



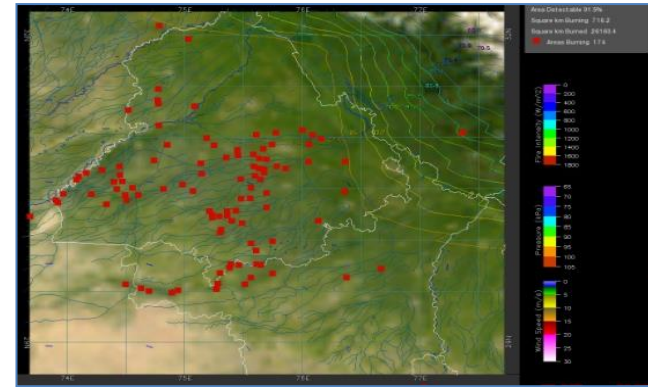
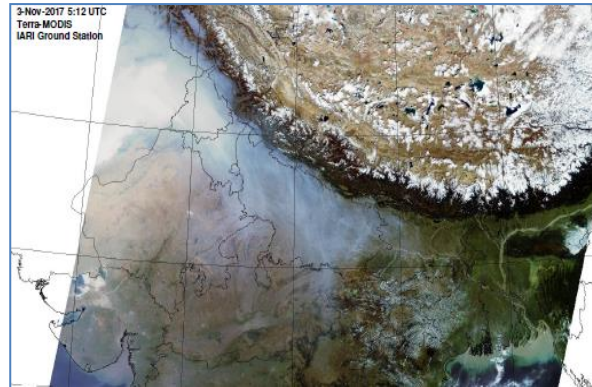
**Bulletin
No. 34**

**Events Date:
18-Oct-2021**

**Issued on:
18-Oct-2021**



MONITORING PADDY RESIDUE BURNING IN INDIA USING SATELLITE REMOTE SENSING DURING 2021



Prepared by:

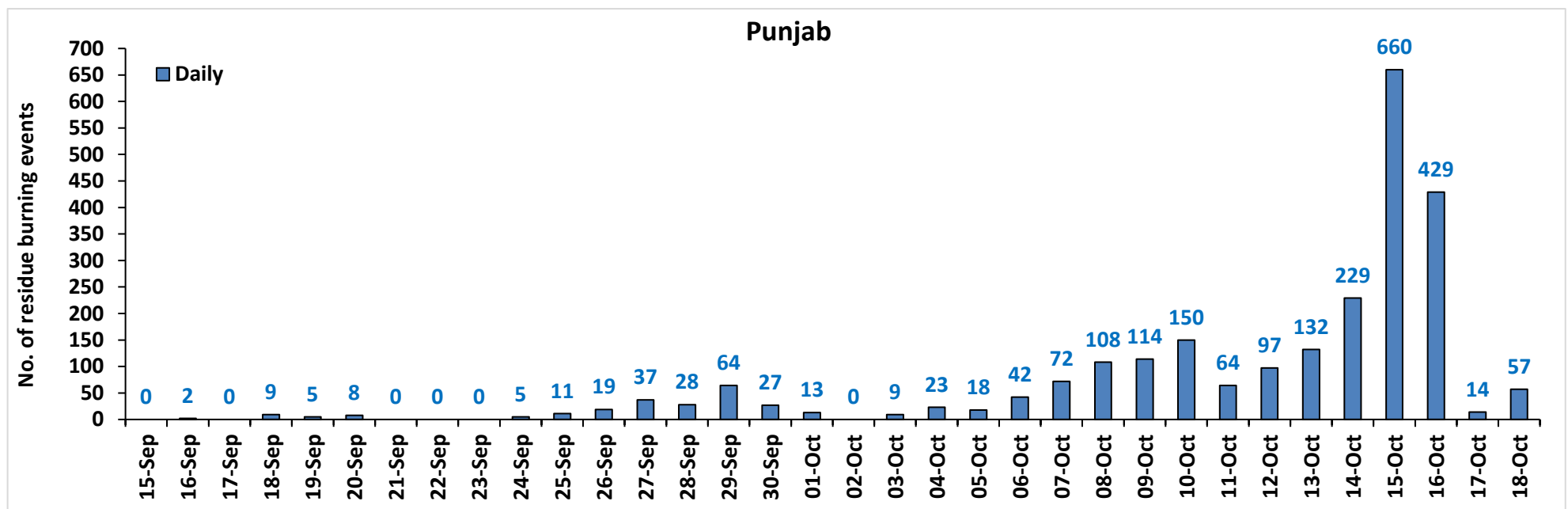
**Consortium for Research on Agroecosystem Monitoring and Modeling from Space (CREAMS) Laboratory,
Division of Agricultural Physics, ICAR – Indian Agricultural Research Institute, New Delhi – 110012**

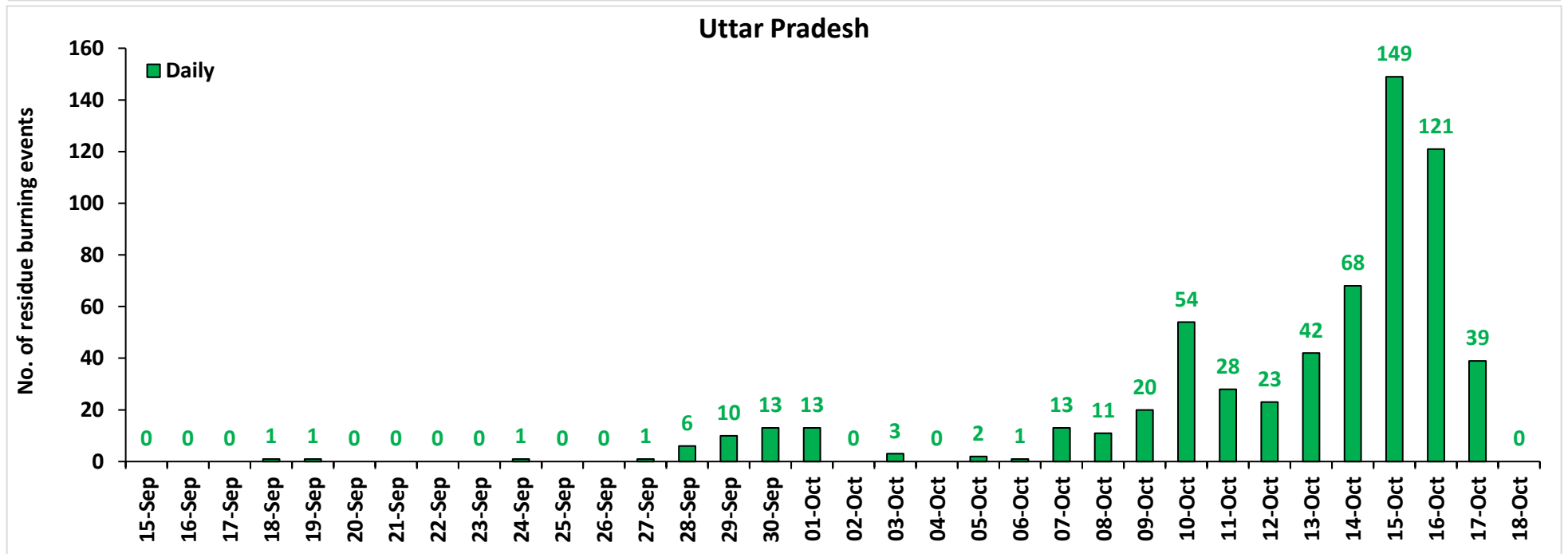
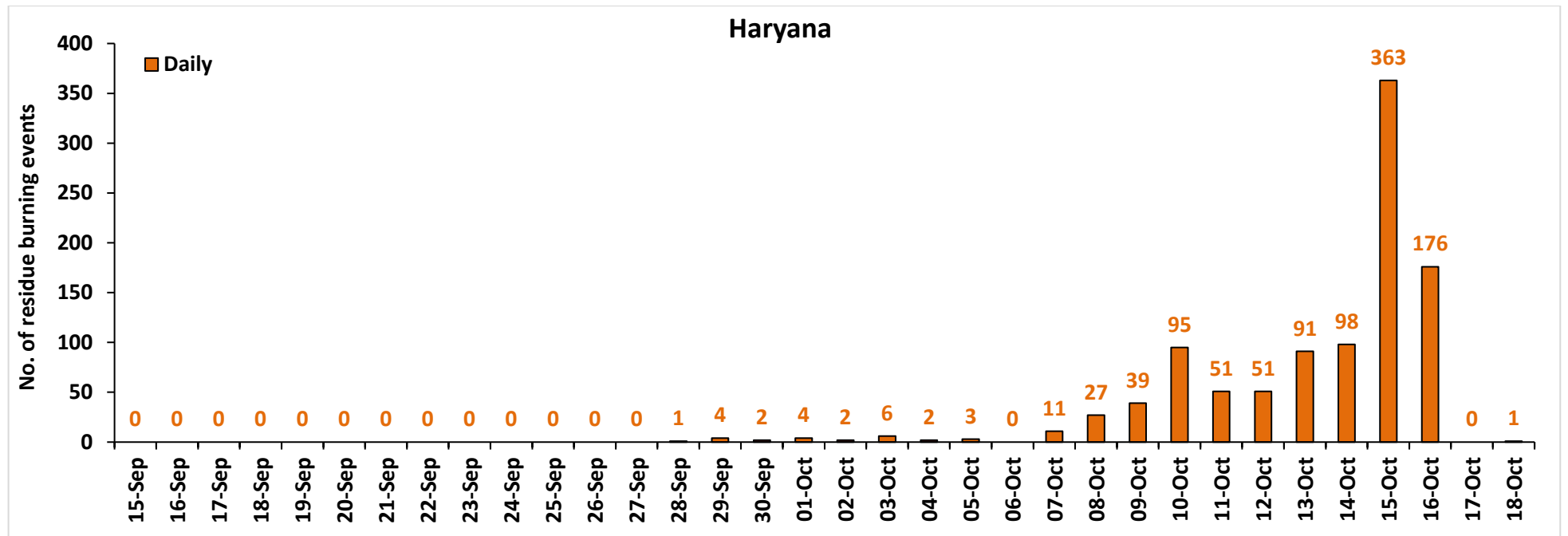
<http://creams.iari.res.in>

Highlights for 18-October-2021

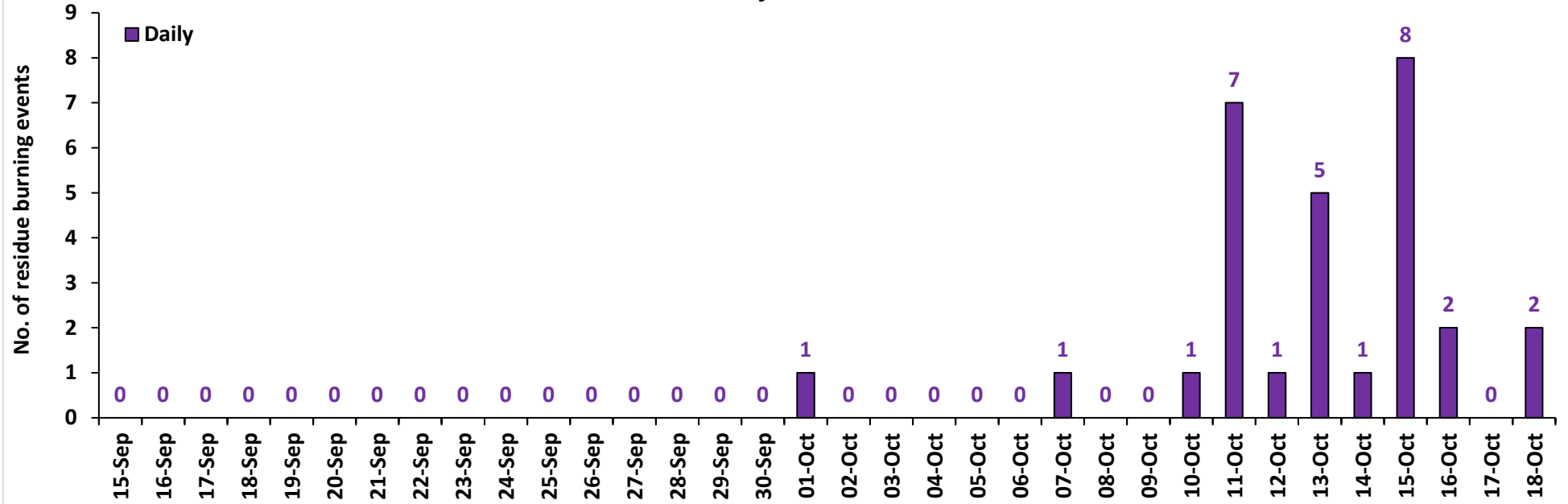
- The active fire events due to rice residue burning were monitored using satellite remote sensing, following the new "Standard Protocol for Estimation of Crop Residue Burning Fire Events using Satellite Data".
- Satellites detected **60** residue burning events in the six study States on 18-Oct-2021.
- The state wise events detected on 18-Oct-2021 were **57** in Punjab, **1** in Haryana, **0** in UP, **0** in Delhi, **2** in Rajasthan and **0** in MP.
- The number of events has increased from **54** on 17-Oct-2021 to **60** on 18-Oct-2021 in the six study states.
- Detection of burning events by satellites was hampered due to clouds over all the study states.
- Total **4206** burning events were detected in the six states between 15-Sept-2021 and 18-Oct-2021, which are distributed as **2446**, **1027**, **620**, **0**, **29** and **84** in Punjab, Haryana, UP, Delhi, Rajasthan and MP, respectively.
- Overall, the total burning events recorded in the six states are **56.8%** less than in 2020 till date. Punjab recorded **67.1%** reduction, Haryana recorded **5.8%** reduction, UP recorded **36.3%** increase, Delhi recorded **100%** reduction, Rajasthan recorded **89.5%** reduction and MP recorded **84.2%** reduction, in the current season than in 2020.

