



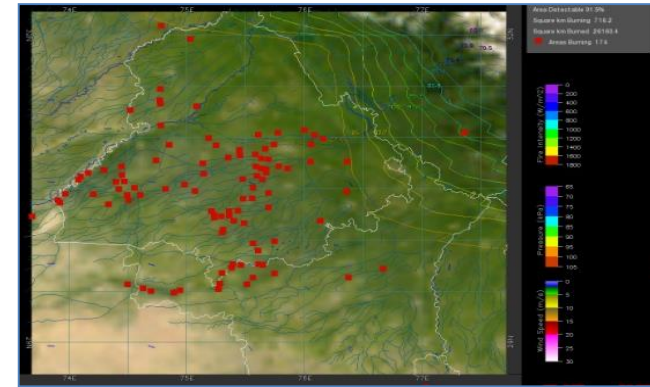
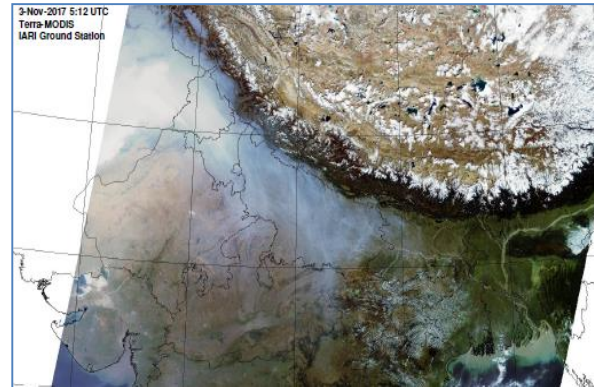
**Bulletin
No. 61**

**Events Date:
30-Nov-2019**

**Issued on:
01-Dec-2019**



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



Prepared by:

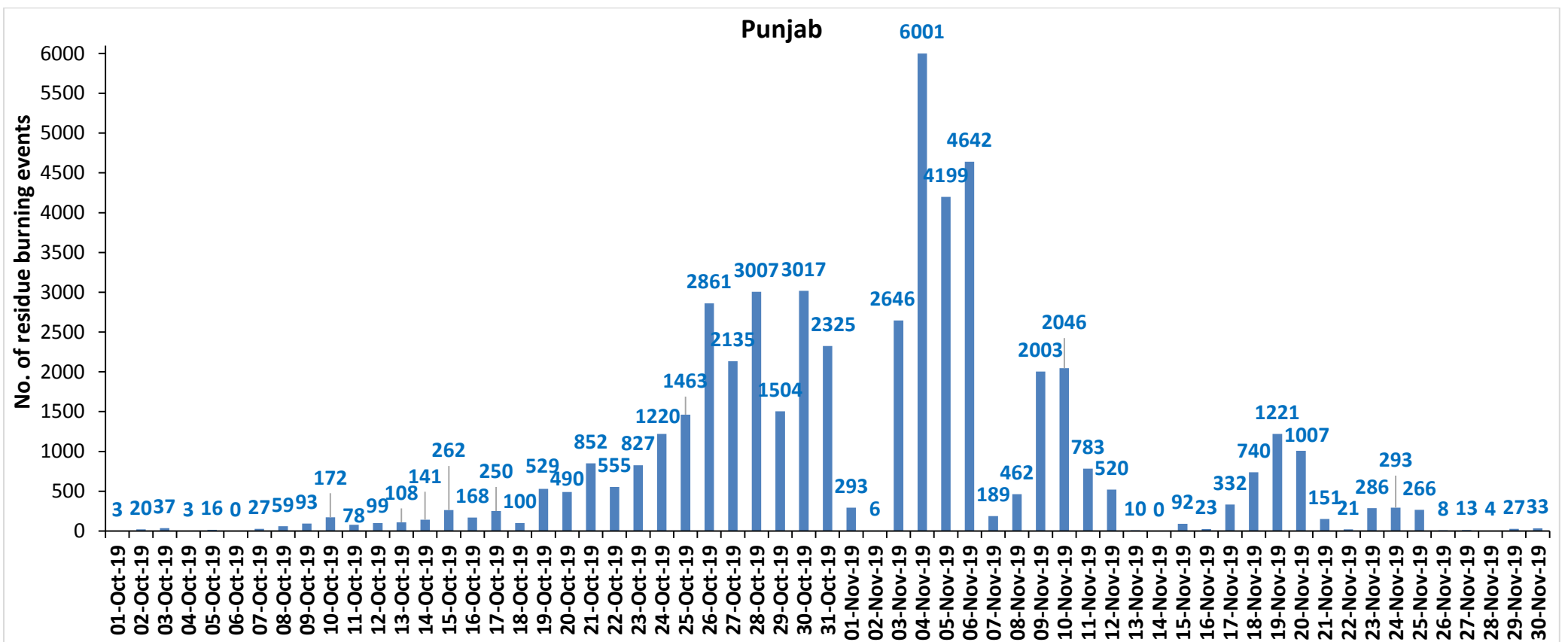
**Consortium for Research on Agroecosystem Monitoring and Modeling from Space (CREAMS) Laboratory,
Division of Agricultural Physics, ICAR – Indian Agricultural Research Institute, New Delhi – 110012**

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

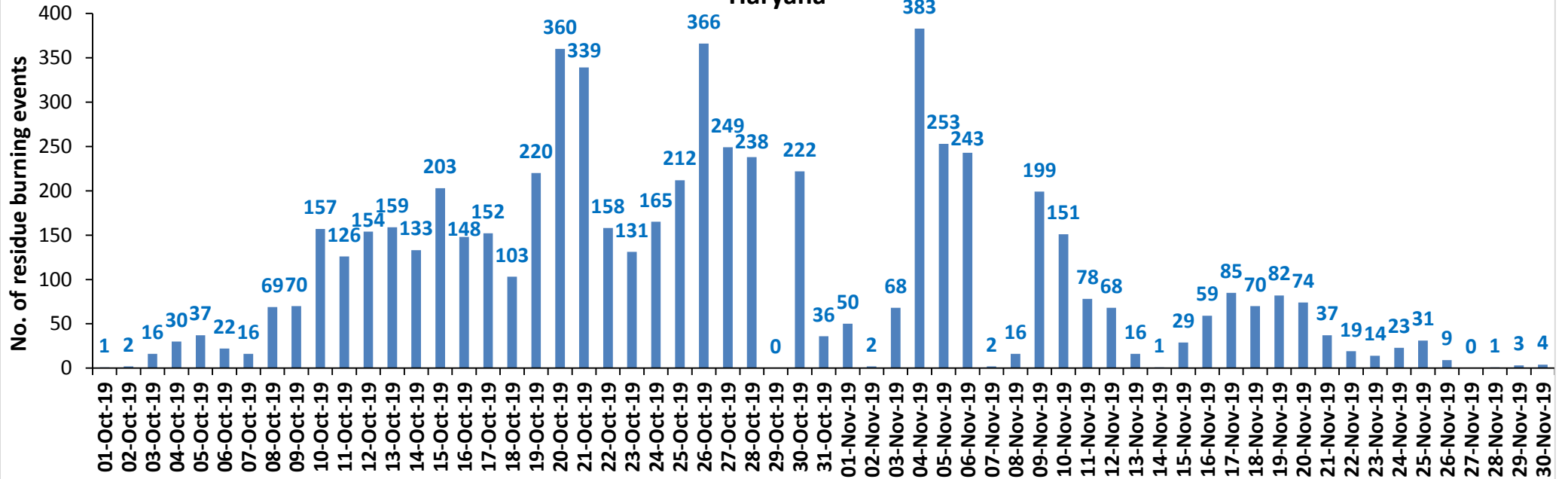
Highlights for 30-November-2019

- Satellites detected **71** residue burning events in the three study States on **30-Nov-2019**.
- The burning events detected on **30-Nov-2019** are **33, 04** and **34** in Punjab, Haryana and UP, respectively.
- The number of events has increased from **67** on **29-Nov-2019** to **71** on **30-Nov-2019** in the three states.
- Total **61332** burning events were detected in the three States between **01-Oct-2019** and **30-Nov-2019**, which are distributed as **50738, 6364** and **4230** in Punjab, Haryana and UP, respectively.
- Overall, the total burning events recorded in the three states are **18.8%** less than in 2018 till date. UP recorded **36.1%** reduction, Haryana recorded **31.0%** reduction, and Punjab recorded **15.0%** reduction, respectively, in the current season than in 2018.

