



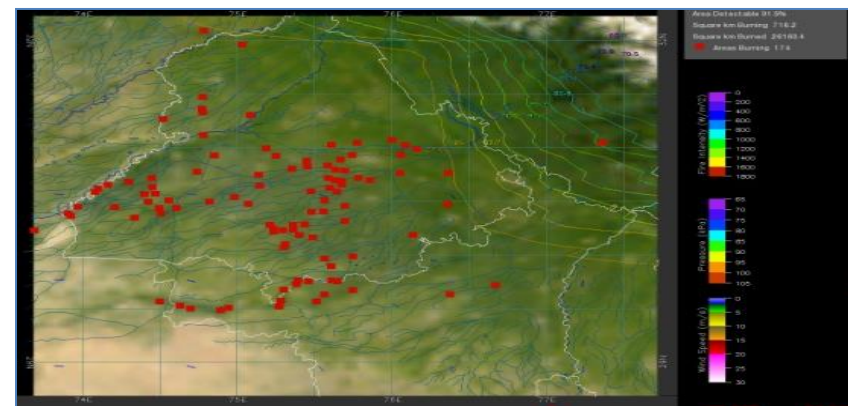
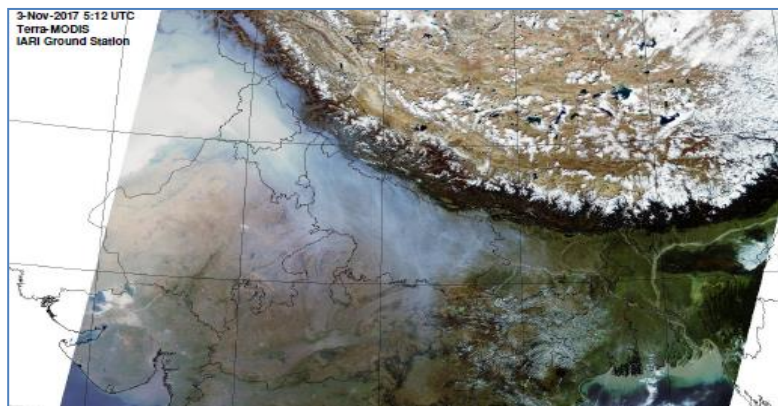
**Bulletin
No. 33**

**Events Date:
17-Oct-2023**

**Issued on:
17-Oct-2023**



MONITORING PADDY RESIDUE BURNING IN INDIA USING SATELLITE REMOTE SENSING DURING 2023



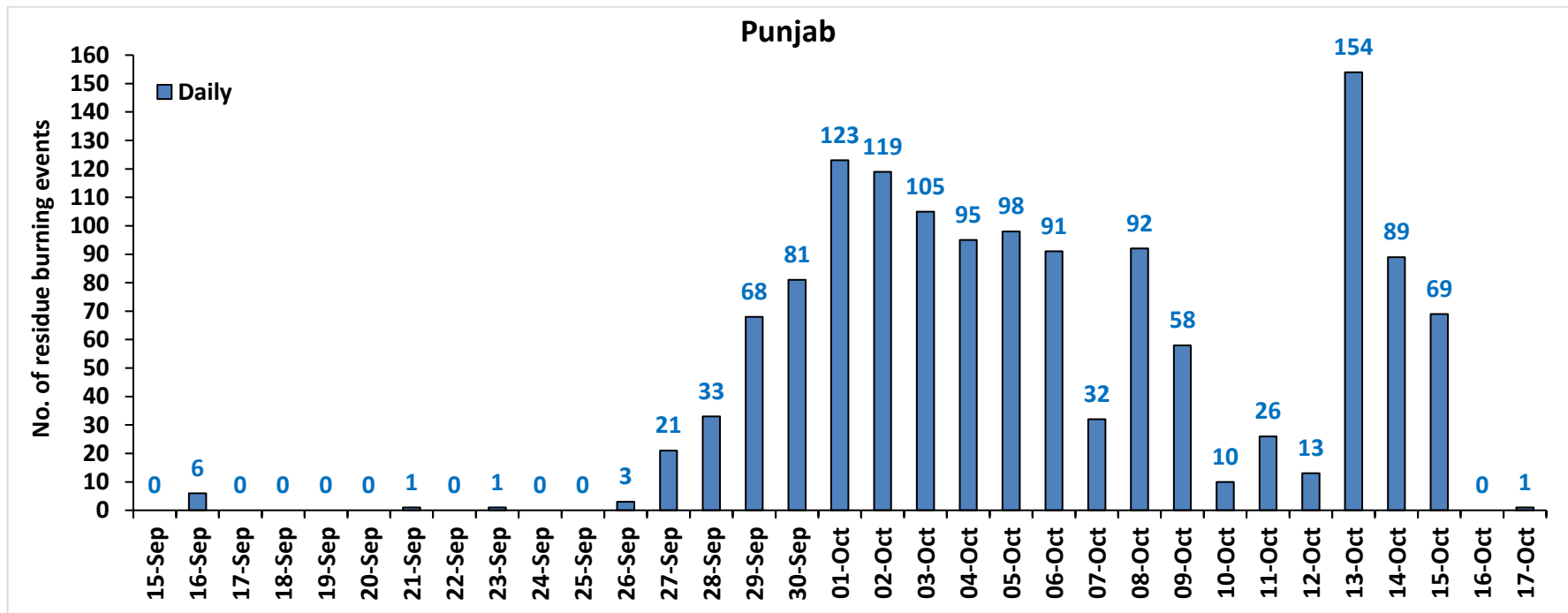
**Consortium for Research on Agroecosystem Monitoring and Modeling from Space (CREAMS) Laboratory,
Division of Agricultural Physics, ICAR – Indian Agricultural Research Institute, New Delhi – 110012**

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

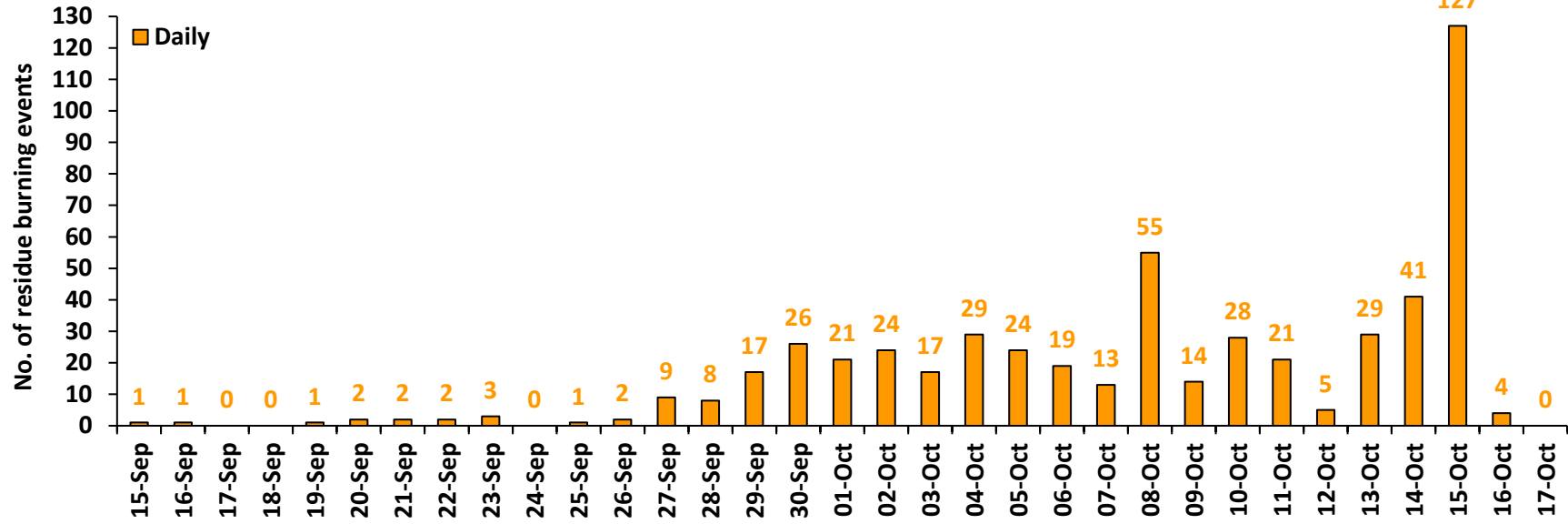
Highlights for 17-Oct-2023

- The active fire events due to rice residue burning were monitored using satellite remote sensing, following the "Standard Protocol for Estimation of Crop Residue Burning Fire Events using Satellite Data".
- Satellites detected **44** residue burning events in the six study States on 17-Oct-2023.
- The state wise events detected on 17-Oct-2023 were **01** in Punjab, **00** in Haryana, **00** in UP, **00** in Delhi, **12** in Rajasthan and **31** in MP.
- Total **2922** burning events were detected in the six states between 15-Sept-2023 and 17-Oct-2023, which are distributed as **1389**, **546**, **326**, **02**, **253** and **406** in Punjab, Haryana, UP, Delhi, Rajasthan and MP, respectively.
- Detection of residue burning events was hampered by the presence of clouds over Punjab, Haryana, Delhi, Uttar Pradesh, Rajasthan and Madhya Pradesh states.

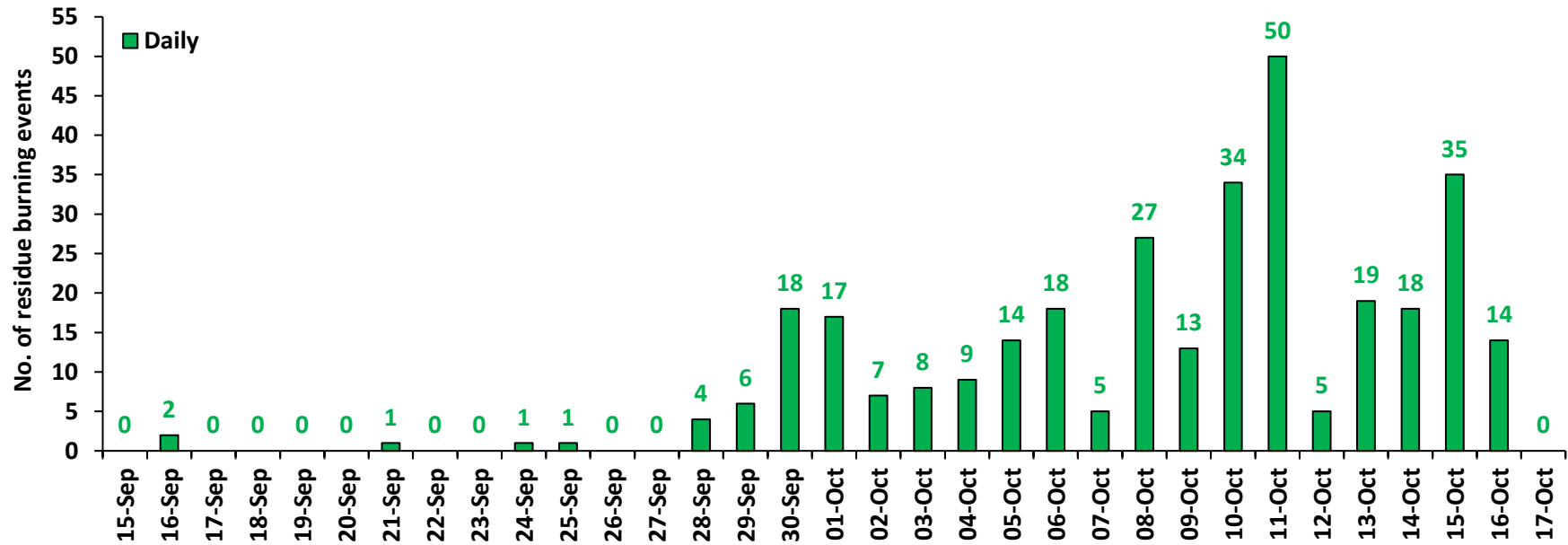
Temporal distribution of rice residue burning events for the study States in 2023



