

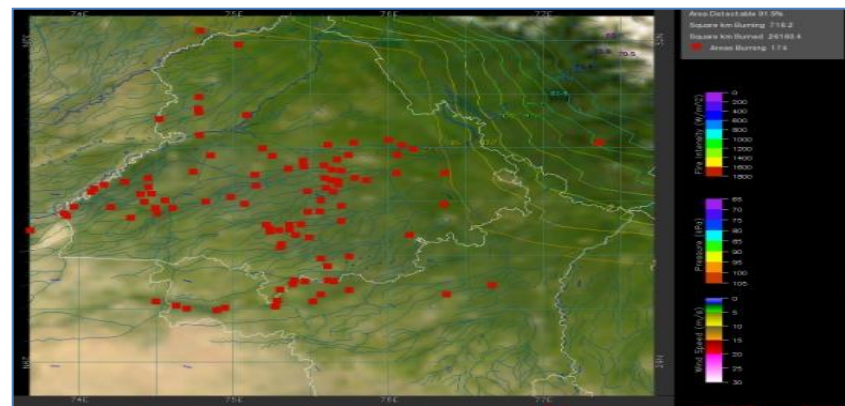
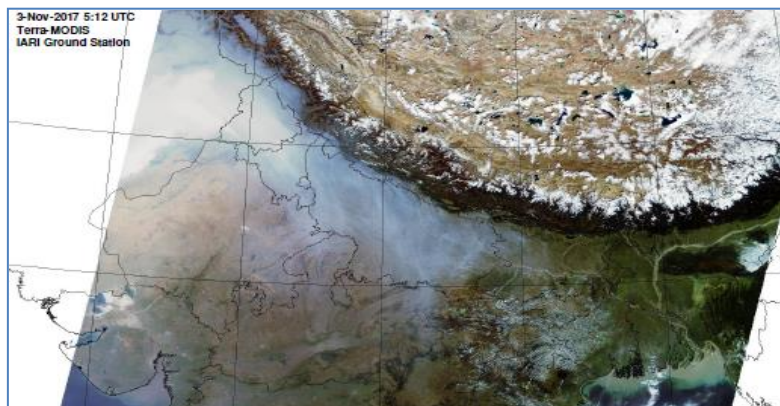


# MONITORING PADDY RESIDUE BURNING IN INDIA USING SATELLITE REMOTE SENSING DURING 2023

Bulletin  
No. 14

Events Date:  
28-Sep-2023

Issued on:  
28-Sep-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

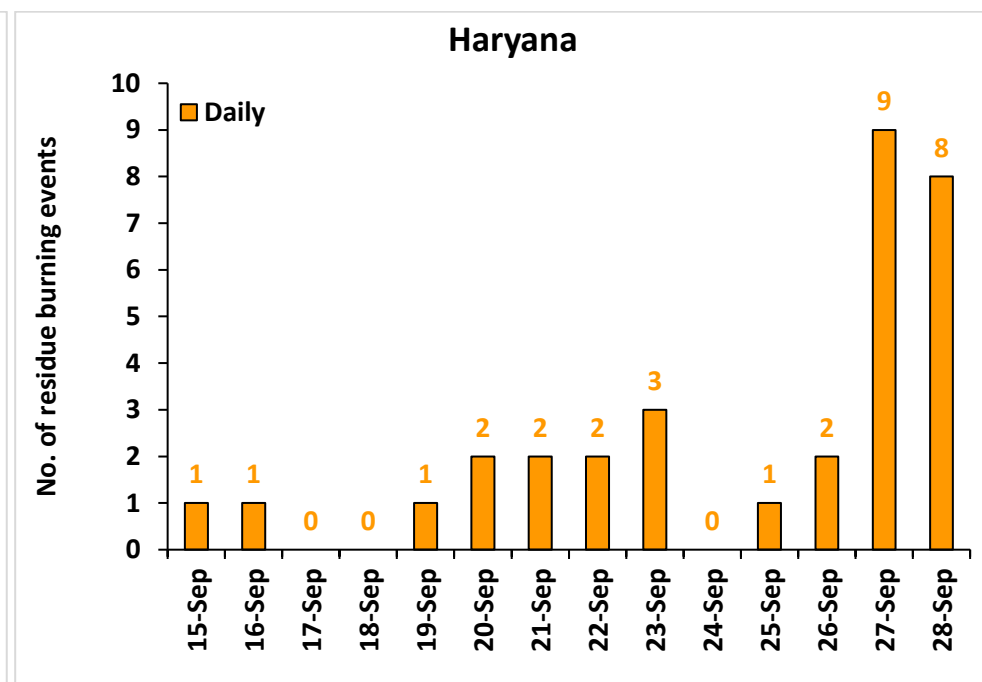
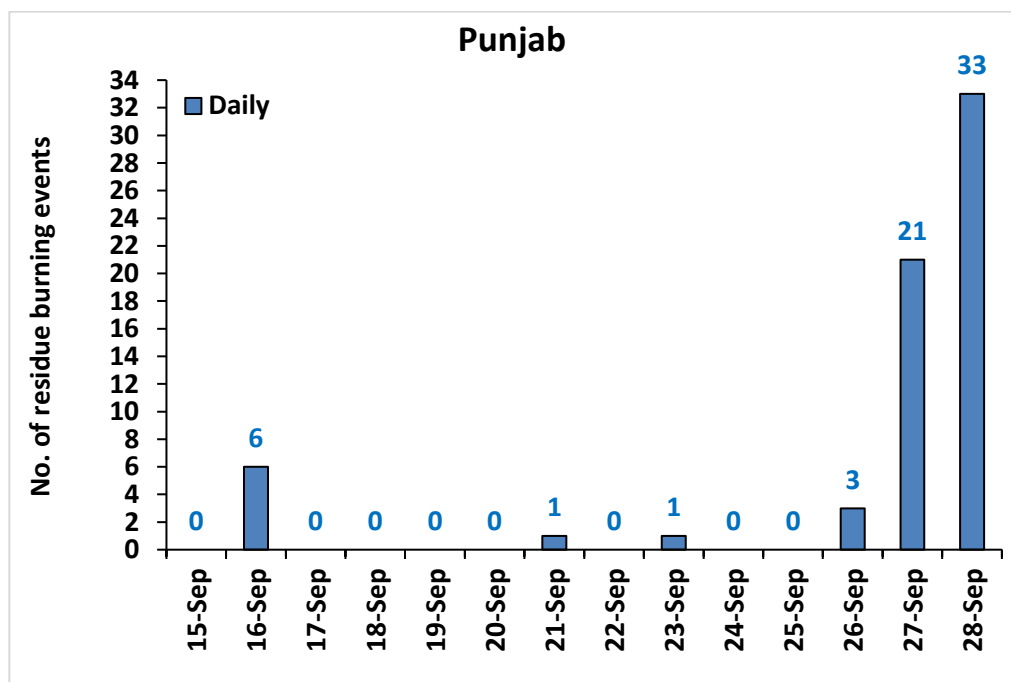
<http://creams.iari.res.in>