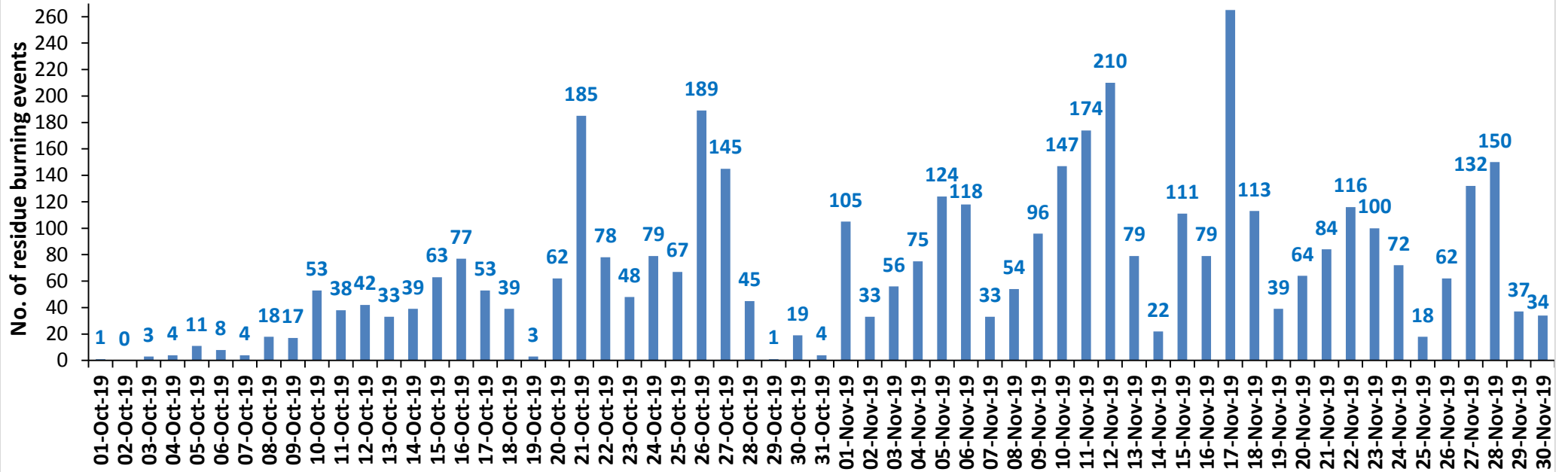
Temporal distribution of residue burning events for the three study States in 2019



Haryana



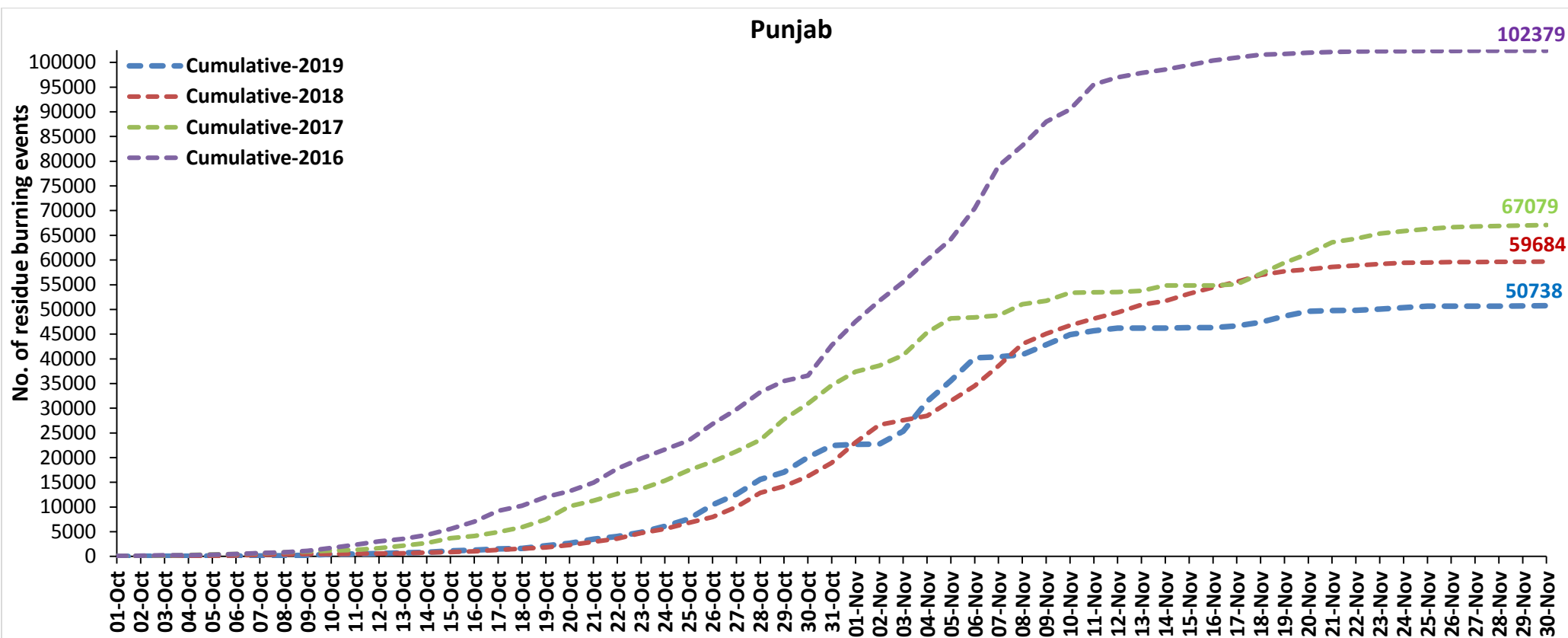
UP



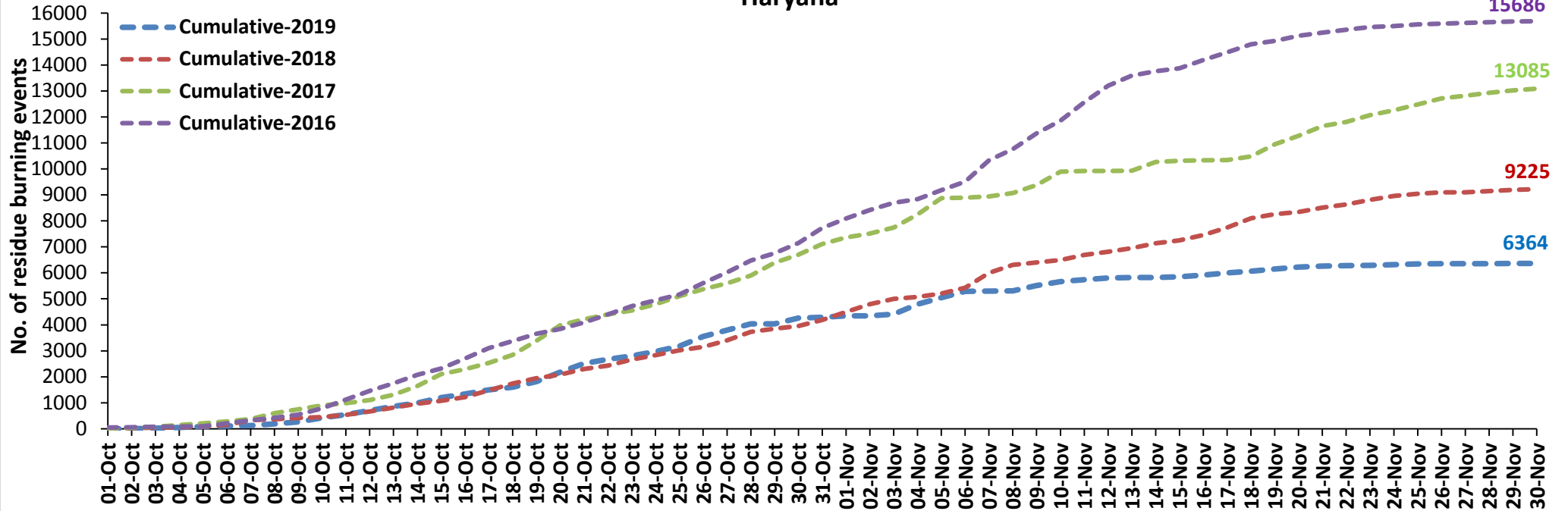
Comparison of residue burning events in current year (2019) with previous years (2018, 2017 & 2016) for the three study States