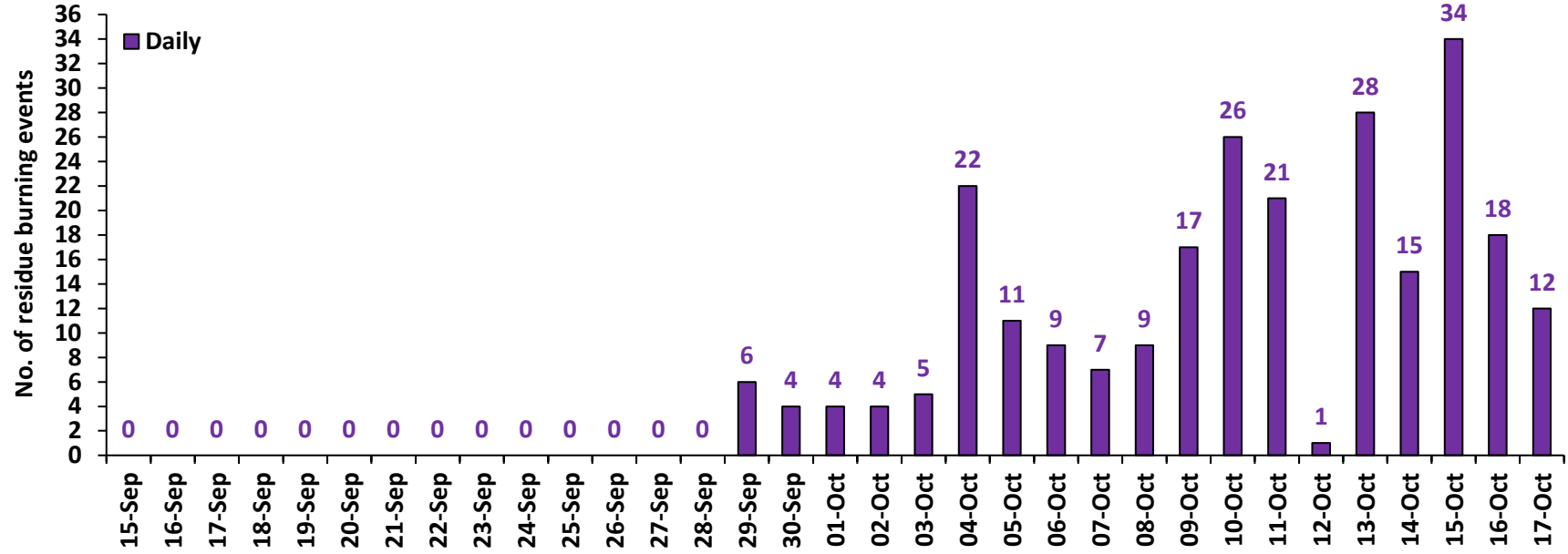
Haryana



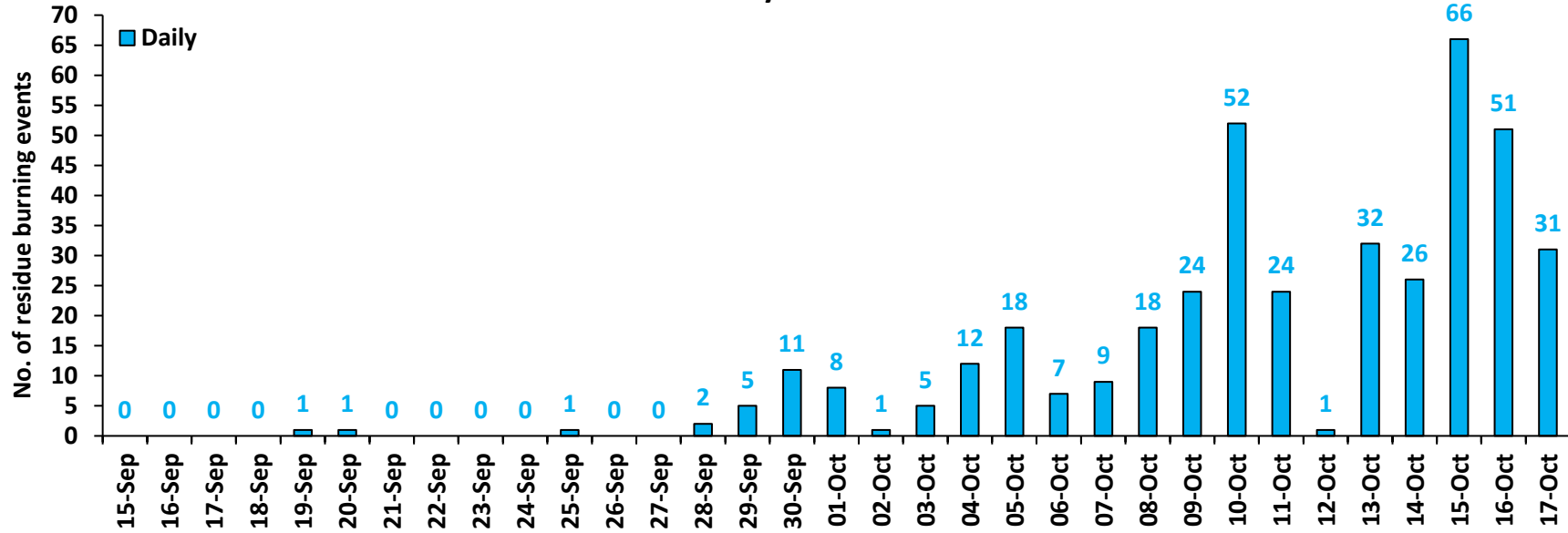
Uttar Pradesh



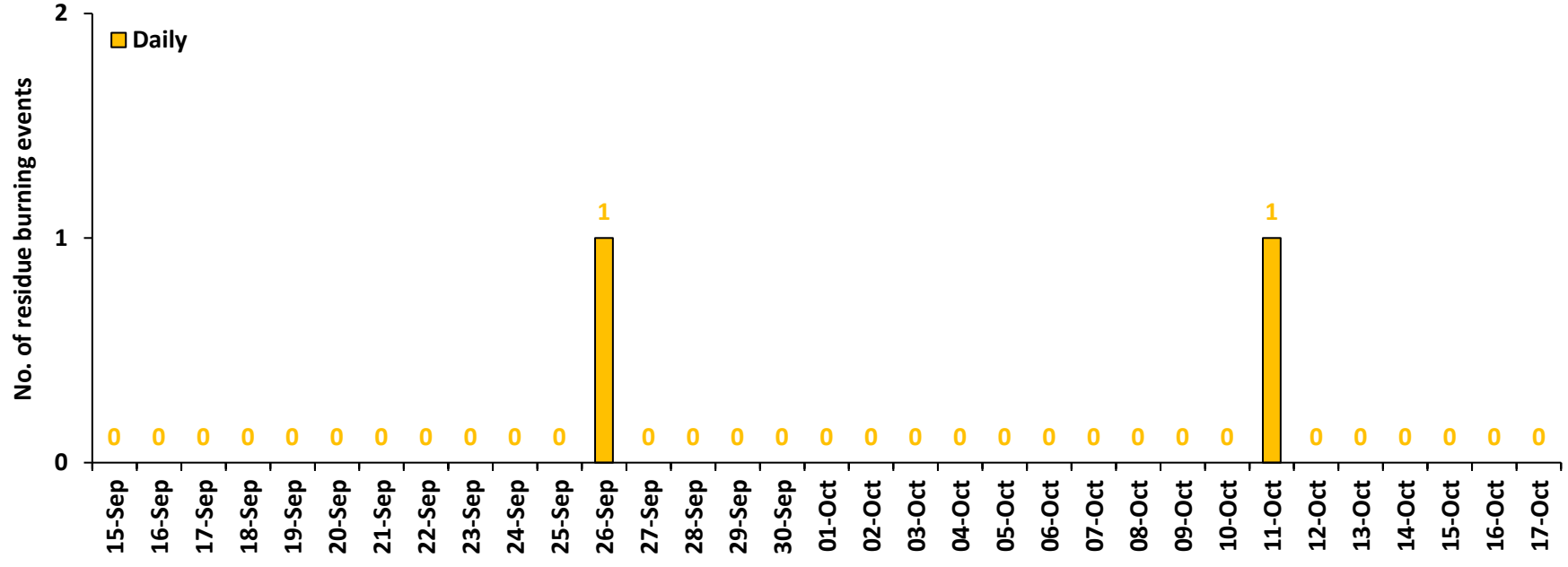
Rajasthan



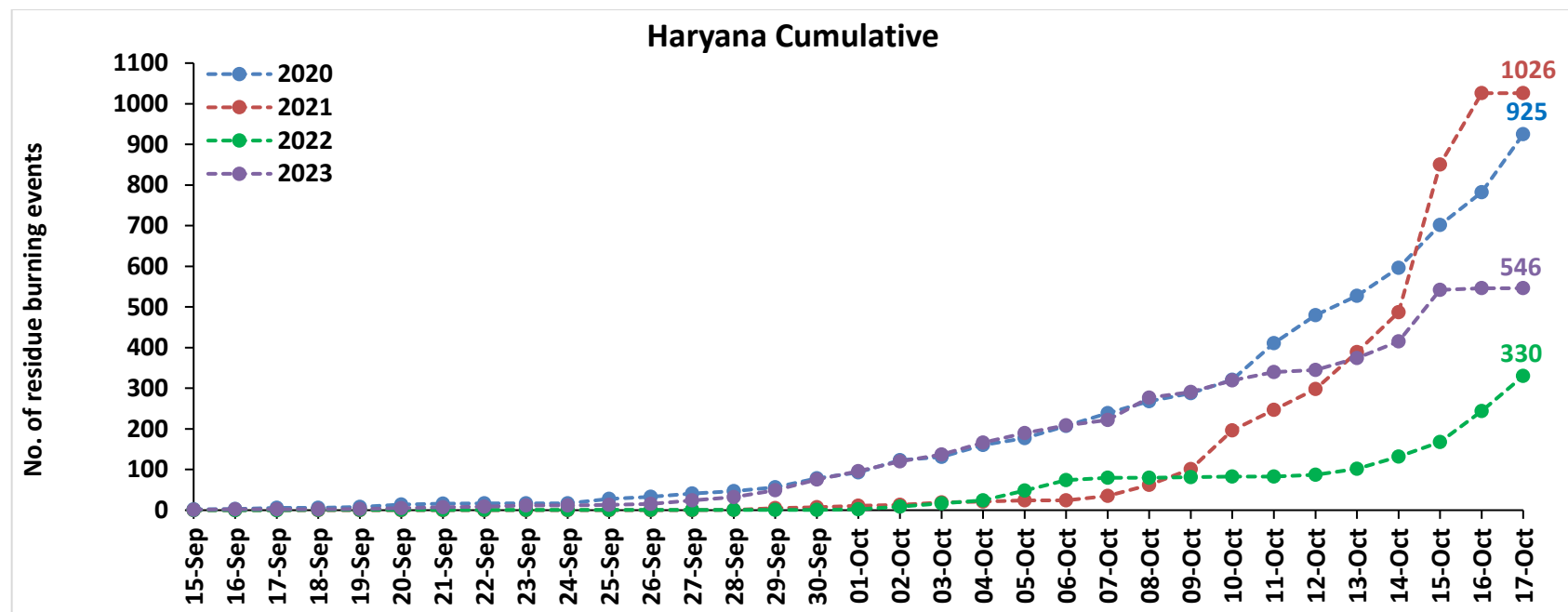
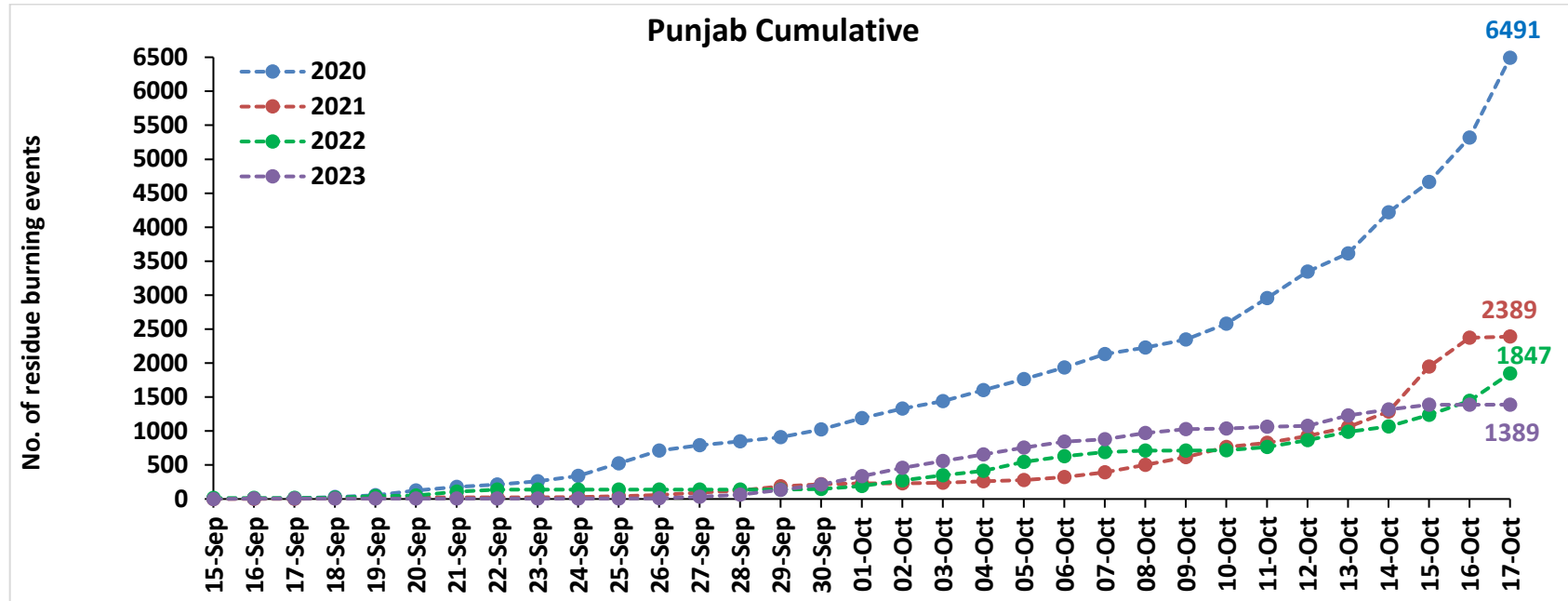
Madhya Pradesh