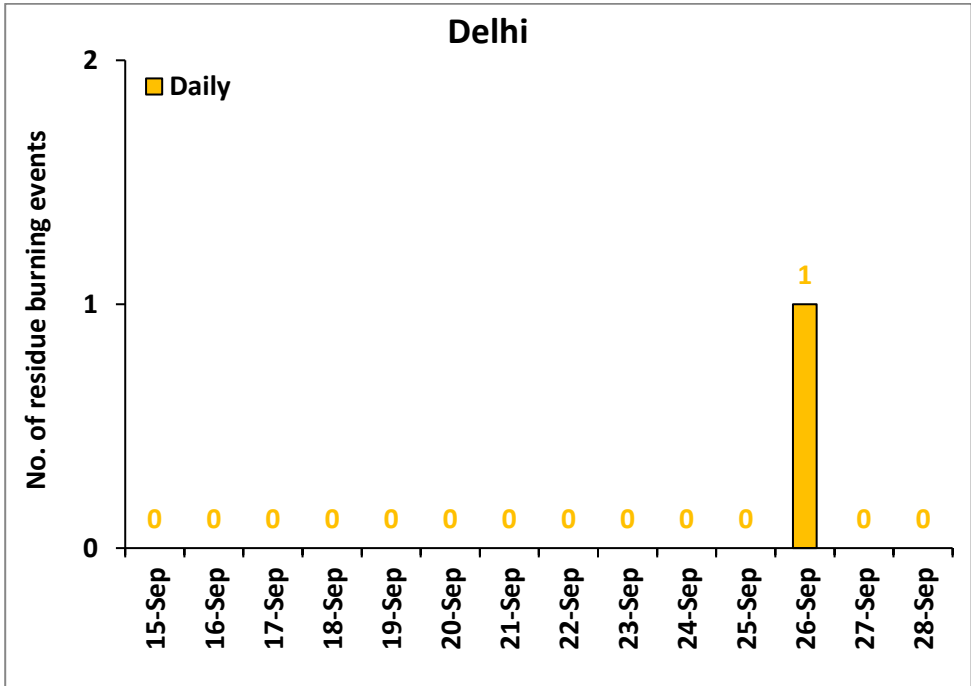
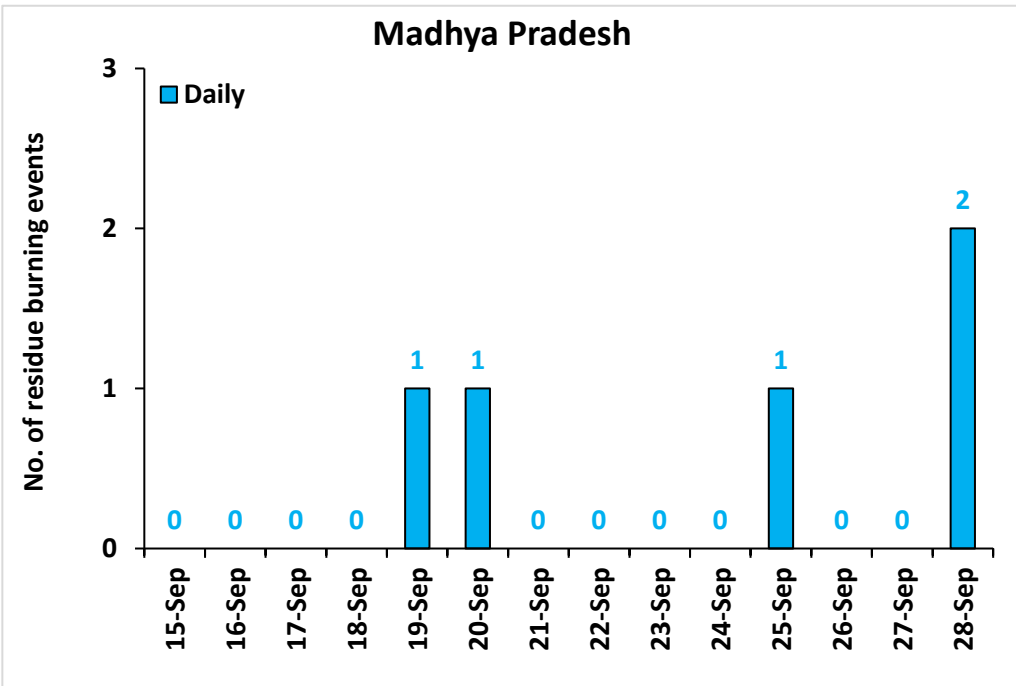
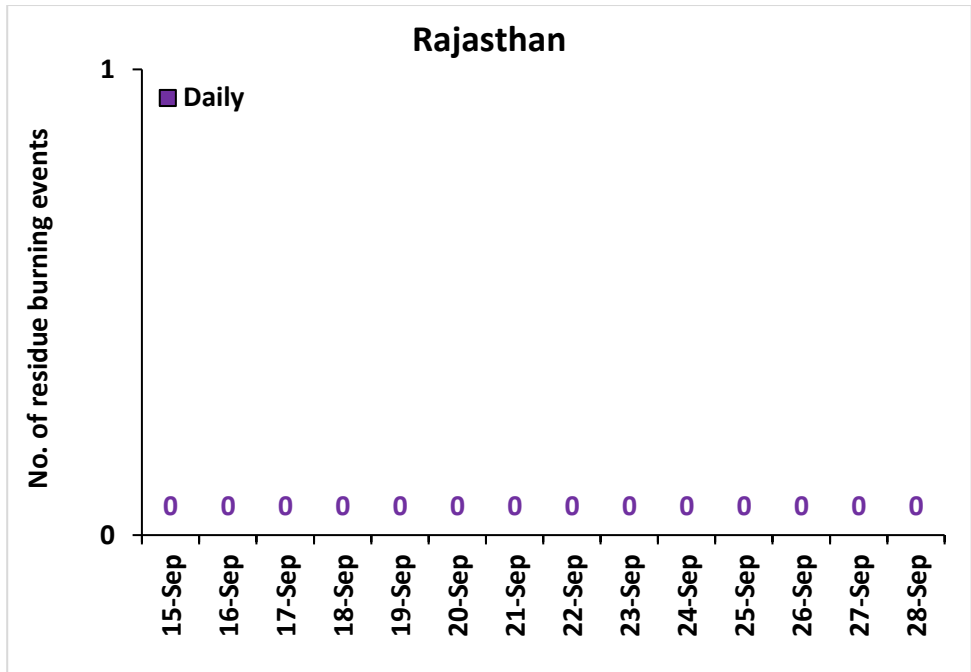
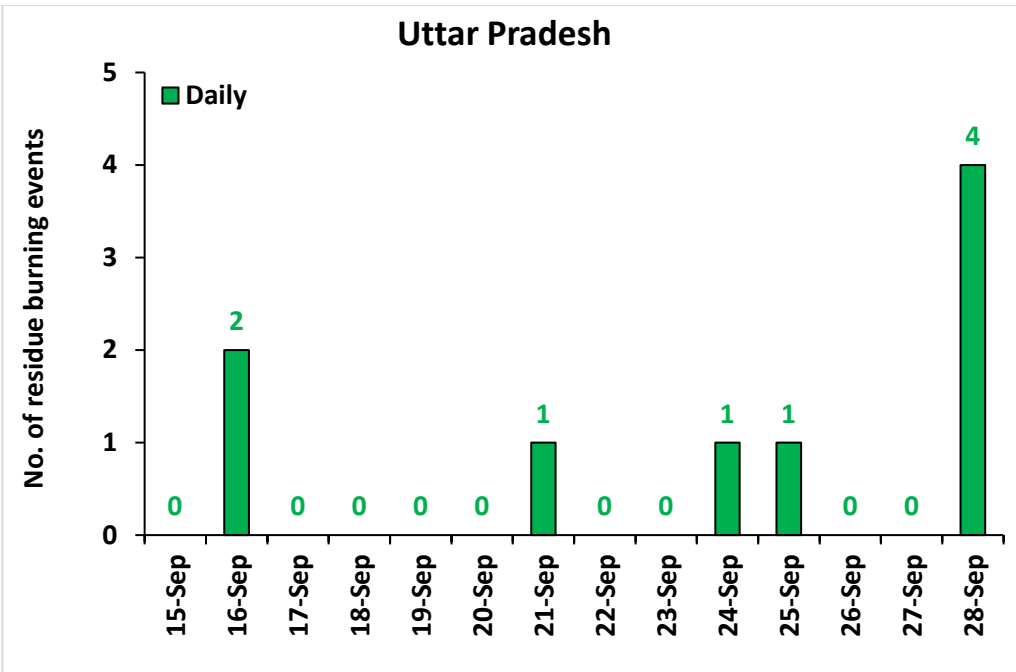