(01-Oct to 30-Nov)

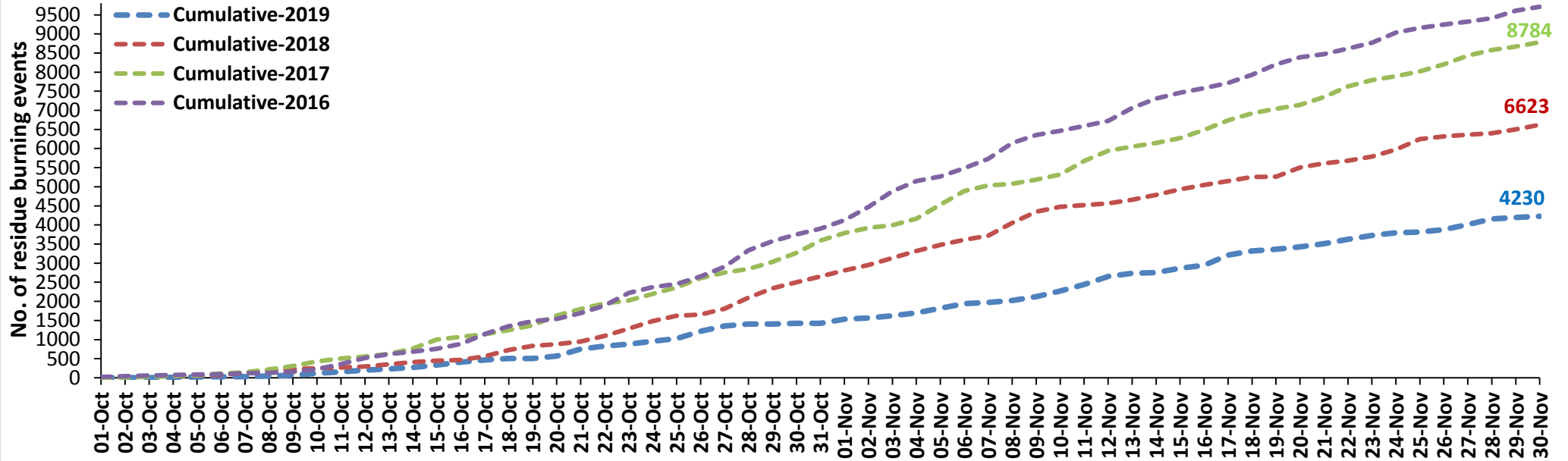
Punjab



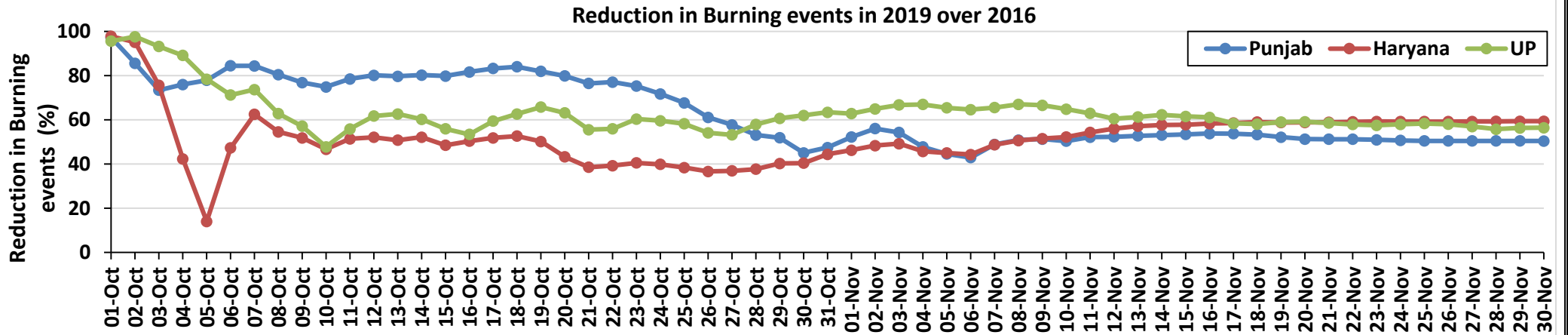
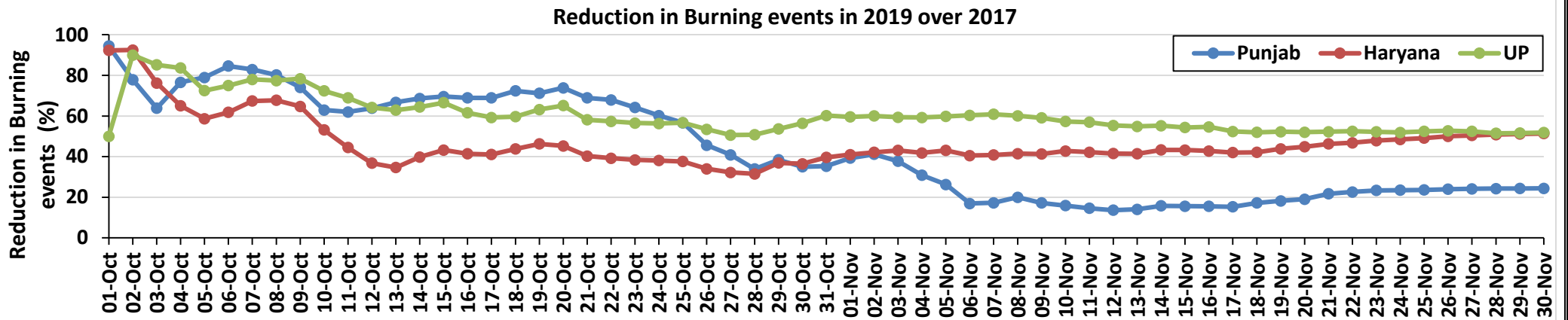
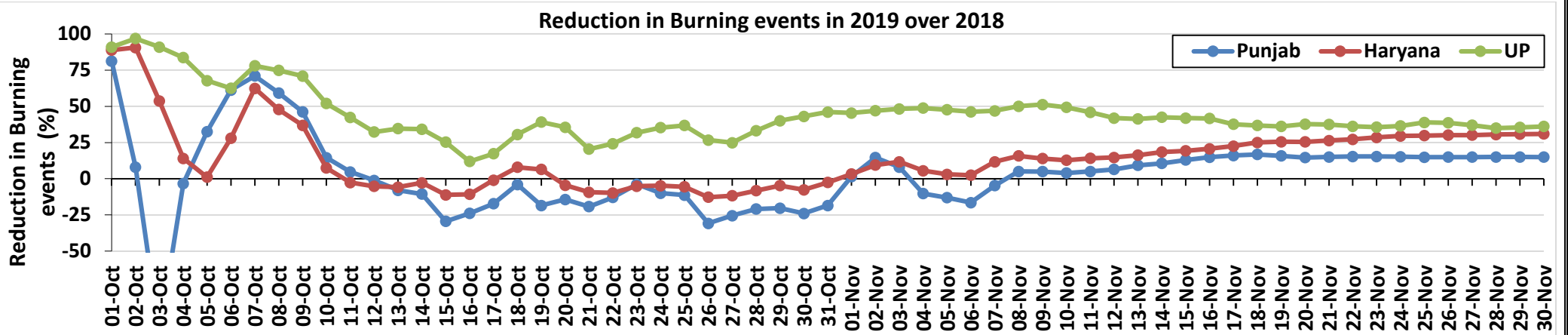
Haryana



