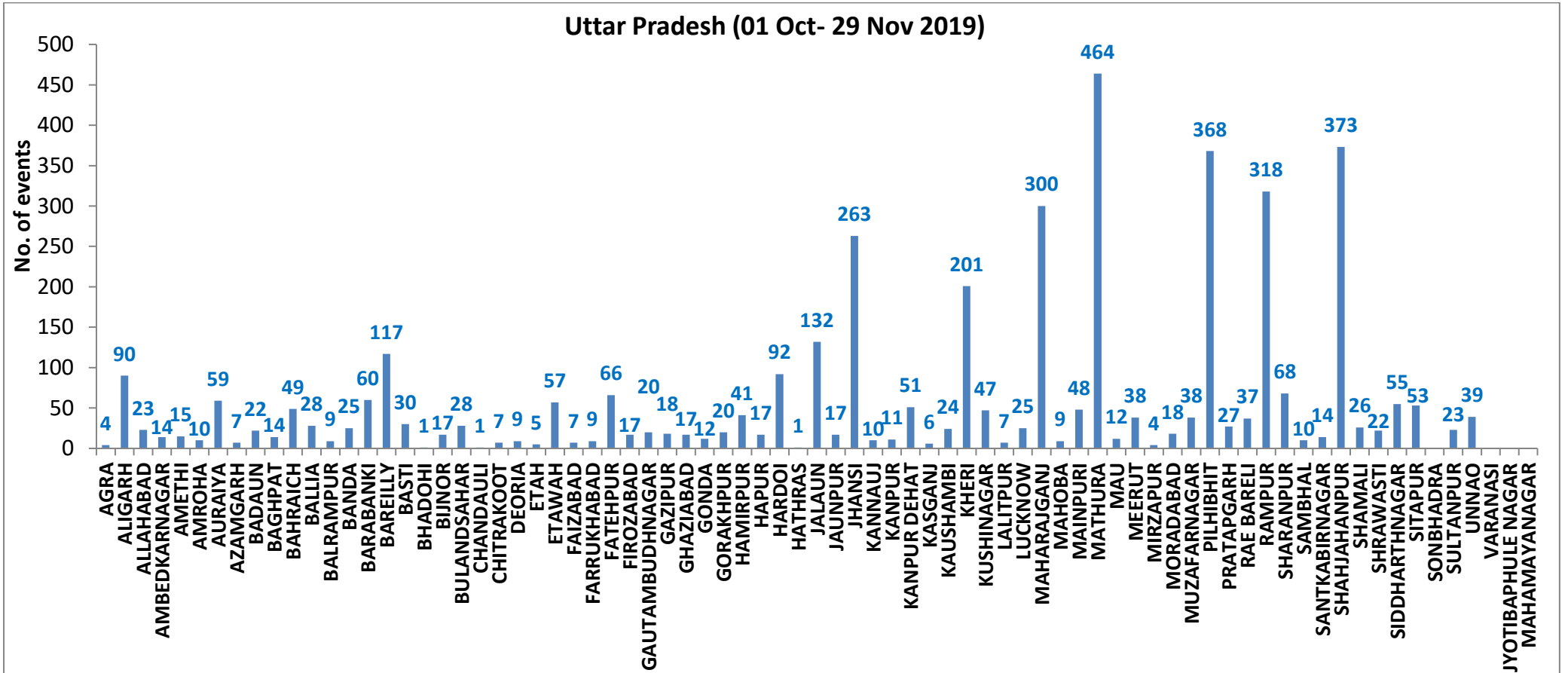
Fire Intensity (W/m²)

- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- >20



<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Uttar Pradesh (01 Oct to 29-Nov 2019)



State-wise, date-wise and district-wise number of residues burning events detected in 2016, 2017, 2018 and 2019
(Period: 01-Oct to 29-Nov)

