



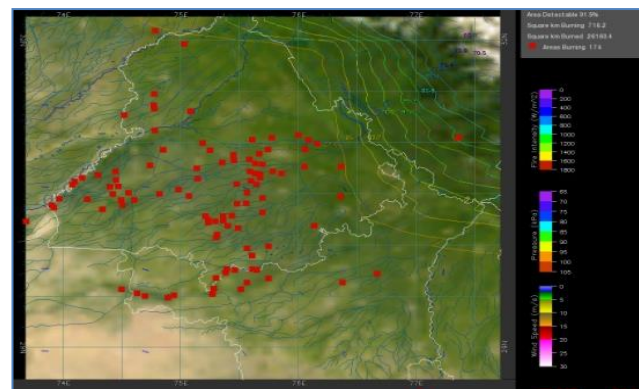
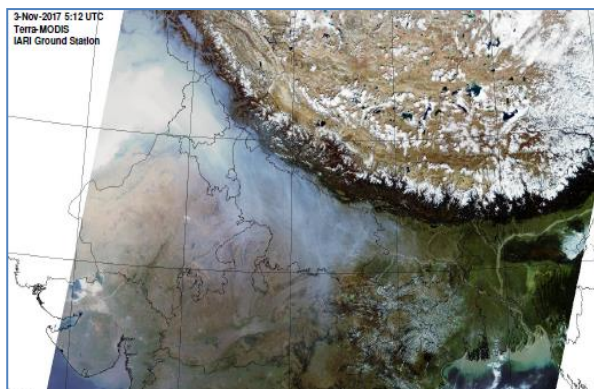
Bulletin No. 45

Events Date:
14-Nov-2019

Issued on:
15-Nov-2019



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



Prepared by:

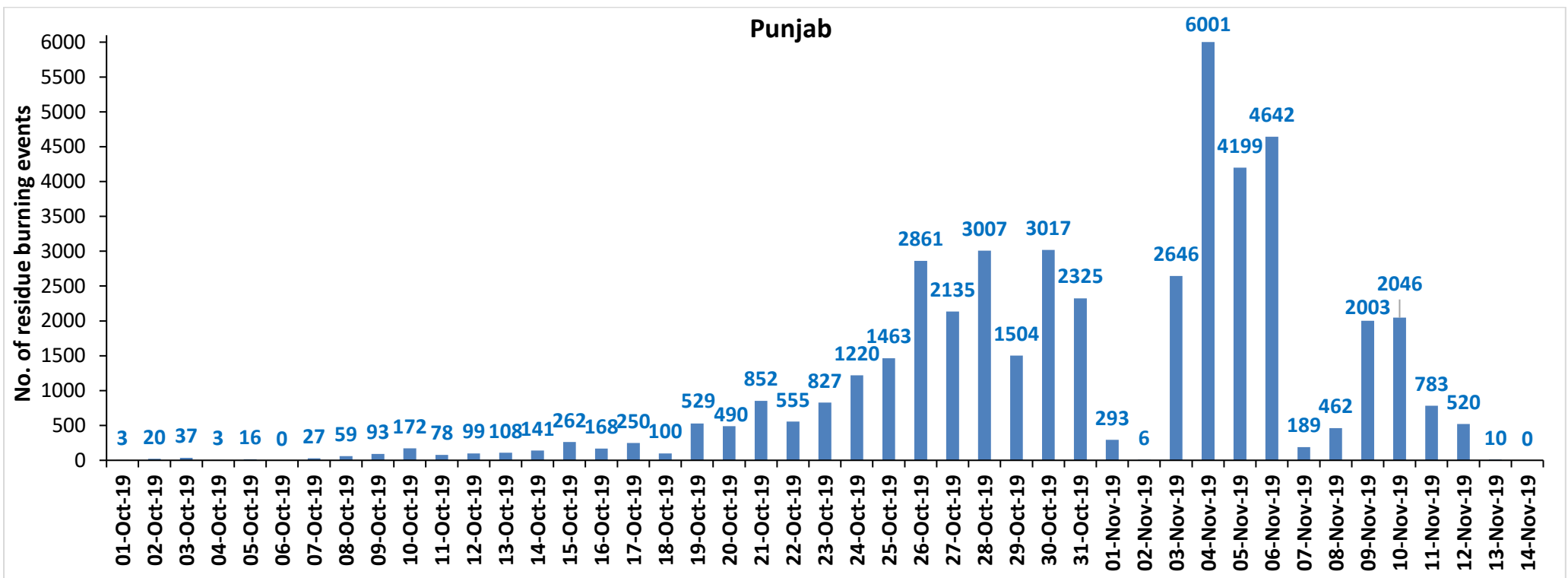
Consortium for Research on Agroecosystem Monitoring and Modeling from Space (CREAMS) Laboratory,
Division of Agricultural Physics, ICAR – Indian Agricultural Research Institute, New Delhi – 110012

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

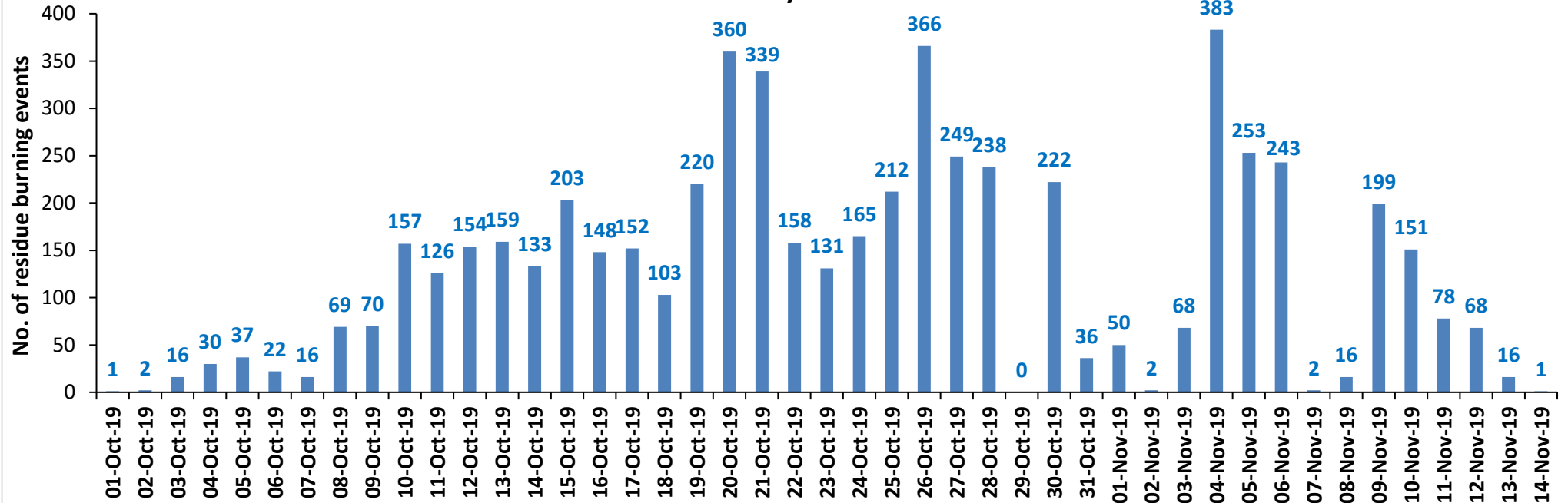
Highlights for 14-November-2019

- Satellites detected **23** residue burning events in the three study States on **14-Nov-2019**.
- The burning events detected on **14-Nov-2019** are **00**, **01** and **22** in Punjab, Haryana and UP, respectively.
- The state of Punjab, Haryana and UP were mostly covered with clouds which prevented fire event detection by satellites.
- The number of events has decreased from **105** on **13-Nov-2019** to **23** on **14-Nov-2019** in the three states.
- Total **54799** burning events were detected in the three States between **01-Oct-2019** and **14-Nov-2019**, which are distributed as **46221**, **5824** and **2754** in Punjab, Haryana and UP, respectively.
- Overall, the total burning events recorded in the three states are **13.9%** less than in 2018 till date. UP recorded **42.4%** reduction, Haryana recorded **18.5%** reduction, and Punjab recorded **10.6%** reduction, respectively, in the current season than in 2018.