## Highlights for 28-Sep-2023

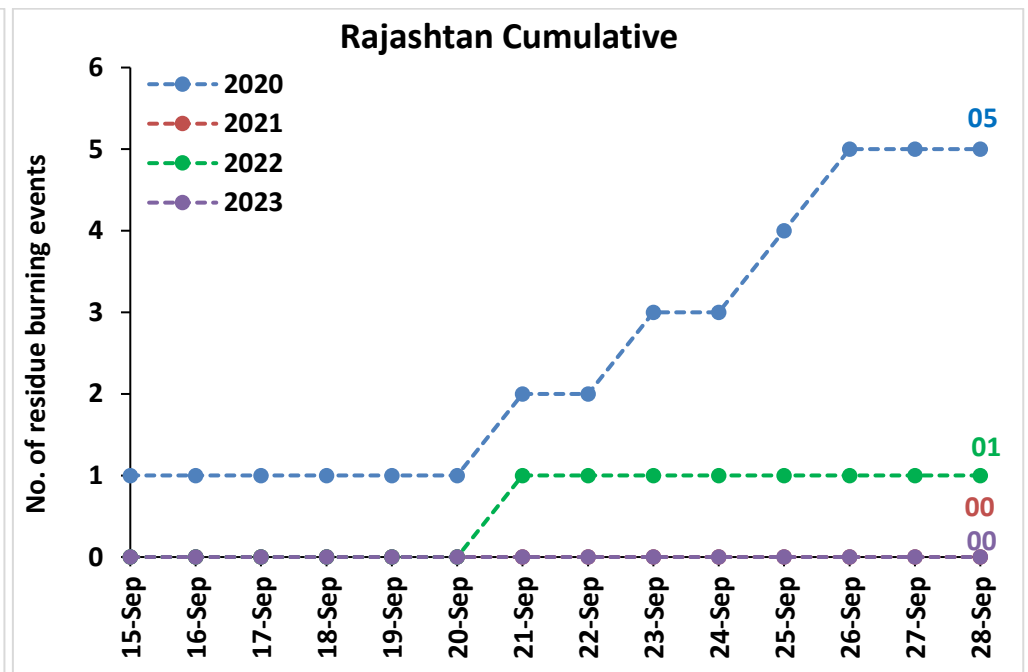
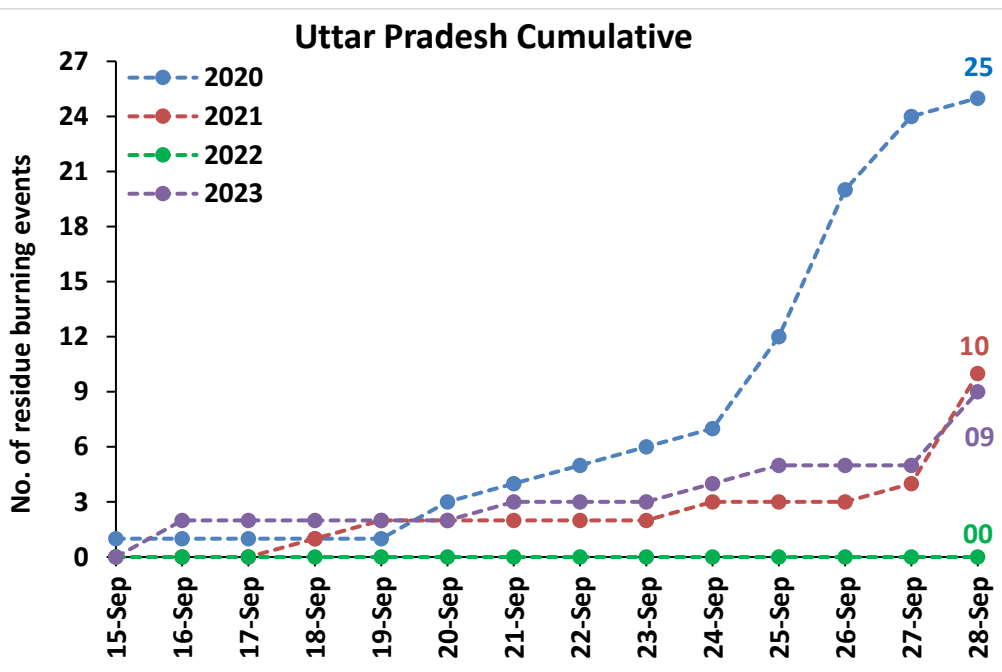
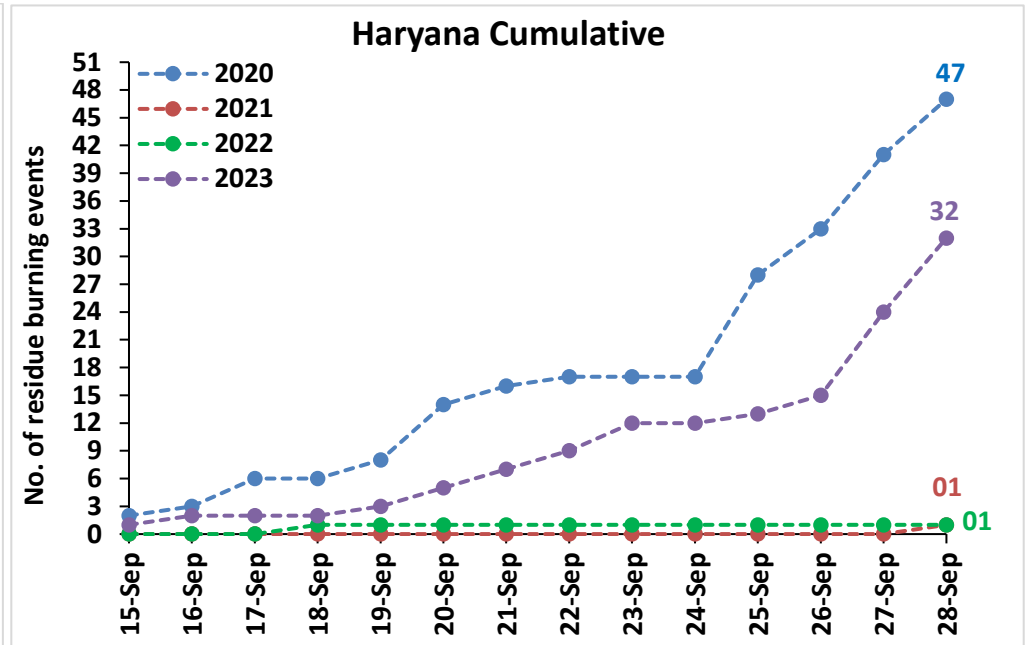
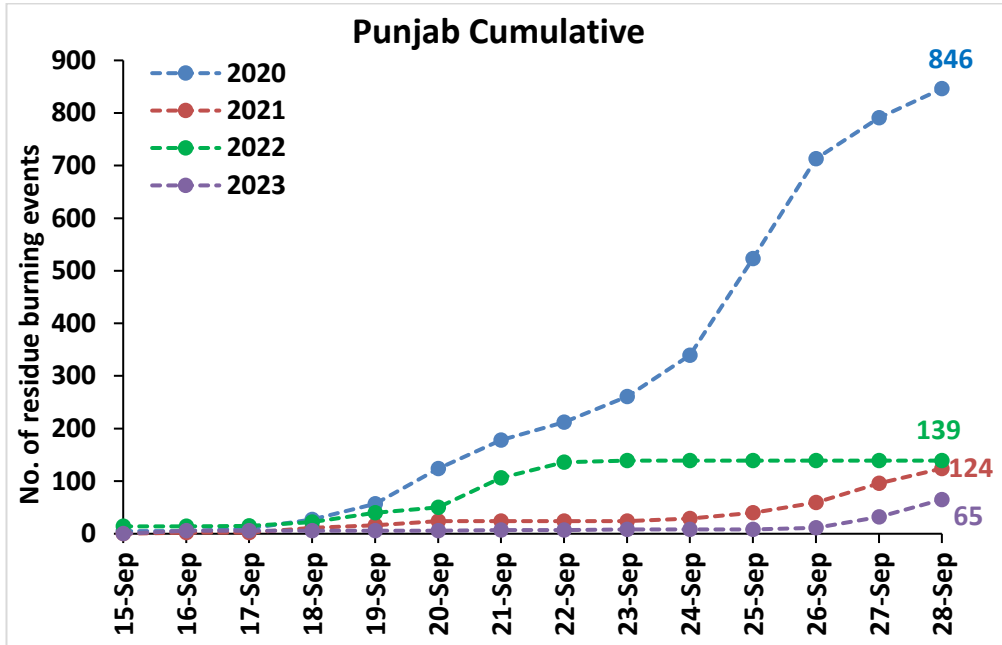
- The active fire events due to rice residue burning were monitored using satellite remote sensing, following the "Standard Protocol for Estimation of Crop Residue Burning Fire Events using Satellite Data".
- Satellites detected **47** residue burning events in the six study States on 28-Sep-2023.
- The state wise events detected on 28-Sep-2023 were **33** in Punjab, **08** in Haryana, **04** in UP, **00** in Delhi, **00** in Rajasthan and **02** in MP.
- Total **112** burning events were detected in the six states between 15-Sept-2023 and 28-Sep-2023, which are distributed as **65**, **32**, **09**, **01**, **00** and **05** in Punjab, Haryana, UP, Delhi, Rajasthan and MP, respectively.
- Detection of residue burning events was hampered by the presence of scattered clouds over eastern Uttar Pradesh, and eastern Madhya Pradesh states.