UP

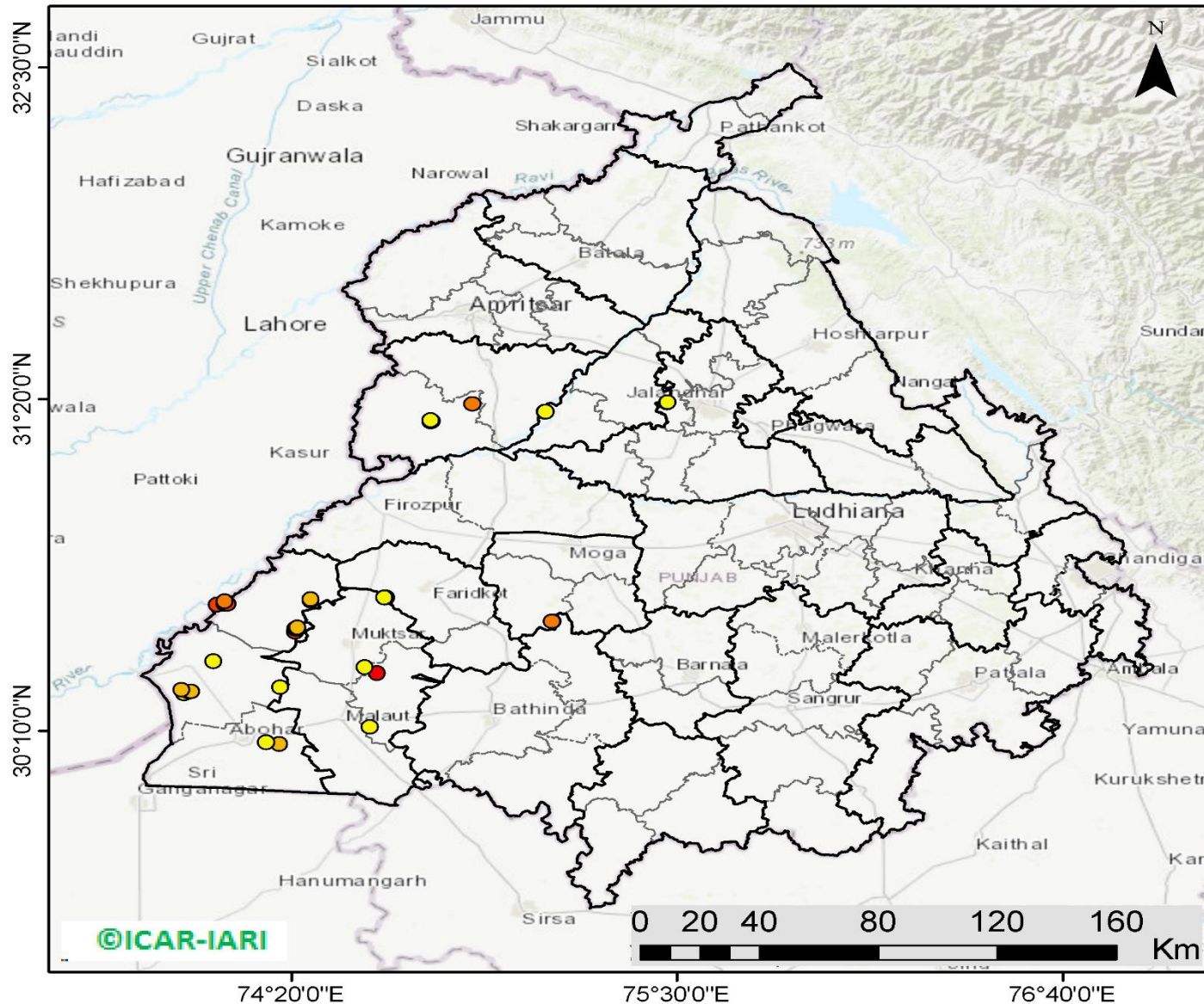


Percent Reduction in Burning events in 2019 over 2018, 2017 and 2016 (Daily Cumulative)



(a) Punjab

RICE RESIDUE BURNING IN PUNJAB



33 burning events detected in Punjab on 30th November 2019

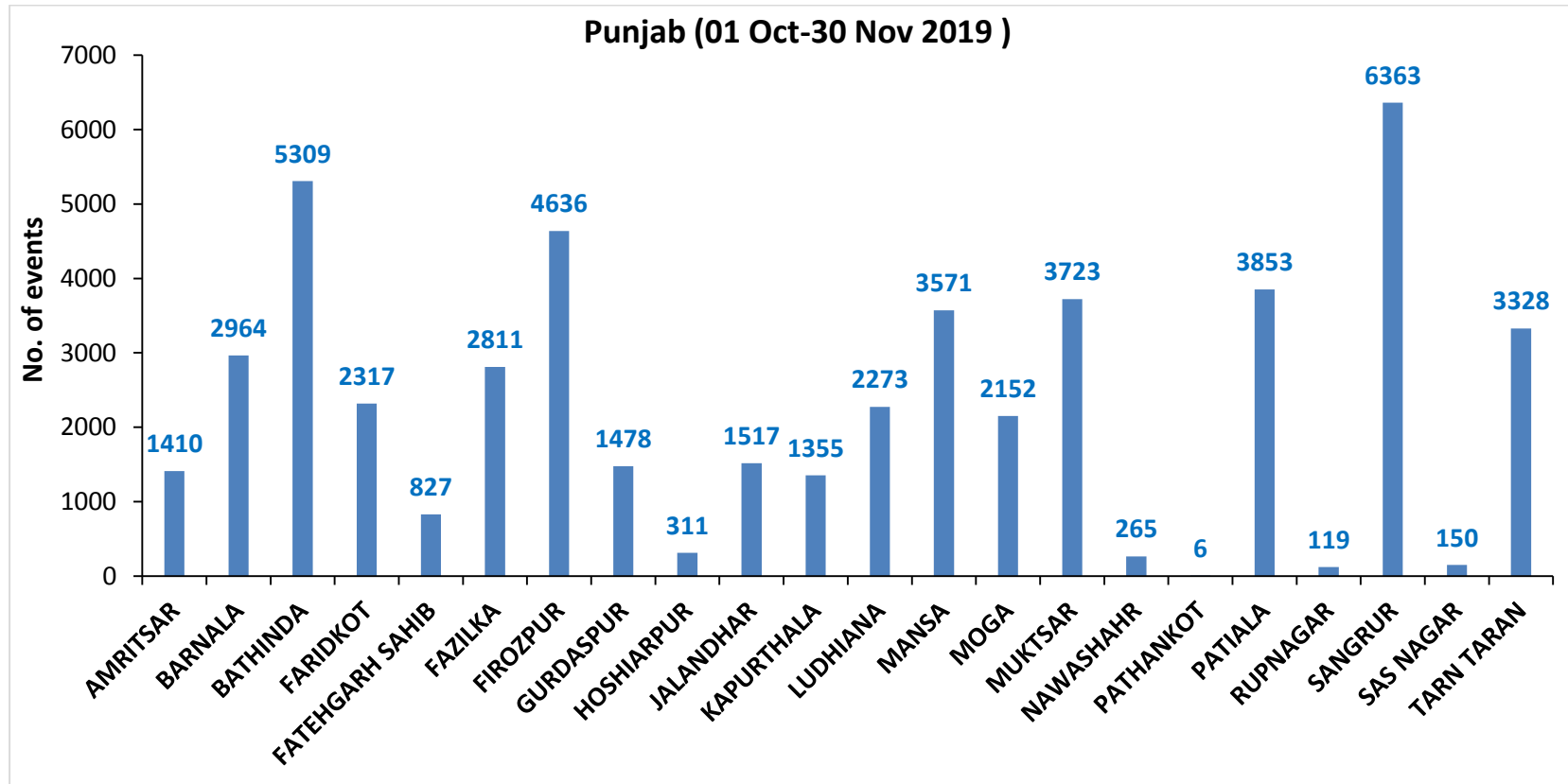
Fire Intensity (W/m²)