Temporal distribution of rice residue burning events for the study States in 2021

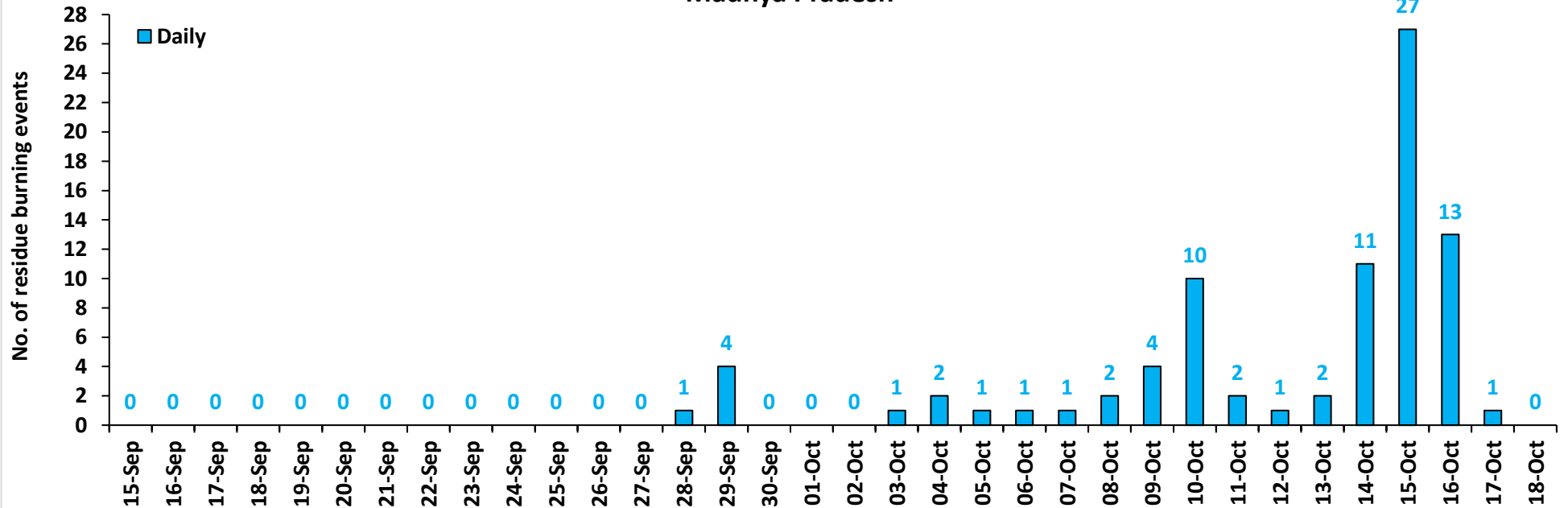




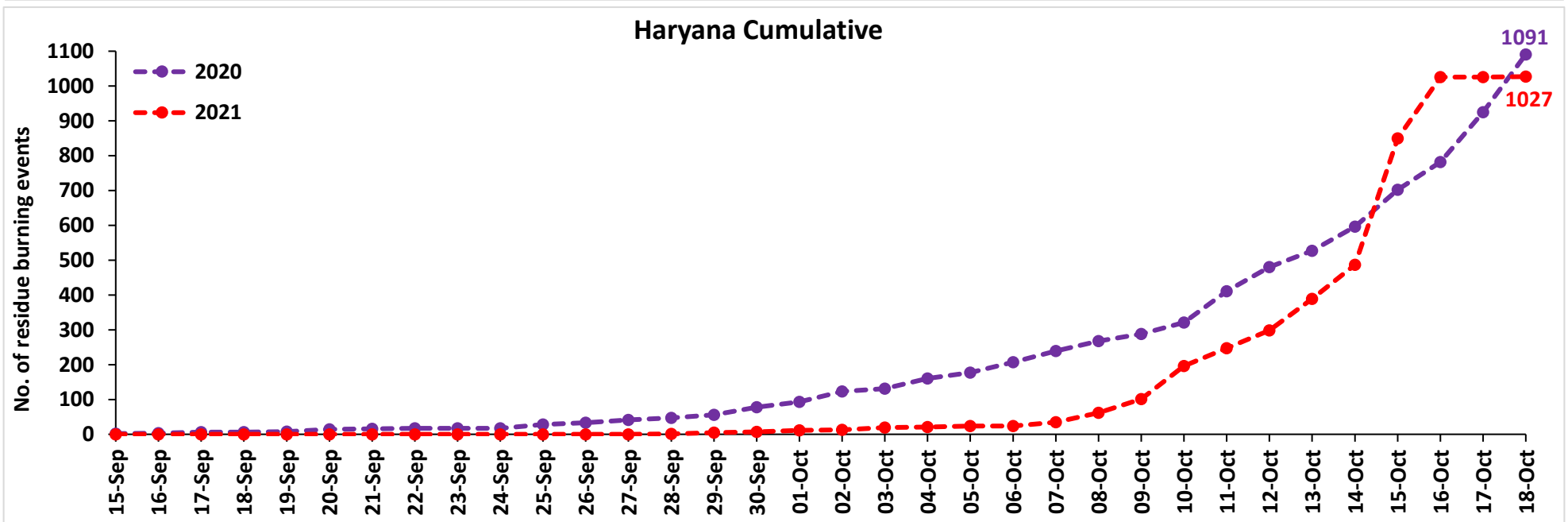
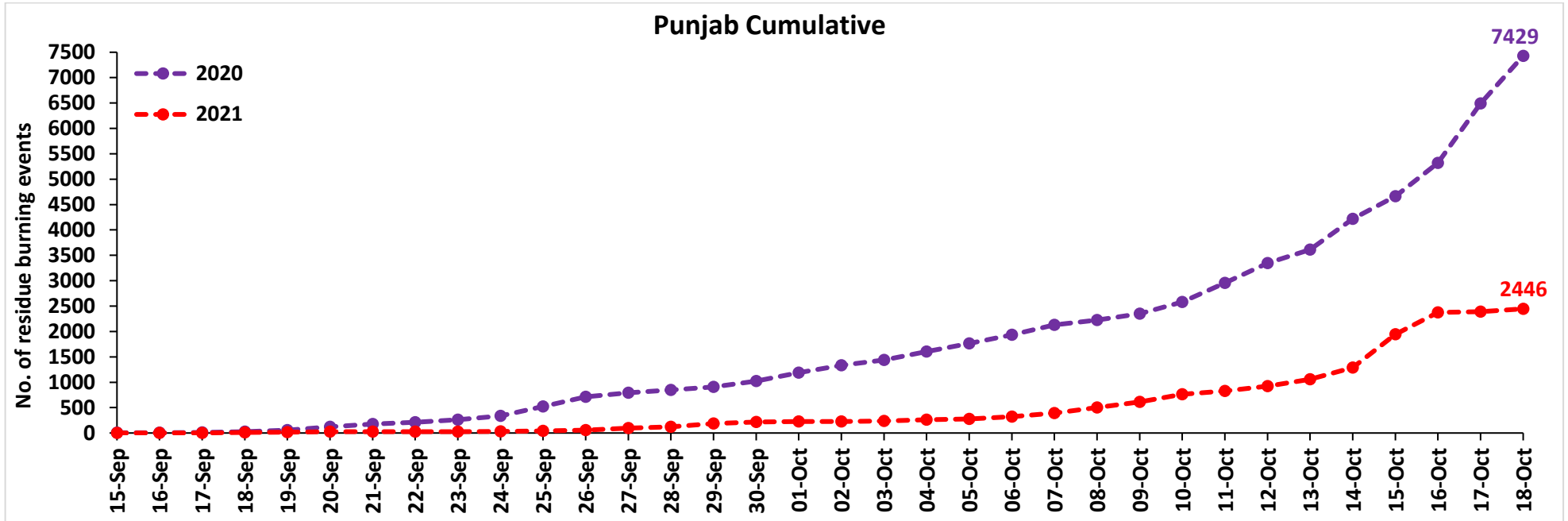
Rajasthan

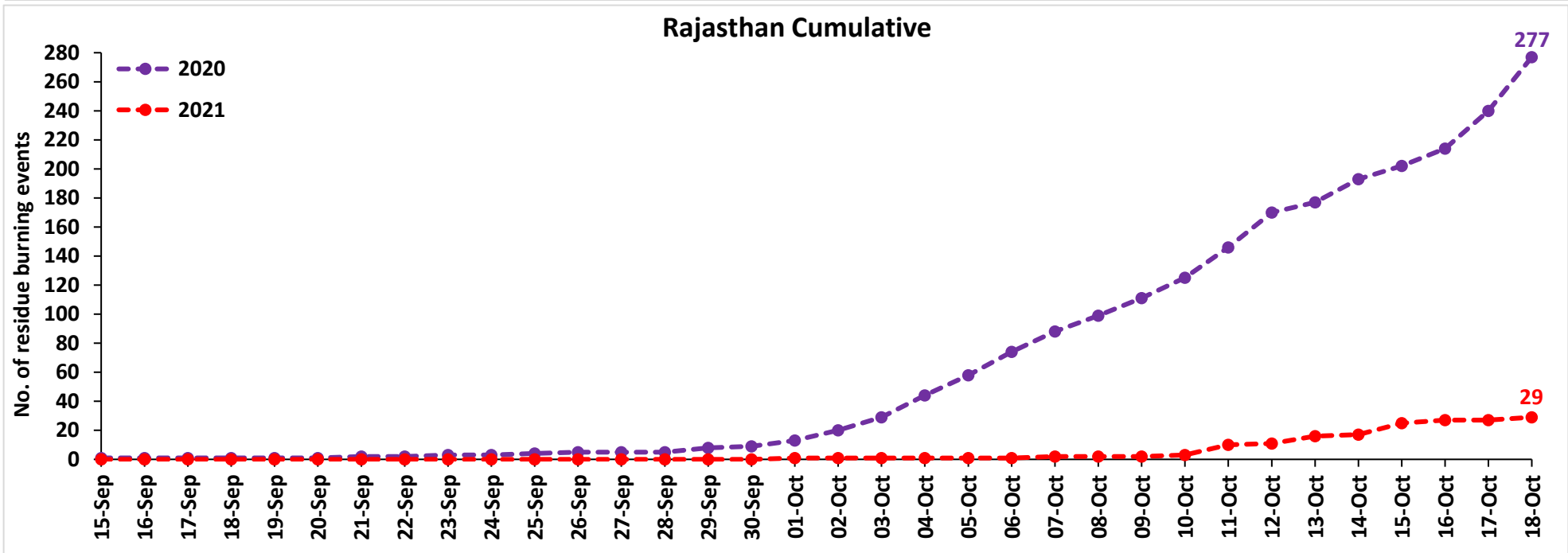
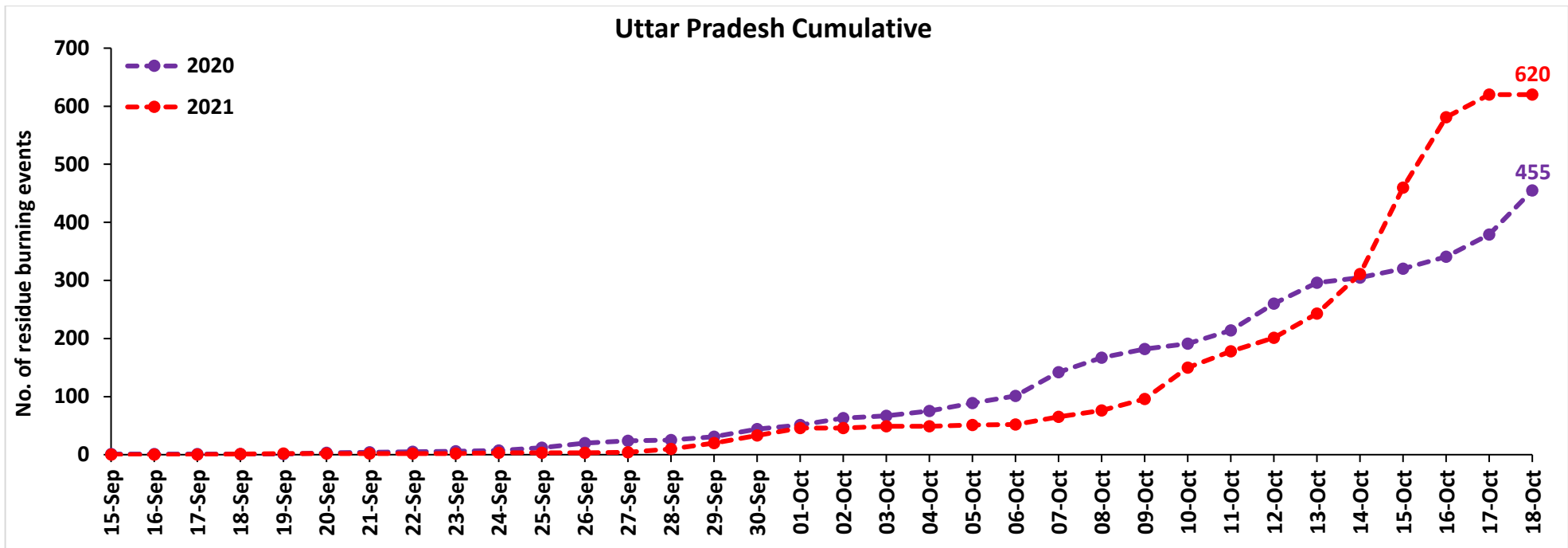