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

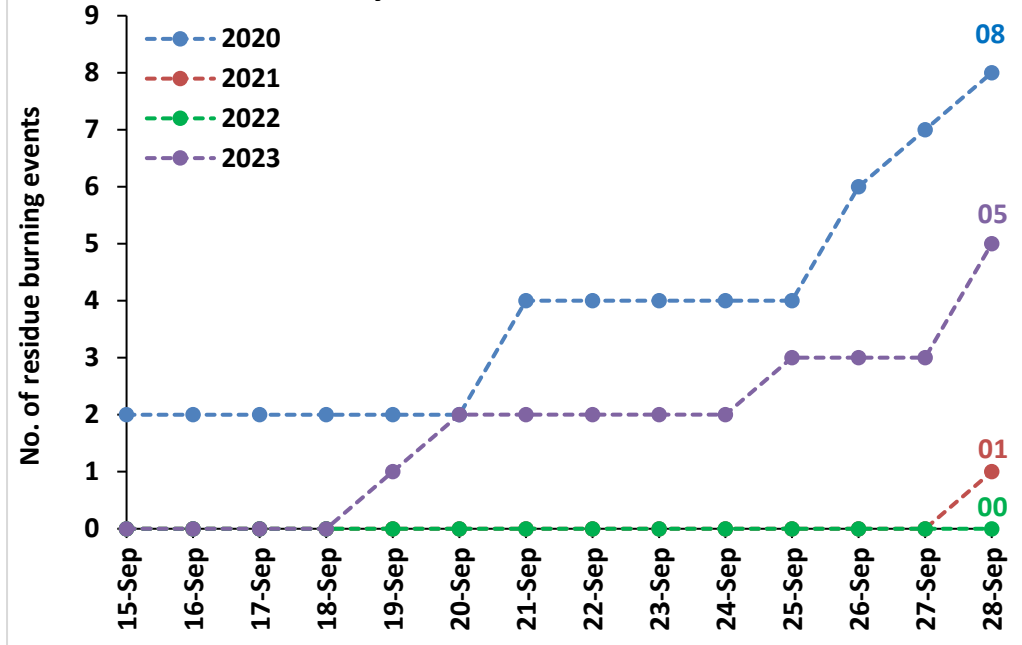




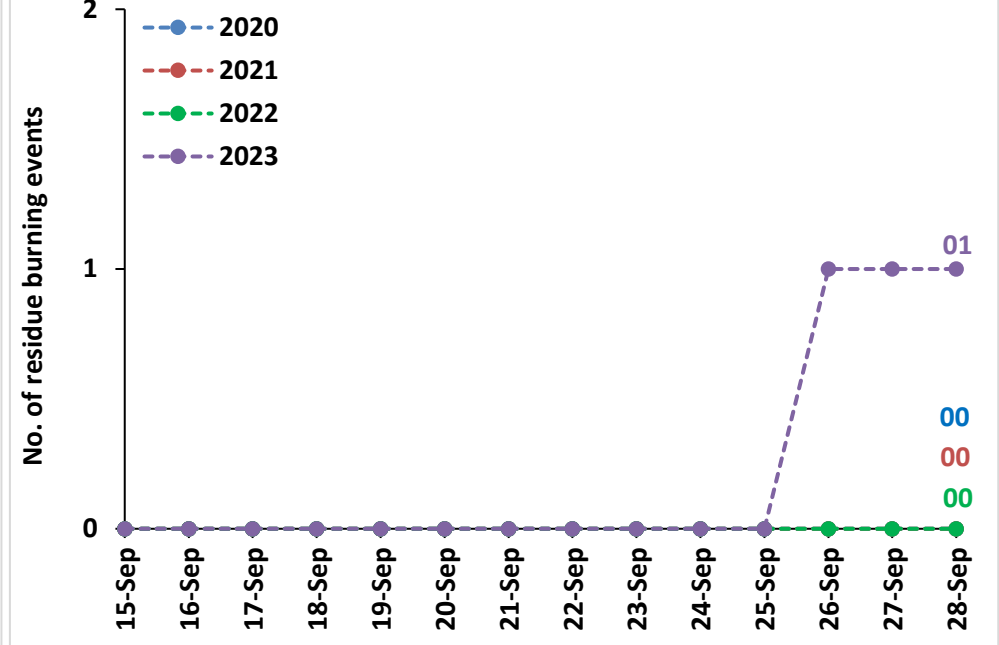
**Comparison of residue burning events in current year (2023) with previous years (2020, 2021 and 2022) for the study State**



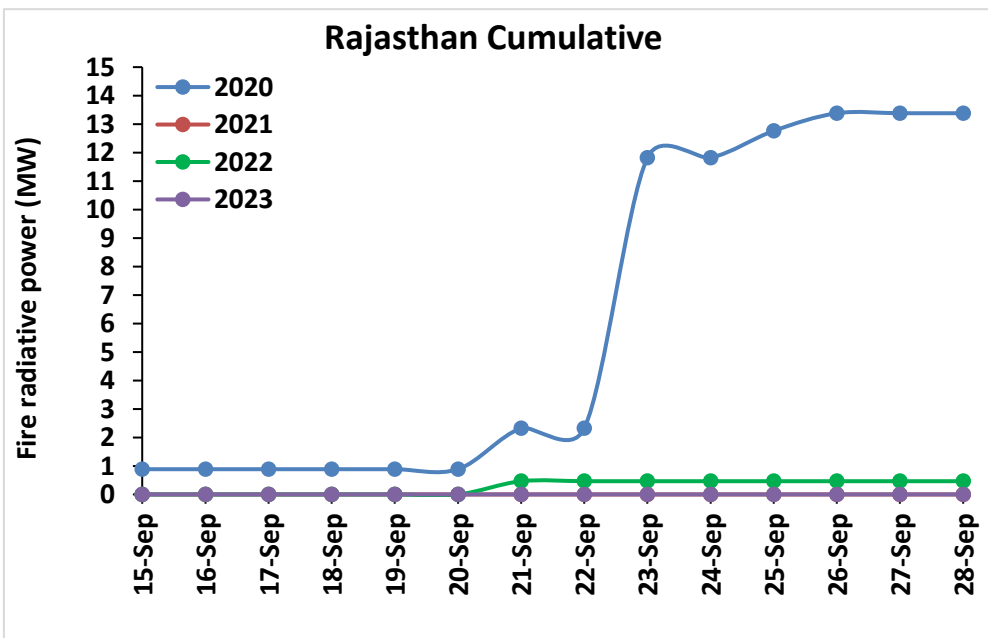
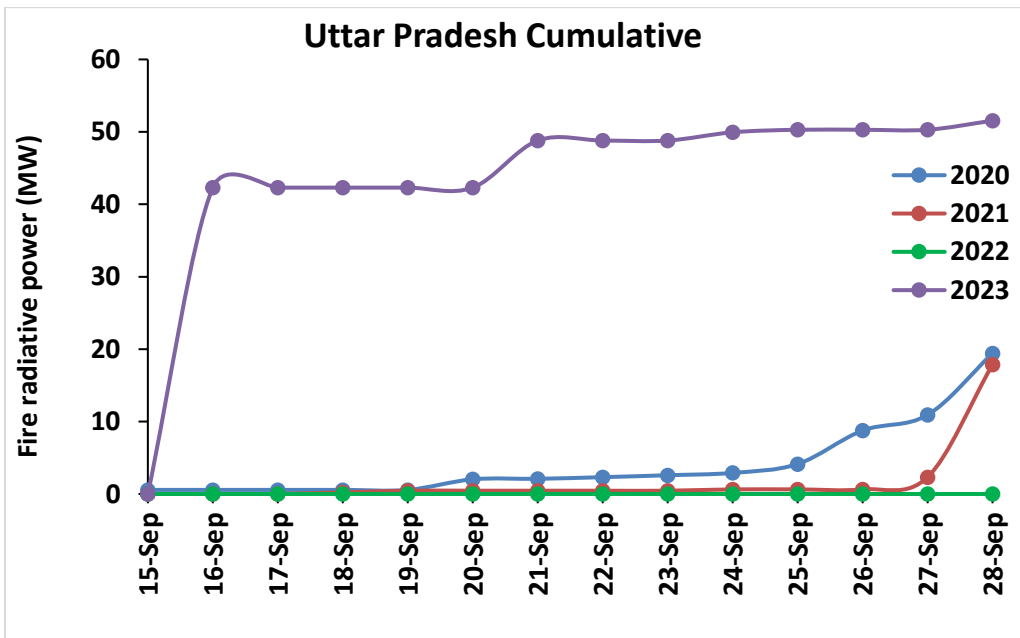
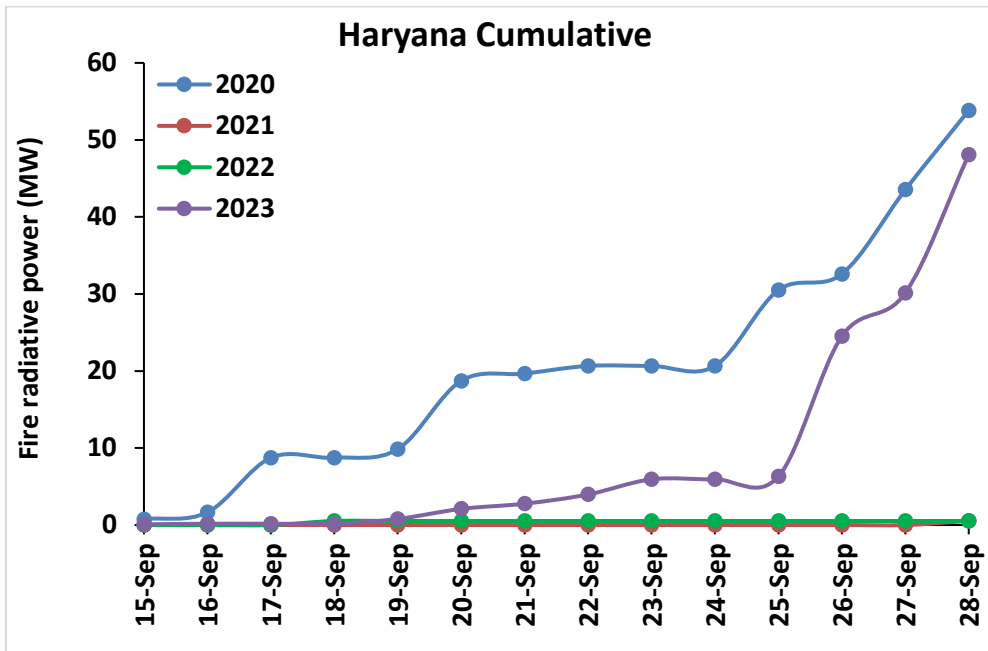
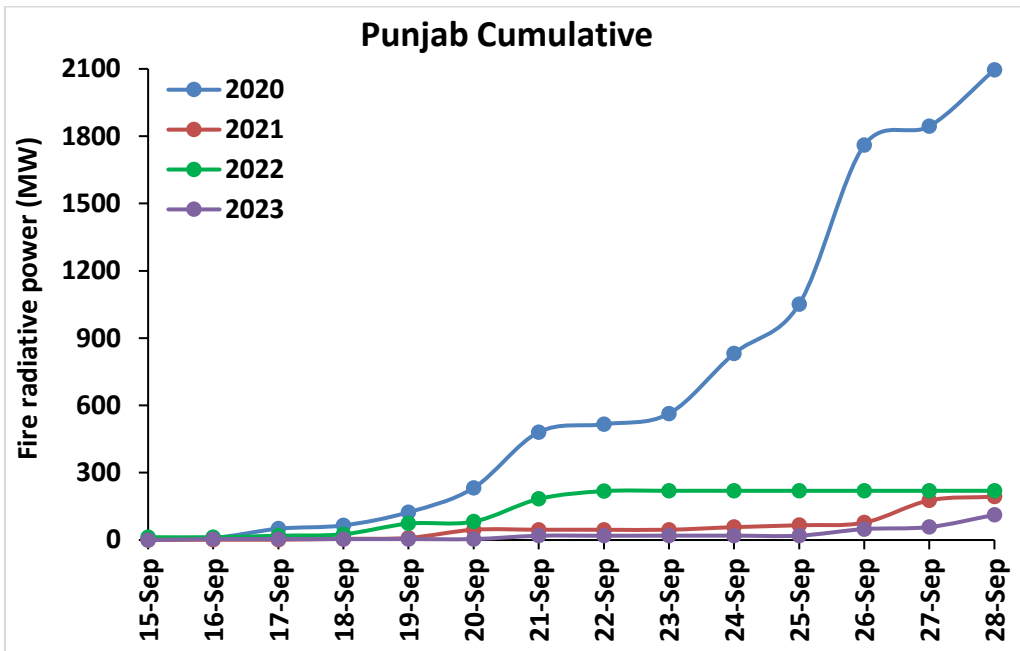
### Madhya Pradesh Cumulative