Date	Punjab				Haryana				UP				Total			
	2019	2018	2017	2016	2019	2018	2017	2016	2019	2018	2017	2016	2019	2018	2017	2016
01-Oct	3	16	54	109	1	9	13	46	1	11	2	23	5	36	69	178
02-Oct	20	9	50	51	2	23	27	16	0	21	8	20	23	53	85	87
03-Oct	37	4	62	66	16	9	40	16	3	12	17	16	56	25	119	98
04-Oct	3	32	103	37	30	16	60	7	4	5	22	15	37	53	185	59
05-Oct	16	56	106	95	37	30	68	15	11	10	20	14	64	96	194	124
06-Oct	0	87	138	152	22	63	75	105	8	13	39	6	30	163	252	263
07-Oct	27	162	105	171	16	180	97	126	4	69	33	24	47	411	235	321
08-Oct	59	39	215	166	69	40	218	94	18	54	76	14	146	133	509	274
09-Oct	93	75	163	270	70	47	148	121	17	32	88	22	180	154	399	413
10-Oct	172	23	164	597	157	37	151	242	53	21	126	74	382	81	441	913
11-Oct	78	30	177	652	126	78	87	336	38	24	74	128	242	131	338	1116
12-Oct	99	67	342	694	154	133	123	338	42	22	51	164	295	222	516	1196
13-Oct	108	62	470	467	159	147	207	284	33	61	69	102	300	270	746	853
14-Oct	141	112	582	812	133	153	333	328	39	57	137	60	313	322	1052	1200
15-Oct	262	90	943	1215	203	110	458	248	63	35	237	76	528	235	1638	1539
16-Oct	168	174	465	1478	148	138	186	385	77	20	71	125	393	332	722	1988
17-Oct	250	272	807	2173	152	268	244	399	53	94	69	261	455	634	1120	2833
18-Oct	100	263	970	1065	103	255	306	270	39	163	108	204	242	681	1384	1539
19-Oct	529	254	1591	1762	220	208	541	276	3	108	128	132	752	570	2260	2170
20-Oct	490	496	2653	1175	360	141	597	188	62	49	255	62	912	686	3505	1425
21-Oct	852	618	1139	1726	339	217	233	257	185	66	168	152	1376	901	1540	2135
22-Oct	555	656	1356	2837	158	134	186	309	78	149	151	194	791	939	1693	3340
23-Oct	827	1113	994	2040	131	232	155	313	48	193	72	331	1006	1538	1221	2684
24-Oct	1220	844	1714	1836	165	166	244	221	79	192	171	152	1464	1202	2129	2209
25-Oct	1463	1247	2104	1813	212	182	303	229	67	142	175	83	1742	1571	2582	2125
26-Oct	2861	1173	1715	3390	366	132	276	434	189	33	240	195	3416	1338	2231	4019
27-Oct	2135	2040	2069	2904	249	252	224	417	145	154	145	255	2529	2446	2438	3576
28-Oct	3007	2864	2318	3493	238	330	292	458	45	290	99	435	3290	3484	2709	4386
29-Oct	1504	1321	4184	2258	0	124	502	278	1	243	180	237	1505	1688	4866	2773
30-Oct	3017	2008	3152	1076	222	103	307	395	19	158	238	175	3258	2269	3697	1646
31-Oct	2325	2715	3743	6132	36	229	413	575	4	148	321	153	2365	3092	4477	6860
01-Nov	293	4140	2736	4843	50	306	250	362	105	161	199	223	448	4607	3185	5428
02-Nov	6	3550	1246	4183	2	306	145	332	33	142	131	345	41	3998	1522	4860