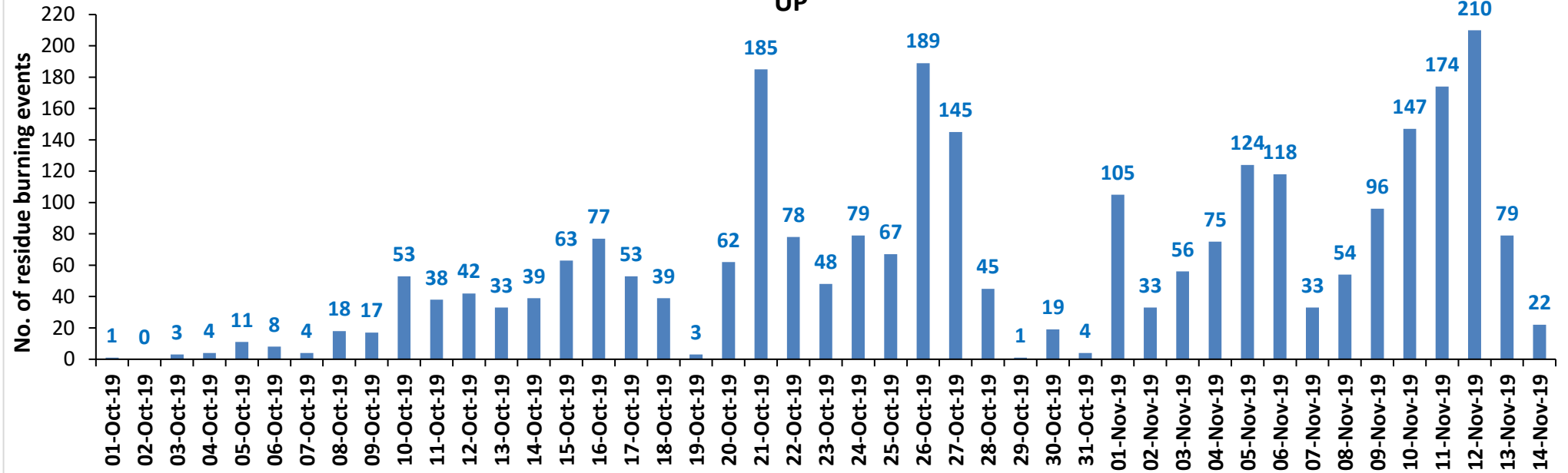
Temporal distribution of residue burning events for the three study States in 2019



Haryana



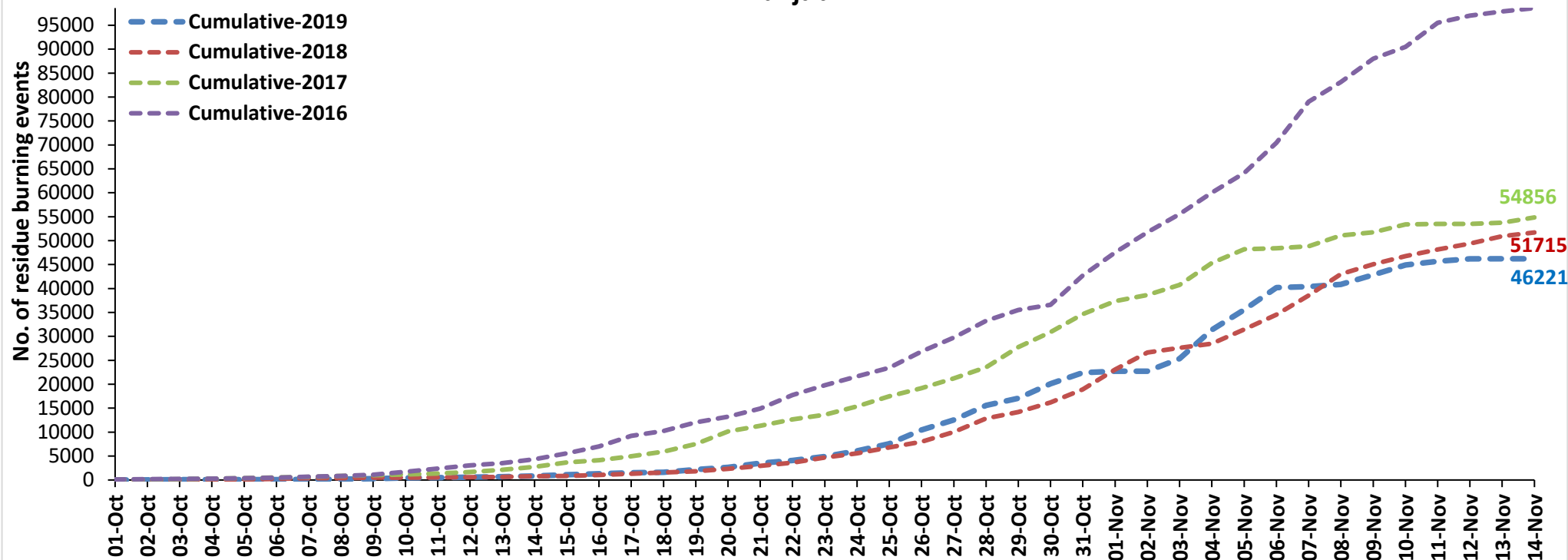
UP



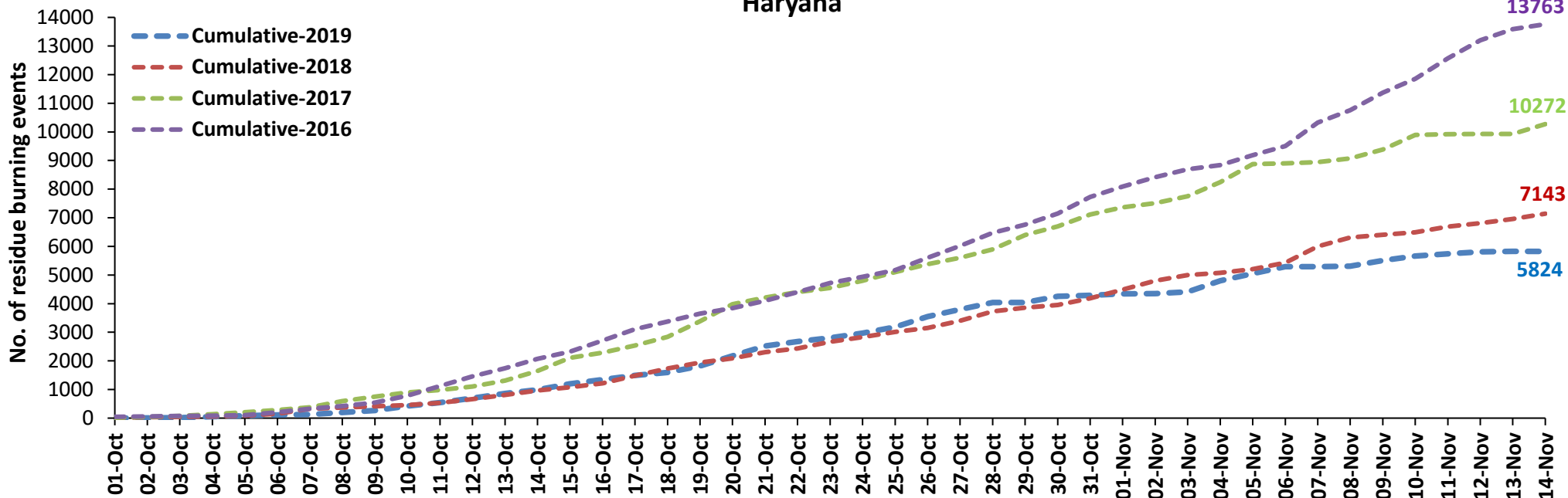
Comparison of residue burning events in current year (2019) with previous years (2018, 2017 & 2016) for the three study States