Madhya Pradesh

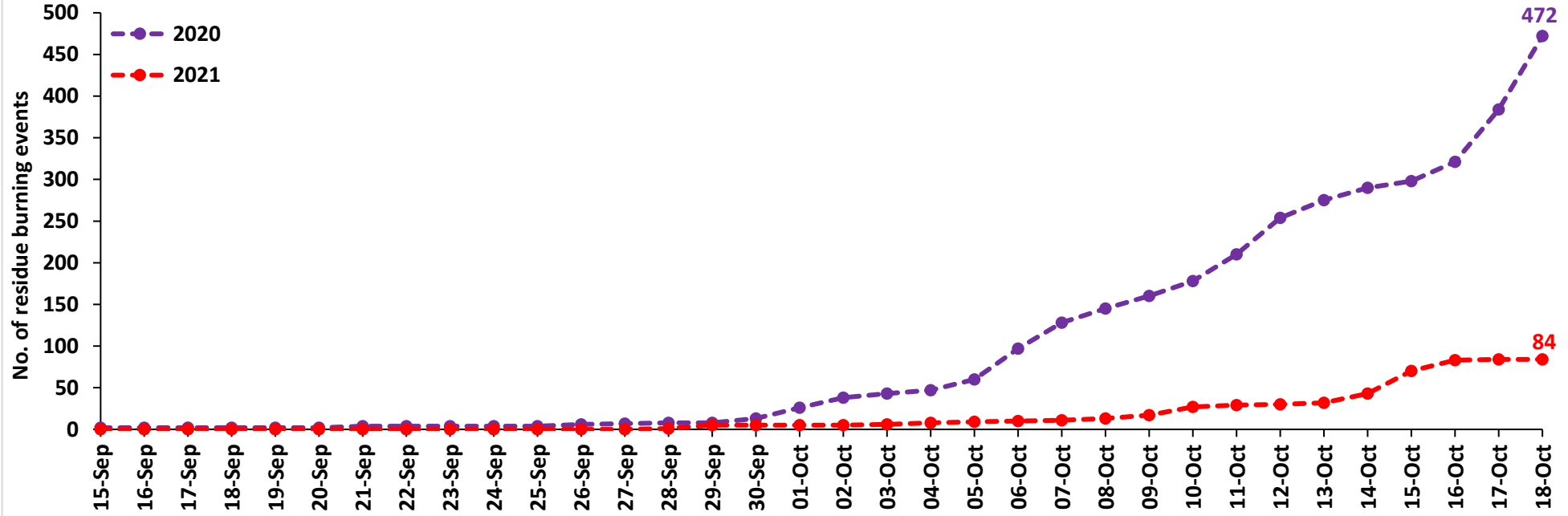


Comparison of residue burning events in current year (2021) with previous year (2020) for the study States

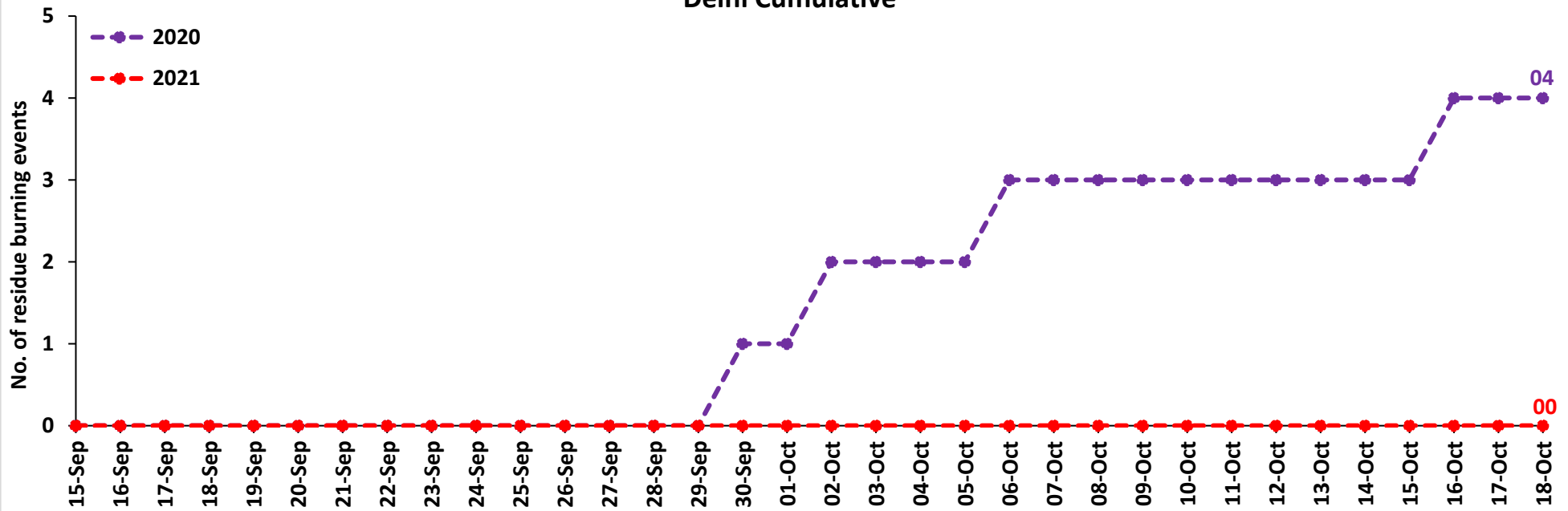




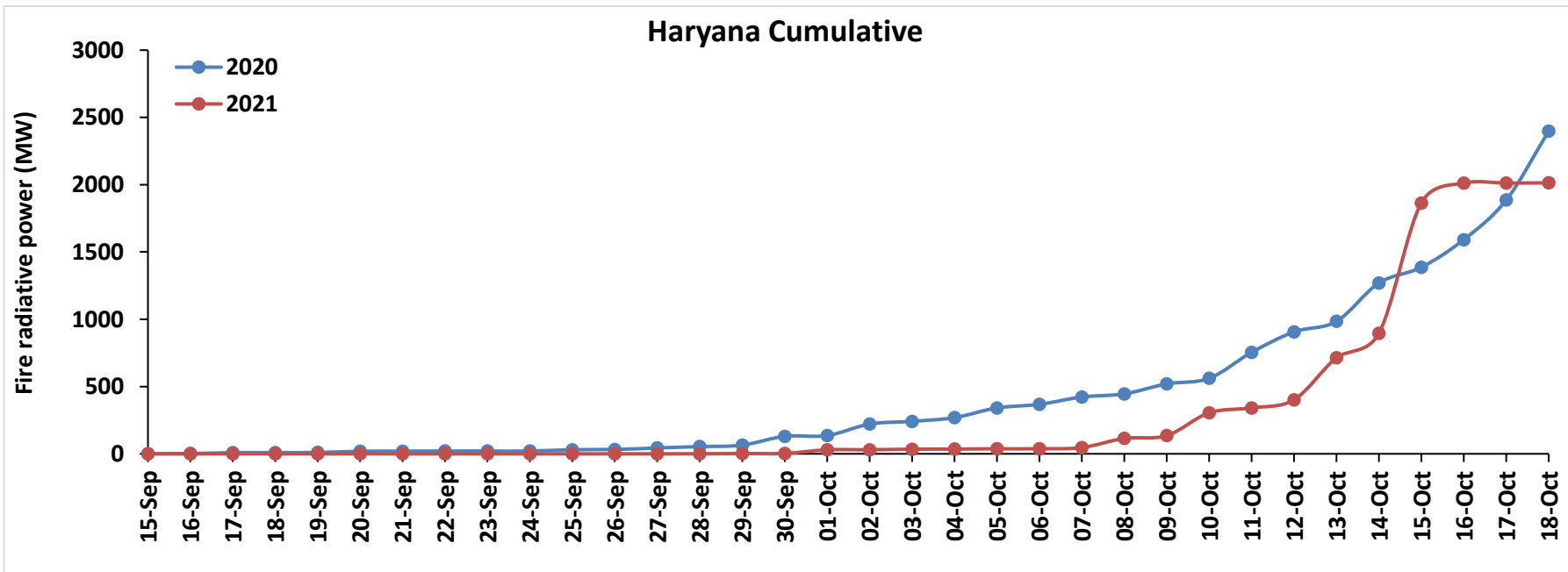
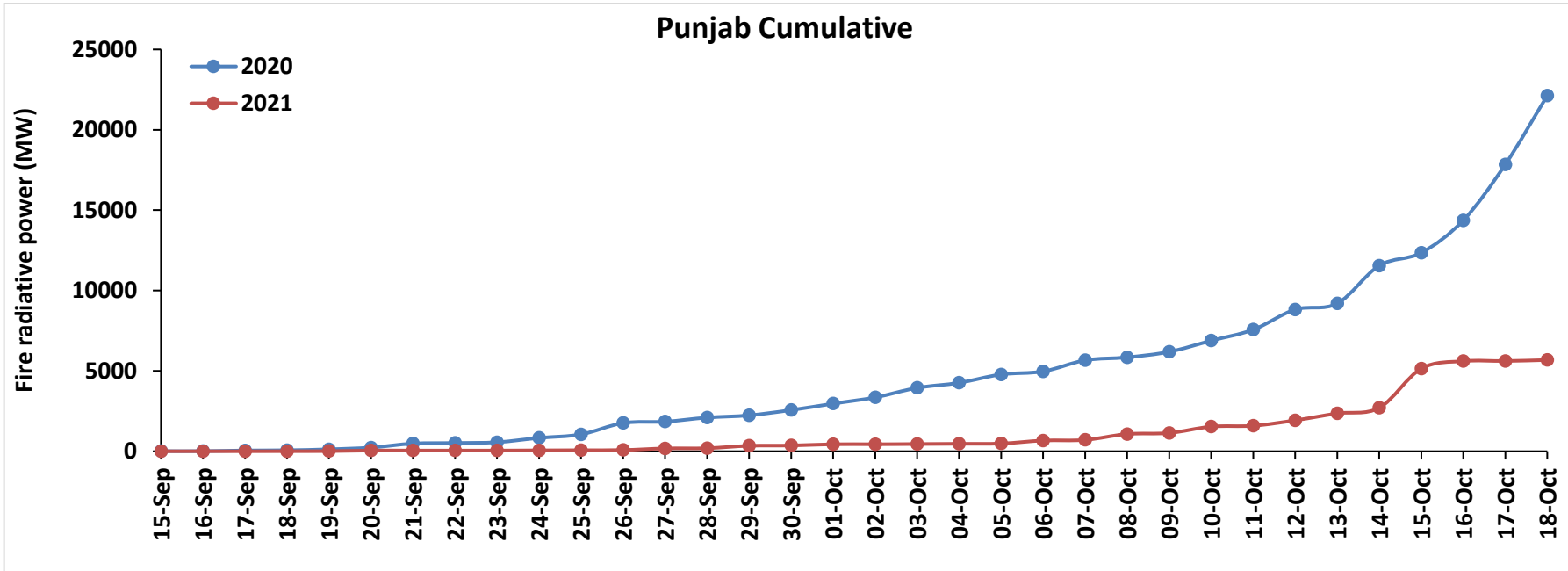
Madhya Pradesh Cumulative