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



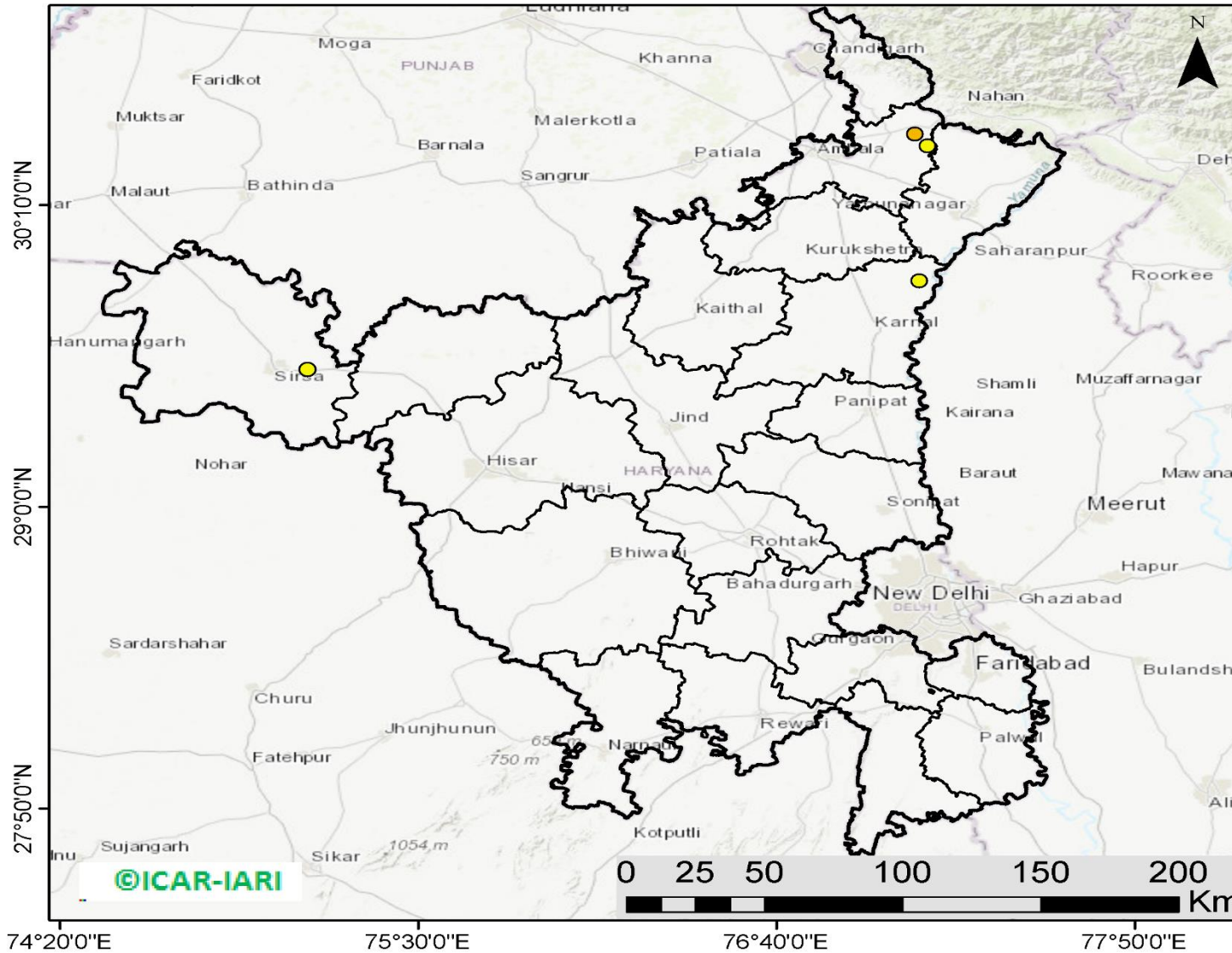
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Punjab (01 Oct to 30-Nov 2019)



(b) Haryana

RICE RESIDUE BURNING IN HARYANA



04 burning events detected in Haryana on 30th November 2019

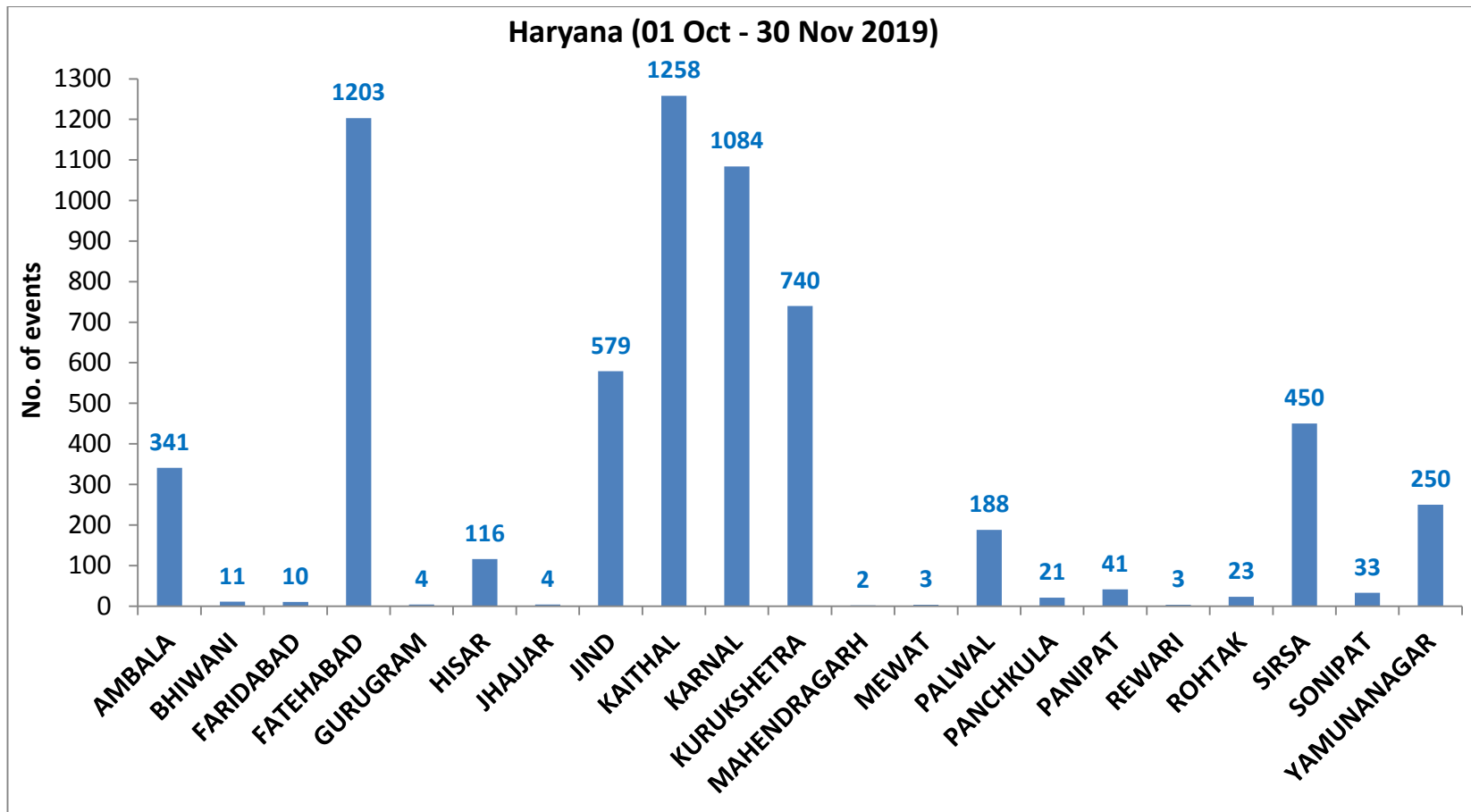
Fire Intensity (W/m²)