(01-Oct to 14-Nov)

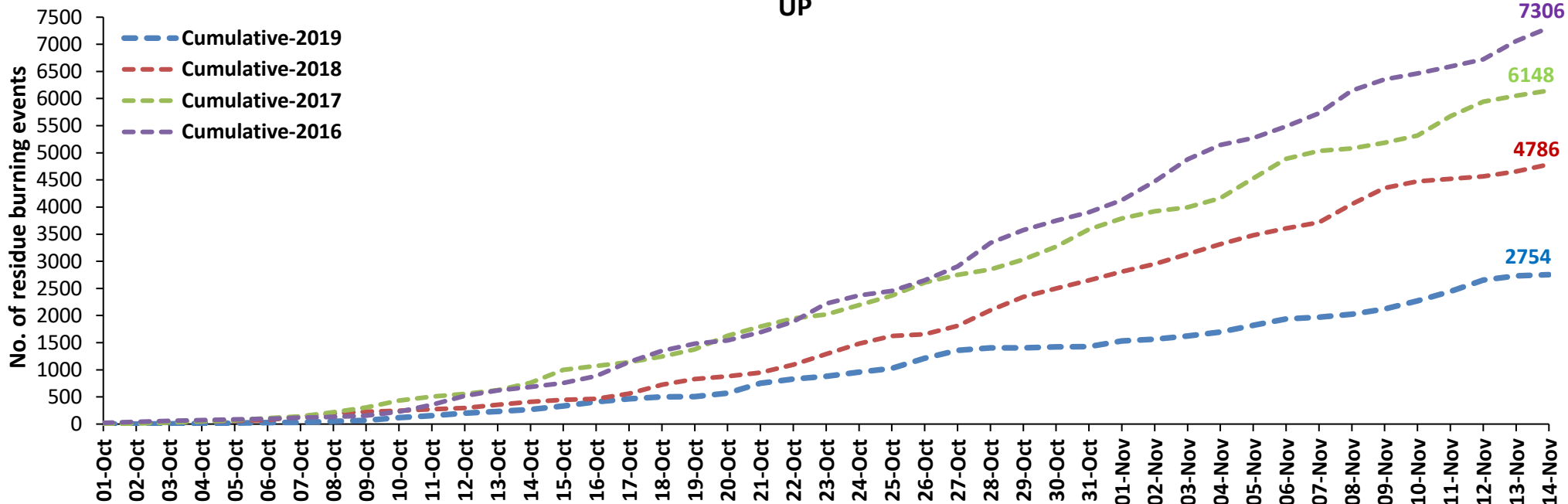
Punjab



Haryana

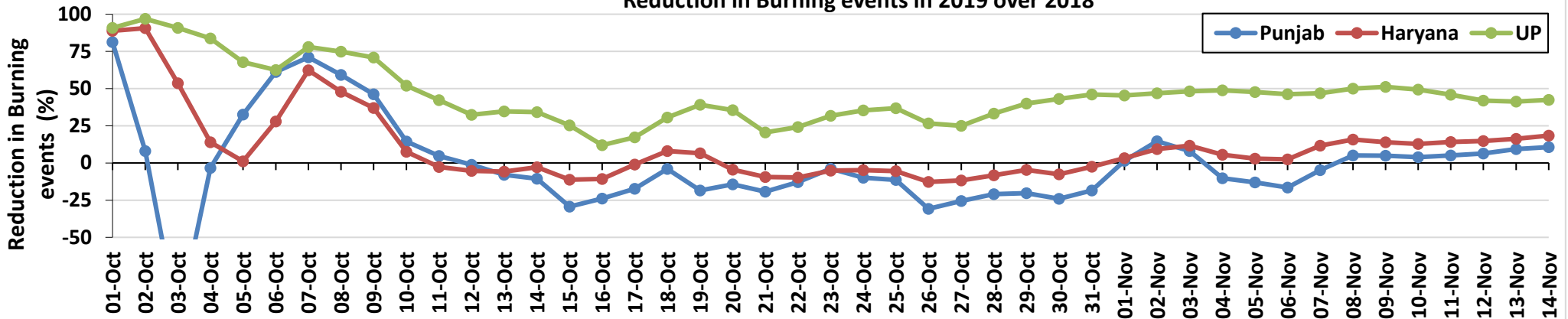


UP

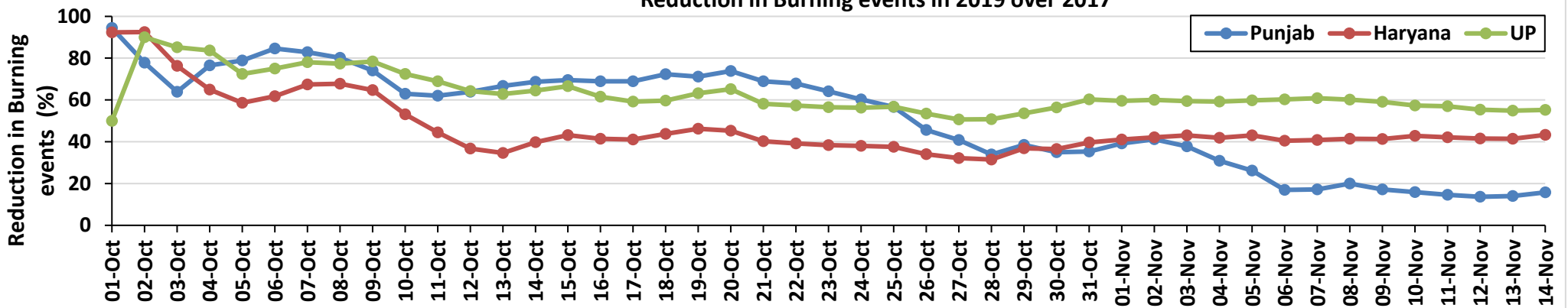


Percent Reduction in Burning events in 2019 over 2018, 2017 and 2016 (Daily Cumulative)