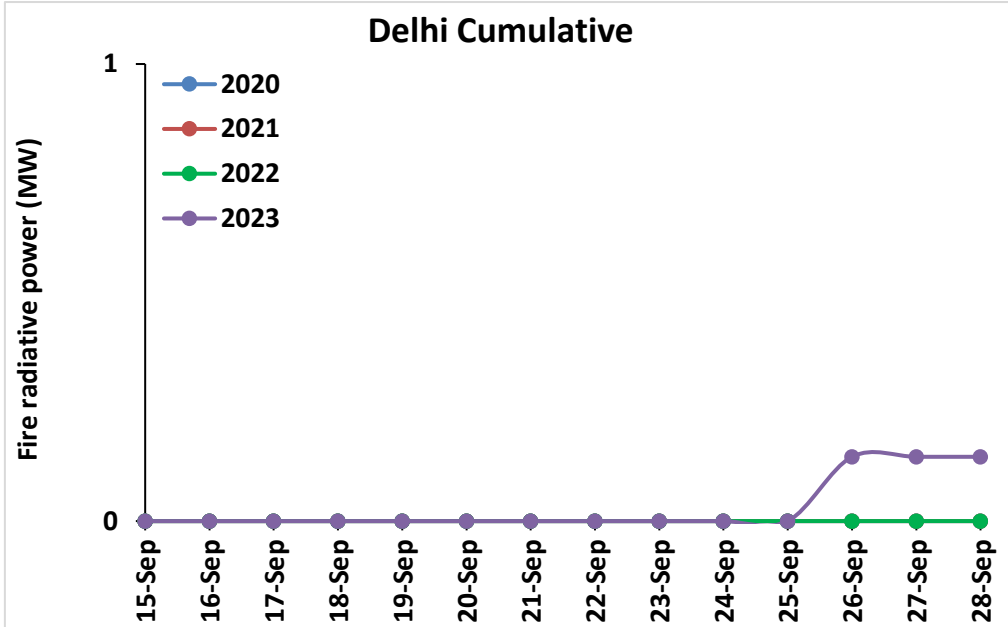
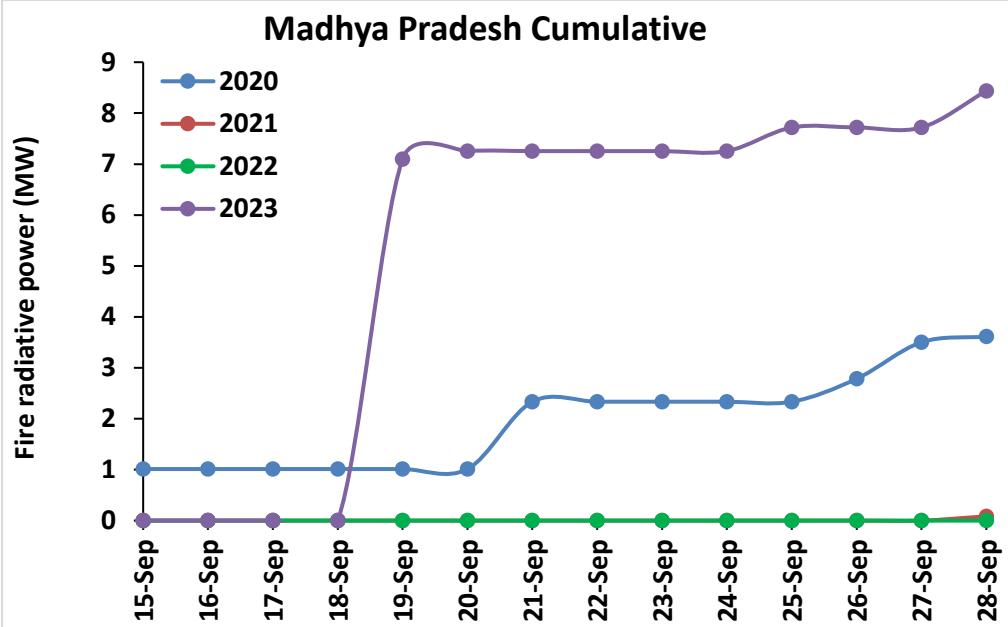