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



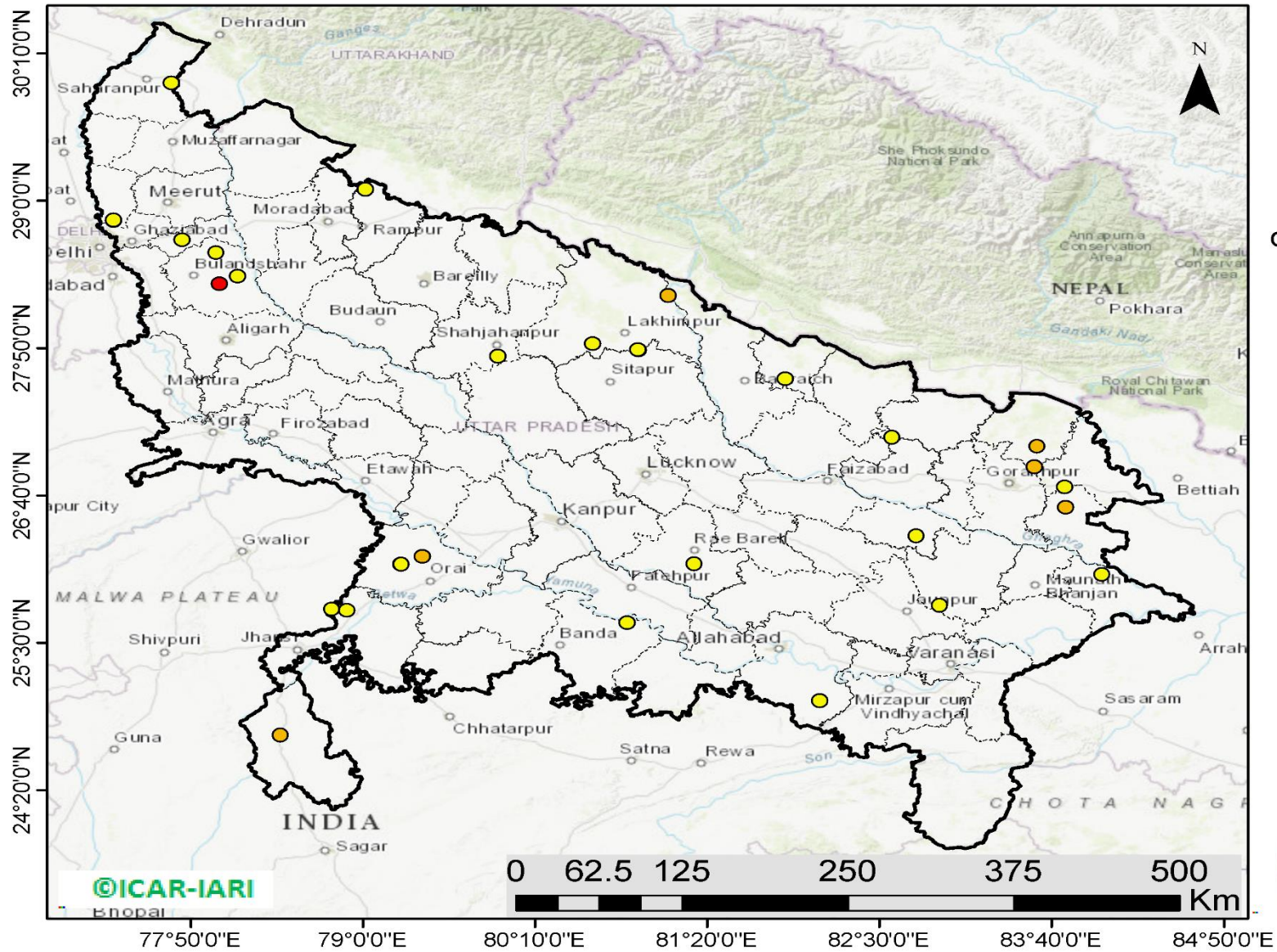
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Haryana (01 Oct to 30-Nov 2019)



(c) UP

RICE RESIDUE BURNING IN UTTAR PRADESH



34 burning events detected in Uttar Pradesh on 30th November 2019

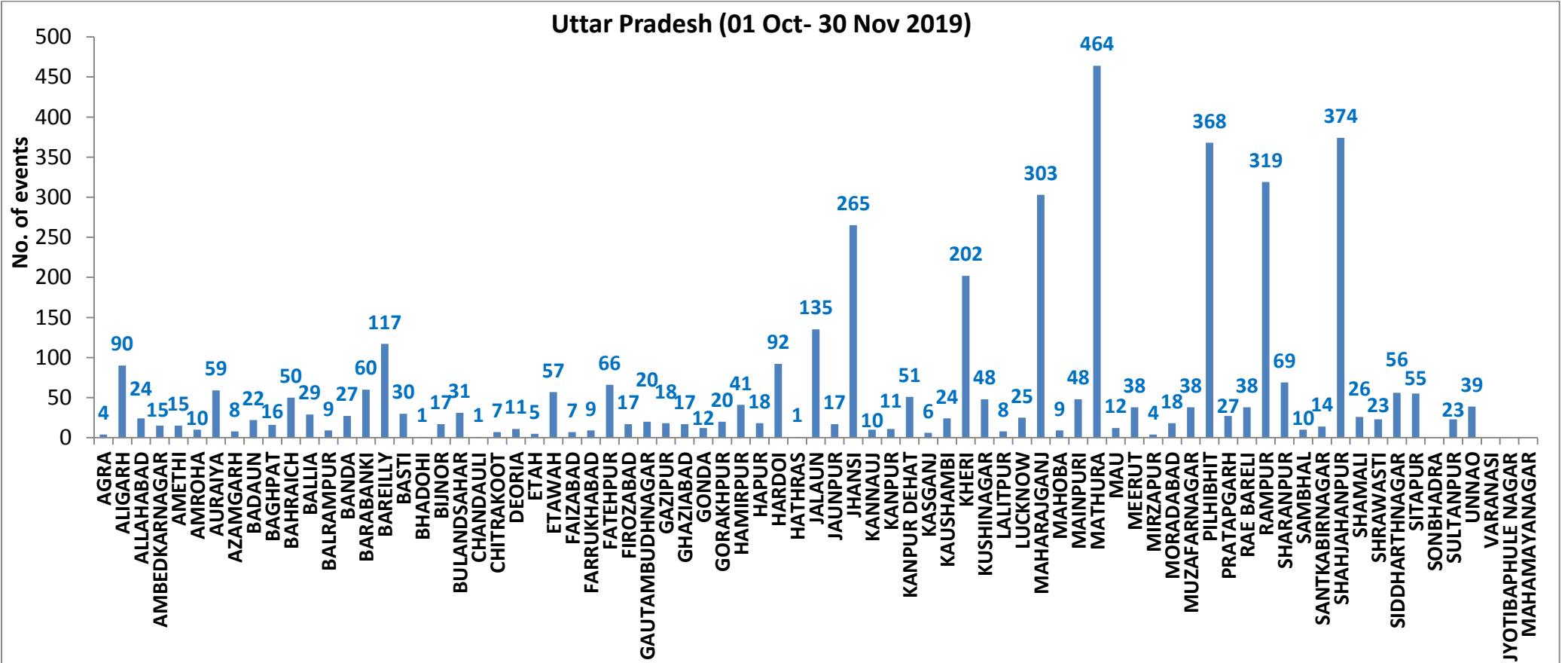
Fire Intensity (W/m²)

- 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 30-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 30-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
30-Nov	33	27	111	8	4	36	67	14	34	122	116	101	71	185	294	123
Total	50738	59684	67079	102379	6364	9225	13085	15686	4230	6623	8784	9709	61332	75532	88948	127774

(a) Punjab

Districts	01Oct-30 Nov			
	2016	2017	2018	2019
AMRITSAR	2171	1368	1399	1410
BARNALA	5701	3430	3279	2964
BATHINDA	8846	5783	6348	5309
FARIDKOT	4630	3472	3058	2317
FATEHGARH SAHIB	2461	1643	866	827
FAZILKA	0	0	0	2811
FIROZPUR	13645	9957	9993	4636
GURDASPUR	2221	1599	1172	1478
HOSHIARPUR	905	497	199	311
JALANDHAR	4663	2134	1395	1517
KAPURTHALA	3136	1627	751	1355
LUDHIANA	9546	4769	3052	2273
MANSA	5652	4506	4317	3571
MOGA	6393	2786	2730	2152
MUKTSAR	7037	5458	5786	3723
NAWASHAHR (SBS Nagar)	1615	830	399	265
PATHANKOT	0	0	0	6
PATIALA	6546	5034	4215	3853
RUPNAGAR	719	329	91	119
SANGRUR	11862	8430	7782	6363
SAS NAGAR	117	107	104	150
TARN TARAN	4513	3320	2748	3328
Total	102379	67079	59684	50738