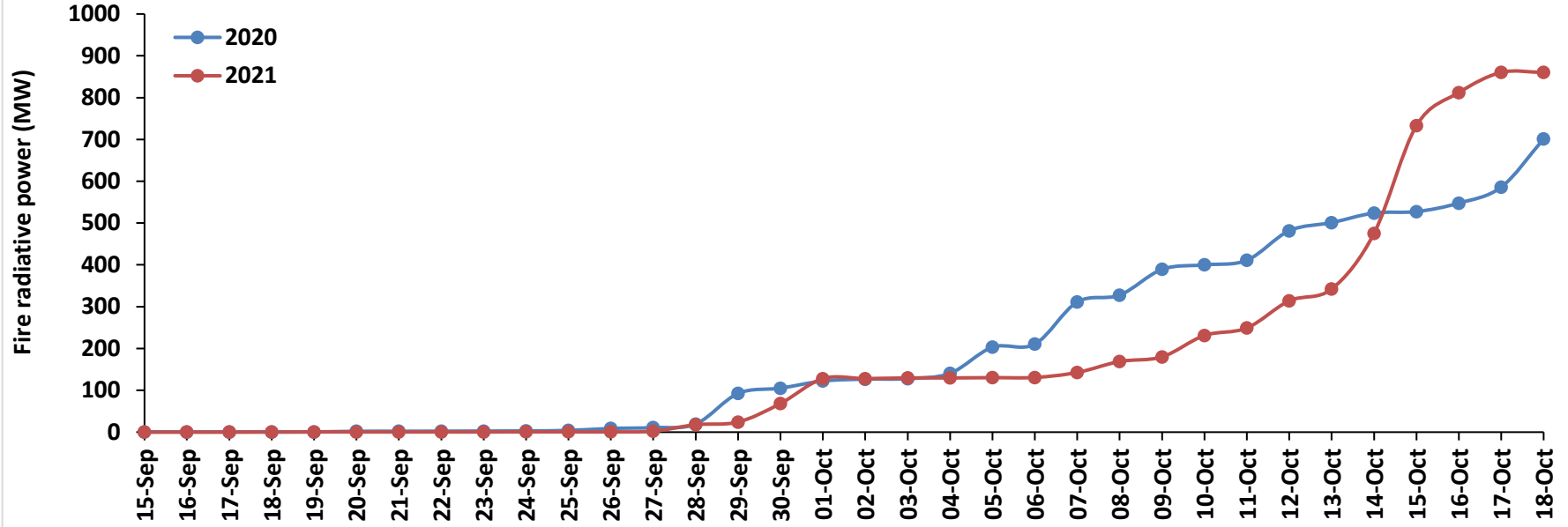
Delhi Cumulative



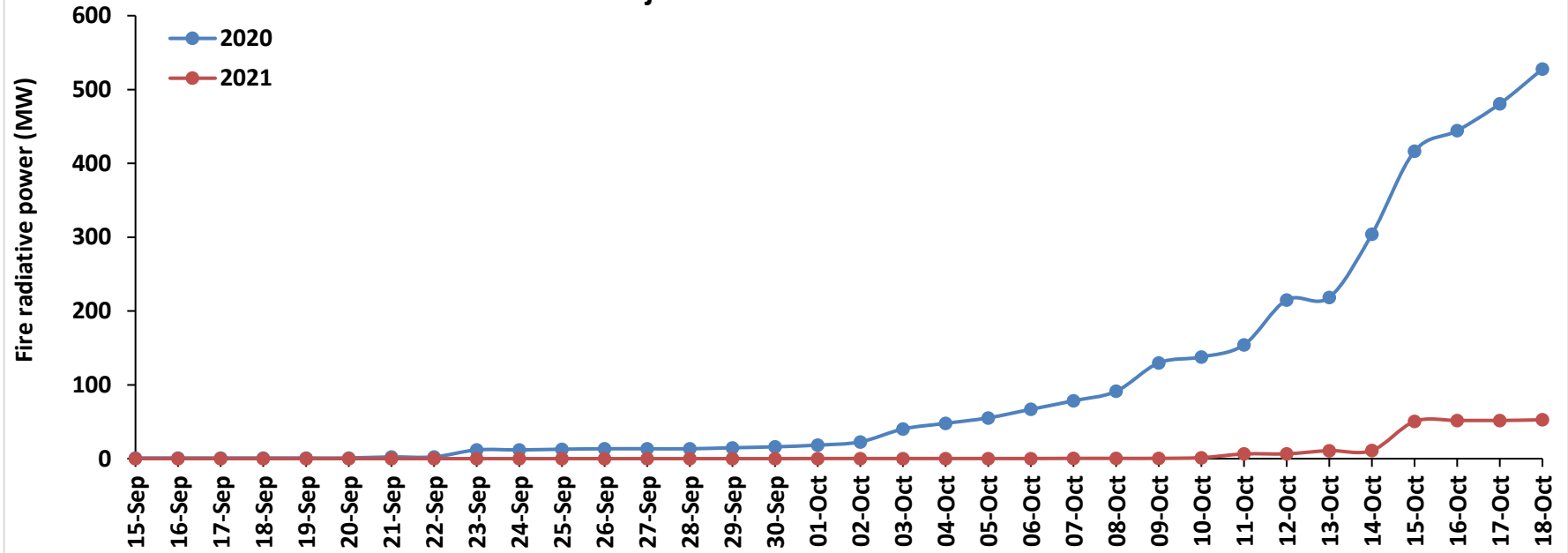
Comparison of residue burning fire power in current year (2021) with previous year (2020) for the study States