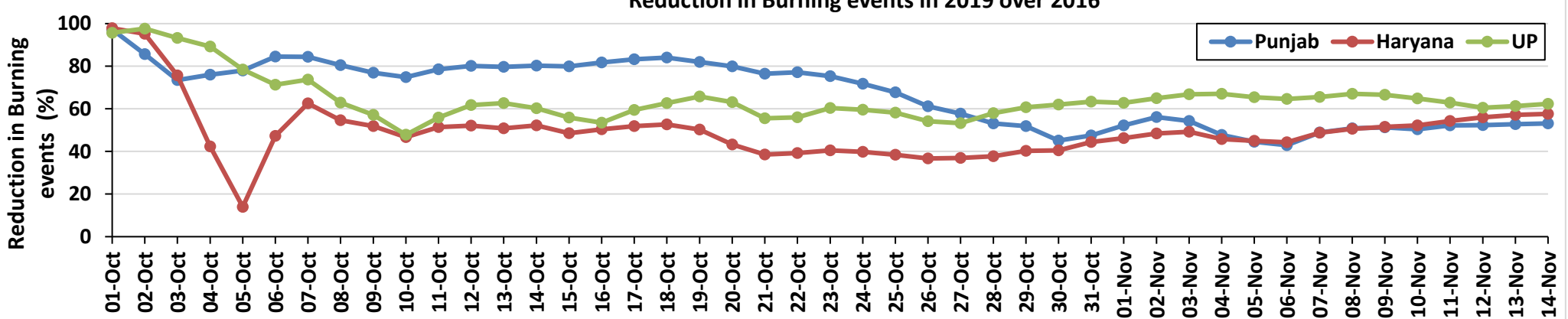
Reduction in Burning events in 2019 over 2018



Reduction in Burning events in 2019 over 2017

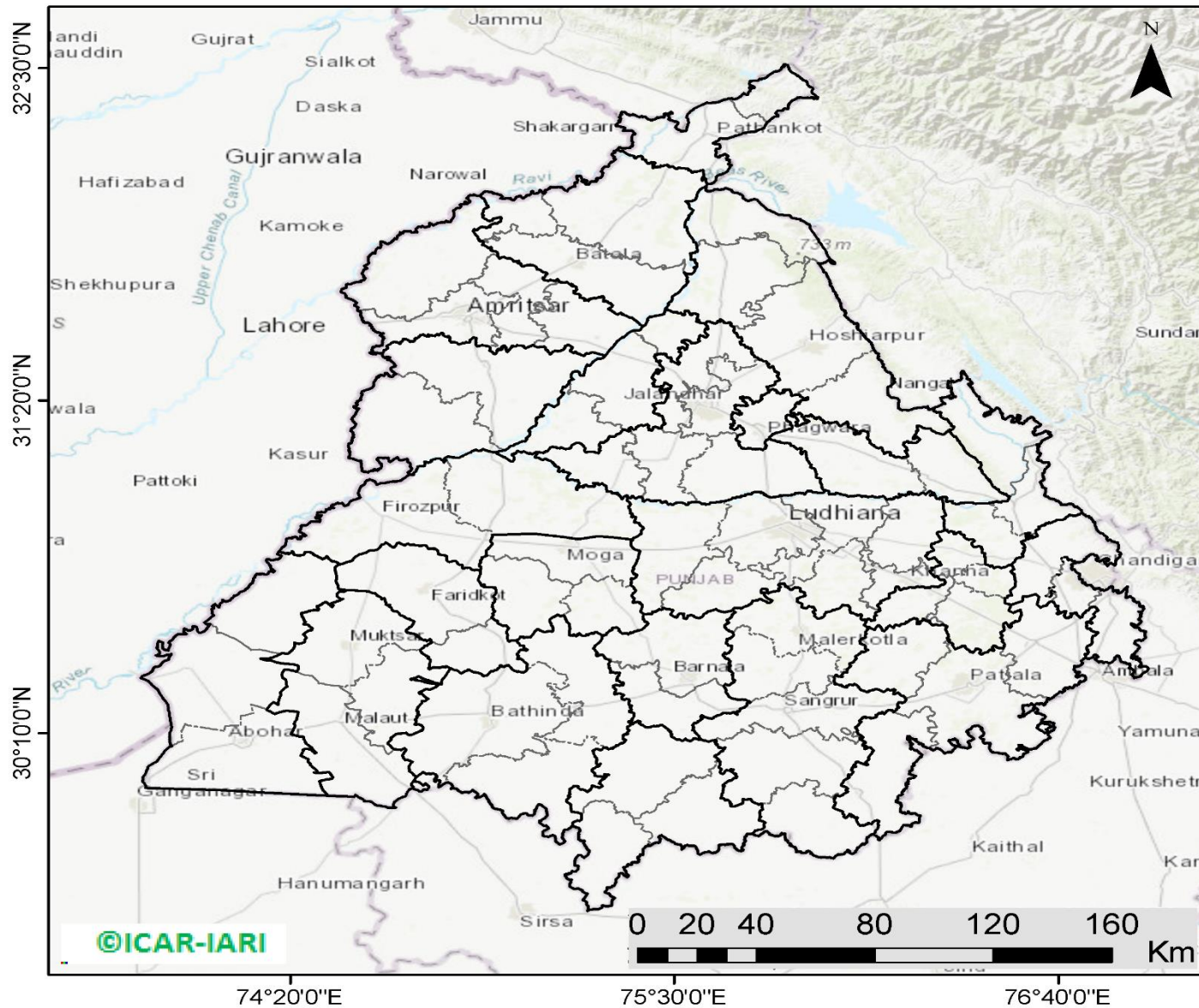


Reduction in Burning events in 2019 over 2016



(a) Punjab

RICE RESIDUE BURNING IN PUNJAB



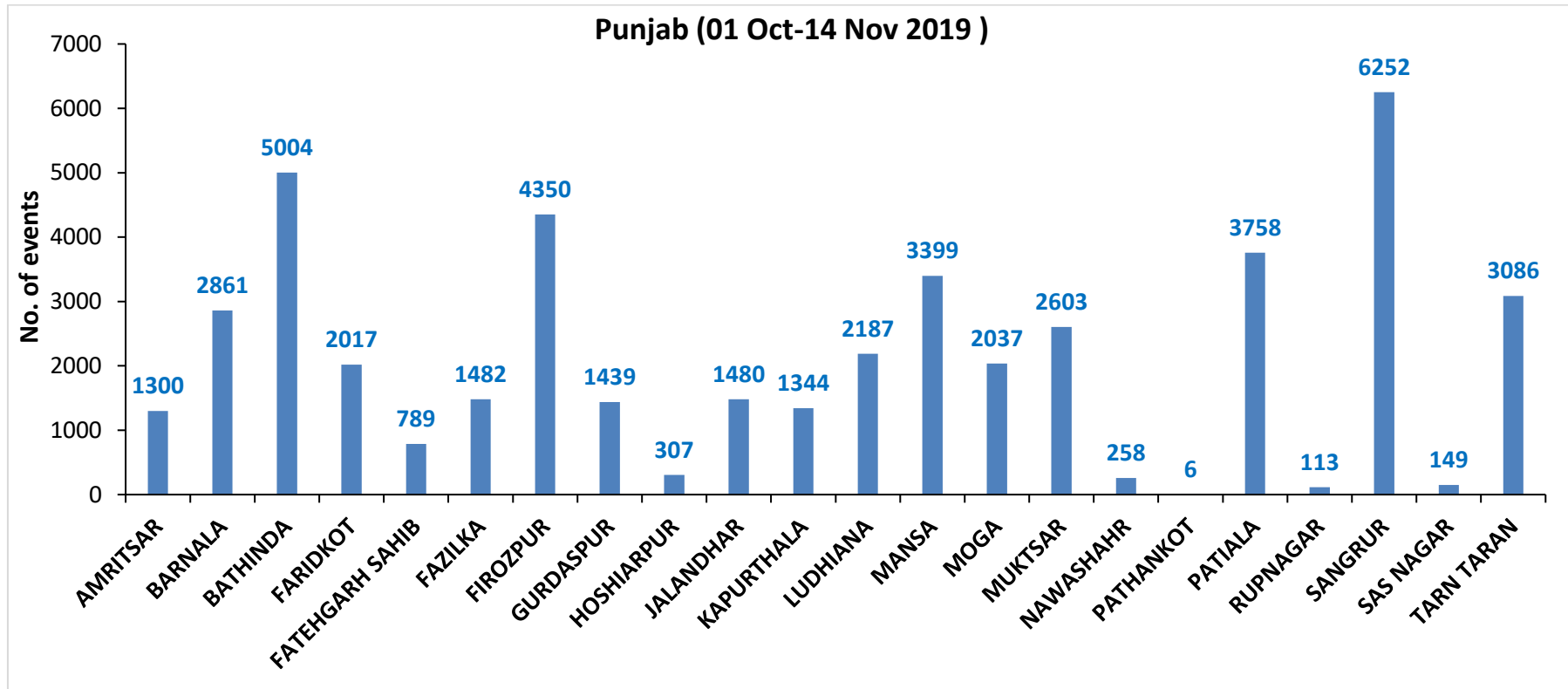
00 burning events detected in Punjab on 14th November 2019