03-Nov	2646	972	2109	3806	68	202	240	275	56	181	75	409	2770	1355	2424	4490
04-Nov	6001	882	4603	4477	383	77	499	146	75	183	168	265	6459	1142	5270	4888
05-Nov	4199	2989	2876	4137	253	129	625	345	124	163	367	125	4576	3281	3868	4607
06-Nov	4642	3071	171	6303	243	222	26	322	118	130	357	215	5003	3423	554	6840
07-Nov	189	4033	420	8575	2	568	46	821	33	108	149	244	224	4709	615	9640
08-Nov	462	4450	2256	4129	16	313	128	432	54	338	43	419	532	5101	2427	4980
09-Nov	2003	2083	675	4857	199	199	311	608	96	294	107	205	2298	2473	1093	5670
10-Nov	2046	1675	1642	2468	151	85	509	484	147	125	131	109	2344	1885	2282	3061
11-Nov	783	1364	103	5040	78	196	29	716	174	45	358	129	1035	1605	490	5885
12-Nov	520	1256	33	1477	68	122	3	634	210	45	269	129	798	1423	305	2240
13-Nov	10	1563	237	885	16	146	7	389	79	94	109	338	105	1803	353	1612
14-Nov	0	765	1101	692	1	189	340	171	22	128	95	247	23	1082	1536	1110
15-Nov	92	1480	5	871	29	107	40	107	111	146	123	154	232	1733	168	1132
16-Nov	23	1250	8	911	59	204	17	318	79	112	218	123	161	1566	243	1352
17-Nov	332	1132	217	638	85	289	12	299	265	103	249	130	682	1524	478	1067
18-Nov	740	1400	2147	568	70	356	139	312	113	111	180	217	923	1867	2466	1097
19-Nov	1221	752	2200	168	82	159	471	125	39	3	122	273	1342	914	2793	566
20-Nov	1007	385	1857	240	74	88	325	204	64	243	101	183	1145	716	2283	627
21-Nov	151	480	2310	112	37	161	378	115	84	107	205	86	272	748	2893	313
22-Nov	21	287	719	99	19	122	154	118	116	72	281	148	156	481	1154	365
23-Nov	283	317	1033	54	14	180	259	97	100	106	163	151	400	603	1455	302
24-Nov	293	229	507	21	23	152	192	36	72	186	105	265	388	567	804	322
25-Nov	266	72	443	33	31	81	219	68	18	272	124	123	315	425	786	224
26-Nov	8	95	334	27	9	57	240	25	62	73	186	85	79	225	760	137
27-Nov	13	1	151	22	0	2	99	34	132	42	227	80	145	45	477	136
28-Nov	4	35	95	13	1	49	114	23	150	35	145	87	155	119	354	123
29-Nov	27	27	86	10	03	39	87	28	37	104	91	197	67	170	264	235
Total	50705	59657	66968	102371	6360	9189	13018	15672	4196	6501	8668	9608	61261	75347	88654	127651

(a) Punjab

Districts	01Oct-29 Nov			
	2016	2017	2018	2019
AMRITSAR	2170	1362	1397	1410
BARNALA	5701	3426	3279	2964
BATHINDA	8846	5777	6346	5309
FARIDKOT	4630	3472	3058	2317
FATEHGARH SAHIB	2461	1642	866	827
FAZILKA	0	0	0	2793
FIROZPUR	13643	9938	9989	4636
GURDASPUR	2219	1594	1171	1478
HOSHIARPUR	905	497	199	311
JALANDHAR	4662	2126	1393	1515
KAPURTHALA	3136	1626	750	1353
LUDHIANA	9546	4753	3043	2273
MANSA	5652	4501	4317	3571
MOGA	6393	2776	2730	2150
MUKTSAR	7037	5441	5786	3718
NAWASHAHR (SBS Nagar)	1614	825	397	265
PATHANKOT	0	0	0	6
PATIALA	6545	5034	4215	3853
RUPNAGAR	719	328	87	119
SANGRUR	11862	8429	7782	6363
SAS NAGAR	117	107	104	150
TARN TARAN	4513	3314	2748	3324
Total	102371	66968	59657	50705

(b) Haryana

Districts	01Oct-29 Nov			
	2016	2017	2018	2019
AMBALA	537	502	331	339
BHIWANI	93	47	22	11
FARIDABAD	288	343	187	10
FATEHABAD	4831	3734	2549	1203
GURUGRAM	0	0	0	4
HISAR	414	192	211	116
JHAJJAR	43	19	34	4
JIND	861	945	886	579
KAITHAL	1748	1512	1292	1258
KARNAL	1640	1513	856	1083
KURUKSHETRA	1079	1150	681	740
MAHENDRAGARH	0	0	0	2
MEWAT	0	0	0	3
PALWAL	0	0	0	188
PANCHKULA	0	0	3	21
PANIPAT	102	110	60	41
REWARI	0	0	0	3
ROHTAK	103	98	51	23
SIRSA	3580	2444	1781	449
SONIPAT	100	86	43	33
YAMUNANAGAR	253	323	202	250
Total	15672	13018	9189	6360