### Delhi Cumulative



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

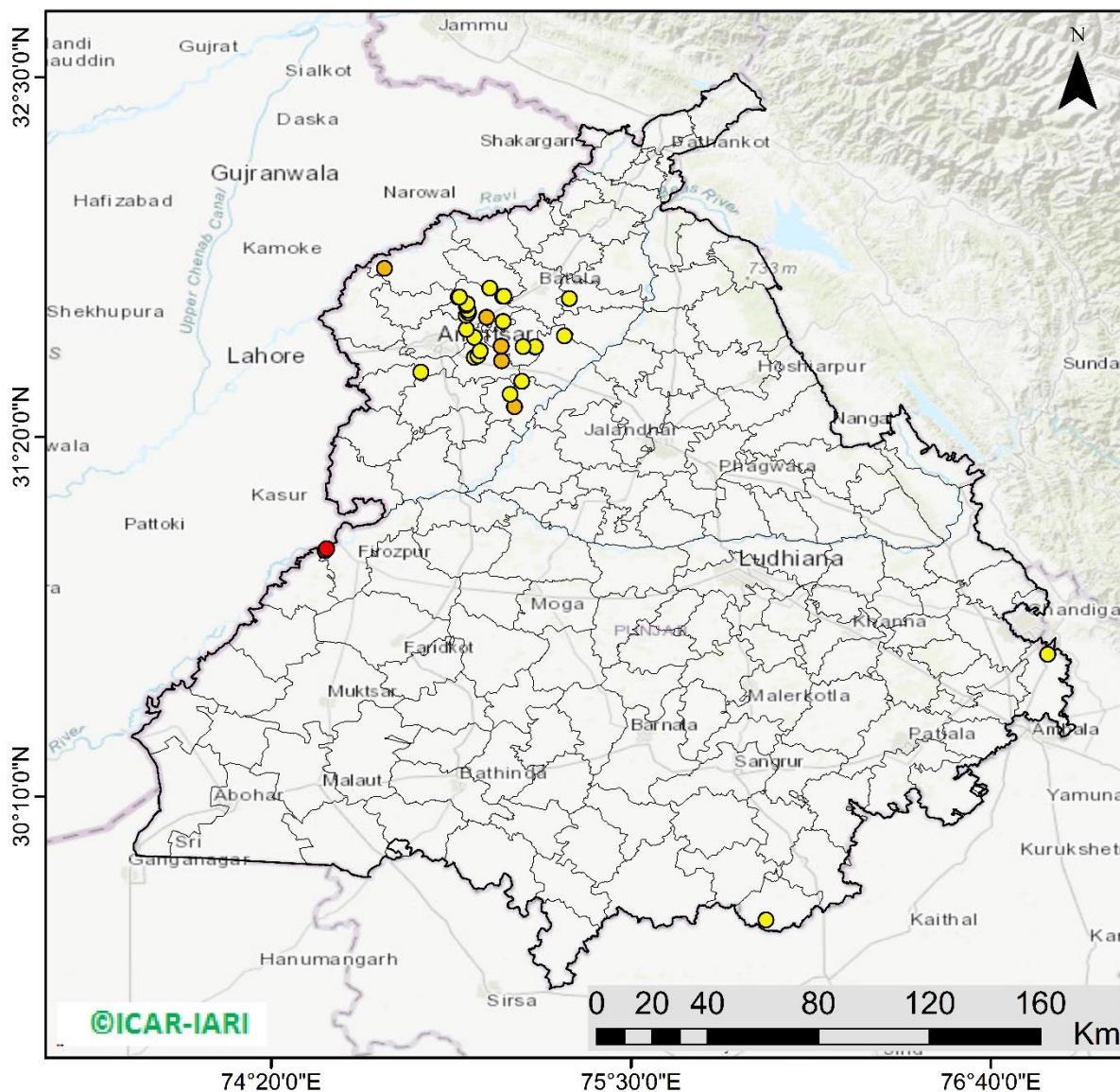






# Punjab

## RICE RESIDUE BURNING IN PUNJAB



**33** burning events detected in Punjab during (28th Sep 2023)

### Fire Intensity (W/m<sup>2</sup>)

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

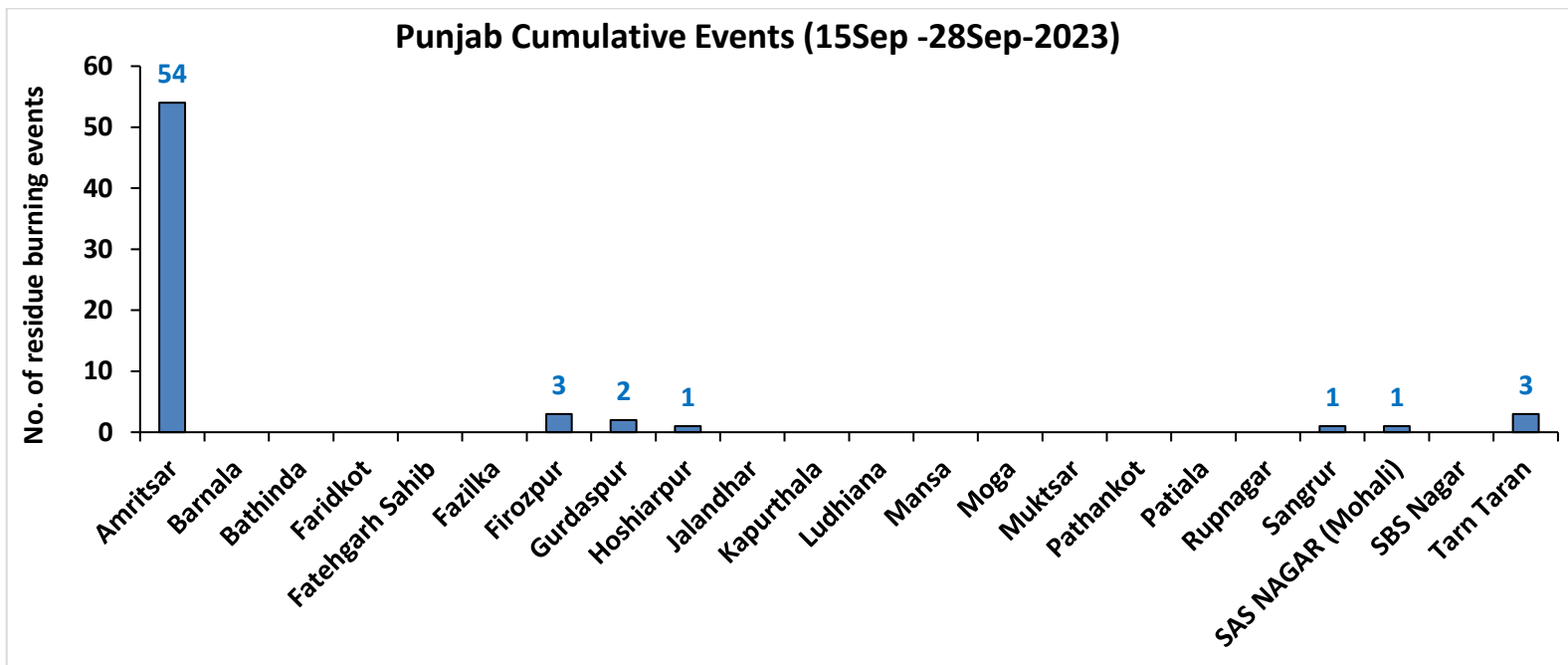
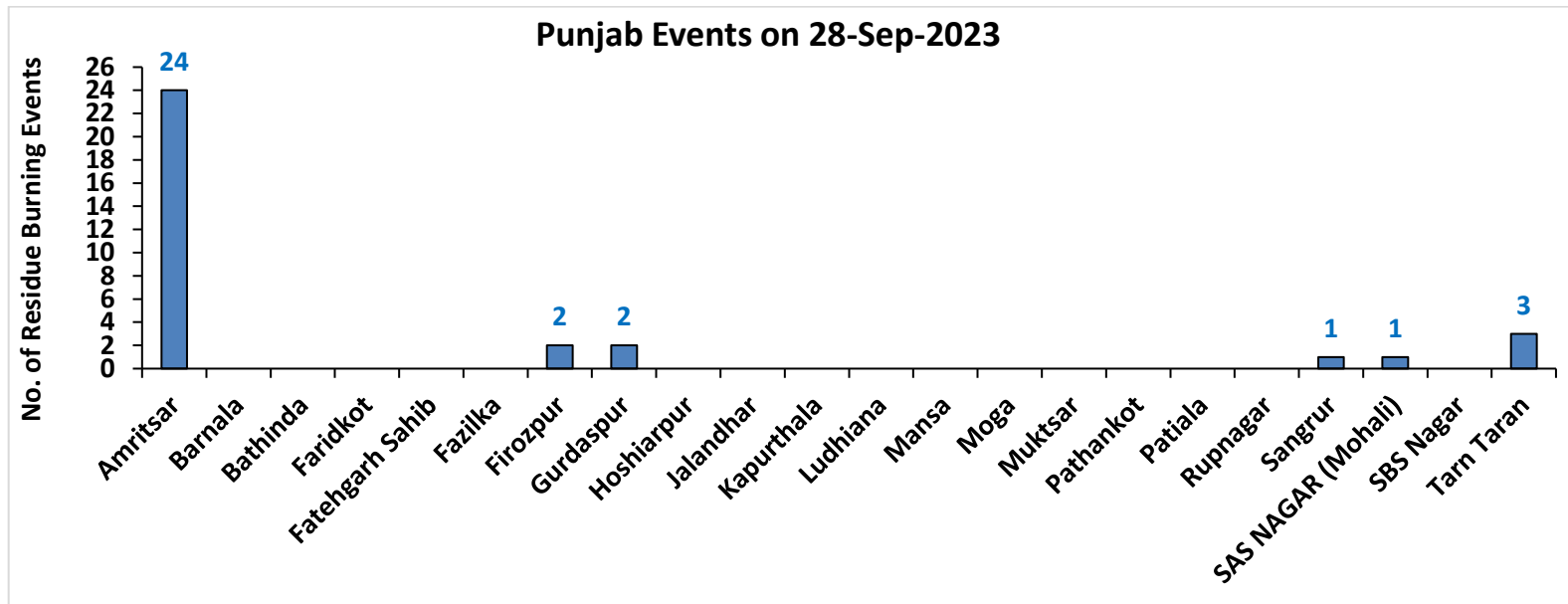