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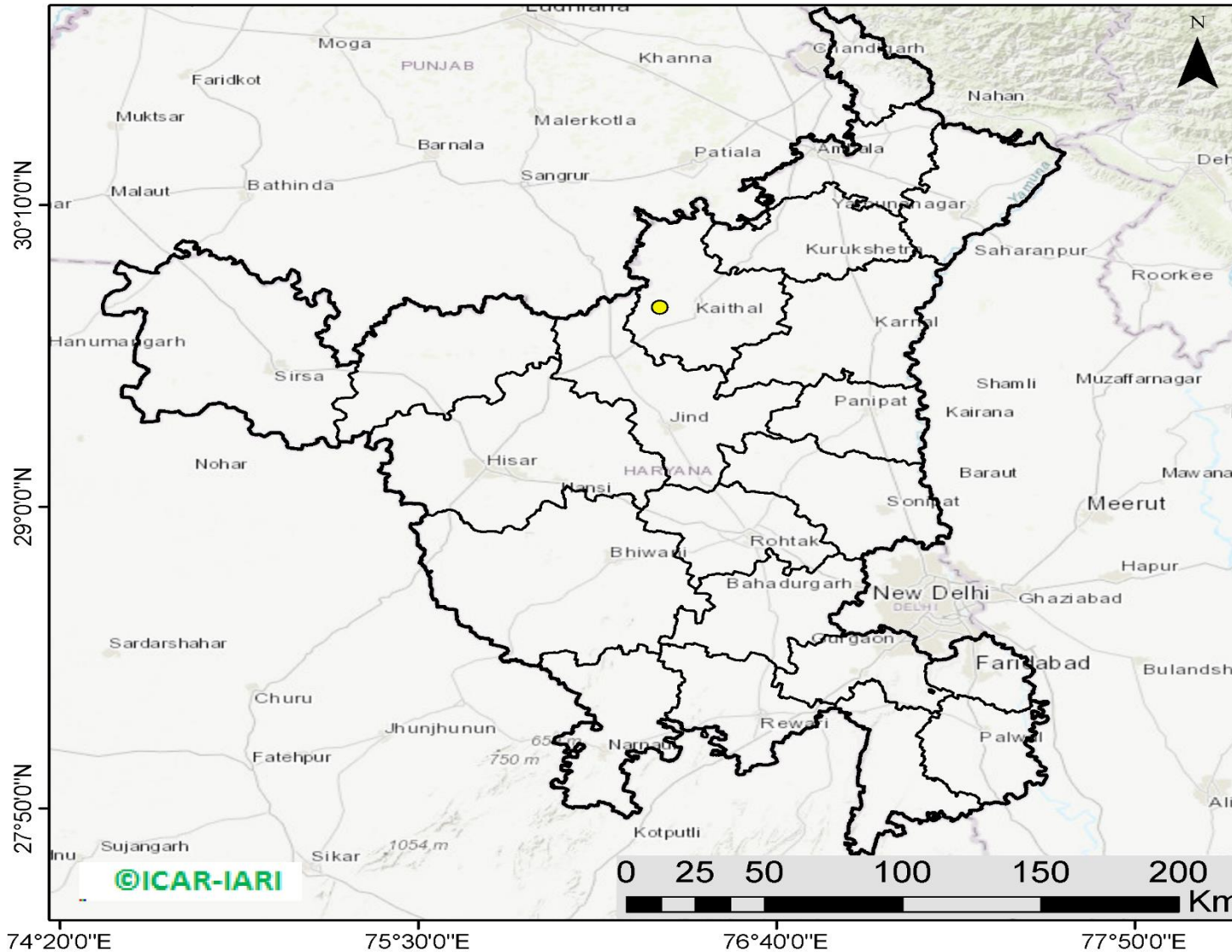
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Punjab (01 Oct to 14-Nov 2019)