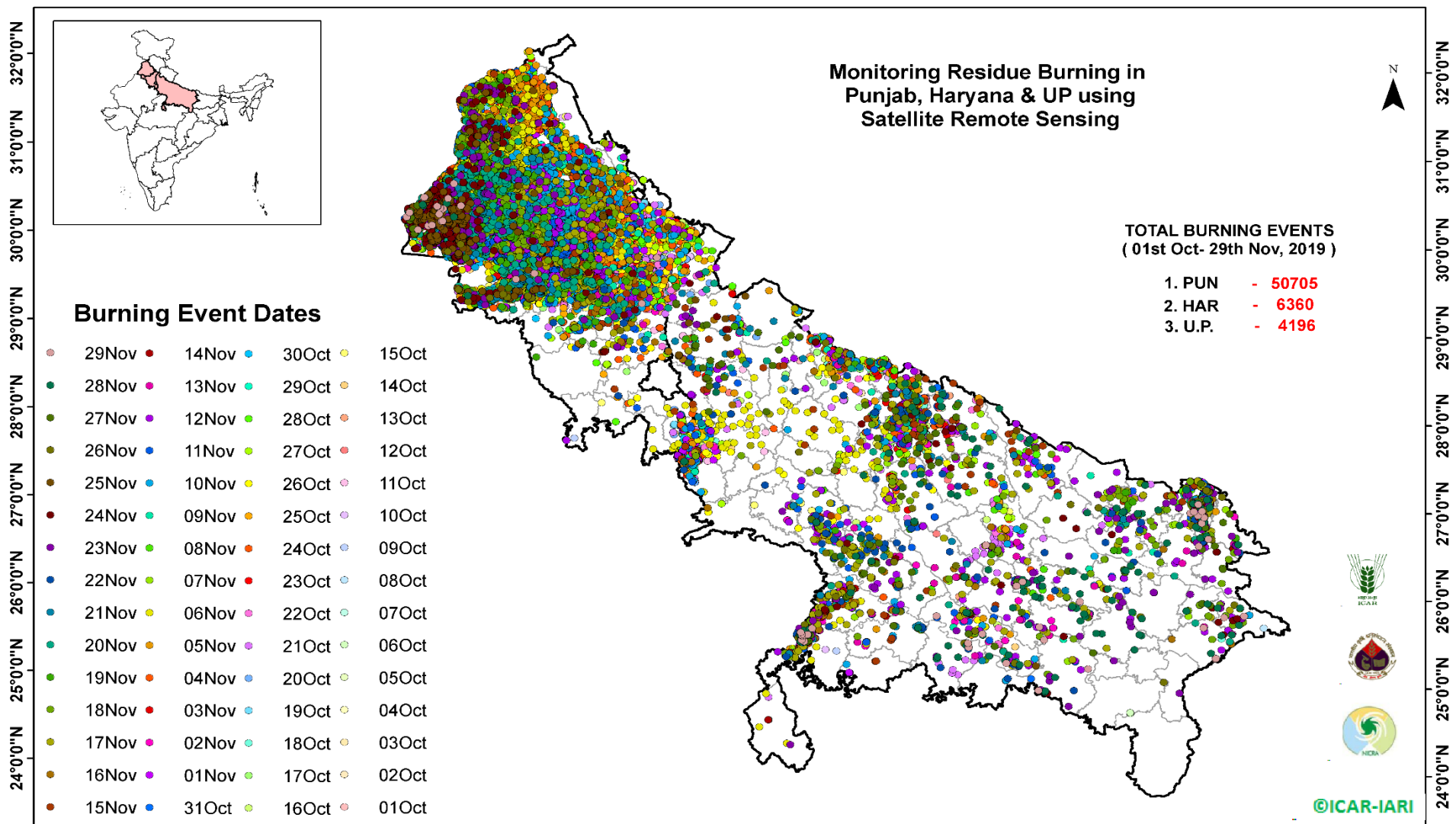
(c) Uttar Pradesh

Districts	01Oct-29 Nov			
	2016	2017	2018	2019
AGRA	0	0	0	4
ALIGARH	59	82	95	90
ALLAHABAD	8	20	21	23
AMBEDKARNAGAR	79	71	31	14
AMETHI	0	0	0	15
AMROHA	0	0	0	10
AURAIYA	289	254	74	59
AZAMGARH	38	56	38	7
BADAUN	13	12	14	22
BAGHPAT	0	0	0	14
BAHRAICH	82	42	60	49
BALLIA	19	48	33	28
BALRAMPUR	38	28	45	9
BANDA	2	23	12	25
BARABANKI	222	168	175	60
BAREILLY	270	239	122	117
BASTI	146	187	126	30
BHADOHI	0	0	0	1
BIJNOR	84	75	24	17
BULANDSAHAR	38	39	27	28
CHANDAULI	21	27	3	1
CHITRAKOOT	0	0	0	7
DEORIA	62	86	80	9
ETAH	24	33	28	5
ETAWAH	189	148	72	57
FAIZABAD	20	16	10	7
FARRUKHABAD	0	0	0	9
FATEHPUR	88	73	92	66
FIROZABAD	23	18	11	17

GAUTAMBUDHNAGAR	33	47	13	20
GAZIPUR	16	23	28	18
GHAZIABAD	95	67	47	17
GONDA	50	39	22	12
GORAKHPUR	67	115	142	20
HAMIRPUR	0	0	1	41
HAPUR	0	0	0	17
HARDOI	259	211	116	92
HATHRAS	0	0	0	1
JALAUN	0	0	0	132
JAUNPUR	26	44	26	17
JHANSI	0	0	2	263
KANNAUJ	35	20	8	10
KANPUR	20	14	13	11