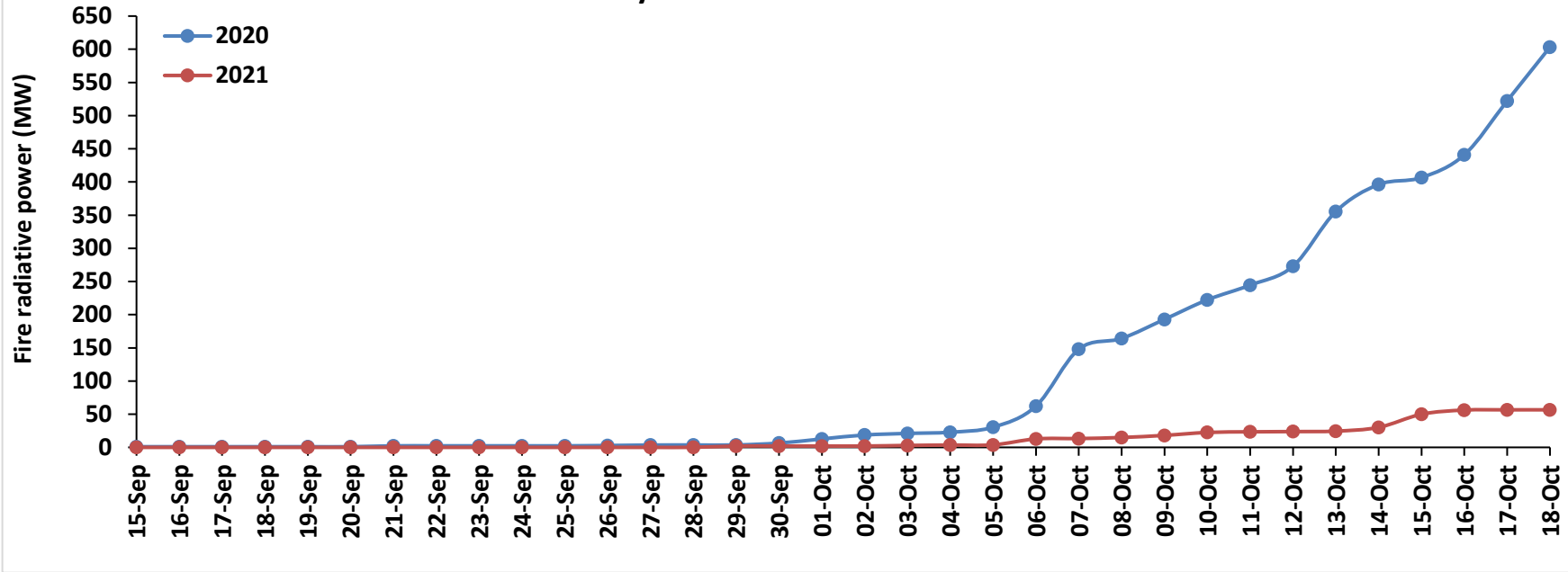
Uttar Pradesh Cumulative



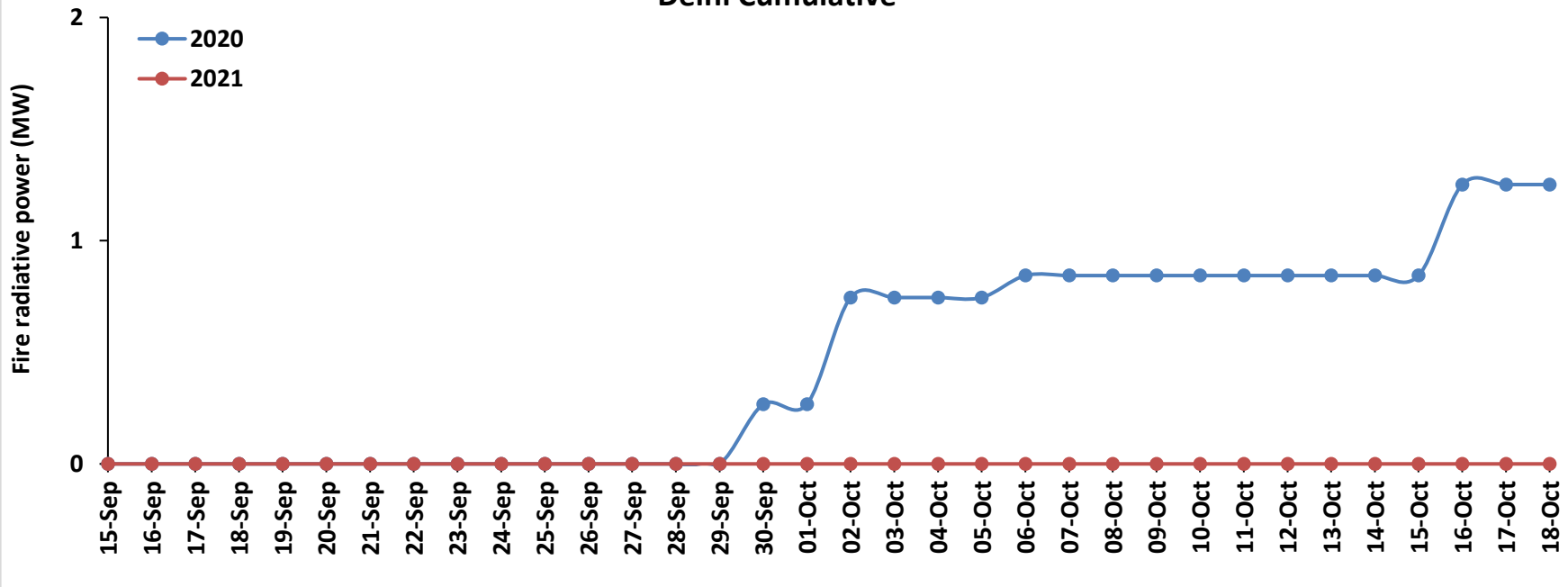
Rajasthan Cumulative



Madhya Pradesh Cumulative

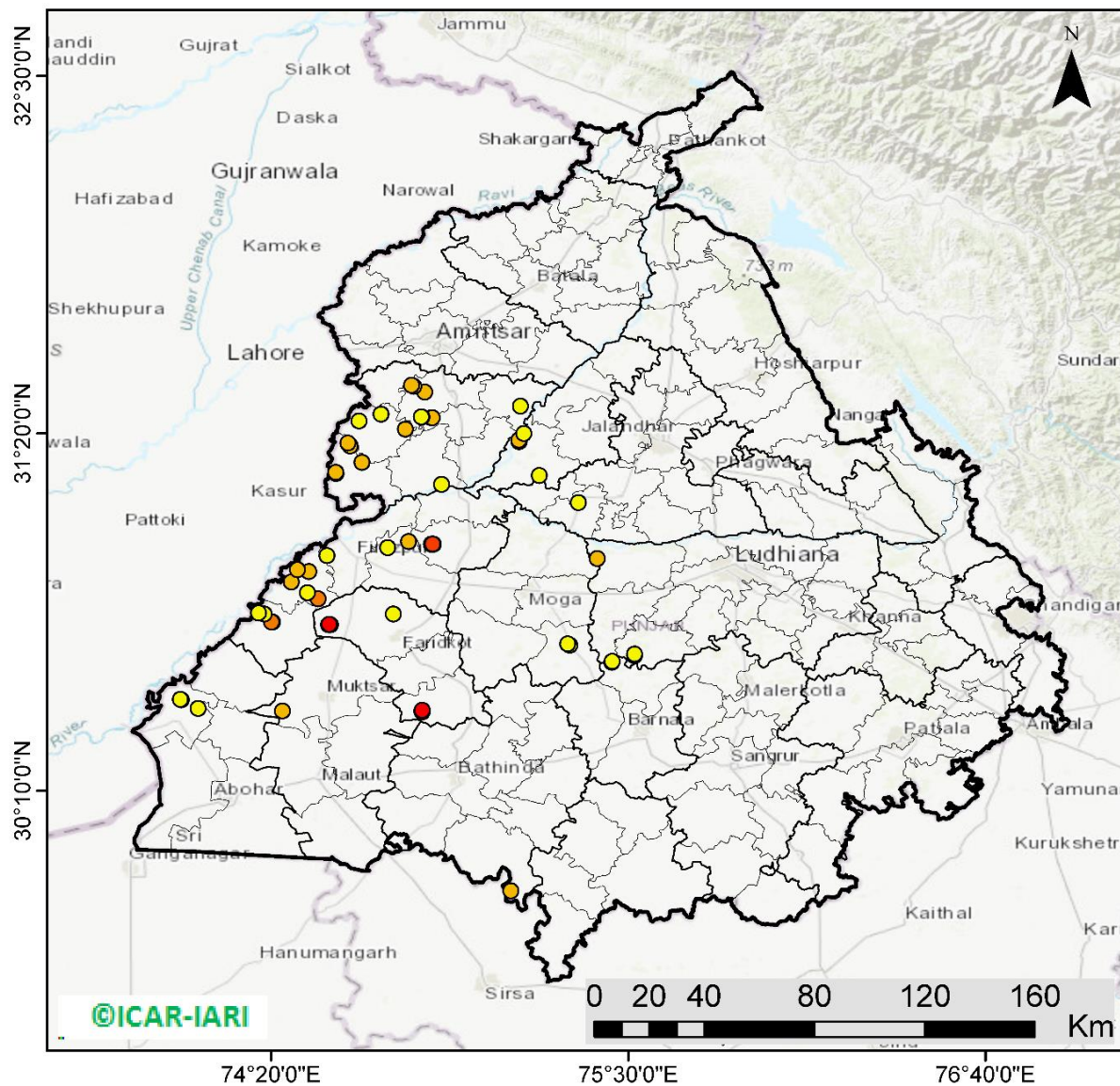


Delhi Cumulative



Punjab

RICE RESIDUE BURNING IN PUNJAB



57 burning events detected in Punjab on **18th October 2021**

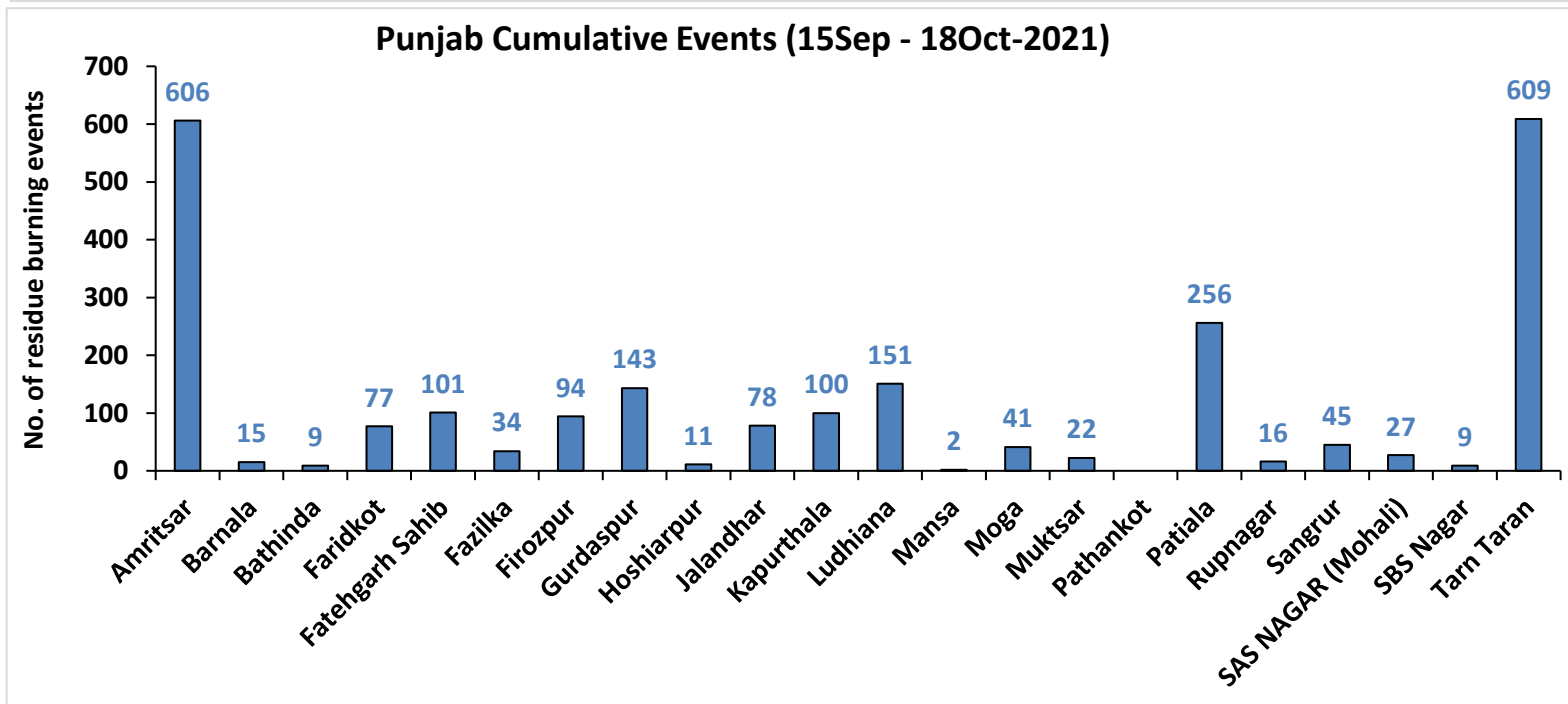
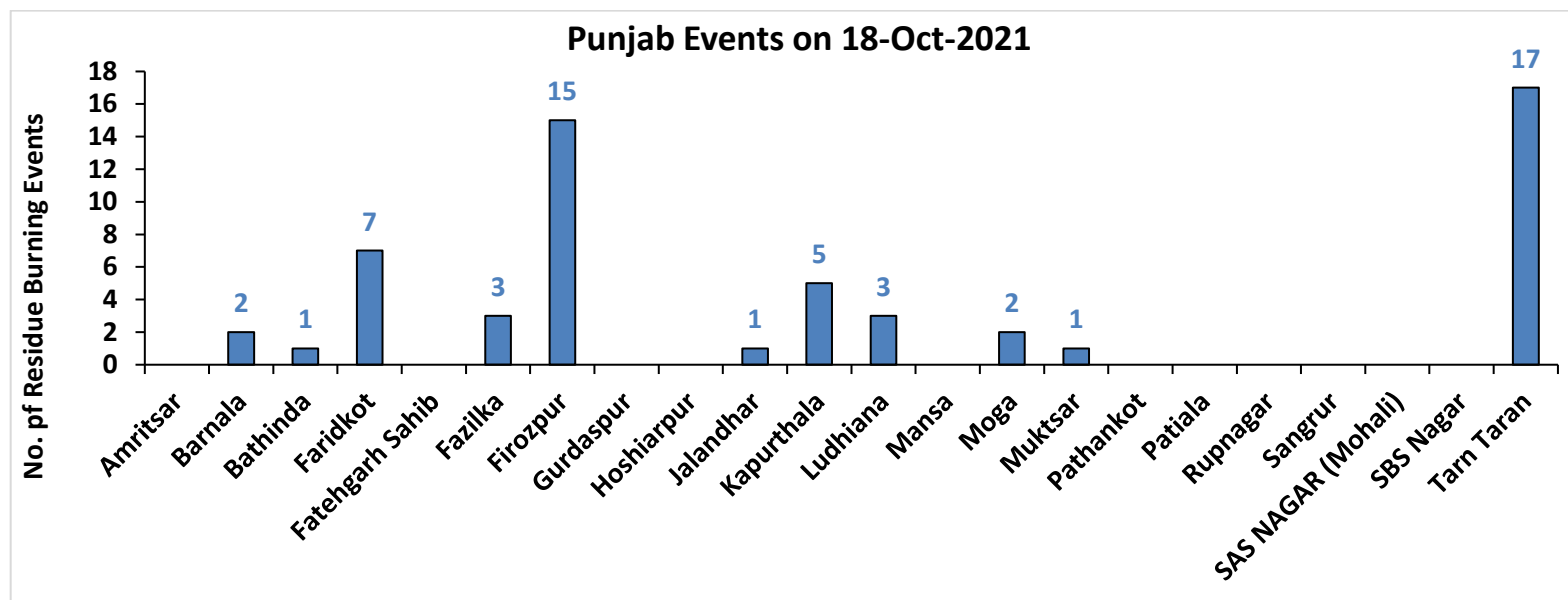
Fire Intensity (W/m²)

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



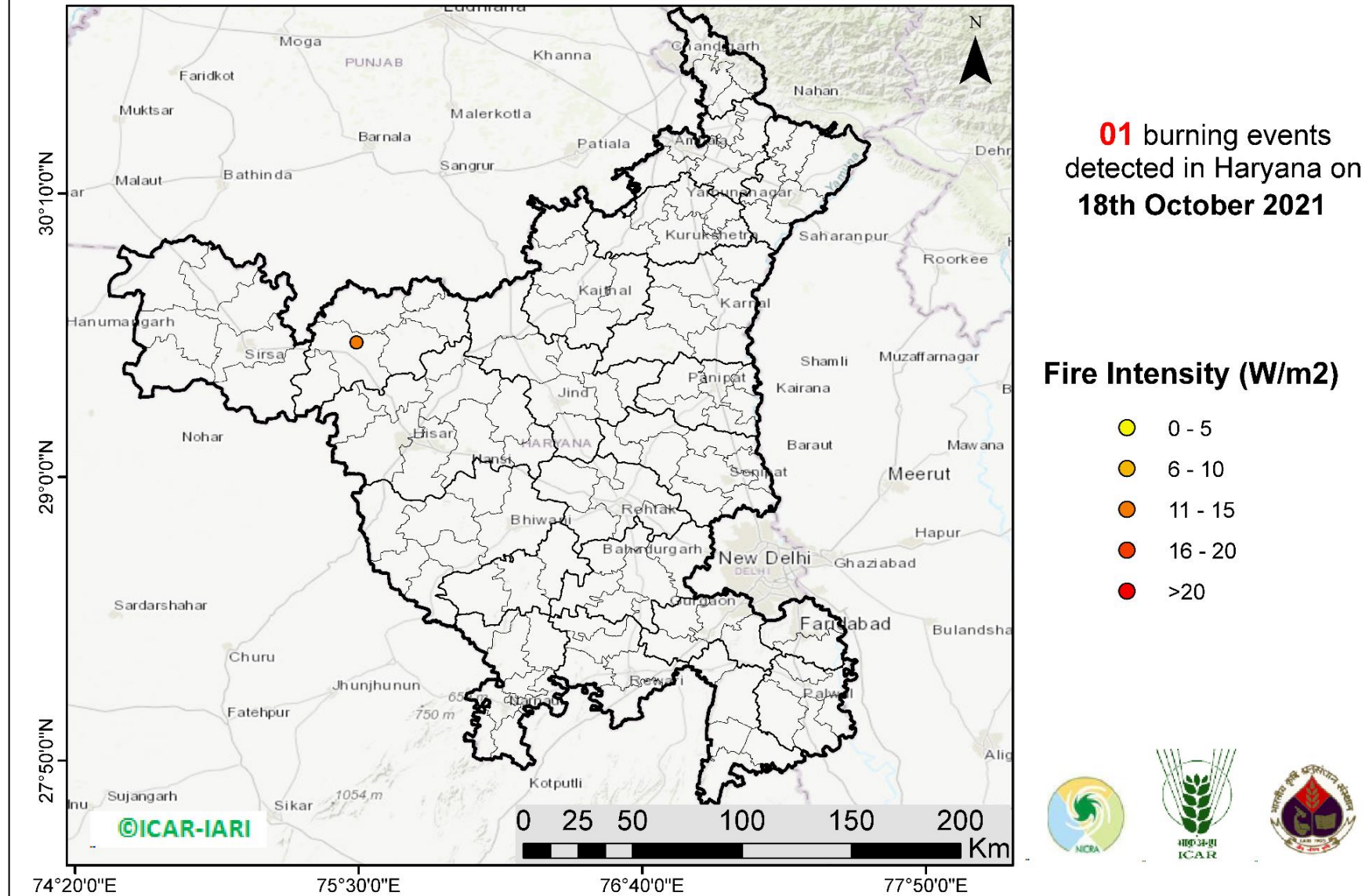
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Punjab (15Sep - 18Oct-2021)