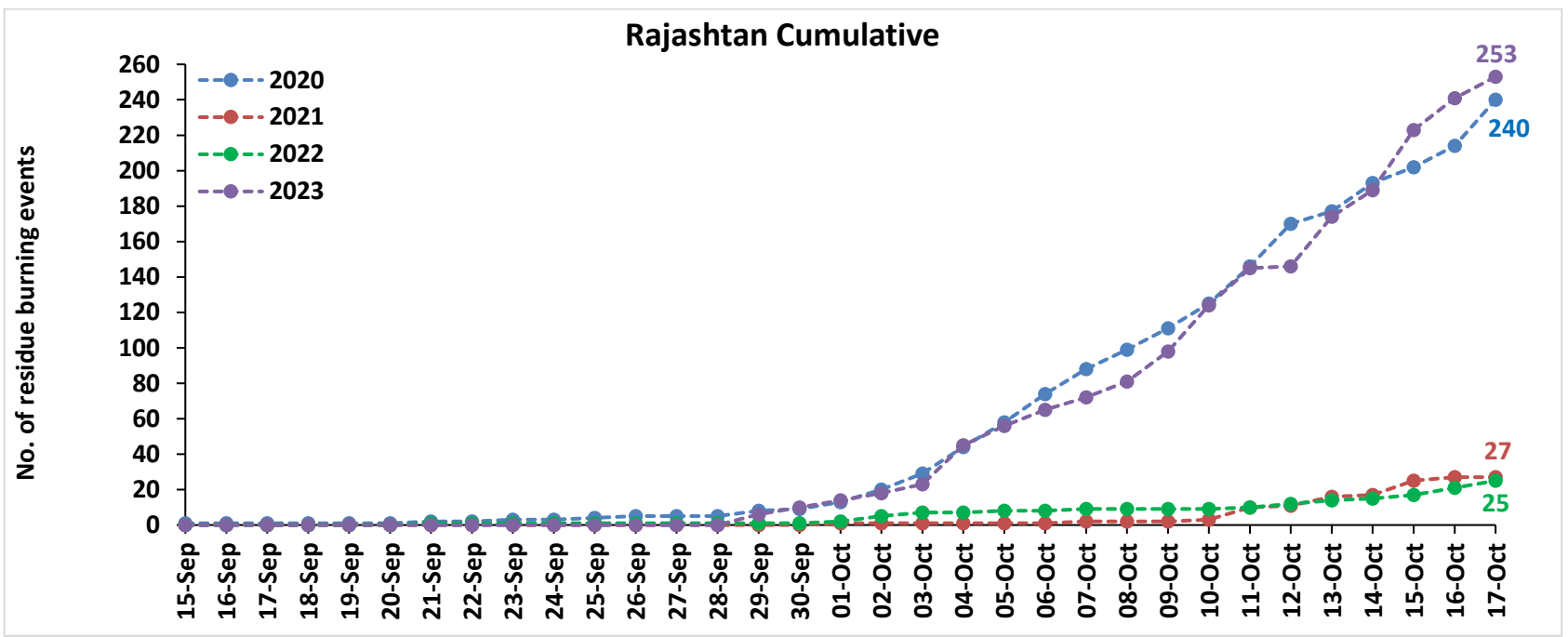
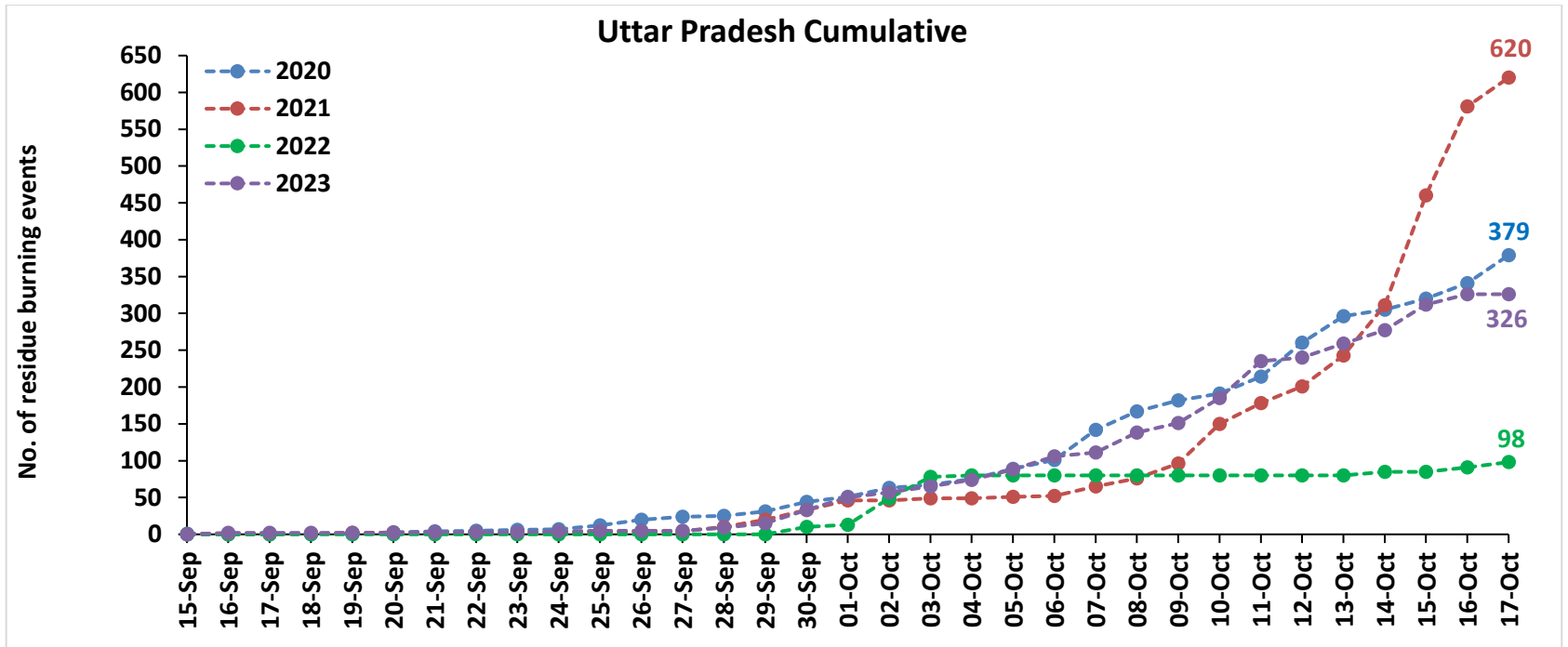


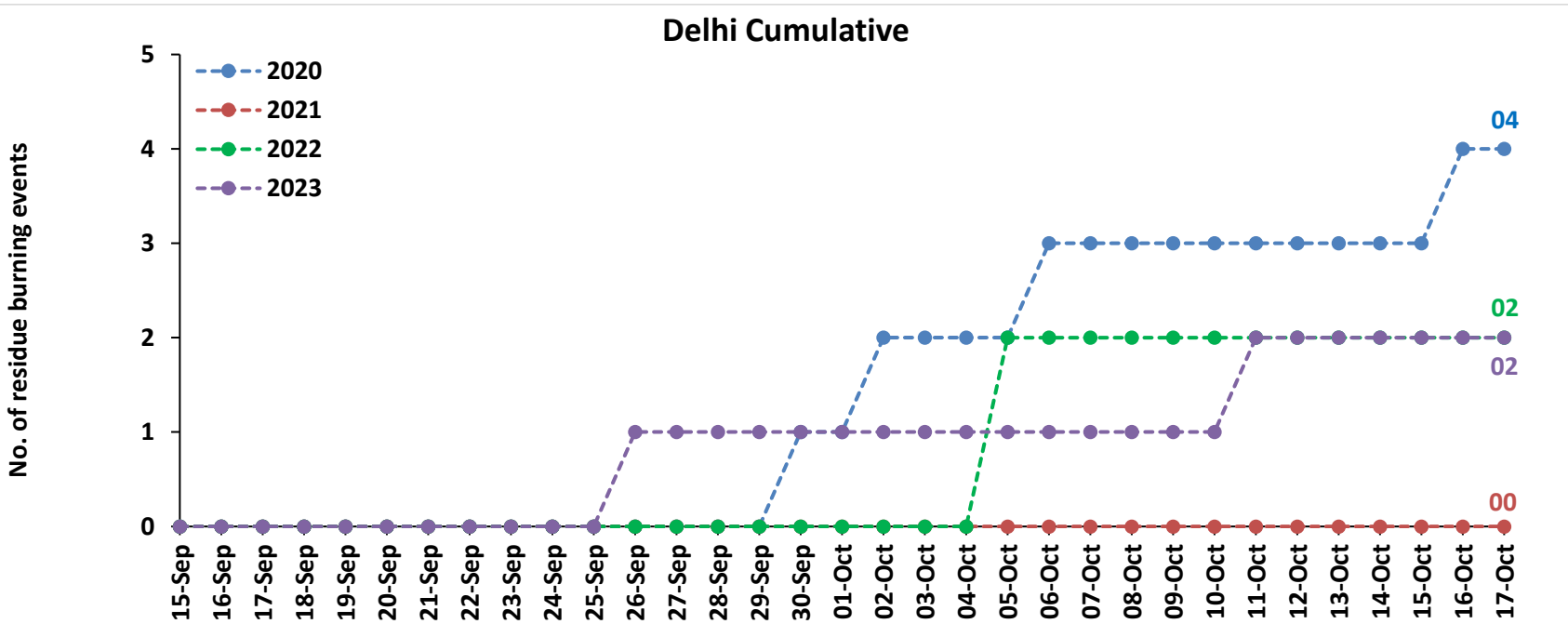
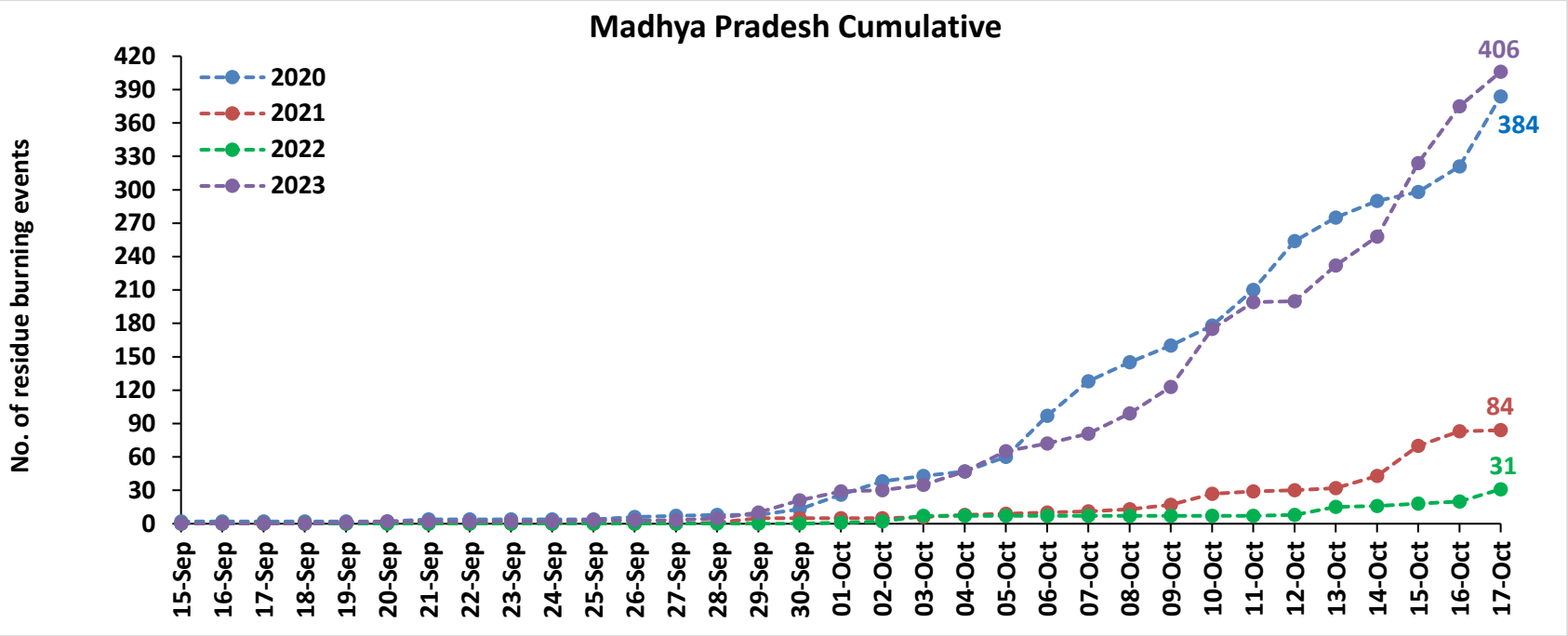
Delhi