(b) Haryana

Districts	01Oct-30 Nov			
	2016	2017	2018	2019
AMBALA	538	504	333	341
BHIWANI	93	49	22	11
FARIDABAD	288	343	187	10
FATEHABAD	4833	3749	2554	1203
GURUGRAM	0	0	0	4
HISAR	416	195	214	116
JHAJJAR	43	19	35	4
JIND	862	946	889	579
KAITHAL	1748	1513	1292	1258
KARNAL	1640	1514	857	1084
KURUKSHETRA	1080	1152	682	740
MAHENDRAGARH	0	0	0	2
MEWAT	0	0	0	3
PALWAL	0	0	0	188
PANCHKULA	0	0	3	21
PANIPAT	102	110	61	41
REWARI	0	0	0	3
ROHTAK	103	100	53	23
SIRSA	3580	2479	1790	450
SONIPAT	102	87	45	33
YAMUNANAGAR	258	325	208	250
Total	15686	13085	9225	6364

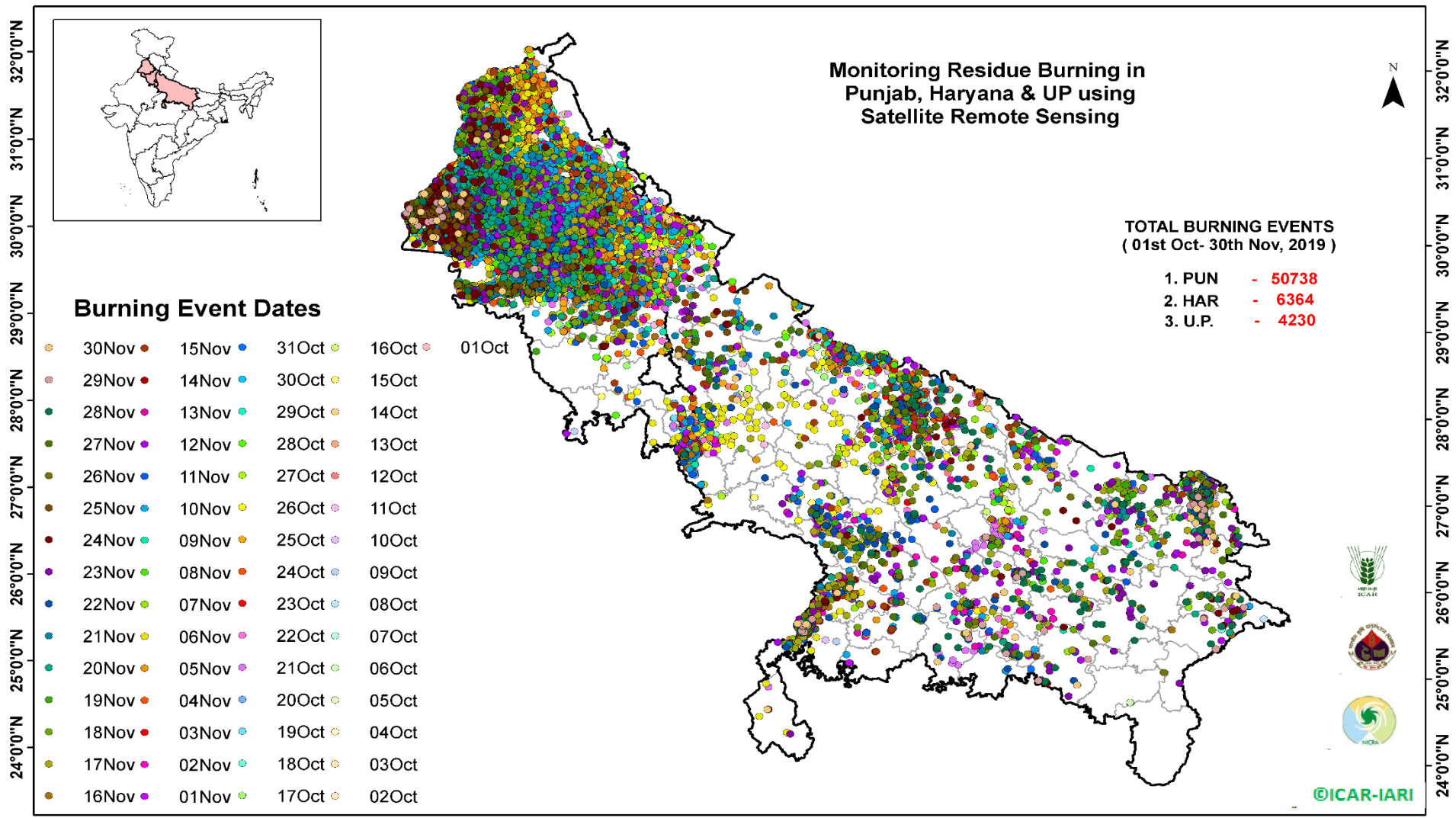
(c) Uttar Pradesh

Districts	01Oct-30 Nov			
	2016	2017	2018	2019
AGRA	0	0	0	4
ALIGARH	60	83	95	90
ALLAHABAD	8	20	22	24
AMBEDKARNAGAR	80	71	36	15
AMETHI	0	0	0	15
AMROHA	0	0	0	10
AURAIYA	291	263	79	59
AZAMGARH	38	58	38	8
BADAUN	15	14	15	22
BAGHPAT	0	0	0	16
BAHRAICH	85	42	60	50
BALLIA	19	48	35	29
BALRAMPUR	39	28	46	9
BANDA	2	23	13	27
BARABANKI	222	168	175	60
BAREILLY	271	240	126	117
BASTI	147	187	127	30
BHADOHI	0	0	0	1
BIJNOR	88	79	25	17
BULANDSAHAR	39	41	30	31
CHANDAULI	22	28	6	1
CHITRAKOOT	0	0	0	7
DEORIA	62	86	82	11
ETAH	24	33	28	5
ETAWAH	189	148	77	57
FAIZABAD	20	16	13	7
FARRUKHABAD	0	0	0	9
FATEHPUR	90	76	95	66
FIROZABAD	23	18	11	17

GAUTAMBUDHNAGAR	33	48	13	20
GAZIPUR	16	27	33	18
GHAZIABAD	102	73	49	17
GONDA	52	39	23	12
GORAKHPUR	67	115	142	20
HAMIRPUR	0	0	1	41
HAPUR	0	0	0	18
HARDOI	260	211	117	92
HATHRAS	0	0	0	1
JALAUN	0	0	0	135
JAUNPUR	27	46	28	17
JHANSI	0	0	2	265
KANNAUJ	35	20	8	10
KANPUR	20	14	13	11
KANPUR DEHAT	75	76	30	51
KASGANJ	0	0	0	6
KAUSHAMBI	37	60	53	24
KHERI	525	371	254	202
KUSHINAGAR	70	157	179	48
LALITPUR	0	0	0	8
LUCKNOW	64	30	26	25
MAHARAJGANJ	744	1029	1092	303
MAHOBA	0	0	0	9
MAINPURI	97	97	62	48
MATHURA	1463	1083	1049	464
MAU	15	24	25	12
MEERUT	123	128	40	38
MIRZAPUR	6	24	10	4
MORADABAD	69	48	21	18
MUZAFARNAGAR	192	202	76	38
PILHIBHIT	970	752	439	368
PRATAPGARH	47	65	45	27

RAE BARELI	120	153	80	38
RAMPUR	640	667	230	319
SHARANPUR	144	166	85	69
SAMBHAL	0	0	0	10
SANTKABIRNAGAR	56	65	56	14
SHAHJAHANPUR	1163	718	398	374
SHAMALI	0	0	0	26
SHRAWASTI	39	32	37	23
SIDDHARTHANAGAR	266	188	477	56
SITAPUR	152	88	48	55
SONBHADRA	17	20	14	0
SULTANPUR	82	93	71	23
UNNAO	68	60	41	39
VARANASI	2	0	0	0
JYOTIBAPHULE NAGAR	13	22	14	0
MAHAMAYANAGAR	4	3	8	0
Total	9709	8784	6623	4230

Map of Cumulative Burning Events (01 Oct – 30 Nov 2019)



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

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Details of residue burning events in Punjab on 30-Nov-2019