(b) Haryana

RICE RESIDUE BURNING IN HARYANA



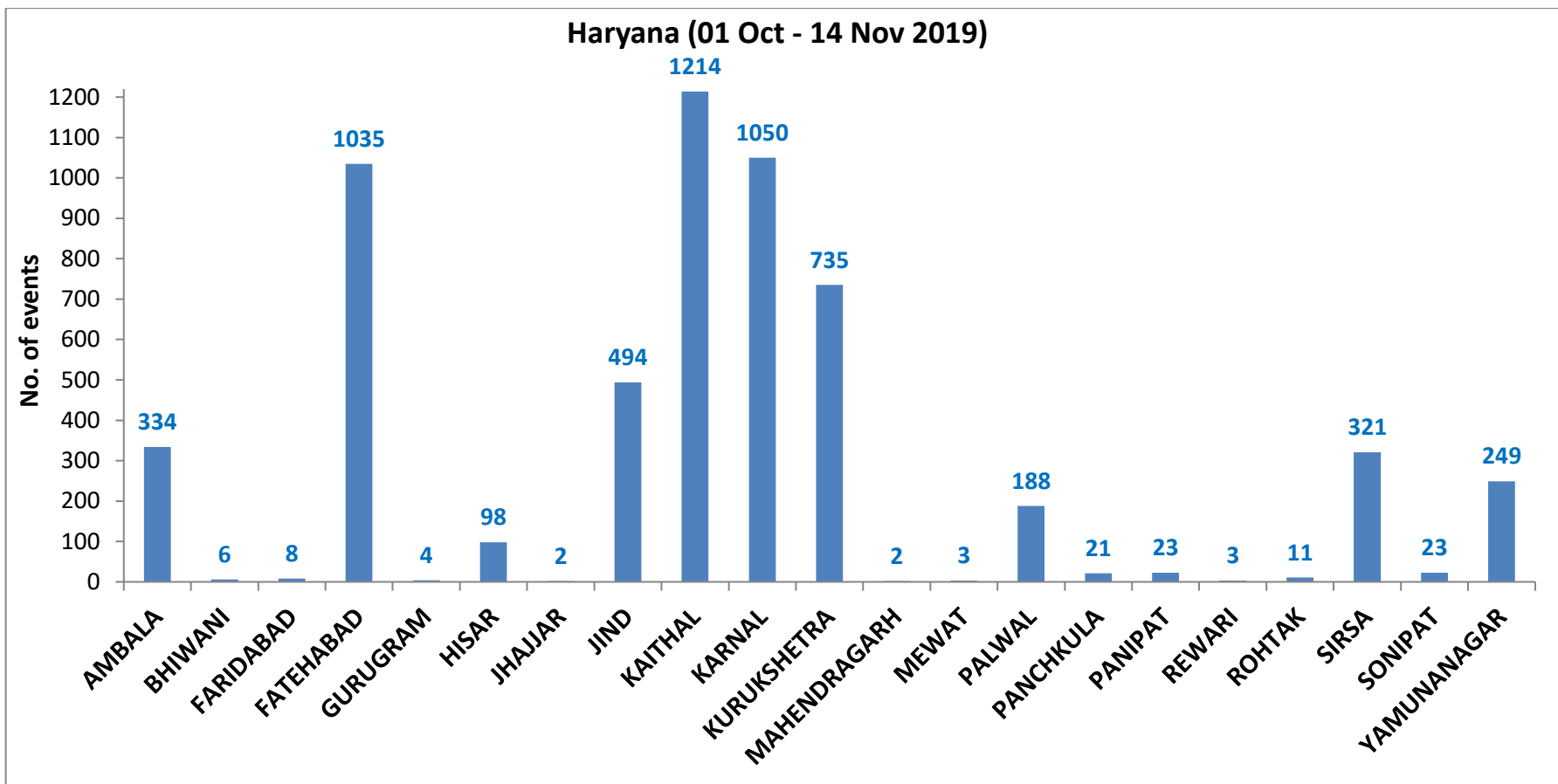
01 burning events
detected in Haryana on
14th November 2019

Fire Intensity (W/m²)

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

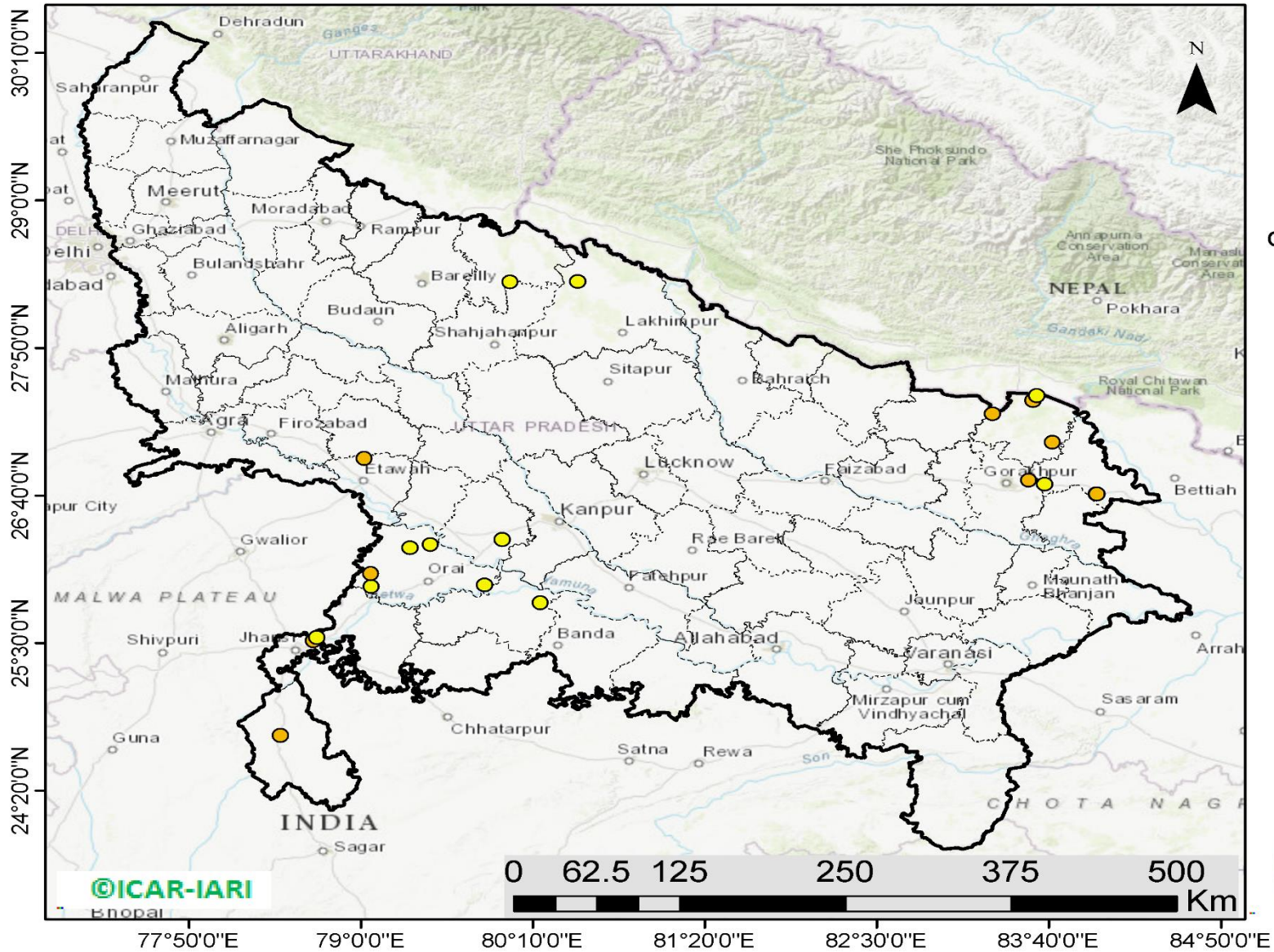


District-wise cumulative number of residues burning events in Haryana (01 Oct to 14-Nov 2019)