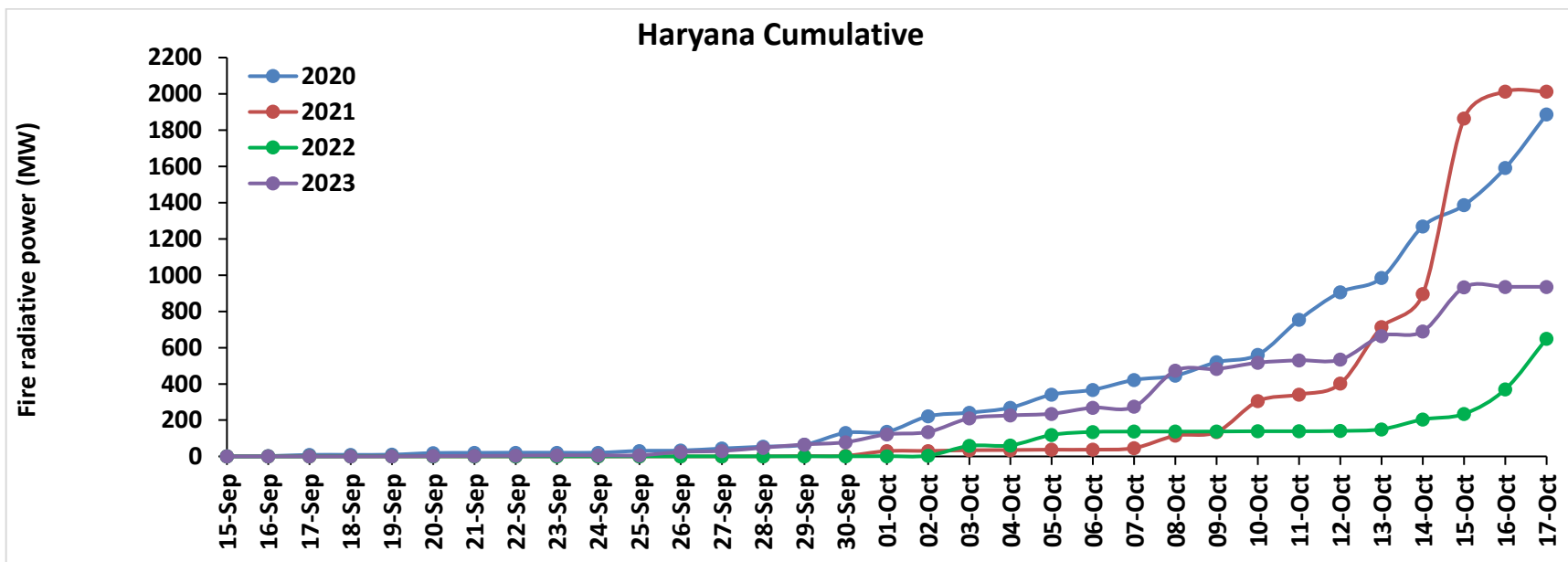
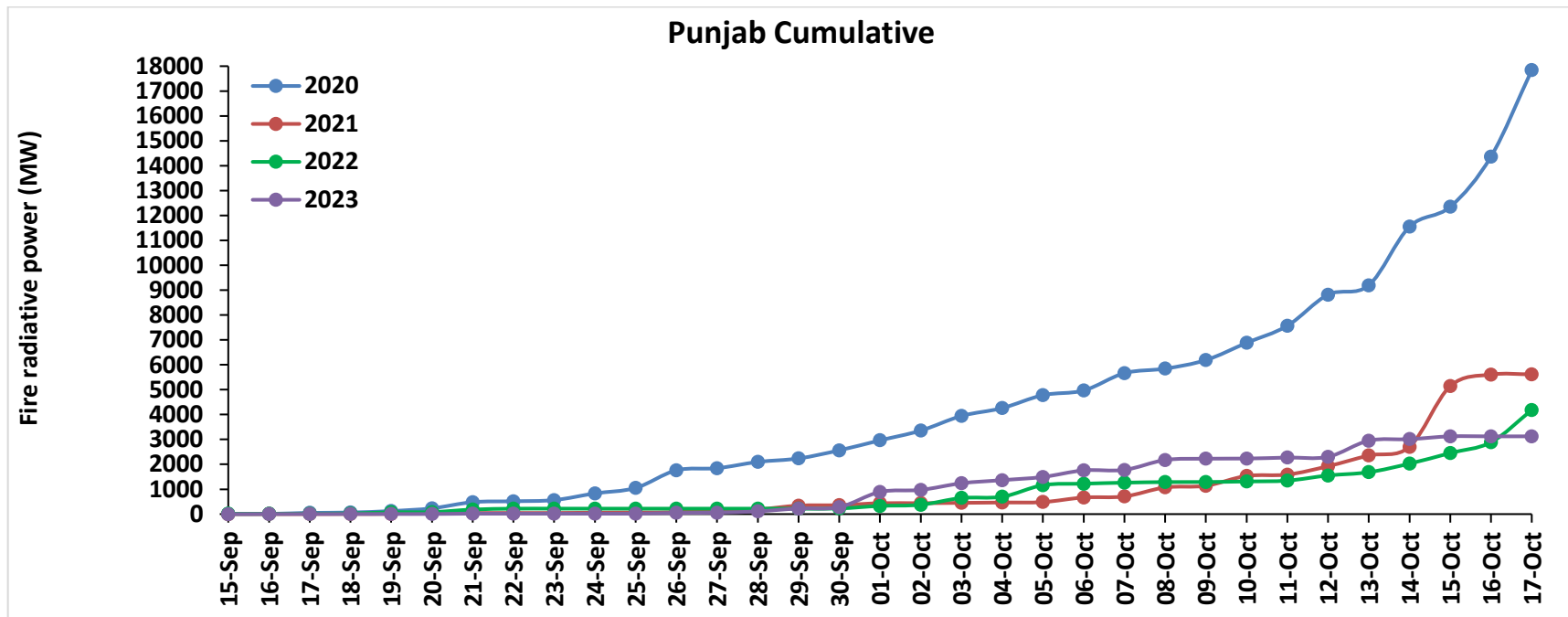
Comparison of residue burning events in current year (2023) with previous years (2020, 2021 and 2022) for the study State



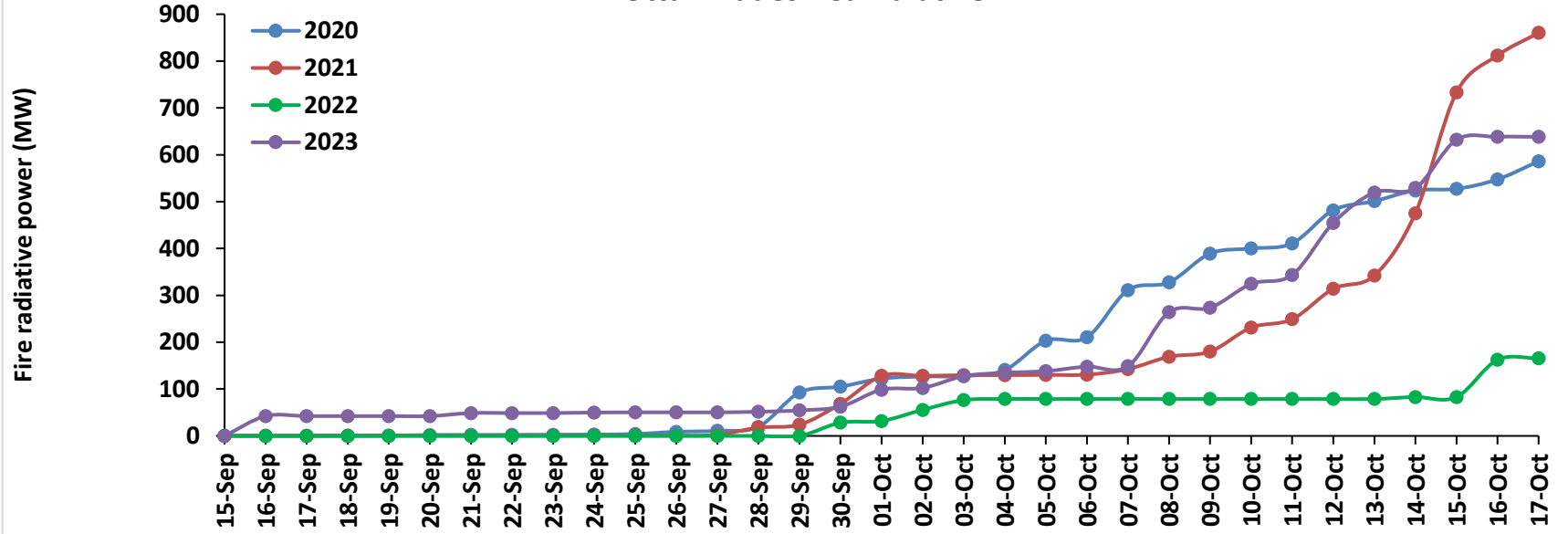




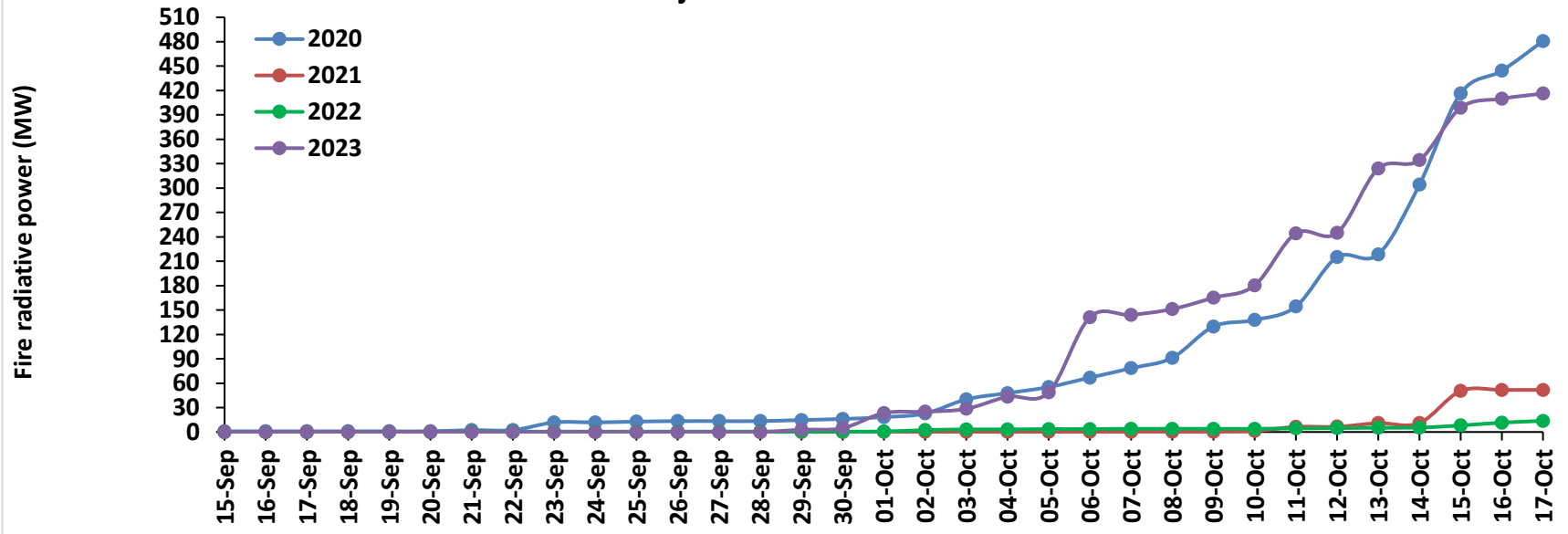
Comparison of residue burning fire power in current year (2023) with previous years (2020, 2021 and 2022) for the study States