©ICAR-IARI

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

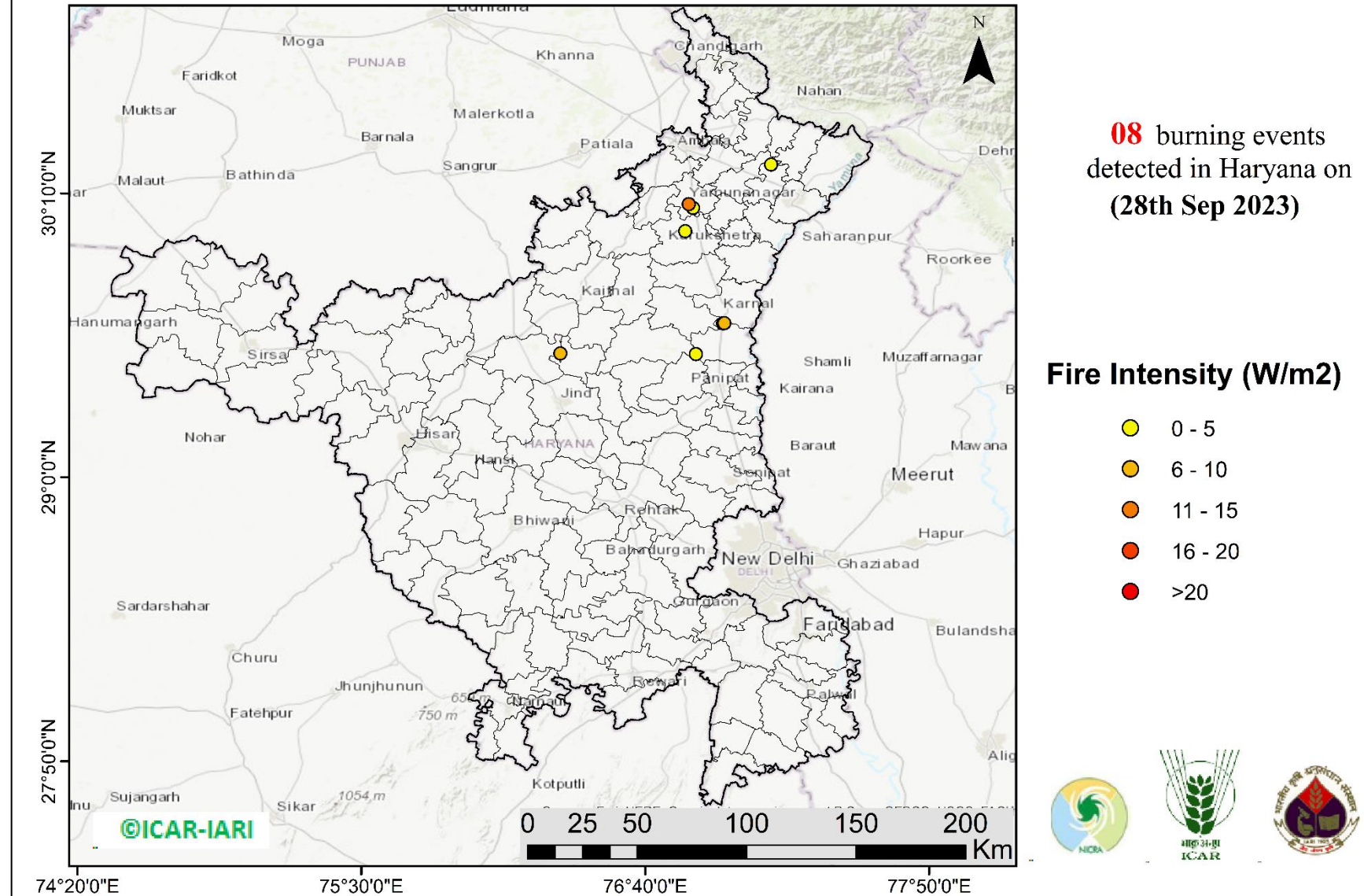


## District-wise cumulative number of residues burning events in Punjab (15Sep- 28Sep-2023)



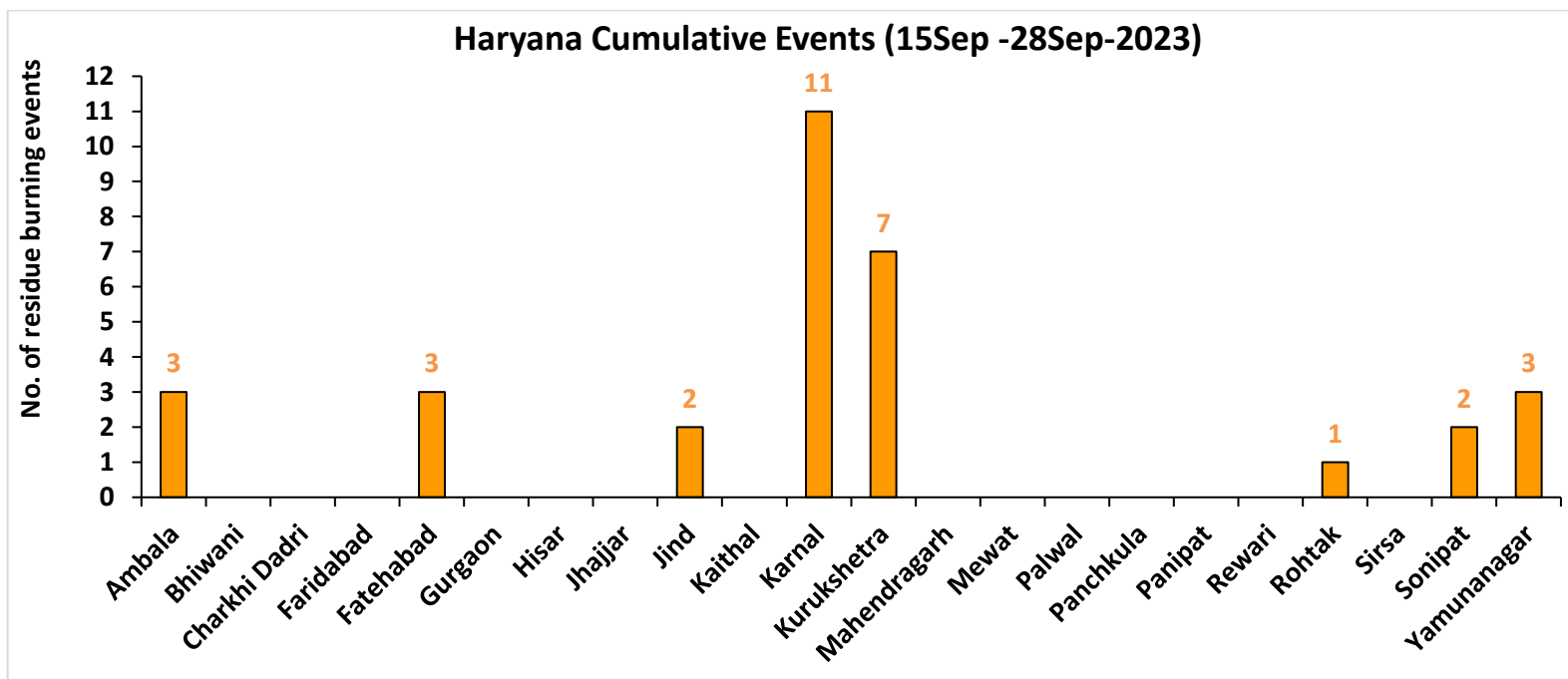
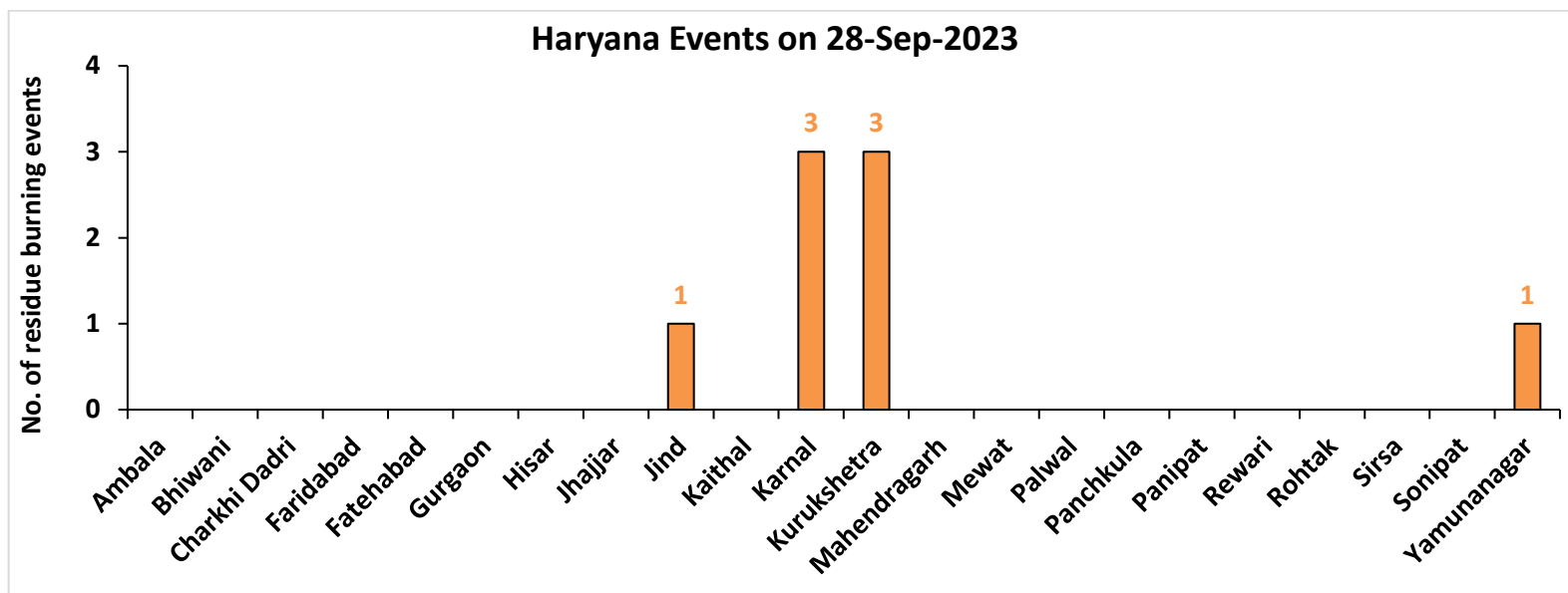
# Haryana