KANPUR DEHAT	75	75	29	51
KASGANJ	0	0	0	6
KAUSHAMBI	36	55	53	24
KHERI	518	359	240	201
KUSHINAGAR	68	157	176	47
LALITPUR	0	0	0	7
LUCKNOW	64	30	26	25
MAHARAJGANJ	733	1029	1081	300
MAHOBA	0	0	0	9
MAINPURI	97	96	60	48
MATHURA	1462	1083	1049	464
MAU	15	24	22	12
MEERUT	113	117	39	38
MIRZAPUR	6	21	9	4
MORADABAD	69	45	17	18
MUZAFARNAGAR	186	192	72	38
PILHIBHIT	964	746	437	368
PRATAPGARH	47	63	44	27

RAE BARELI	119	152	76	37
RAMPUR	635	665	228	318
SHARANPUR	136	162	82	68
SAMBHAL	0	0	0	10
SANTKABIRNAGAR	56	65	56	14
SHAHJAHANPUR	1159	713	393	373
SHAMALI	0	0	0	26
SHRAWASTI	37	32	37	22
SIDDHARTHANAGAR	264	188	476	55
SITAPUR	150	88	48	53
SONBHADRA	16	17	13	0
SULTANPUR	82	84	65	23
UNNAO	68	60	41	39
VARANASI	2	0	0	0
JYOTIBAPHULE NAGAR	12	22	13	0
MAHAMAYANAGAR	4	3	8	0
Total	9608	8668	6501	4196

Map of Cumulative Burning Events (01 Oct – 29 Nov 2019)



[\(http://geoportal.icar.gov.in:8080/geoexplorer/composer/\)](http://geoportal.icar.gov.in:8080/geoexplorer/composer/)