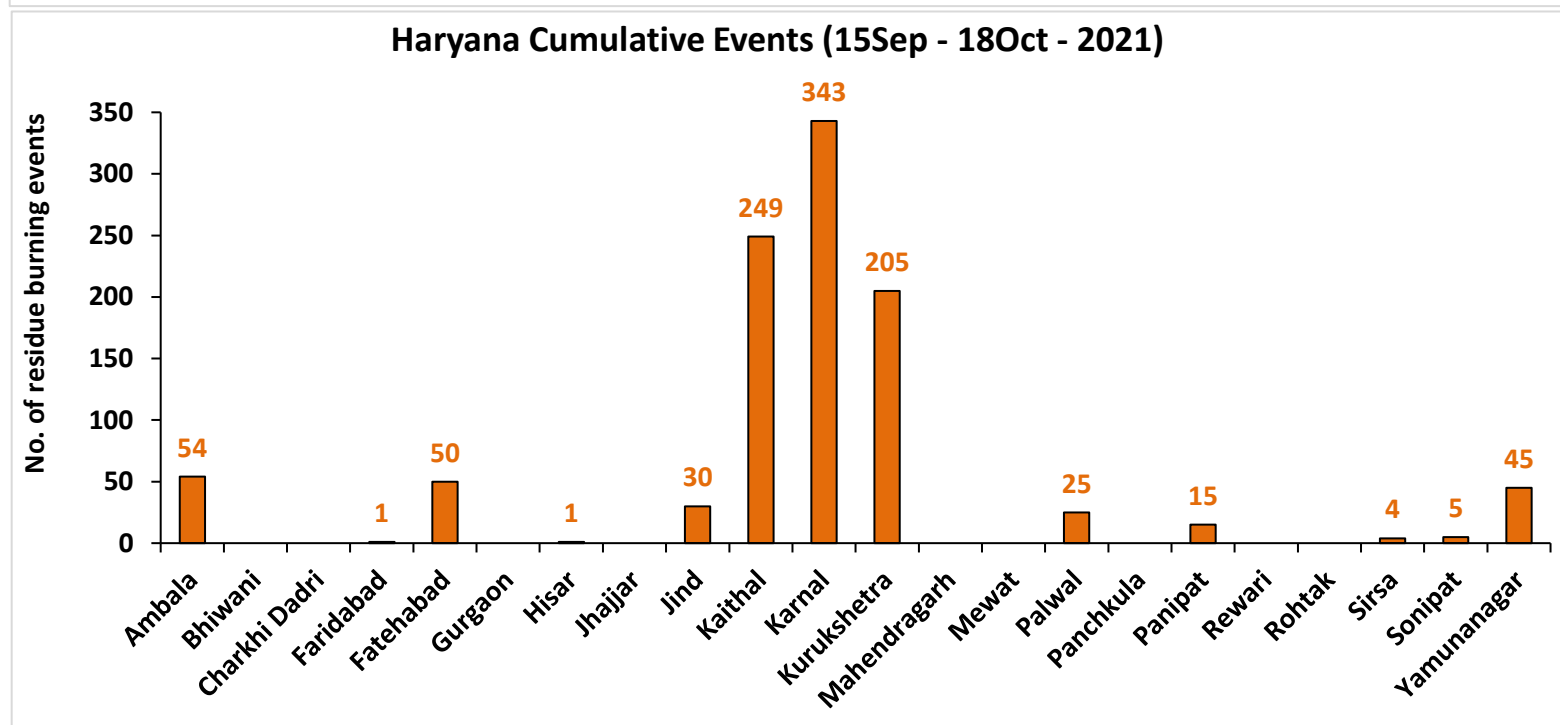
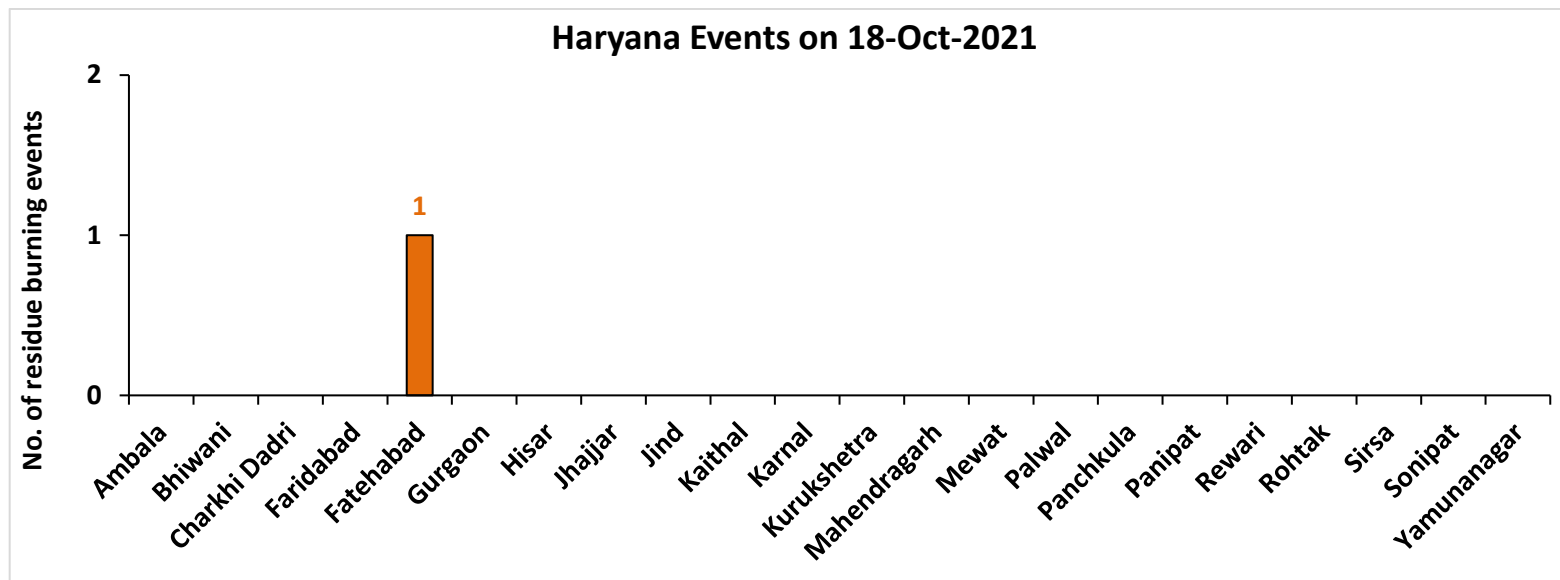
Haryana

RICE RESIDUE BURNING IN HARYANA



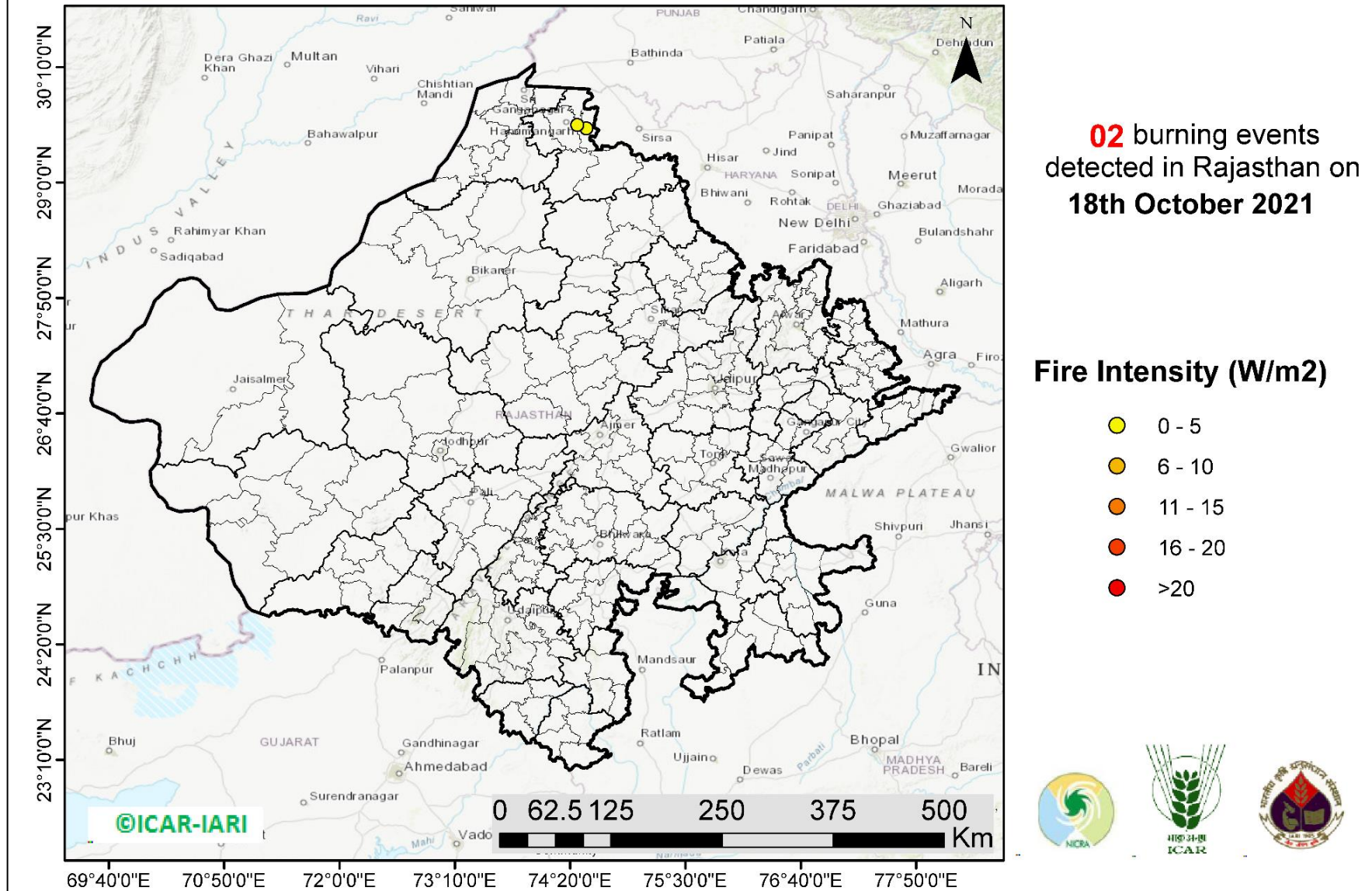
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District-wise cumulative number of residues burning events in Haryana (15 Sep - 18 Oct-2021)