(c) UP

RICE RESIDUE BURNING IN UTTAR PRADESH



22 burning events detected in Uttar Pradesh on 14th November 2019

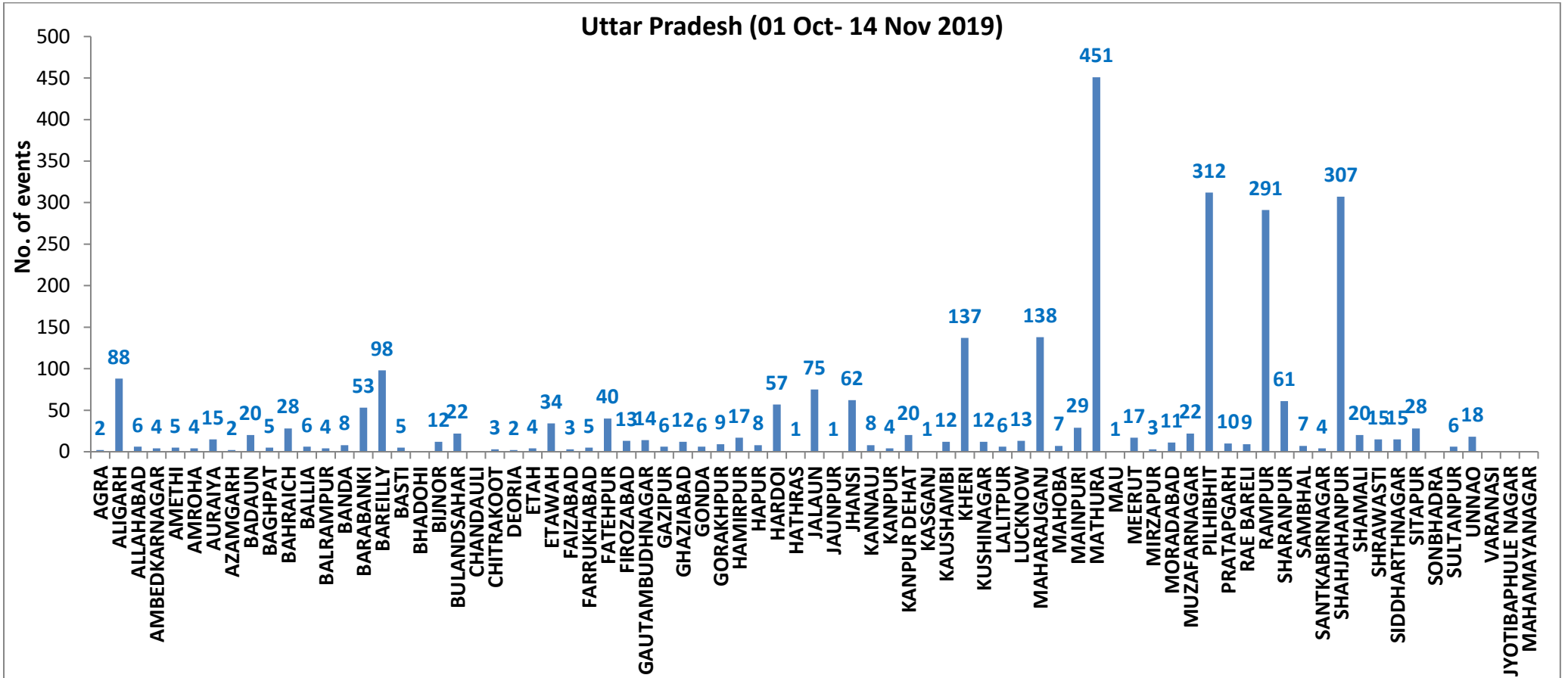
Fire Intensity (W/m²)

- 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 14-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 14-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
Total	46221	51715	54856	98584	5824	7143	10272	13763	2754	4786	6148	7306	54799	63644	71276	119653

(a) Punjab

Districts	01Oct-14 Nov			
	2016	2017	2018	2019
AMRITSAR	2028	1205	1133	1300
BARNALA	5595	2790	2812	2861
BATHINDA	8606	4750	5564	5004
FARIDKOT	4541	2862	2630	2017
FATEHGARH SAHIB	2440	1605	822	789
FAZILKA	0	0	0	1482
FIROZPUR	12515	5606	7933	4350
GURDASPUR	2132	1507	1090	1439
HOSHIARPUR	891	475	187	307
JALANDHAR	4596	1987	1263	1480
KAPURTHALA	3111	1526	707	1344
LUDHIANA	9121	3978	2223	2187
MANSA	5402	4082	3899	3399
MOGA	6331	1986	2221	2037
MUKTSAR	6420	3433	4713	2603
NAWASHAHR (SBS Nagar)	1571	792	337	258
PATHANKOT	0	0	0	6
PATIALA	6524	5004	4107	3758
RUPNAGAR	706	326	76	113
SANGRUR	11773	8221	7476	6252
SAS NAGAR	114	107	104	149
TARN TARAN	4167	2614	2418	3086
Total	98584	54856	51715	46221

(b) Haryana

Districts	01Oct-14 Nov			
	2016	2017	2018	2019
AMBALA	527	489	320	334
BHIWANI	54	25	13	6
FARIDABAD	278	341	183	8
FATEHABAD	4358	2949	1855	1035
GURUGRAM	0	0	0	4
HISAR	325	160	123	98
JHAJJAR	22	12	14	2
JIND	811	889	696	494
KAITHAL	1732	1484	1247	1214
KARNAL	1616	1479	827	1050
KURUKSHETRA	1074	1141	677	735
MAHENDRAGARH	0	0	0	2
MEWAT	0	0	0	3
PALWAL	0	0	0	188
PANCHKULA	0	0	3	21
PANIPAT	70	69	51	23
REWARI	0	0	0	3
ROHTAK	72	50	11	11
SIRSA	2516	827	917	321
SONIPAT	69	53	28	23
YAMUNANAGAR	239	304	178	249
Total	13763	10272	7143	5824