Details of residue burning events in Punjab on 29-Nov-2019

S. No.	District	Tehsil / Block	Satellite	Longitude	Latitude	Time (IST)	Day / Night	Fire Power (W/m ²)
1	FAZILKA	FAZILKA	S-NPP	74.07198	30.25036	14:24:00	D	2.90
2	FAZILKA	FAZILKA	S-NPP	74.19187	30.29929	14:24:00	D	3.10
3	FAZILKA	FAZILKA	S-NPP	74.24109	30.30808	14:24:00	D	20.80
4	FAZILKA	FAZILKA	S-NPP	74.23791	30.30955	14:24:00	D	7.70
5	FAZILKA	FAZILKA	S-NPP	73.92694	30.38939	14:24:00	D	4.40
6	FAZILKA	FAZILKA	S-NPP	73.92576	30.38955	14:24:00	D	5.10
7	FAZILKA	FAZILKA	AQUA	73.95900	30.44200	13:35:00	D	10.20
8	FAZILKA	JALALABAD	AQUA	74.33400	30.48600	13:35:00	D	21.00
9	FAZILKA	JALALABAD	AQUA	74.34700	30.48800	13:35:00	D	4.20
10	FAZILKA	JALALABAD	S-NPP	74.37090	30.50041	14:24:00	D	5.90
11	FAZILKA	JALALABAD	S-NPP	74.33099	30.50450	14:24:00	D	3.60
12	FAZILKA	JALALABAD	S-NPP	74.29612	30.52137	14:24:00	D	5.40
13	FAZILKA	JALALABAD	S-NPP	74.29329	30.52547	14:24:00	D	4.10
14	FAZILKA	JALALABAD	S-NPP	74.12577	30.61628	14:24:00	D	9.40
15	FAZILKA	JALALABAD	S-NPP	74.42381	30.62047	14:24:00	D	10.50
16	FAZILKA	JALALABAD	S-NPP	74.12990	30.62137	14:24:00	D	7.00
17	FAZILKA	JALALABAD	S-NPP	74.13543	30.62165	14:24:00	D	7.00
18	FAZILKA	JALALABAD	S-NPP	74.13085	30.62279	14:24:00	D	9.40
19	FIROZPUR	FIROZPUR	AQUA	74.48900	30.79000	13:35:00	D	5.90
20	MANSA	BUDHLADA	AQUA	75.51100	29.79900	13:35:00	D	9.00
21	MANSA	BUDHLADA	AQUA	75.52300	29.80000	13:35:00	D	11.10
22	MANSA	SARDULGARH	AQUA	75.29700	29.72900	13:35:00	D	9.90
23	MUKTSAR	MALAUT	AQUA	74.35600	30.35700	13:35:00	D	14.30
24	MUKTSAR	MALAUT	AQUA	74.36900	30.35900	13:35:00	D	12.20
25	MUKTSAR	MUKTSAR	S-NPP	74.32223	30.43768	14:24:00	D	5.00
26	MUKTSAR	MUKTSAR	S-NPP	74.59074	30.54155	12:48:00	D	4.10
27	MUKTSAR	MUKTSAR	S-NPP	74.58664	30.54240	12:48:00	D	5.30

Details of residue burning events in Haryana on 29-Nov-2019

S. No.	District	Tehsil / Block	Satellite	Longitude	Latitude	Time (IST)	Day / Night	Fire Power (W/m ²)
1	KURUKSHETRA	THANESAR	S-NPP	77.01575	30.01515	12:48:00	D	2.40
2	KURUKSHETRA	THANESAR	S-NPP	77.01907	30.01591	12:48:00	D	3.20
3	PANIPAT	PANIPAT	NOAA-18	76.84635	29.49042	20:34:00	N	13.00