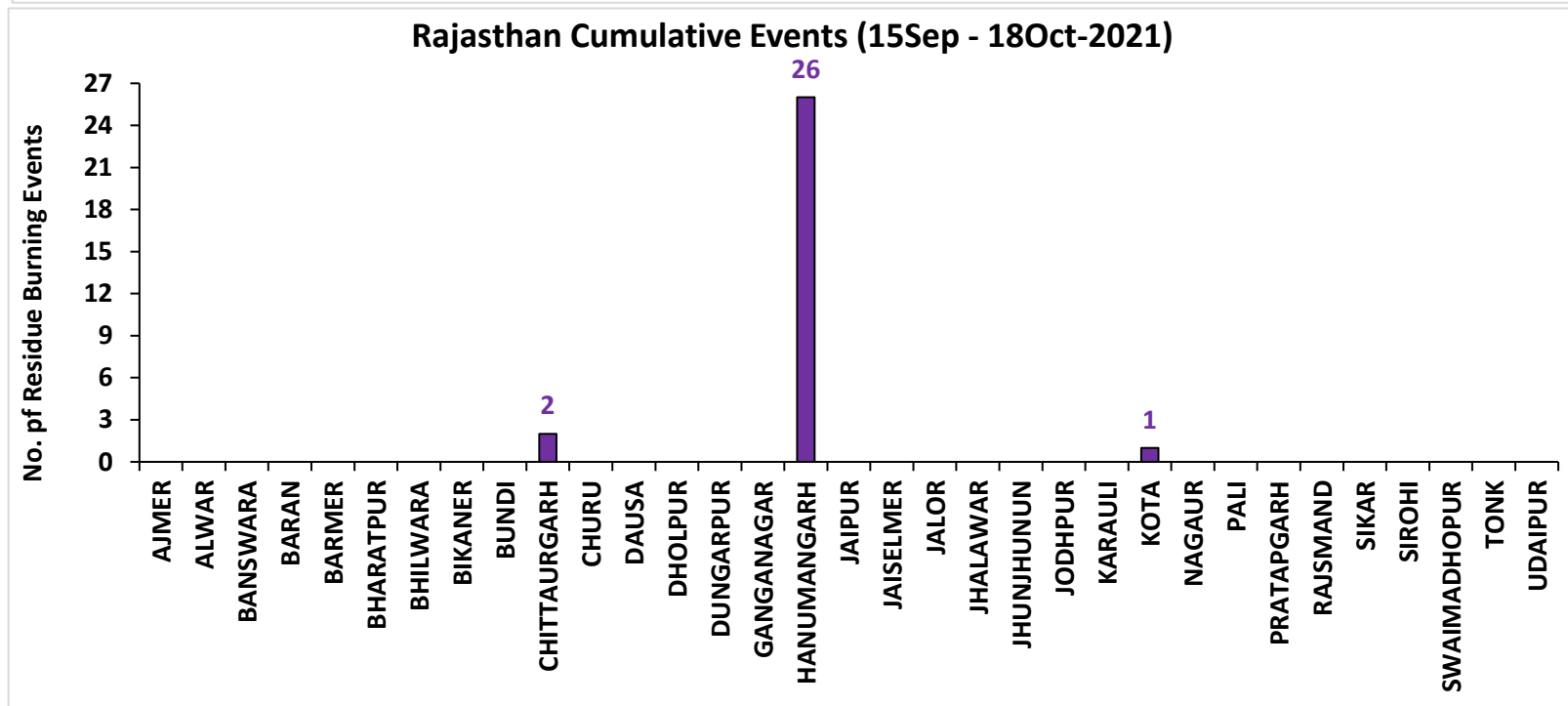
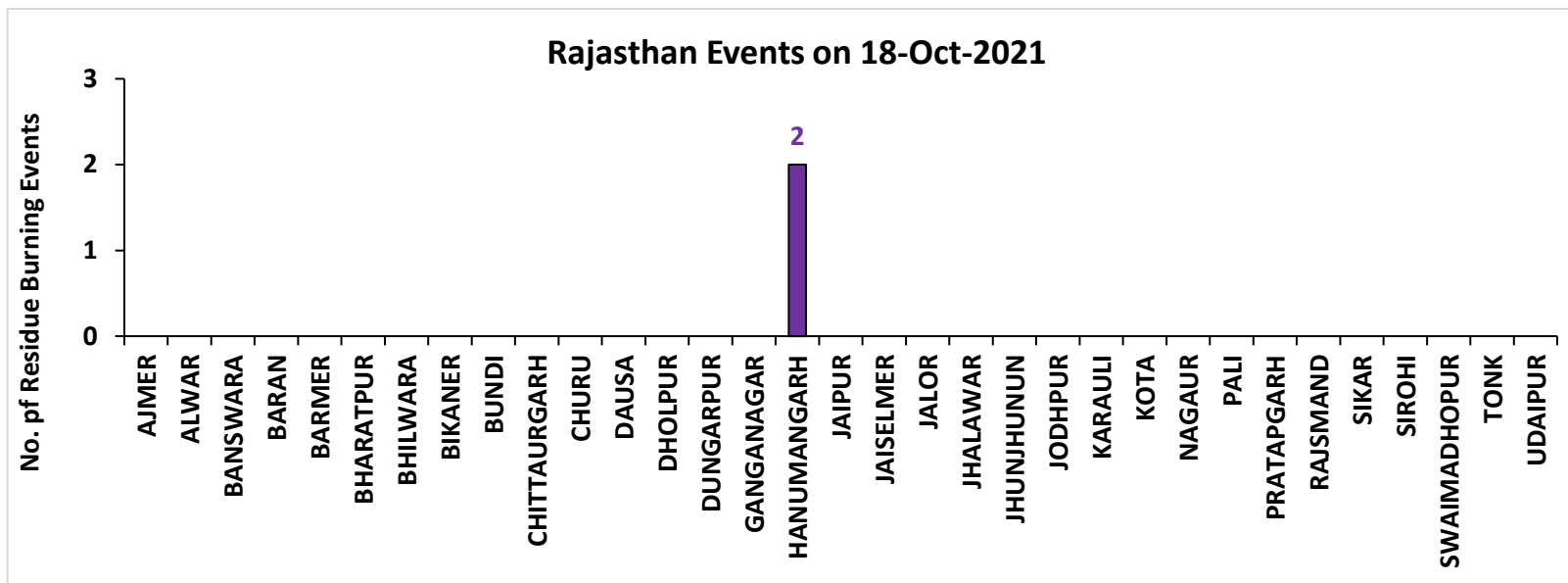


Rajasthan

RICE RESIDUE BURNING IN RAJASTHAN



District-wise cumulative number of residues burning events in Rajasthan (15 Sep - 18 Oct-2021)



District-wise cumulative number of residues burning events detected in 2020 and 2021
(Period: 15 September - 18 October)

(a) Punjab

District	15 Sep – 18 Oct	
	2020	2021
AMRITSAR	1969	606
BARNALA	27	15
BATHINDA	85	9
FARIDKOT	291	77
FATEHGARH SAHIB	190	101
FAZILKA	67	34
FIROZPUR	609	94
GURDASPUR	528	143
HOSHIARPUR	65	11
JALANDHAR	125	78
KAPURTHALA	303	100
LUDHIANA	189	151
MANSA	62	2
MOGA	90	41
MUKTSAR	47	22
PATHANKOT	3	0
PATIALA	644	256
RUPNAGAR	44	16
SANGRUR	165	45
SAS NAGAR (MOHALI)	50	27
SBS NAGAR	16	9
TARN TARAN	1860	609
Total	7429	2446

(b) Haryana

District	15 Sep – 18 Oct	
	2020	2021
AMBALA	123	54
BHIWANI	0	0
CHARKHI DADRI	0	0
FARIDABAD	0	1
FATEHABAD	62	50
GURGAON	0	0
HISAR	9	1
JHAJJAR	1	0
JIND	33	30
KAITHAL	204	249
KARNAL	313	343
KURUKSHETRA	238	205
MAHENDRAGARH	0	0
MEWAT	0	0
PALWAL	19	25
PANCHKULA	0	0
PANIPAT	9	15
REWARI	0	0
ROHTAK	1	0
SIRSA	11	4
SONIPAT	11	5
YAMUNANAGAR	57	45
Total	1091	1027

(c) Uttar Pradesh

District	15 Sep – 18 Oct							
	2020	2021	GAUTAMBUDHNAGAR	2	7	MUZAFARNAGAR	3	2
AGRA	2	0	GAZIPUR	0	0	PILHIBHIT	8	108
ALIGARH	34	21	GHAZIABAD	3	2	PRATAPGARH	1	0
ALLAHABAD	0	1	GONDA	0	0	RAIBEARELI	1	0
AMBEDKARNAGAR	0	0	GORAKHPUR	1	0	RAMPUR	33	50
AMETHI	0	1	HAMIRPUR	1	0	SAMBHAL	7	7
AMROHA	1	0	HAPUR	3	1	SANTKABIRNAGAR	0	0
AURAIYA	17	6	HARDOI	11	6	SANTRAVIDASNAGAR	0	0
AZAMGARH	0	0	HATHRAS	0	0	SHAHJAHANPUR	40	181
BADAUN	1	1	JALAUN	0	0	SHAMLI	19	11
BAGHPAT	3	1	JAUNPUR	0	0	SHARANPUR	31	17
BAHRAICH	5	2	JHANSI	10	6	SHRAWASTI	4	0
BALLIA	0	0	KANNAUJ	3	1	SIDDHARTHANAGAR	0	0
BALRAMPUR	1	1	KANPUR	2	7	SITAPUR	13	9
BANDA	0	0	KANPUR DEHAT	7	1	SONBHADRA	0	0
BARABANKI	12	20	KASGANJ	1	2	SULTANPUR	0	0
BAREILLY	15	15	KAUSHAMBI	9	3	UNNAO	5	0
BASTI	3	1	KHERI	40	54	VARANASI	0	0
BIJNOR	5	3	KUSHINAGAR	0	0	Total	455	620
BULANDSAHAR	10	2	LALITPUR	0	1			
CHANDAULI	0	0	LUCKNOW	2	0			
CHITRAKOOT	0	0	MAHARAJGANJ	0	0			
DEORIA	0	0	MAHOBA	3	0			
ETAH	6	6	MAINPURI	8	7			
ETAWAH	2	7	MATHURA	22	27			
FAIZABAD	1	0	MAU	0	0			
FARRUKHABAD	0	0	MEERUT	11	4			
FATEHPUR	18	6	MIRZAPUR	6	5			
FIROZABAD	4	4	MORADABAD	5	3			

(d) Delhi

District	15 Sep – 18 Oct	
	2020	2021
CENTRAL	0	0
EAST	0	0
NEW DELHI	0	0
NORTH	2	0
NORTH EAST	0	0
NORTH WEST DELHI		
SHAHADRA	1	0
SOUTH	0	0
SOUTH EAST	1	0
SOUTH WEST DELHI	0	0
WEST DELHI	0	0
Total	4	0

(e) Rajasthan

District	15 Sep – 18 Oct	
	2020	2021
AJMER	0	0
ALWAR	1	0
BANSWARA	0	0
BARAN	88	0
BARMER	2	0
BHARATPUR	1	0
BHILWARA	2	0
BIKANER	1	0
BUNDI	10	0
CHITTAURGARH	0	2
CHURU	0	0
DAUSA	0	0
DHOLPUR	0	0
DUNGARPUR	0	0
GANGANAGAR	3	0
HANUMANGARH	121	26
JAIPUR	1	0
JAISELMER	2	0
JALOR	0	0
JHALAWAR	1	0
JHUNJHUNUN	1	0
JODHPUR	1	0
KARALI	1	0
KOTA	27	1
NAGPUR	0	0
PALI	1	0
PRATAPGARH	4	0
RAJSMAND	0	0
SIKAR	0	0
SIROHI	1	0
SWAIMADHOPUR	7	0
TONK	1	0
UDAIPUR	0	0
Total	277	29

(f) Madhya Pradesh

District	15 Sep – 18 Oct				
	2020	2021			
			PANNA	3	0
ALIRAJPUR	0	0	RAISEN	13	1
ANUPPUR	0	0	RAJGARH	7	1
ASHOKNAGAR	16	1	RATLAM	0	0
BALAGHAT	0	0	REWA	4	0
BARWANI	0	0	SAGAR	14	6
BETUL	1	0	SATNA	10	6
BHIND	9	1	SEHORE	7	3
BHOPAL	6	5	SEONI	27	5
BURHANPUR	0	0	SHAHDOL	0	0
CHHATARPUR	4	0	SHAJAPUR	5	0
CHHINDWARA	4	3	SHEOPUR	15	0
DAMOH	19	4	SHIVPURI	9	0
DATIA	71	8	SIDHI	0	0
DEWAS	3	0	SINGRAULI	0	0
DHAR	20	0	TIKAMGARH	1	0
DINDORI	0	0	UJJAIN	5	0
EAST NIMAR	2	1	UMARIA	0	0
GUNA	16	1	VIDESHA	60	8
GWALIOR	44	0	WEST NIMAR	6	0
HARDA	8	9	Total	472	84
HOSHANGABAD	26	8			
INDORE	2	0			
JABALPUR	7	4			
JHABUA	0	0			
KATNI	2	0			
MANDLA	1	0			
MANDSAUR	3	0			
MORENA	17	5			
NARSHIMAPURA	5	4			
NIMACH	0	0			

State-wise and date-wise number of paddy residue burning events detected in 2020 and 2021
(Period: 15 September – 18 October)

Number of Paddy Residue Burning Events Detected

	Punjab		Haryana		Uttar Pradesh		Delhi		Rajasthan		Madhya Pradesh	
	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021	2020	2021
15-Sep	5	0	2	0	1	0	0	0	1	0	2	0
16-Sep	0	2	1	0	0	0	0	0	0	0	0	0
17-Sep	5	0	3	0	0	0	0	0	0	0	0	0
18-Sep	17	9	0	0	0	1	0	0	0	0	0	0
19-Sep	30	5	2	0	0	1	0	0	0	0	0	0
20-Sep	67	8	6	0	2	0	0	0	0	0	0	0
21-Sep	54	0	2	0	1	0	0	0	1	0	2	0
22-Sep	34	0	1	0	1	0	0	0	0	0	0	0
23-Sep	49	0	0	0	1	0	0	0	1	0	0	0
24-Sep	78	5	0	0	1	1	0	0	0	0	0	0
25-Sep	184	11	11	0	5	0	0	0	1	0	0	0
26-Sep	190	19	5	0	8	0	0	0	1	0	2	0
27-Sep	78	37	8	0	4	1	0	0	0	0	1	0
28-Sep	55	28	6	1	1	6	0	0	0	0	1	1
29-Sep	63	64	9	4	6	10	0	0	3	0	0	4
30-Sep	116	27	22	2	13	13	1	0	1	0	5	0
01-Oct	165	13	15	4	7	13	0	0	4	1	13	0
02-Oct	141	0	30	2	12	0	1	0	7	0	12	0
03-Oct	110	9	8	6	4	3	0	0	9	0	5	1
04-Oct	162	23	29	2	8	0	0	0	15	0	4	2
05-Oct	161	18	17	3	14	2	0	0	14	0	13	1
06-Oct	171	42	30	0	12	1	1	0	16	0	37	1
07-Oct	197	72	32	11	41	13	0	0	14	1	31	1
08-Oct	95	108	29	27	25	11	0	0	11	0	17	2
09-Oct	121	114	20	39	15	20	0	0	12	0	15	4
10-Oct	232	150	33	95	9	54	0	0	14	1	18	10
11-Oct	377	64	90	51	23	28	0	0	21	7	32	2
12-Oct	388	97	69	51	46	23	0	0	24	1	44	1