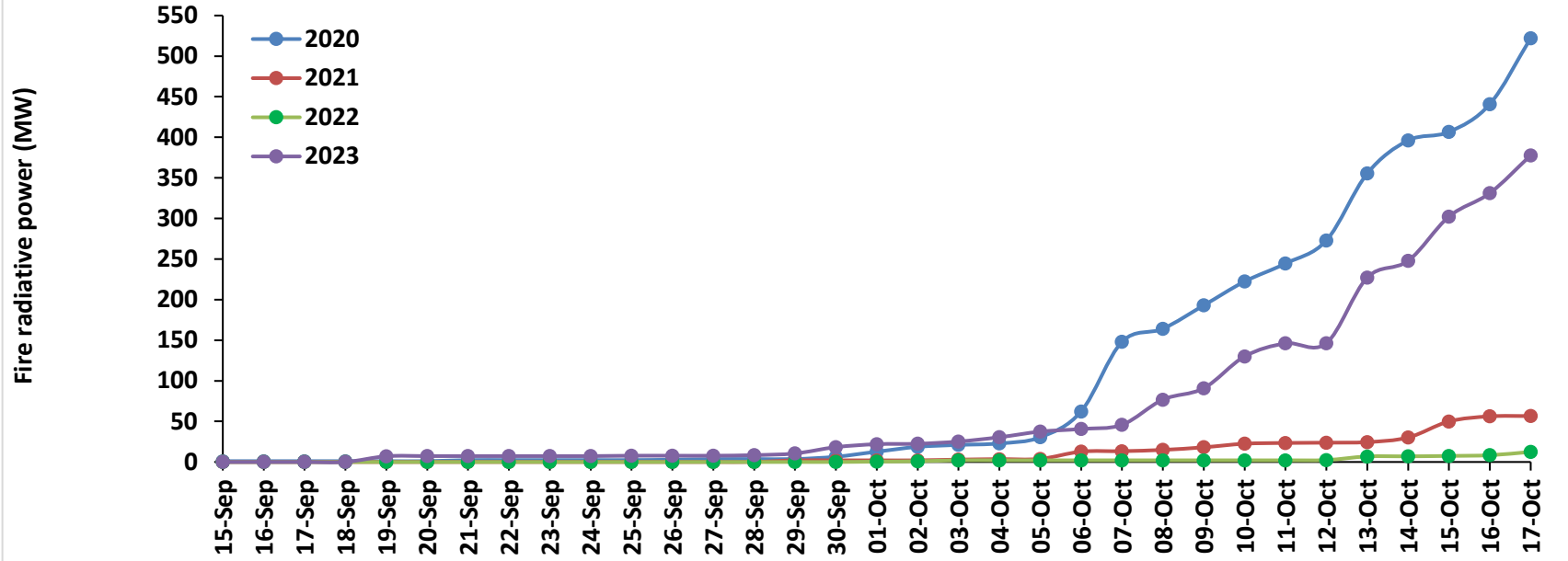
Uttar Pradesh Cumulative



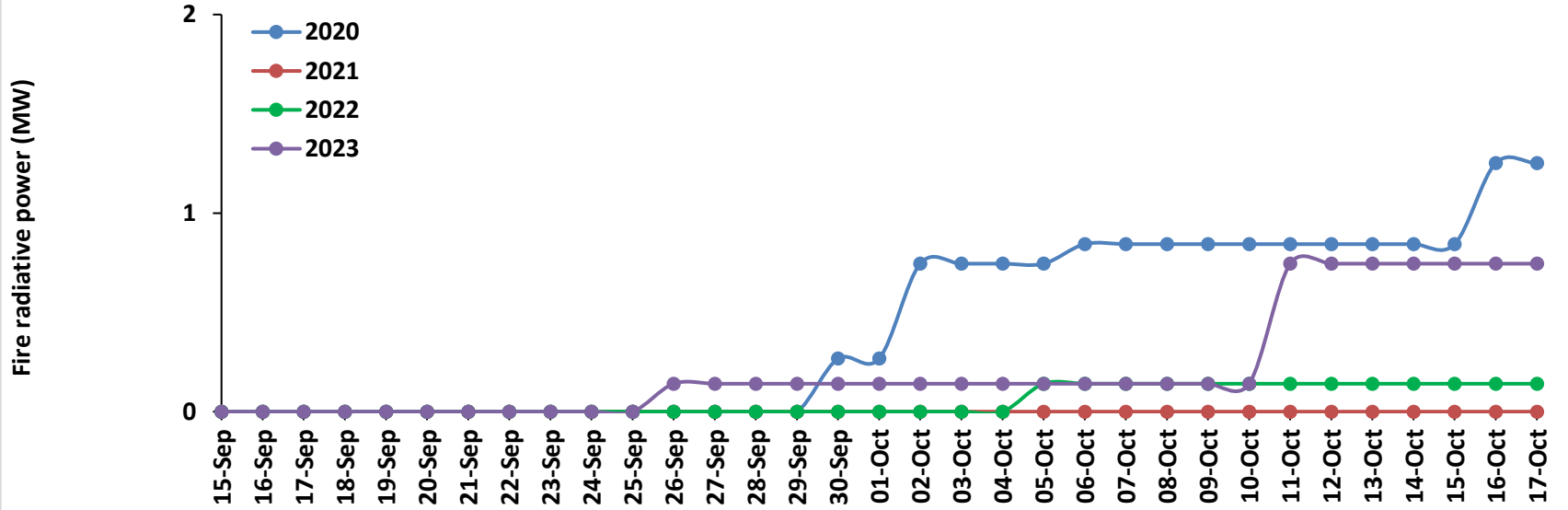
Rajasthan Cumulative



Madhya Pradesh Cumulative

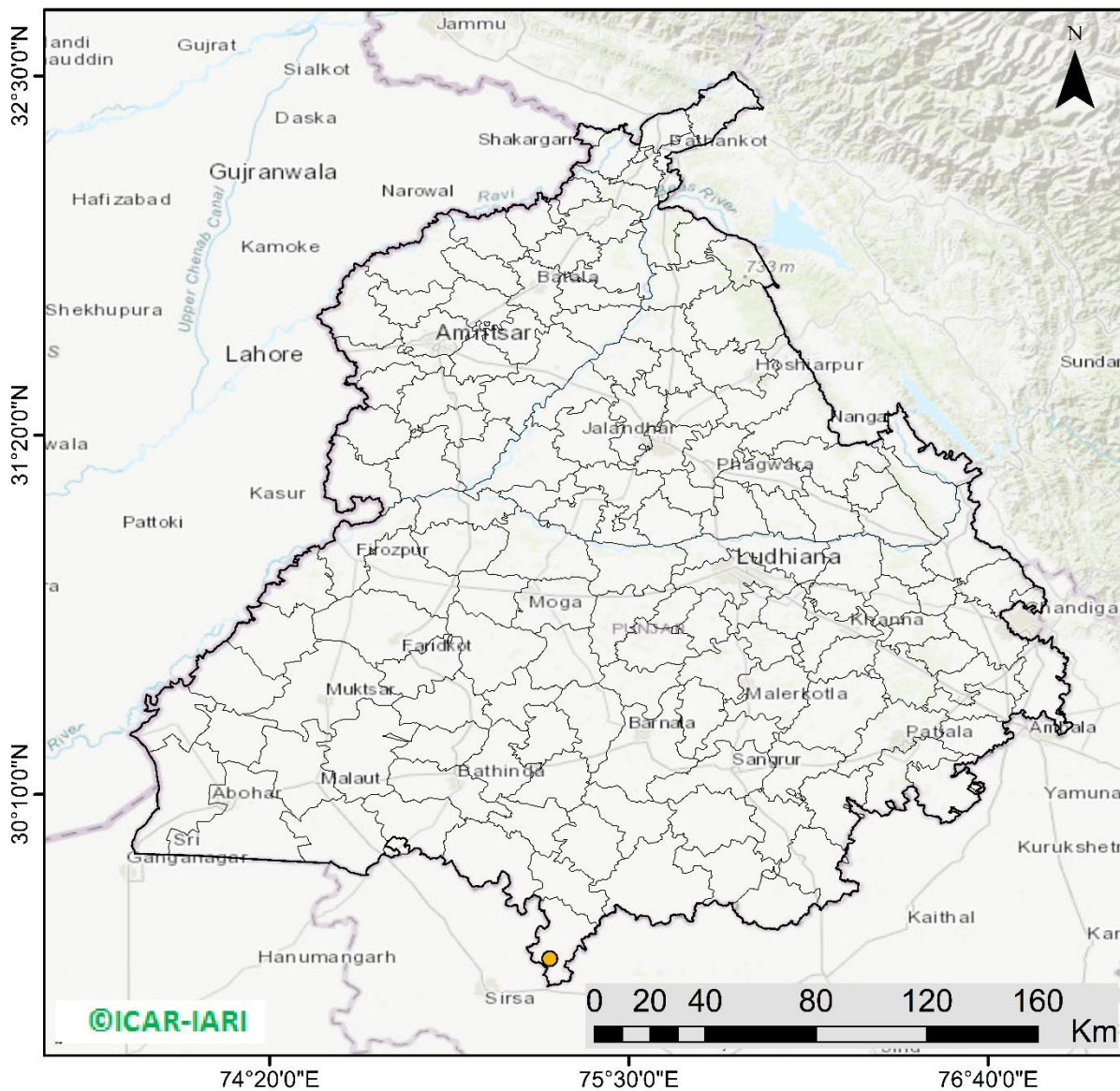


Delhi Cumulative



Punjab

RICE RESIDUE BURNING IN PUNJAB



01 burning events detected in Punjab during (17th Oct 2023)

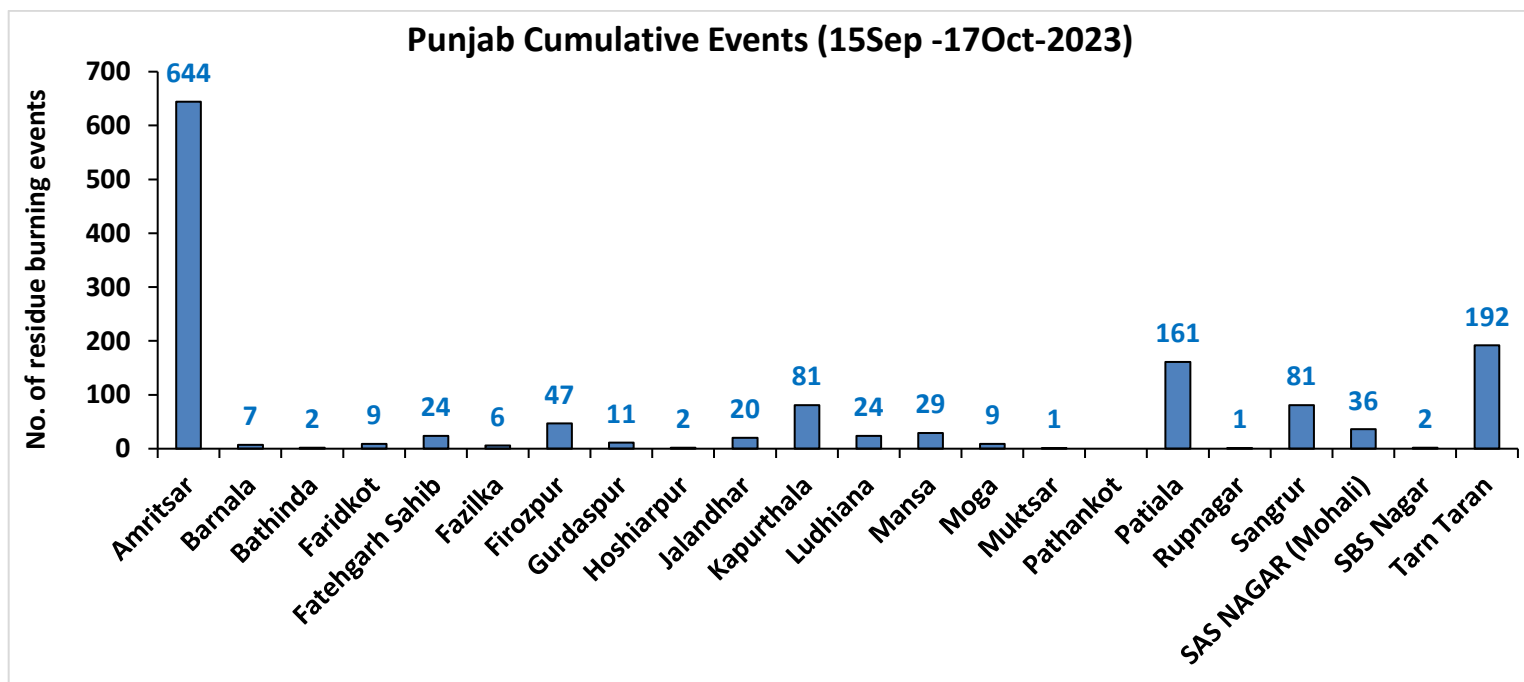
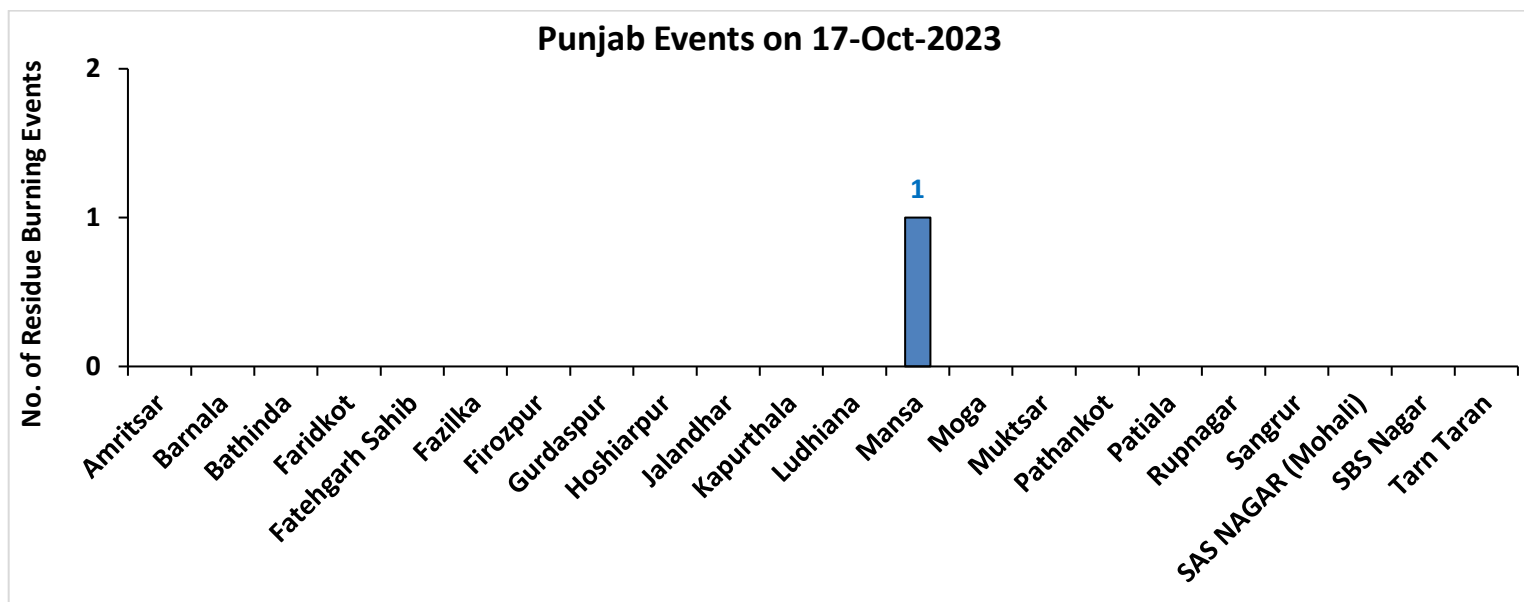
Fire Intensity (W/m²)