Details of residue burning events in Uttar Pradesh on 29-Nov-2019

S. No.	District	Tehsil / Block	Satellite	Longitude	Latitude	Time (IST)	Day / Night	Fire Power (W/m ²)
1	ALLAHABAD	BARA	AQUA	81.64200	25.10300	13:30:00	D	6.00
2	ALLAHABAD	HADIYA	S-NPP	82.23235	25.33983	12:42:00	D	2.80
3	BALLIA	BALLIA	S-NPP	84.09752	25.90579	12:42:00	D	2.50
4	BALLIA	RASRA	S-NPP	83.85756	25.89646	12:42:00	D	6.70
5	BANDA	BABERU	AQUA	80.81900	25.60200	13:30:00	D	5.60
6	BANDA	BABERU	S-NPP	80.81374	25.64812	01:30:00	N	1.50
7	FATEHPUR	BINKI	S-NPP	80.43918	25.96056	12:42:00	D	2.10
8	FATEHPUR	FATEHPUR	S-NPP	80.98254	25.75345	12:42:00	D	3.10
9	GAZIPUR	GAZIPUR	S-NPP	83.61086	25.78152	12:42:00	D	4.60
10	GAZIPUR	ZAMANIA	AQUA	83.74100	25.42300	13:30:00	D	12.10
11	GAZIPUR	ZAMANIA	S-NPP	83.74882	25.42906	12:42:00	D	10.30
12	GORAKHPUR	CHAURI CHAURA	S-NPP	83.58187	26.71452	12:42:00	D	5.20
13	JHANSI	MOTH	AQUA	78.86800	25.66700	13:30:00	D	4.80
14	JHANSI	MOTH	AQUA	78.83800	25.68200	13:30:00	D	5.10
15	JHANSI	MOTH	S-NPP	78.84764	25.73128	12:42:00	D	4.90
16	JHANSI	MOTH	AQUA	78.83900	25.73700	13:30:00	D	25.30
17	JHANSI	MOTH	AQUA	78.87800	25.74300	13:30:00	D	7.60
18	JHANSI	MOTH	AQUA	78.90800	25.74700	13:30:00	D	4.70
19	JHANSI	MOTH	S-NPP	78.83631	25.74950	12:42:00	D	3.20
20	JHANSI	MOTH	AQUA	78.82700	25.77200	13:30:00	D	8.00
21	JHANSI	MOTH	AQUA	78.96000	25.81900	13:30:00	D	6.90
22	KAUSHAMBI	MANJHANPUR	S-NPP	81.26302	25.41844	12:42:00	D	6.40

23	KUSHINAGAR	HATA	S-NPP	83.69966	26.79416	01:30:00	N	0.40
24	LUCKNOW	MOHANLAL GANJ	S-NPP	81.03667	26.76754	01:30:00	N	0.50
25	MAHARAJGANJ	MAHARAJGANJ	S-NPP	83.62329	26.97786	12:42:00	D	5.90
26	MAHARAJGANJ	MAHARAJGANJ	AQUA	83.65300	27.04200	13:30:00	D	12.10
27	MAHARAJGANJ	MAHARAJGANJ	S-NPP	83.58093	27.06406	12:42:00	D	3.10
28	MAHARAJGANJ	MAHARAJGANJ	S-NPP	83.49016	27.09517	12:42:00	D	2.50
29	MAHARAJGANJ	MAHARAJGANJ	S-NPP	83.53216	27.11053	12:42:00	D	3.20
30	MAHARAJGANJ	MAHARAJGANJ	S-NPP	83.63172	27.11364	12:42:00	D	2.30
31	MAHARAJGANJ	MAHARAJGANJ	S-NPP	83.58891	27.19306	12:42:00	D	3.60
32	PRATAPGARH	KUNDA	S-NPP	81.71386	25.67839	12:42:00	D	4.10
33	PRATAPGARH	KUNDA	AQUA	81.66000	25.82800	13:30:00	D	6.20
34	RAIBEARELI	RAEBARELI	S-NPP	81.38893	26.29556	12:42:00	D	5.90
35	RAIBEARELI	TILOI	S-NPP	81.39745	26.29726	12:42:00	D	2.90
36	RAIBEARELI	TILOI	S-NPP	81.46871	26.34565	01:30:00	N	0.40
37	SULTANPUR	LAMBHUA	S-NPP	82.14920	26.10919	12:42:00	D	1.90

The study used images received from following Satellites at IARI Satellite Ground Station

S. No.	Satellite Name	Sensor	Resolution (meter)	Day / Night Passes
1.	Suomi NPP	VIIRS	375 / 1000	Both
2.	Terra	MODIS	1000	Both
3.	Aqua	MODIS	1000	Both
4.	NOAA – 18	AVHRR	1000	Night
5.	NOAA – 19	AVHRR	1000	Night
6.	Metop - 1	AVHRR	1000	Night
7.	Metop - 2	AVHRR	1000	Night

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GIS Maps of fire events can be visualized online on ICAR KRISHI Geoportal website: <http://geoportal.icar.gov.in:8080/geoexplorer/composer/>
(Part of KRISHI Portal: <https://krishi.icar.gov.in> initiative)