13-Oct	266	132	47	91	36	42	0	0	7	5	21	2
14-Oct	605	229	69	98	9	68	0	0	16	1	15	11
15-Oct	449	660	106	363	15	149	0	0	9	8	8	27
16-Oct	654	429	80	176	21	121	1	0	12	2	23	13
17-Oct	1172	14	143	0	38	39	0	0	26	0	63	1
18-Oct	938	57	166	1	76	0	0	0	37	2	88	0
Total	7429	2446	1091	1027	455	620	4	0	277	29	472	84

Details of residue burning events in Punjab on 18-Oct-2021

S. No.	District	Tehsil / Block	Satellite	Latitude	Longitude	ACQ_DATE	ACQ_TIME	Day / Night	Fire Power (W/m ²)
1	BARNALA	MAHAL KALAN	S-NPP	30.58580	75.44580	10/18/2021	14:06:41	D	2.50
2	BARNALA	MAHAL KALAN	S-NPP	30.58860	75.44720	10/18/2021	14:06:41	D	3.40
3	BATHINDA	TALWANDI SABO	S-NPP	29.83970	75.11610	10/18/2021	14:06:41	D	8.10
4	FARIDKOT	FARIDKOT	S-NPP	30.70790	74.52100	10/18/2021	14:06:41	D	19.90
5	FARIDKOT	FARIDKOT	S-NPP	30.70840	74.52710	10/18/2021	14:06:41	D	19.90
6	FARIDKOT	FARIDKOT	S-NPP	30.70990	74.52320	10/18/2021	14:06:41	D	27.80
7	FARIDKOT	FARIDKOT	S-NPP	30.74270	74.73250	10/18/2021	12:27:07	D	1.70
8	FARIDKOT	JAITON	S-NPP	30.42390	74.82710	10/18/2021	14:06:41	D	17.50
9	FARIDKOT	JAITON	S-NPP	30.42600	74.82530	10/18/2021	14:06:41	D	35.10
10	FARIDKOT	JAITON	S-NPP	30.42880	74.82660	10/18/2021	14:06:41	D	22.90
11	FAZILKA	FAZILKA	S-NPP	30.43500	74.09460	10/18/2021	14:06:41	D	3.60
12	FAZILKA	FAZILKA	S-NPP	30.46300	74.03990	10/18/2021	14:06:41	D	3.00
13	FAZILKA	FAZILKA	S-NPP	30.46460	74.03690	10/18/2021	14:06:41	D	3.00
14	FIROZPUR	FIROZPUR	S-NPP	30.93350	74.51610	10/18/2021	14:06:41	D	3.60
15	FIROZPUR	GHALL KHURD	S-NPP	30.95970	74.71420	10/18/2021	14:06:41	D	2.80
16	FIROZPUR	GHALL KHURD	S-NPP	30.98010	74.78240	10/18/2021	14:06:41	D	6.40
17	FIROZPUR	GURUHAR SAHAI	S-NPP	30.71670	74.33780	10/18/2021	14:06:41	D	7.00
18	FIROZPUR	GURUHAR SAHAI	S-NPP	30.71700	74.33440	10/18/2021	14:06:41	D	10.80
19	FIROZPUR	GURUHAR SAHAI	S-NPP	30.74330	74.31090	10/18/2021	14:06:41	D	3.00
20	FIROZPUR	GURUHAR SAHAI	S-NPP	30.74650	74.29260	10/18/2021	14:06:41	D	3.00
21	FIROZPUR	MAMDOT	S-NPP	30.79270	74.48700	10/18/2021	14:06:41	D	14.90
22	FIROZPUR	MAMDOT	S-NPP	30.81300	74.45210	10/18/2021	14:06:41	D	4.40
23	FIROZPUR	MAMDOT	S-NPP	30.84740	74.39950	10/18/2021	14:06:41	D	7.00
24	FIROZPUR	MAMDOT	S-NPP	30.88150	74.45670	10/18/2021	14:06:41	D	8.20
25	FIROZPUR	MAMDOT	S-NPP	30.88790	74.41930	10/18/2021	14:06:41	D	6.60
26	FIROZPUR	ZIRA	S-NPP	30.97070	74.85690	10/18/2021	14:06:41	D	8.20
27	FIROZPUR	ZIRA	S-NPP	30.97120	74.86330	10/18/2021	14:06:41	D	11.00
28	FIROZPUR	ZIRA	S-NPP	30.97160	74.86090	10/18/2021	14:06:41	D	15.50
29	JALANDHAR	SHAHKOT	S-NPP	31.10680	75.33660	10/18/2021	14:06:41	D	3.20

30	KAPURTHALA	SULTANPUR LODHI	S-NPP	31.19500	75.20890	10/18/2021	14:06:41	D	2.40
31	KAPURTHALA	SULTANPUR LODHI	S-NPP	31.30600	75.14300	10/18/2021	14:06:41	D	7.80
32	KAPURTHALA	SULTANPUR LODHI	S-NPP	31.30710	75.14410	10/18/2021	14:06:41	D	17.50
33	KAPURTHALA	SULTANPUR LODHI	S-NPP	31.31100	75.14250	10/18/2021	14:06:41	D	7.80
34	KAPURTHALA	SULTANPUR LODHI	S-NPP	31.33270	75.15910	10/18/2021	14:06:41	D	3.50
35	LUDHIANA	RAIKOT	S-NPP	30.60700	75.52060	10/18/2021	14:06:41	D	2.30
36	LUDHIANA	RAIKOT	S-NPP	30.61210	75.52000	10/18/2021	14:06:41	D	2.30
37	LUDHIANA	SIDHWAN BET	S-NPP	30.92420	75.39890	10/18/2021	14:06:41	D	5.60
38	MOGA	NIHAL SINGH	S-NPP	30.64150	75.30900	10/18/2021	14:06:41	D	3.50
39	MOGA	NIHAL SINGH	S-NPP	30.64600	75.30170	10/18/2021	14:06:41	D	3.00
40	MUKTSAR	MUKTSAR	S-NPP	30.42640	74.37030	10/18/2021	14:06:41	D	7.90
41	TARN TARAN	BHIKHIWIND	S-NPP	31.34650	74.77160	10/18/2021	14:06:41	D	5.40
42	TARN TARAN	BHIKHIWIND	S-NPP	31.37330	74.62060	10/18/2021	14:06:41	D	4.30
43	TARN TARAN	BHIKHIWIND	S-NPP	31.39580	74.69260	10/18/2021	14:06:41	D	3.70
44	TARN TARAN	KHADUR SAHIB	S-NPP	31.42190	75.14770	10/18/2021	14:06:41	D	2.70
45	TARN TARAN	NAUSHERA PANNUAN	S-NPP	31.38400	74.85700	10/18/2021	14:06:41	D	8.90
46	TARN TARAN	NAUSHERA PANNUAN	S-NPP	31.38400	74.85930	10/18/2021	14:06:41	D	9.10
47	TARN TARAN	PATTI	S-NPP	31.16650	74.89000	10/18/2021	12:27:07	D	4.30
48	TARN TARAN	TARN TARAN	S-NPP	31.38620	74.82620	10/18/2021	14:06:41	D	3.00
49	TARN TARAN	TARN TARAN	S-NPP	31.38640	74.82390	10/18/2021	14:06:41	D	4.20
50	TARN TARAN	TARN TARAN	S-NPP	31.46740	74.83500	10/18/2021	14:06:41	D	5.40
51	TARN TARAN	TARN TARAN	S-NPP	31.48630	74.79920	10/18/2021	12:27:07	D	6.50
52	TARN TARAN	TARN TARAN	S-NPP	31.48980	74.79170	10/18/2021	14:06:41	D	5.50
53	TARN TARAN	VALTOHA	S-NPP	31.20210	74.54530	10/18/2021	12:27:07	D	3.70
54	TARN TARAN	VALTOHA	S-NPP	31.20540	74.54470	10/18/2021	12:27:07	D	8.90
55	TARN TARAN	VALTOHA	S-NPP	31.23840	74.63050	10/18/2021	14:06:41	D	7.20
56	TARN TARAN	VALTOHA	S-NPP	31.29180	74.59120	10/18/2021	14:06:41	D	6.50
57	TARN TARAN	VALTOHA	S-NPP	31.30100	74.58390	10/18/2021	14:06:41	D	7.40

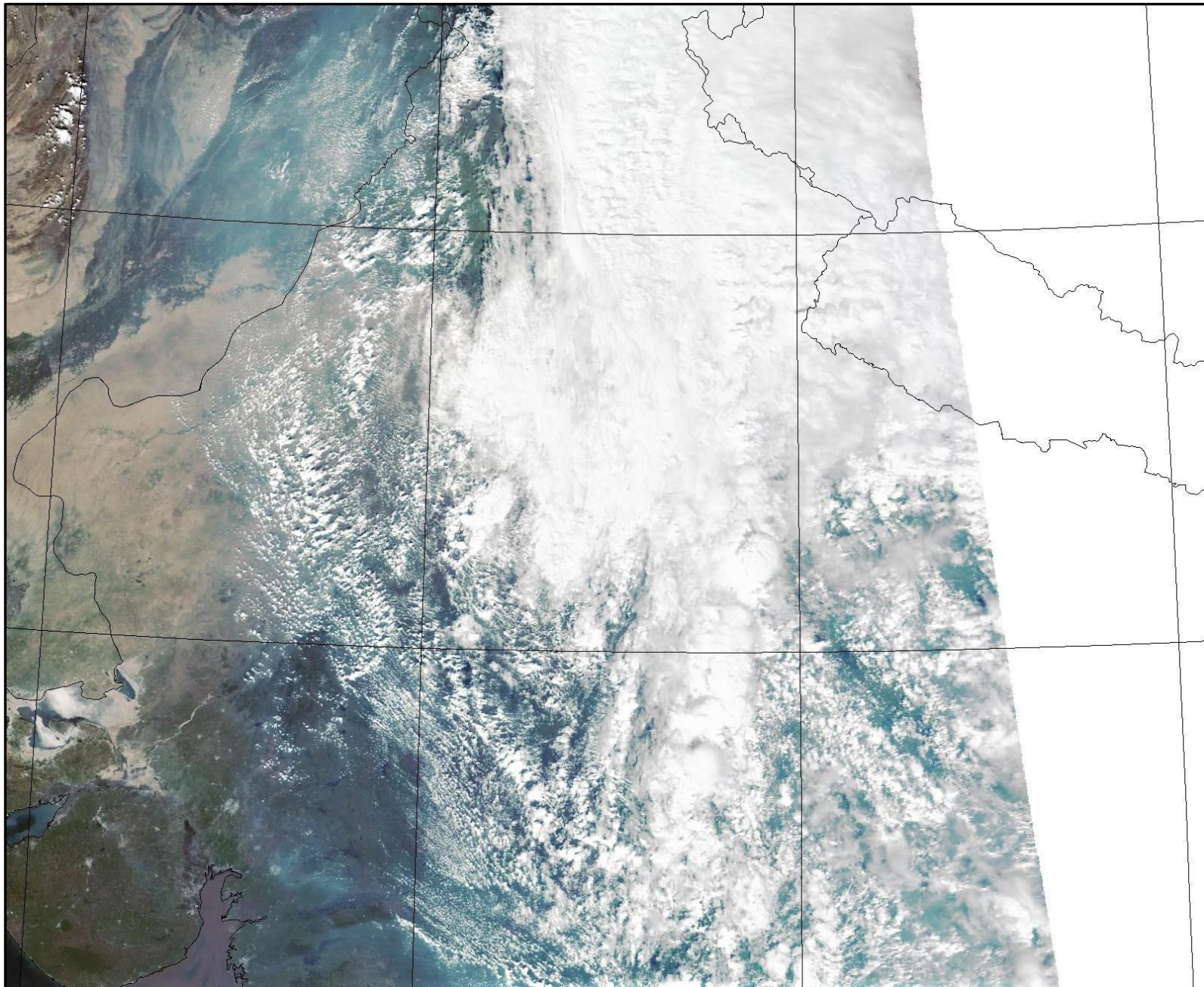
Details of residue burning events in Haryana on 18-Oct-2021

S. No.	District	Tehsil / Block	Satellite	Latitude	Longitude	ACQ_DATE	ACQ_TIME	Day / Night	Fire Power (W/m2)
1	FATEHABAD	FATEHABAD	S-NPP	29.55330	75.49140	10/18/2021	14:06:41	D	10.80

Details of residue burning events in Rajasthan on 18-Oct-2021

S. No.	District	Tehsil / Block	Satellite	Latitude	Longitude	ACQ_DATE	ACQ_TIME	Day / Night	Fire Power (W/m2)
1	HANUMANGARH	TIBI	S-NPP	29.54590	74.49800	10/18/2021	14:06:41	D	4.40
2	HANUMANGARH	TIBI	S-NPP	29.58090	74.40630	10/18/2021	14:06:41	D	2.30

AQUA (MODIS) Satellite image (TCC) of North and Central India Acquired on 17-Oct-2021 at 13:30:25 IST by IARI Ground Station



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**

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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)