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



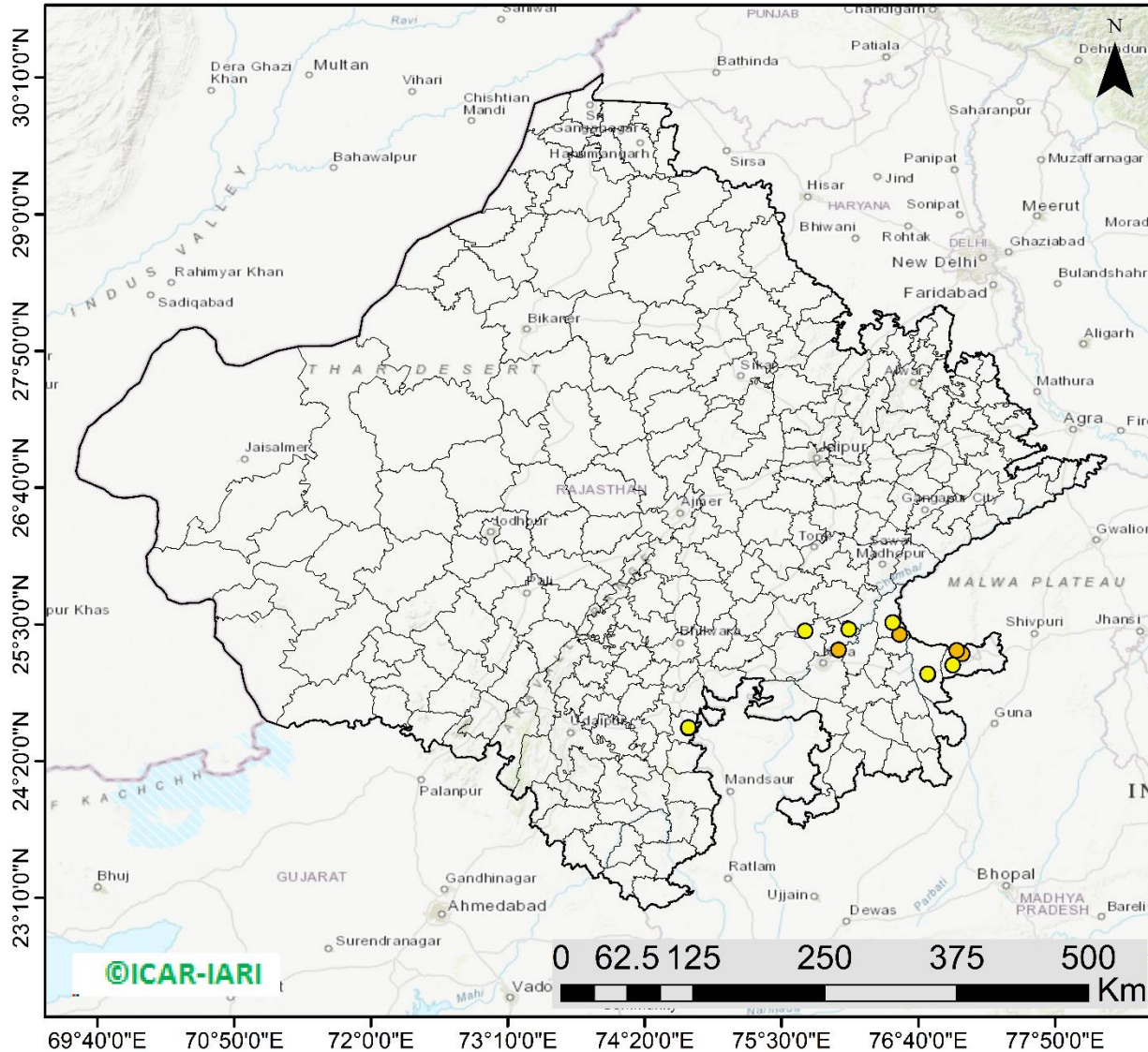
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Punjab (15Sep- 17Oct-2023)



Rajasthan

RICE RESIDUE BURNING IN RAJASTHAN



12 burning events
detected in Rajasthan on
(17th Oct 2023)

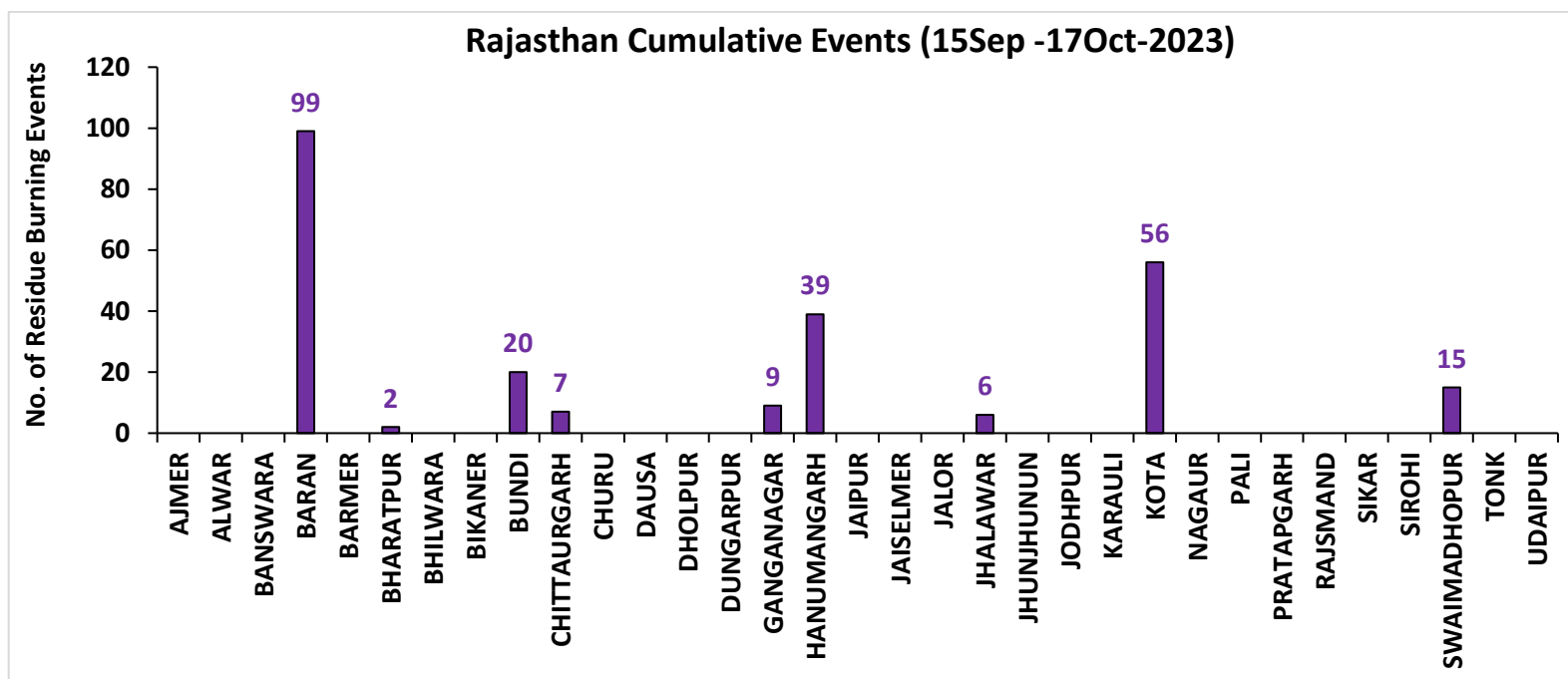
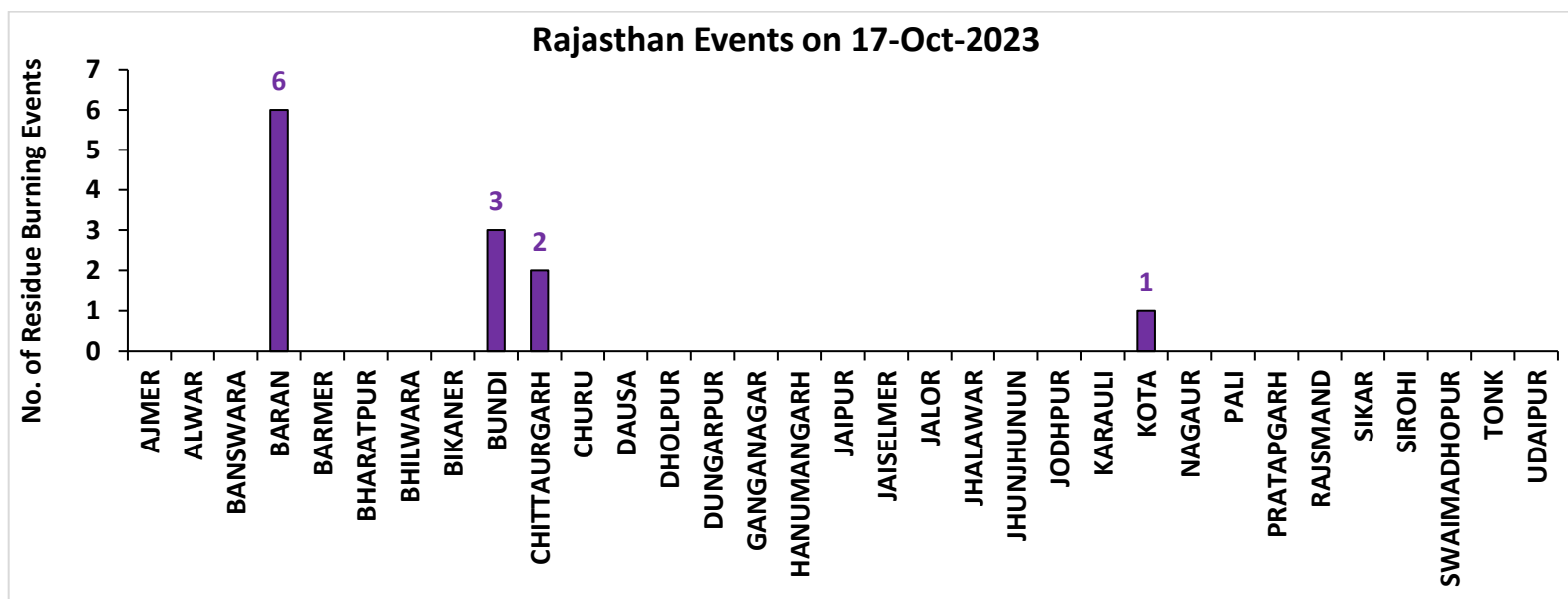
Fire Intensity (W/m²)

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



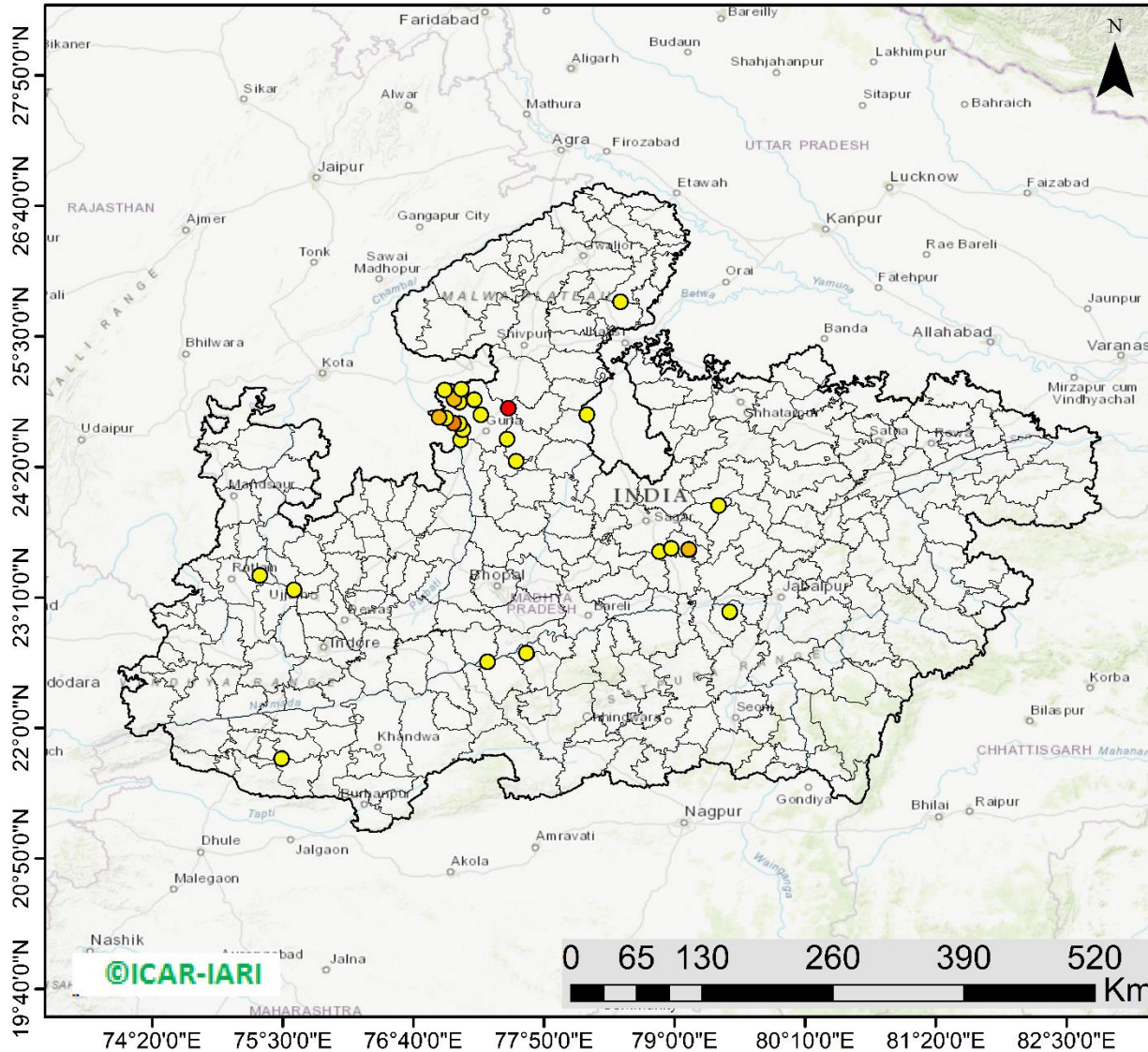
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Rajasthan (15Sep-17Oct -2023)