S. No.	District	Tehsil / Block	Satellite	Longitude	Latitude	Time (IST)	Day / Night	Fire Power (W/m ²)
1	FAZILKA	ABOHAR	S-NPP	74.29729	30.12102	14:06:00	D	9.50
2	FAZILKA	ABOHAR	S-NPP	74.25668	30.12677	14:06:00	D	3.30
3	FAZILKA	FAZILKA	S-NPP	74.00822	30.29750	14:06:00	D	3.00
4	FAZILKA	FAZILKA	S-NPP	74.02413	30.30364	14:06:00	D	6.20
5	FAZILKA	FAZILKA	S-NPP	74.02963	30.30415	14:06:00	D	6.20
6	FAZILKA	FAZILKA	S-NPP	74.00112	30.31086	14:06:00	D	6.00
7	FAZILKA	FAZILKA	S-NPP	74.29935	30.31921	14:06:00	D	4.20
8	FAZILKA	FAZILKA	S-NPP	74.09795	30.41154	14:06:00	D	4.70
9	FAZILKA	JALALABAD	AQUA	74.34400	30.51600	14:15:00	D	18.60
10	FAZILKA	JALALABAD	S-NPP	74.34643	30.52555	14:06:00	D	16.30
11	FAZILKA	JALALABAD	S-NPP	74.35221	30.52605	14:06:00	D	16.30
12	FAZILKA	JALALABAD	S-NPP	74.35167	30.53079	14:06:00	D	5.20
13	FAZILKA	JALALABAD	AQUA	74.10900	30.61100	14:15:00	D	18.90
14	FAZILKA	JALALABAD	AQUA	74.13200	30.61300	14:15:00	D	30.00
15	FAZILKA	JALALABAD	AQUA	74.14000	30.61400	14:15:00	D	15.40
16	FAZILKA	JALALABAD	S-NPP	74.13183	30.62165	14:06:00	D	12.90
17	FAZILKA	JALALABAD	S-NPP	74.39246	30.62556	14:06:00	D	18.30
18	FAZILKA	JALALABAD	S-NPP	74.39193	30.63031	14:06:00	D	6.20
19	JALANDHAR	JALANDHAR II	S-NPP	75.47002	31.31956	14:06:00	D	1.40
20	JALANDHAR	JALANDHAR II	S-NPP	75.47154	31.32204	14:06:00	D	1.80
21	KAPURTHALA	SULTANPUR LODHI	S-NPP	75.10010	31.28884	14:06:00	D	3.90
22	KAPURTHALA	SULTANPUR LODHI	S-NPP	75.10210	31.28930	14:06:00	D	3.60
23	MOGA	BAGHA PURANA	S-NPP	75.12244	30.55070	14:06:00	D	10.80
24	MOGA	BAGHA PURANA	S-NPP	75.12095	30.55116	14:06:00	D	14.90
25	MUKTSAR	GIDDARBAHA	S-NPP	74.57076	30.17939	14:06:00	D	4.20
26	MUKTSAR	GIDDARBAHA	AQUA	74.59200	30.37000	14:15:00	D	20.30
27	MUKTSAR	MUKTSAR	S-NPP	74.55567	30.39018	14:06:00	D	3.80
28	MUKTSAR	MUKTSAR	S-NPP	74.61941	30.63526	14:06:00	D	8.80
29	MUKTSAR	MUKTSAR	S-NPP	74.61438	30.63624	14:06:00	D	5.00
30	TARN TARAN	PATTI	S-NPP	74.75436	31.25481	14:06:00	D	4.20

31	TARN TARAN	PATTI	S-NPP	74.75814	31.25712	14:06:00	D	5.50
32	TARN TARAN	PATTI	S-NPP	74.75384	31.25970	14:06:00	D	4.80
33	TARN TARAN	PATTI	S-NPP	74.88004	31.31647	14:06:00	D	11.10

Details of residue burning events in Haryana on 30-Nov-2019

S. No.	District	Tehsil / Block	Satellite	Longitude	Latitude	Time (IST)	Day / Night	Fire Power (W/m ²)
1	AMBALA	NARAYANGARH	S-NPP	77.15832	30.39532	14:06:00	D	3.20
2	AMBALA	NARAYANGARH	S-NPP	77.11714	30.44103	14:06:00	D	5.60
3	KARNAL	INDRI	S-NPP	77.13156	29.87354	12:24:00	D	2.70
4	SIRSA	SIRSA	S-NPP	75.13927	29.53101	02:48:00	N	0.40

Details of residue burning events in Uttar Pradesh on 30-Nov-2019

S. No.	District	Tehsil / Block	Satellite	Longitude	Latitude	Time (IST)	Day / Night	Fire Power (W/m ²)
1	ALLAHABAD	KORAWN	S-NPP	82.09528	25.04228	01:12:00	N	1.20
2	AMBEDKARNAGAR	JALALPUR	S-NPP	82.75005	26.34573	12:24:00	D	3.30
3	AZAMGARH	LALGANJ	S-NPP	82.90862	25.79608	12:24:00	D	3.40
4	BAGHPAT	BAGHPAT	S-NPP	77.30959	28.84520	14:06:00	D	3.00
5	BAGHPAT	BAGHPAT	S-NPP	77.30929	28.84616	14:06:00	D	2.50
6	BAHRAICH	NANPARA	S-NPP	81.06779	28.24941	14:06:00	D	5.90
7	BALLIA	SIKANDARPUR	S-NPP	84.00795	26.03996	12:24:00	D	4.70
8	BANDA	BABERU	S-NPP	80.79009	25.65687	01:12:00	N	1.90
9	BANDA	NARAINI	S-NPP	80.45077	25.32733	01:12:00	N	0.20
10	BULANSAHAR	ANUP SHAHR	S-NPP	78.14953	28.40118	14:06:00	D	3.40
11	BULANSAHAR	SHIKARPUR	TERRA	78.02800	28.34100	11:05:00	D	20.40
12	BULANSAHAR	SIYANA	S-NPP	78.00614	28.58747	12:24:00	D	5.00
13	DEORIA	DEORIA	METOP-1	83.76176	26.57090	20:59:00	N	6.00
14	DEORIA	DEORIA	S-NPP	83.67073	26.66818	01:12:00	N	0.30
15	HAPUR	HAPUR	S-NPP	77.77560	28.69055	14:06:00	D	3.70
16	JALAUN	JALAUN	S-NPP	79.25817	26.12358	14:06:00	D	3.90
17	JALAUN	JALAUN	S-NPP	79.25883	26.12398	14:06:00	D	3.70
18	JALAUN	JALAUN	S-NPP	79.40282	26.18281	14:06:00	D	5.10
19	JHANSI	MOTH	S-NPP	78.89089	25.75708	01:12:00	N	0.50
20	JHANSI	MOTH	S-NPP	78.79003	25.76544	01:12:00	N	0.50
21	KHERI	LAKHIMPUR	S-NPP	80.55454	27.86759	12:24:00	D	2.60
22	KUSHINAGAR	HATA	S-NPP	83.75606	26.73128	01:12:00	N	0.50
23	LALITPUR	LALITPUR	TERRA	78.44100	24.76900	11:05:00	D	6.30
24	MAHARAJGANJ	MAHARAJGANJ	METOP-1	83.54823	26.89429	20:59:00	N	9.00
25	MAHARAJGANJ	MAHARAJGANJ	S-NPP	83.49378	26.95237	01:12:00	N	0.20
26	MAHARAJGANJ	MAHARAJGANJ	METOP-1	83.56764	27.05599	20:59:00	N	7.00
27	RAIBEARELI	RAEBARELI	S-NPP	81.24374	26.12577	12:24:00	D	3.10
28	RAMPUR	SUAR	S-NPP	79.01764	29.09047	14:06:00	D	4.90
29	SHAHJAHANPUR	SHAHJAHANPUR	S-NPP	79.91413	27.77069	12:24:00	D	1.80
30	SHARANPUR	SHARANPUR	S-NPP	77.70222	29.93279	14:06:00	D	2.10

31	SHRAWASTI	IKAUNA	S-NPP	81.86164	27.58948	12:24:00	D	1.10
32	SIDDHARTHANAGAR	DOMARIYAGANJ	S-NPP	82.58698	27.12669	12:24:00	D	2.70
33	SITAPUR	LAHARPUR	S-NPP	80.86440	27.81742	12:24:00	D	4.30
34	SITAPUR	LAHARPUR	S-NPP	80.86316	27.82098	12:24:00	D	4.40

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)