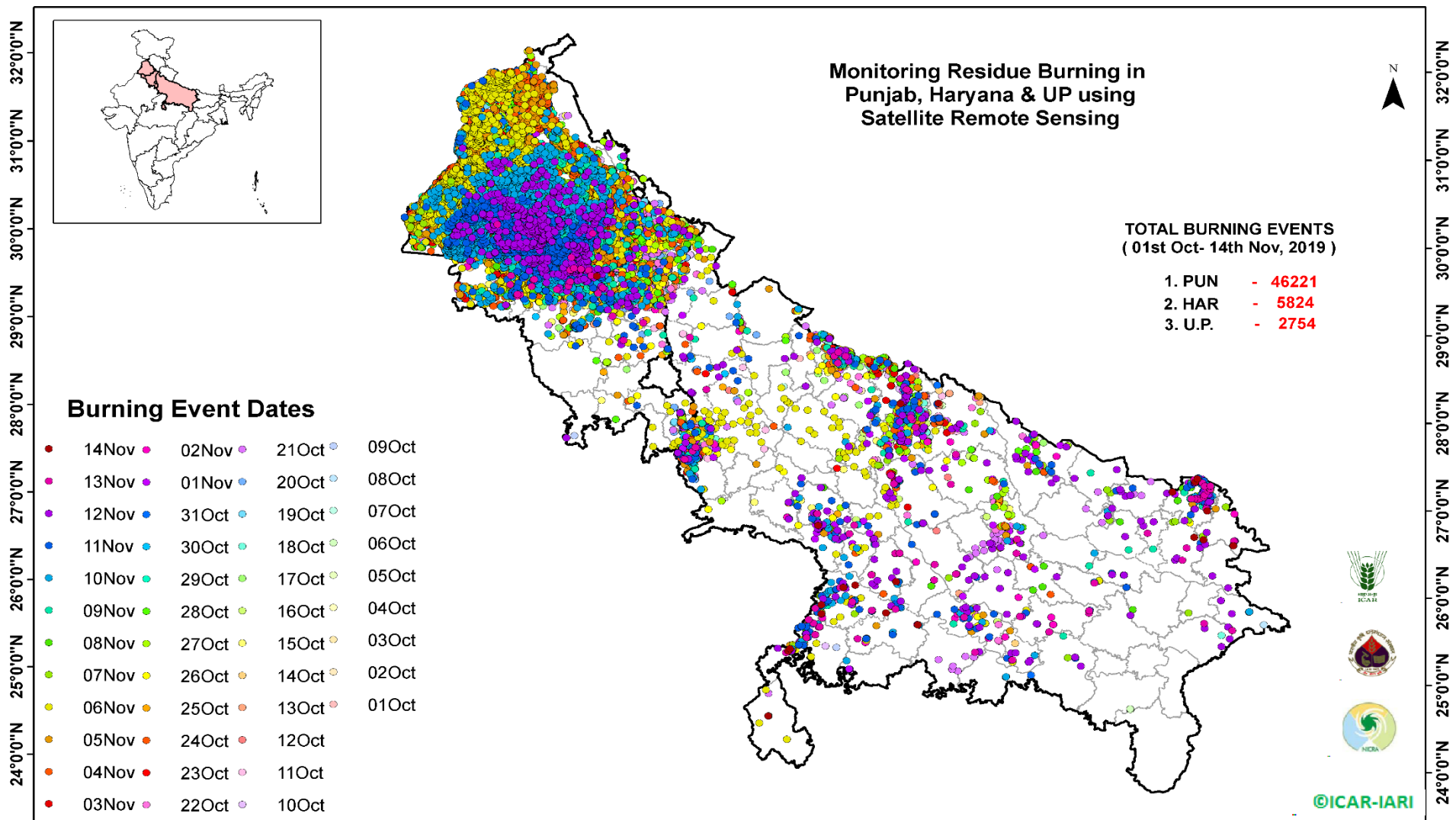
(c) Uttar Pradesh

Districts	01Oct-14 Nov			
	2016	2017	2018	2019
AGRA	0	0	0	2
ALIGARH	48	73	87	88
ALLAHABAD	3	8	10	6
AMBEDKARNAGAR	55	24	10	4
AMETHI	0	0	0	5
AMROHA	0	0	0	4
AURAIYA	168	118	42	15
AZAMGARH	24	19	17	2
BADAUN	6	6	9	20
BAGHPAT	0	0	0	5
BAHRAICH	53	35	56	28
BALLIA	4	15	8	6
BALRAMPUR	25	24	35	4
BANDA	1	8	8	8
BARABANKI	202	137	164	53
BAREILLY	234	191	113	98
BASTI	104	166	85	5
BHADOHI	0	0	0	0
BIJNOR	38	30	6	12
BULANDSAHAR	15	28	12	22
CHANDAULI	2	0	0	0
CHITRAKOOT	0	0	0	3
DEORIA	33	34	39	2
ETAH	16	26	24	4
ETAWAH	69	65	32	34
FAIZABAD	10	6	7	3
FARRUKHABAD	0	0	0	5
FATEHPUR	43	32	64	40
FIROZABAD	22	15	9	13

GAUTAMBUDHNAGAR	20	33	11	14
GAZIPUR	13	7	4	6
GHAZIABAD	54	33	23	12
GONDA	40	30	17	6
GORAKHPUR	42	58	54	9
HAMIRPUR	0	0	1	17
HAPUR	0	0	0	8
HARDOI	225	173	104	57
HATHRAS	0	0	0	1
JALAUN	0	0	0	75
JAUNPUR	9	6	13	1
JHANSI	0	0	2	62
KANNAUJ	19	12	6	8
KANPUR	9	6	8	4
KANPUR DEHAT	22	33	14	20
KASGANJ	0	0	0	1
KAUSHAMBI	14	27	32	12
KHERI	377	230	168	137
KUSHINAGAR	21	42	59	12
LALITPUR	0	0	0	6
LUCKNOW	53	29	26	13
MAHARAJGANJ	297	594	619	138
MAHOBA	0	0	0	7
MAINPURI	58	69	41	29
MATHURA	1418	1082	1046	451
MAU	9	5	8	1
MEERUT	49	48	12	17
MIRZAPUR	2	10	5	3
MORADABAD	37	26	11	11
MUZAFARNAGAR	101	96	29	22
PILHIBHIT	905	670	410	312
PRATAPGARH	24	25	20	10

RAE BARELI	43	29	29	9
RAMPUR	608	601	218	291
SHARANPUR	73	93	48	61
SAMBHAL	0	0	0	7
SANTKABIRNAGAR	48	54	38	4
SHAHJAHANPUR	1116	670	354	307
SHAMALI	0	0	0	20
SHRAWASTI	30	29	33	15
SIDDHARTHANAGAR	185	145	388	15
SITAPUR	102	57	33	28
SONBHADRA	12	9	9	0
SULTANPUR	38	15	15	6
UNNAO	48	30	32	18
VARANASI	1	0	0	0
JYOTIBAPHULE NAGAR	7	10	3	0
MAHAMAYANAGAR	2	2	6	0
Total	7306	6148	4786	2754

Map of Cumulative Burning Events (01 Oct – 14 Nov 2019)



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

Details of residue burning events in Haryana on 14-Nov-2019

S. No.	District	Tehsil / Block	Satellite	Longitude	Latitude	Time (IST)	Day / Night	Fire Power (W/m ²)
1	KAITHAL	KAITHAL	S-NPP	76.28737	29.77061	14:06:00	D	2.40

Details of residue burning events in Uttar Pradesh on 14-Nov-2019

S. No.	District	Tehsil / Block	Satellite	Longitude	Latitude	Time (IST)	Day / Night	Fire Power (W/m ²)
1	GORAKHPUR	GORAKHPUR	S-NPP	83.52943	26.78676	12:24:00	D	8.90
2	HAMIRPUR	HAMIRPUR	S-NPP	80.21695	25.82026	12:24:00	D	2.60
3	JALAUN	JALAUN	S-NPP	79.47023	26.27588	14:06:00	D	4.00
4	JALAUN	KALPI	S-NPP	79.83742	25.95790	12:24:00	D	2.70
5	JALAUN	KONCH	S-NPP	79.07078	25.94524	14:06:00	D	5.00
6	JALAUN	KONCH	S-NPP	79.07113	25.94675	14:06:00	D	4.00
7	JALAUN	KONCH	S-NPP	79.06797	26.04872	12:24:00	D	7.40
8	JALAUN	MADHOGARH	S-NPP	79.33175	26.25107	12:24:00	D	2.60
9	JHANSI	JHANSI	S-NPP	78.67954	25.51791	14:06:00	D	5.10
10	JHANSI	JHANSI	S-NPP	78.70027	25.54303	14:06:00	D	4.40
11	KANPUR DEHAT	AKBARPUR	S-NPP	79.96005	26.31731	12:24:00	D	2.50
12	KHERI	PALIA KALAN	S-NPP	80.47103	28.35868	12:24:00	D	3.20
13	KUSHINAGAR	HATA	S-NPP	83.63845	26.75475	12:24:00	D	4.90
14	KUSHINAGAR	KASAYA	S-NPP	83.98969	26.67798	12:24:00	D	8.00
15	KUSHINAGAR	KASAYA	S-NPP	83.99184	26.67803	12:24:00	D	6.70
16	LALITPUR	LALITPUR	TERRA	78.45400	24.76900	11:05:00	D	8.10
17	MAHARAJGANJ	MAHARAJGANJ	S-NPP	83.69268	27.08522	12:24:00	D	9.20
18	MAHARAJGANJ	NAUTANWA	S-NPP	83.55845	27.41971	12:24:00	D	8.00
19	MAHARAJGANJ	NAUTANWA	S-NPP	83.58549	27.45562	12:24:00	D	3.30
20	MAHARAJGANJ	PHARENDA	S-NPP	83.28270	27.31125	12:24:00	D	5.40
21	MAINPURI	KARHAL	S-NPP	79.02270	26.95966	14:06:00	D	8.50
22	SHAHJAHANPUR	PUWANYA	S-NPP	80.01185	28.35556	12:24:00	D	3.40

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)