Madhya Pradesh

RICE RESIDUE BURNING IN MADHYA PRADESH



31 burning events detected in MP on (17th Oct 2023)

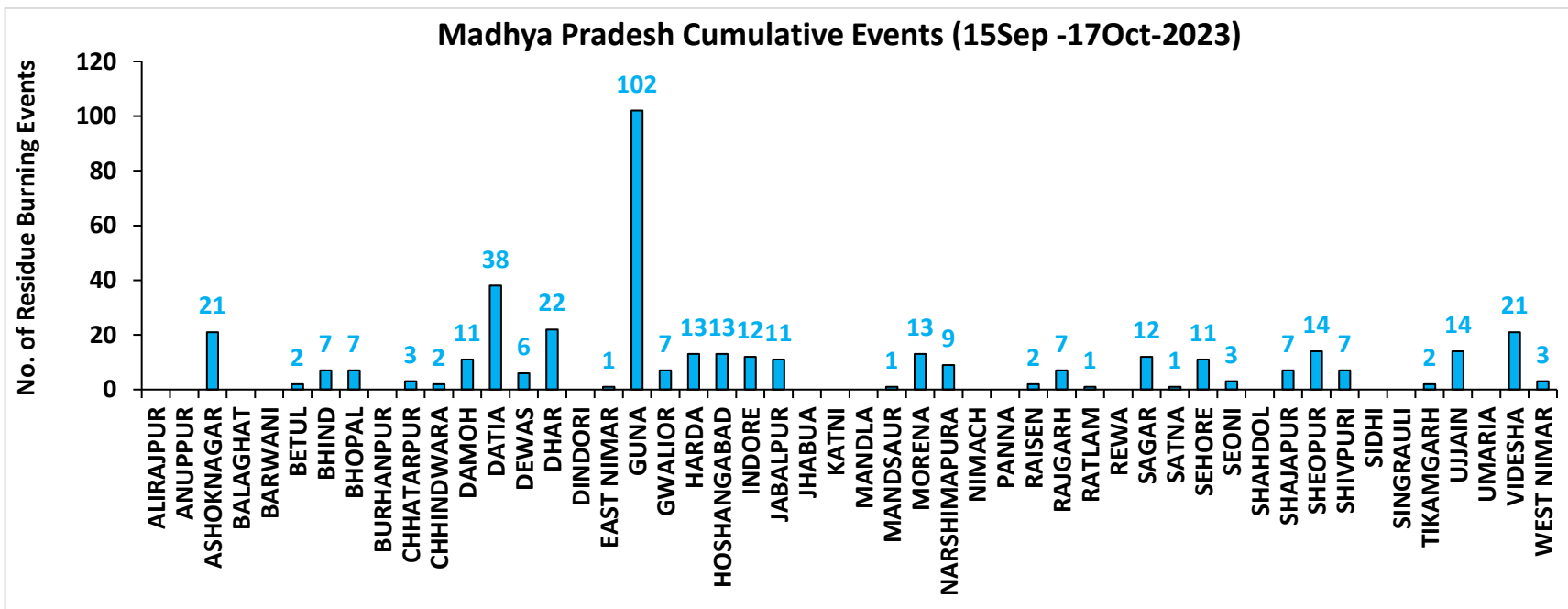
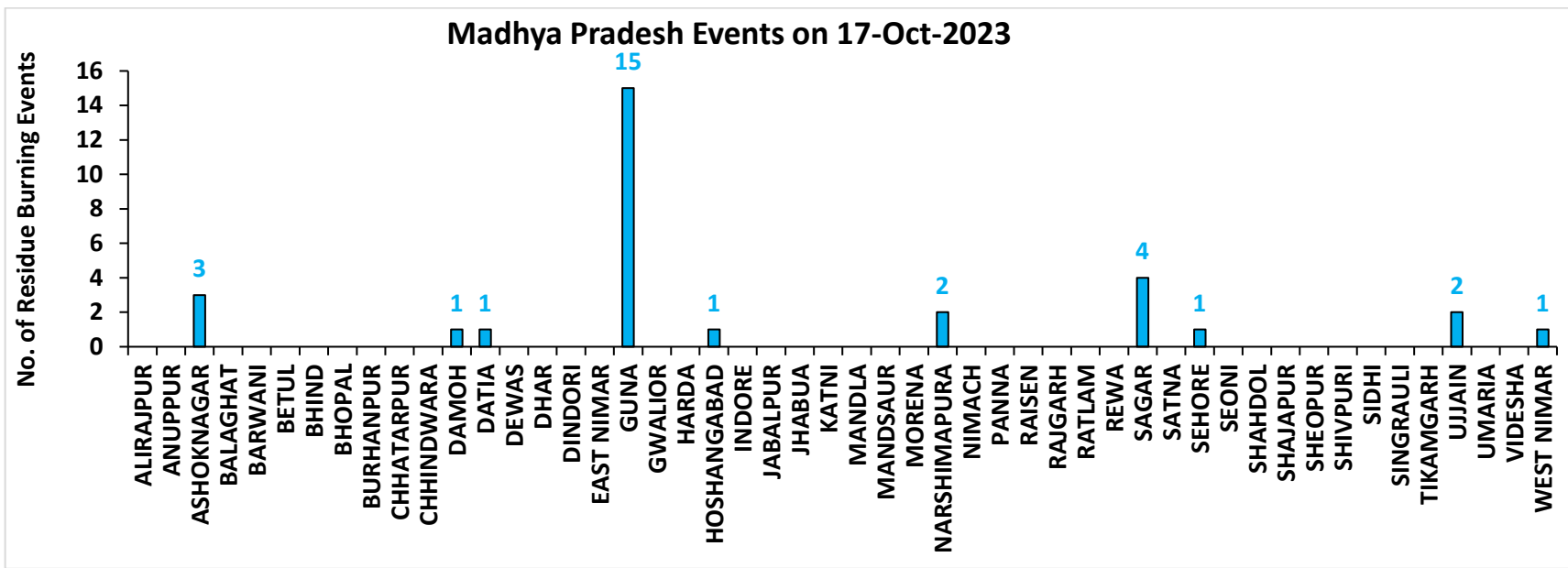
Fire Intensity (W/m²)

- 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 Madhya Pradesh (15Sep-17Oct -2023)



District-wise cumulative number of residues burning events detected in 2020, 2021, 2022 and 2023
(Period: 15 September-17 October)

(a) Punjab

District	15 Sep-17 Oct			
	2020	2021	2022	2023
Amritsar	1905	606	660	644
Barnala	22	13	10	7
Bathinda	69	8	3	2
Faridkot	214	70	9	9
Fatehgarh Sahib	136	101	18	24
Fazilka	52	31	15	6
Firozpur	485	79	84	47
Gurdaspur	460	143	117	11
Hoshiarpur	52	11	2	2
Jalandhar	115	77	68	20
Kapurthala	245	95	95	81
Ludhiana	158	148	38	24
Mansa	51	2	9	29
Moga	58	39	35	9
Muktsar	29	21	3	1
Pathankot	3	0	0	0
Patiala	564	256	69	161
Rupnagar	29	16	0	1
Sangrur	147	45	41	81
SAS NAGAR (Mohali)	45	27	8	36
SBS Nagar	12	9	2	2
Tarn Taran	1640	592	561	192
Total	6491	2389	1847	1389

(b) Haryana

District	15 Sep-17 Oct			
	2020	2021	2022	2023
AMBALA	107	54	22	79
BHIWANI	0	0	0	2
CHARKHI DADRI	0	0	0	0
FARIDABAD	0	1	0	2
FATEHABAD	56	49	27	80
GURGAON	0	0	0	0
HISAR	6	1	5	29
JHAJJAR	1	0	0	3
JIND	29	30	30	59
KAITHAL	171	249	81	51
KARNAL	267	343	58	39
KURUKSHETRA	202	205	77	67
MAHENDRAGARH	0	0	0	0
MEWAT	0	0	0	0
PALWAL	11	25	0	27
PANCHKULA	0	0	0	0
PANIPAT	9	15	2	14
REWARI	0	0	0	0
ROHTAK	0	0	0	4
SIRSA	9	4	3	6
SONIPAT	11	5	4	42
YAMUNANAGAR	46	45	21	42
Total	925	1026	330	546

(c) Uttar Pradesh

District	15 Sep-17 Oct													
	2020	2021	2022	2023	GAUTAMBUDHNAGAR	2	7	0	5	MUZAFARNAGAR	3	2	0	0
AGRA	1	0	0	0	GAZIPUR	0	0	0	0	PILHIBHIT	8	108	5	36
ALIGARH	28	21	2	63	GHAZIABAD	3	2	1	6	PRATAPGARH	0	0	0	0
ALLAHABAD	0	1	0	0	GONDA	0	0	0	0	RAIBEARELI	1	0	0	0
AMBEDKARNAGAR	0	0	0	0	GORAKHPUR	0	0	0	0	RAMPUR	22	50	0	14
AMETHI	0	1	4	1	HAMIRPUR	1	0	0	0	SAMBHAL	6	7	4	8
AMROHA	1	0	0	2	HAPUR	3	1	0	0	SANTKABIRNAGAR	0	0	0	0
AURAIYA	17	6	4	4	HARDOI	9	6	0	4	SANTRAVIDASNAGAR	0	0	0	0
AZAMGARH	0	0	0	0	HATHRAS	0	0	0	2	SHAHJAHANPUR	37	181	54	21
BADAUN	1	1	0	2	JALAUN	0	0	0	0	SHAMLI	19	11	2	3
BAGHPAT	3	1	0	1	JAUNPUR	0	0	0	0	SHARANPUR	22	17	0	0
BAHRAICH	2	2	4	0	JHANSI	9	6	0	3	SHRAWASTI	2	0	0	0
BALLIA	0	0	0	0	KANNAUJ	3	1	0	1	SIDDHARTHANAGAR	0	0	0	0
BALRAMPUR	1	1	1	0	KANPUR	0	7	0	2	SITAPUR	9	9	0	2
BANDA	0	0	0	0	KANPUR DEHAT	6	1	0	3	SONBHADRA	0	0	0	0
BARABANKI	12	20	0	18	KASGANJ	1	2	0	1	SULTANPUR	0	0	0	0
BAREILLY	10	15	1	10	KAUSHAMBI	7	3	0	6	UNNAO	4	0	0	2
BASTI	2	1	0	0	KHERI	38	54	8	3	VARANASI	0	0	0	0
BIJNOR	4	3	1	5	KUSHINAGAR	0	0	0	0	Total	379	620	98	326
BULANDSAHAR	8	2	2	5	LALITPUR	0	1	2	0					
CHANDAULI	0	0	0	0	LUCKNOW	2	0	0	1					
CHITRAKOOT	0	0	0	0	MAHARAJGANJ	0	0	0	0					
DEORIA	0	0	0	2	MAHOBA	2	0	0	0					
ETAH	5	6	0	8	MAINPURI	6	7	0	6					
ETAWAH	2	7	0	11	MATHURA	16	27	0	53					
FAIZABAD	1	0	0	0	MAU	0	0	0	0					
FARRUKHABAD	0	0	0	0	MEERUT	11	4	0	2					
FATEHPUR	16	6	1	6	MIRZAPUR	5	5	2	0					
FIROZABAD	4	4	0	2	MORADABAD	4	3	0	2					

(d) Delhi

District	15 Sep-17 Oct			
	2020	2021	2022	2023
CENTRAL	0	0	0	0
EAST	0	0	0	0
NEW DELHI	0	0	0	0
NORTH	2	0	2	2
NORTH EAST	0	0	0	0
NORTH WEST DELHI	1	0	0	0
SHAHADRA	0	0	0	0
SOUTH	1	0	0	0
SOUTH EAST	0	0	0	0
SOUTH WEST DELHI	0	0	0	0
WEST DELHI	0	0	0	0
Total	4	0	2	2

(e) Rajasthan

District	15 Sep-17 Oct			
	2020	2021	2022	2023
AJMER	0	0	0	0
ALWAR	1	0	0	0
BANSWARA	0	0	0	0
BARAN	82	0	4	99
BARMER	2	0	0	0
BHARATPUR	1	0	0	2
BHILWARA	2	0	0	0
BIKANER	1	0	0	0
BUNDI	5	0	10	20
CHITTAURGARH	0	2	2	7
CHURU	0	0	0	0
DAUSA	0	0	0	0
DHOLPUR	0	0	0	0
DUNGARPUR	0	0	0	0
GANGANAGAR	2	0	1	9
HANUMANGARH	100	24	3	39
JAIPUR	1	0	0	0
JAISELMER	2	0	0	0
JALOR	0	0	0	0
JHALAWAR	1	0	1	6
JHUNJHUNUN	1	0	0	0
JODHPUR	1	0	0	0
KARAULI	1	0	0	0
KOTA	24	1	4	56
NAGOUR	0	0	0	0
PALI	1	0	0	0
PRATAPGARH	4	0	0	0
RAJSMAND	0	0	0	0
SIKAR	0	0	0	0
SIROHI	1	0	0	0
SWAIMADHOPUR	6	0	0	15
TONK	1	0	0	0
UDAIPUR	0	0	0	0
Total	240	27	25	253

(f) Madhya Pradesh

District	15 Sep-17 Oct								
	2020	2021	2022	2023					
					PANNA	2	0	0	0
ALIRAJPUR	0	0	0	0	RAISEN	12	1	0	2
ANUPPUR	0	0	0	0	RAJGARH	7	1	3	7
ASHOKNAGAR	11	1	1	21	RATLAM	0	0	0	1
BALAGHAT	0	0	0	0	REWA	3	0	0	0
BARWANI	0	0	0	0	SAGAR	13	6	1	12
BETUL	0	0	0	2	SATNA	3	6	0	1
BHIND	6	1	0	7	SEHORE	5	3	4	11
BHOPAL	6	5	1	7	SEONI	15	5	0	3
BURHANPUR	0	0	0	0	SHAHDOL	0	0	0	0
CHHATARPUR	4	0	0	3	SHAJAPUR	5	0	0	7
CHHINDWARA	1	3	0	2	SHEOPUR	14	0	0	14
DAMOH	19	4	1	11	SHIVPURI	8	0	6	7
DATIA	50	8	0	38	SIDHI	0	0	0	0
DEWAS	3	0	0	6	SINGRAULI	0	0	0	0
DHAR	20	0	0	22	TIKAMGARH	1	0	0	2
DINDORI	0	0	0	0	UJJAIN	5	0	0	14
EAST NIMAR	2	1	2	1	UMARIA	0	0	0	0
GUNA	15	1	4	102	VIDESHA	55	8	2	21
GWALIOR	34	0	1	7	WEST NIMAR	6	0	0	3
HARDA	8	9	0	13	Total	384	84	31	406
HOSHANGABAD	20	8	0	13					
INDORE	2	0	0	12					
JABALPUR	7	4	3	11					
JHABUA	0	0	0	0					
KATNI	1	0	0	0					
MANDLA	0	0	0	0					
MANDSAUR	3	0	0	1					
MORENA	15	5	0	13					
NARSHIMAPURA	3	4	2	9					
NIMACH	0	0	0	0					

State-wise and date-wise number of paddy residue burning events detected in 2020, 2021, 2022 and 2023
(Period: 15 September-17 October)

Number of Paddy Residue Burning Events Detected

Date	Punjab				Haryana				Uttar Pradesh			
	2020	2021	2022	2023	2020	2021	2022	2023	2020	2021	2022	2023
15-Sep	5	0	14	0	2	0	0	1	1	0	0	0
16-Sep	0	2	0	6	1	0	0	1	0	0	0	2
17-Sep	5	0	1	0	3	0	0	0	0	0	0	0
18-Sep	17	9	7	0	0	0	1	0	0	1	0	0
19-Sep	30	5	18	0	2	0	0	1	0	1	0	0
20-Sep	67	8	10	0	6	0	0	2	2	0	0	0
21-Sep	54	0	56	1	2	0	0	2	1	0	0	1
22-Sep	34	0	30	0	1	0	0	2	1	0	0	0
23-Sep	49	0	3	1	0	0	0	3	1	0	0	0
24-Sep	78	5	0	0	0	0	0	0	1	1	0	1
25-Sep	184	11	0	0	11	0	0	1	5	0	0	1
26-Sep	190	19	0	3	5	0	0	2	8	0	0	0
27-Sep	78	37	0	21	8	0	0	9	4	1	0	0
28-Sep	55	28	0	33	6	1	0	8	1	6	0	4
29-Sep	63	64	0	68	9	4	0	17	6	10	0	6
30-Sep	116	27	8	81	22	2	0	26	13	13	10	18
01-Oct	165	13	45	123	15	4	1	21	7	13	3	17
02-Oct	141	0	83	119	30	2	7	24	12	0	36	7
03-Oct	110	9	75	105	8	6	8	17	4	3	29	8
04-Oct	162	23	65	95	29	2	7	29	8	0	2	9
05-Oct	161	18	130	98	17	3	24	24	14	2	0	14
06-Oct	171	42	85	91	30	0	26	19	12	1	0	18
07-Oct	197	72	62	32	32	11	6	13	41	13	0	5
08-Oct	95	108	19	92	29	27	0	55	25	11	0	27
09-Oct	121	114	3	58	20	39	1	14	15	20	0	13
10-Oct	232	150	4	10	33	95	2	28	9	54	0	34
11-Oct	377	64	45	26	90	51	0	21	23	28	0	50

12-Oct	388	97	104	13	69	51	4	5	46	23	0	5
13-Oct	266	132	120	154	47	91	15	29	36	42	0	19
14-Oct	605	229	82	89	69	98	30	41	9	68	5	18
15-Oct	449	660	169	69	106	363	36	127	15	149	0	35
16-Oct	654	429	206	0	80	176	76	4	21	121	6	14
17-Oct	1172	14	403	1	143	0	86	0	38	39	7	0
Total	6491	2389	1847	1389	925	1026	330	546	379	620	98	326

Number of Paddy Residue Burning Events Detected

Date	Delhi				Rajasthan				Madhya Pradesh			
	2020	2021	2022	2023	2020	2021	2022	2023	2020	2021	2022	2023
15-Sep	0	0	0	0	1	0	0	0	2	0	0	0
16-Sep	0	0	0	0	0	0	0	0	0	0	0	0
17-Sep	0	0	0	0	0	0	0	0	0	0	0	0
18-Sep	0	0	0	0	0	0	0	0	0	0	0	0
19-Sep	0	0	0	0	0	0	0	0	0	0	0	1
20-Sep	0	0	0	0	0	0	0	0	0	0	0	1
21-Sep	0	0	0	0	1	0	1	0	2	0	0	0
22-Sep	0	0	0	0	0	0	0	0	0	0	0	0
23-Sep	0	0	0	0	1	0	0	0	0	0	0	0
24-Sep	0	0	0	0	0	0	0	0	0	0	0	0
25-Sep	0	0	0	0	1	0	0	0	0	0	0	1
26-Sep	0	0	0	1	1	0	0	0	2	0	0	0
27-Sep	0	0	0	0	0	0	0	0	1	0	0	0
28-Sep	0	0	0	0	0	0	0	0	1	1	0	2
29-Sep	0	0	0	0	3	0	0	6	0	4	0	5
30-Sep	1	0	0	0	1	0	0	4	5	0	0	11
01-Oct	0	0	0	0	4	1	1	4	13	0	1	8
02-Oct	1	0	0	0	7	0	3	4	12	0	1	1
03-Oct	0	0	0	0	9	0	2	5	5	1	5	5
04-Oct	0	0	0	0	15	0	0	22	4	2	0	12
05-Oct	0	0	2	0	14	0	1	11	13	1	0	18
06-Oct	1	0	0	0	16	0	0	9	37	1	0	7

07-Oct	0	0	0	0	14	1	1	7	31	1	0	9
08-Oct	0	0	0	0	11	0	0	9	17	2	0	18
09-Oct	0	0	0	0	12	0	0	17	15	4	0	24
10-Oct	0	0	0	0	14	1	0	26	18	10	0	52
11-Oct	0	0	0	1	21	7	1	21	32	2	0	24
12-Oct	0	0	0	0	24	1	2	1	44	1	1	1
13-Oct	0	0	0	0	7	5	2	28	21	2	7	32
14-Oct	0	0	0	0	16	1	1	15	15	11	1	26
15-Oct	0	0	0	0	9	8	2	34	8	27	2	66
16-Oct	1	0	0	0	12	2	4	18	23	13	2	51
17-Oct	0	0	0	0	26	0	4	12	63	1	11	31
Total	4	0	2	2	240	27	25	253	384	84	31	406

Details of residue burning events in Punjab on 17-Oct-2023

S. No.	District	Tehsil / Block	Satellite	Latitude	Longitude	ACQ_TIME	Day / Night	Fire Power (W/m ²)
1	MANSA	SARDULGARH	S-NPP	29.63239	75.24337	12:57:53	D	5.40

Details of residue burning events in Rajasthan on 17-Oct-2023

S. No.	District	Tehsil / Block	Satellite	Latitude	Longitude	ACQ_TIME	Day / Night	Fire Power (W/m ²)
1	BARAN	KISHANGUNJ	S-NPP	25.07294	76.75019	01:47:53	N	0.50
2	BARAN	KISHANGUNJ	S-NPP	25.07708	76.74628	01:47:53	N	1.40
3	BARAN	MANGROL	S-NPP	25.41271	76.50726	12:57:53	D	5.60
4	BARAN	SHAHBAD	S-NPP	25.15157	76.96152	12:57:53	D	4.80
5	BARAN	SHAHBAD	S-NPP	25.24809	77.04070	12:57:53	D	6.70
6	BARAN	SHAHBAD	S-NPP	25.27700	76.99445	12:57:53	D	6.80
7	BUNDI	BUNDI	S-NPP	25.44286	75.70129	12:57:53	D	3.30
8	BUNDI	KESHORAIPATAN	S-NPP	25.28128	75.98711	12:57:53	D	9.30
9	BUNDI	KESHORAIPATAN	S-NPP	25.45718	76.07416	01:47:53	N	1.30
10	CHITTAURGARH	NIMBAHERA	S-NPP	24.61383	74.70663	01:47:53	N	1.60
11	CHITTAURGARH	NIMBAHERA	S-NPP	24.61823	74.70722	01:47:53	N	1.60
12	KOTA	PIPALDA	S-NPP	25.51494	76.44904	12:57:53	D	2.90

Details of residue burning events in Madhya Pradesh on 17-Oct-2023

S. No.	District	Tehsil / Block	Satellite	Latitude	Longitude	ACQ_TIME	Day / Night	Fire Power (W/m2)
1	ASHOKNAGAR	ASHOKNAGAR	S-NPP	24.38396	77.58493	12:57:53	D	4.10
2	ASHOKNAGAR	ASHOKNAGAR	S-NPP	24.58095	77.50459	12:57:53	D	4.00
3	ASHOKNAGAR	CHANDERI	S-NPP	24.79934	78.21745	12:57:53	D	2.40
4	DAMOH	PATHARIA	S-NPP	23.98732	79.39383	01:47:53	N	0.50
5	DATIA	SEONDHA	S-NPP	25.80876	78.51753	12:57:53	D	4.20
6	GUNA	GUNA	S-NPP	24.66472	77.10612	12:57:53	D	4.80
7	GUNA	GUNA	S-NPP	24.66583	77.11147	12:57:53	D	4.80
8	GUNA	GUNA	S-NPP	24.71987	77.07858	12:57:53	D	4.40
9	GUNA	GUNA	S-NPP	24.72363	77.02690	12:57:53	D	11.20
10	GUNA	GUNA	S-NPP	24.76812	76.95901	12:57:53	D	3.50
11	GUNA	GUNA	S-NPP	24.77575	76.89711	12:57:53	D	5.10
12	GUNA	GUNA	S-NPP	24.79826	77.26955	12:57:53	D	4.20
13	GUNA	GUNA	S-NPP	24.91120	77.07894	12:57:53	D	3.70
14	GUNA	GUNA	S-NPP	24.93212	77.20921	12:57:53	D	4.60
15	GUNA	GUNA	S-NPP	24.93348	77.21156	12:57:53	D	2.40
16	GUNA	GUNA	S-NPP	24.93796	77.03069	12:57:53	D	7.60
17	GUNA	GUNA	S-NPP	25.01947	76.94683	12:57:53	D	5.00
18	GUNA	GUNA	S-NPP	25.02681	77.09622	12:57:53	D	4.00
19	GUNA	GUNA	AQUA	24.85700	77.51600	13:36:09	D	29.50
20	GUNA	RAGHOGARH	S-NPP	24.57363	77.08934	12:57:53	D	4.00
21	HOSHANGABAD	HOSHANGABAD	S-NPP	22.66719	77.67659	12:57:53	D	3.50
22	NARSHIMAPURA	GOTECAON	S-NPP	23.03363	79.49299	12:57:53	D	3.00
23	NARSHIMAPURA	GOTECAON	S-NPP	23.03776	79.49207	12:57:53	D	3.50
24	SAGAR	DEVRI	S-NPP	23.57413	78.86549	12:57:53	D	3.00
25	SAGAR	REHLI	S-NPP	23.59051	79.12793	12:57:53	D	3.30
26	SAGAR	REHLI	S-NPP	23.59468	79.12695	12:57:53	D	6.30
27	SAGAR	REHLI	S-NPP	23.60352	78.97059	12:57:53	D	2.80
28	SEHORE	NASRULLAHGANJ	S-NPP	22.59044	77.33002	12:57:53	D	3.80
29	UJJAIN	BARNAGAR	S-NPP	23.23312	75.60210	12:57:53	D	2.80
30	UJJAIN	KACHROD	S-NPP	23.36128	75.29566	12:57:53	D	2.00
31	WEST NIMAR	KHARGON	S-NPP	21.72474	75.48996	12:57:53	D	2.80

The study used data received from following Satellites at NRSC Ground Station

S. No.	Satellite Name	Sensor	Resolution (meter)	Day / Night Passes
1.	Suomi NPP	VIIRS	375 / 750	Both
2.	Terra	MODIS	1000	Both
3.	Aqua	MODIS	1000	Both

**The rice mask for the Punjab and Haryana were provided by MNCFC, MoA&FW, Govt of India
The kharif crop mask for Delhi, Uttar Pradesh, Rajasthan and Madhya Pradesh were provided by NRSC (ISRO)**

Study Team

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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)

The DASHBOARD for paddy residue burning events is available at weblink: [CREAMS Fire Dashboard](#)