## RICE RESIDUE BURNING IN HARYANA



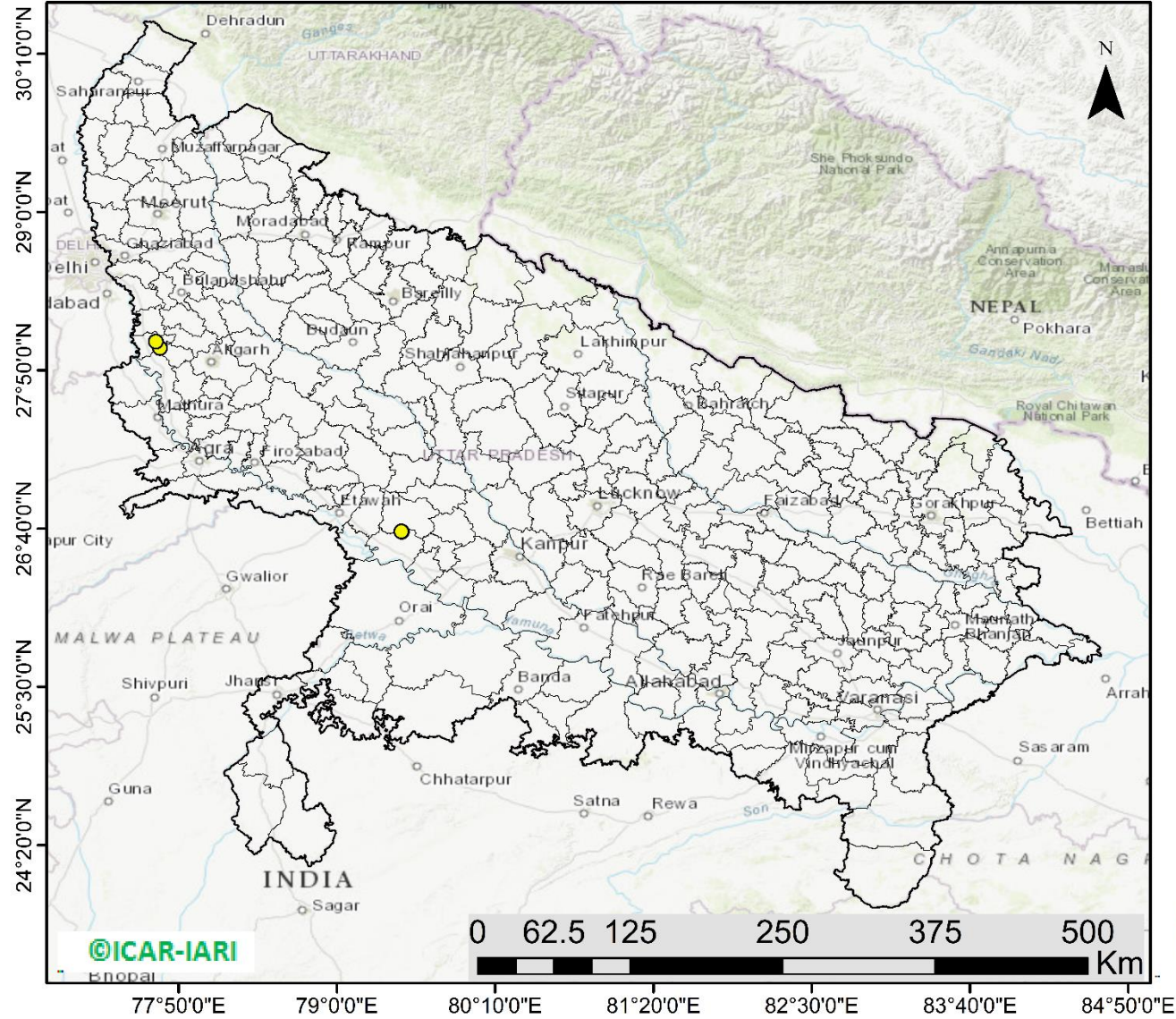
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

## District-wise cumulative number of residues burning events in Haryana (15Sep-28Sep-2023)



Uttar Pradesh

RICE RESIDUE BURNING IN UTTAR PRADESH



04 burning events detected in Uttar Pradesh on (28th Sep 2023)

Fire Intensity (W/m2)

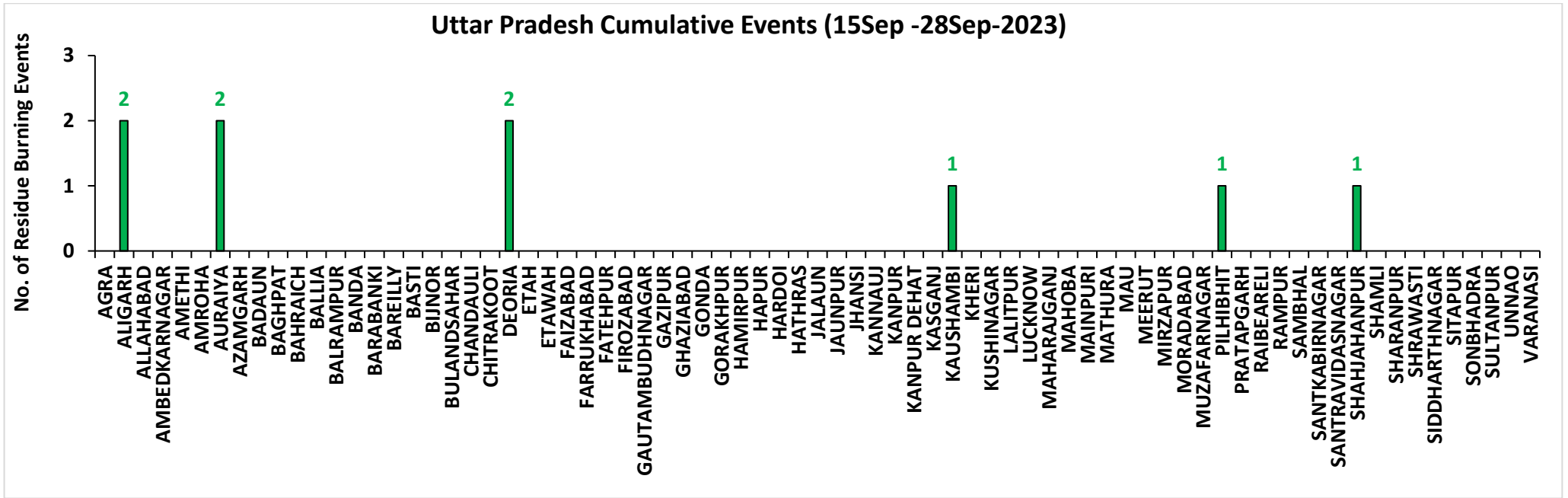
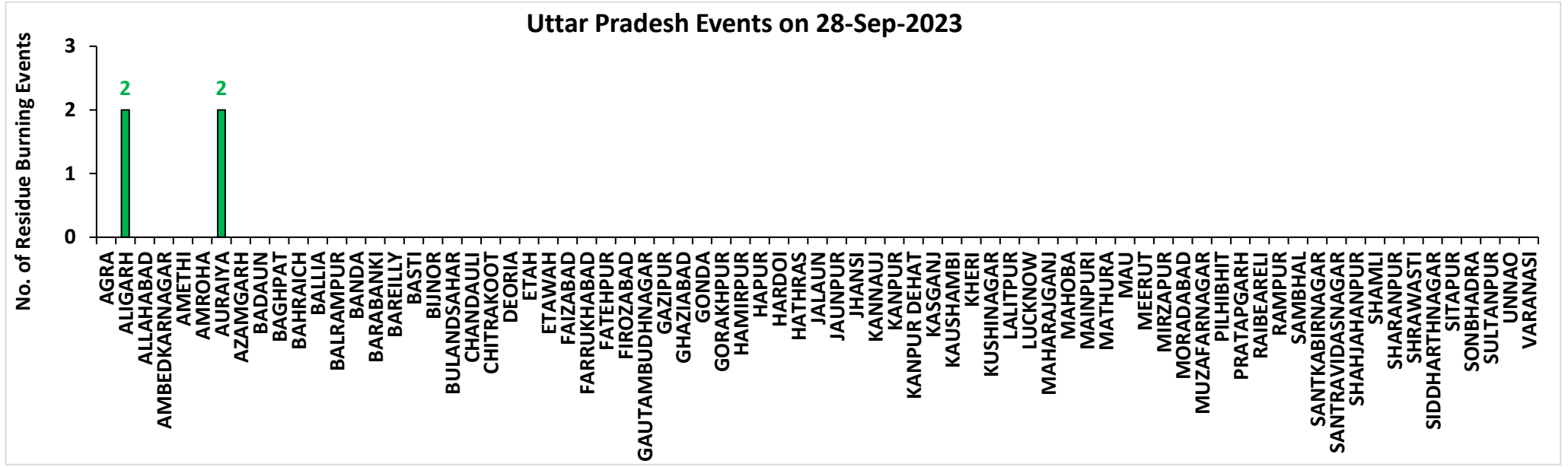
- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- >20



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

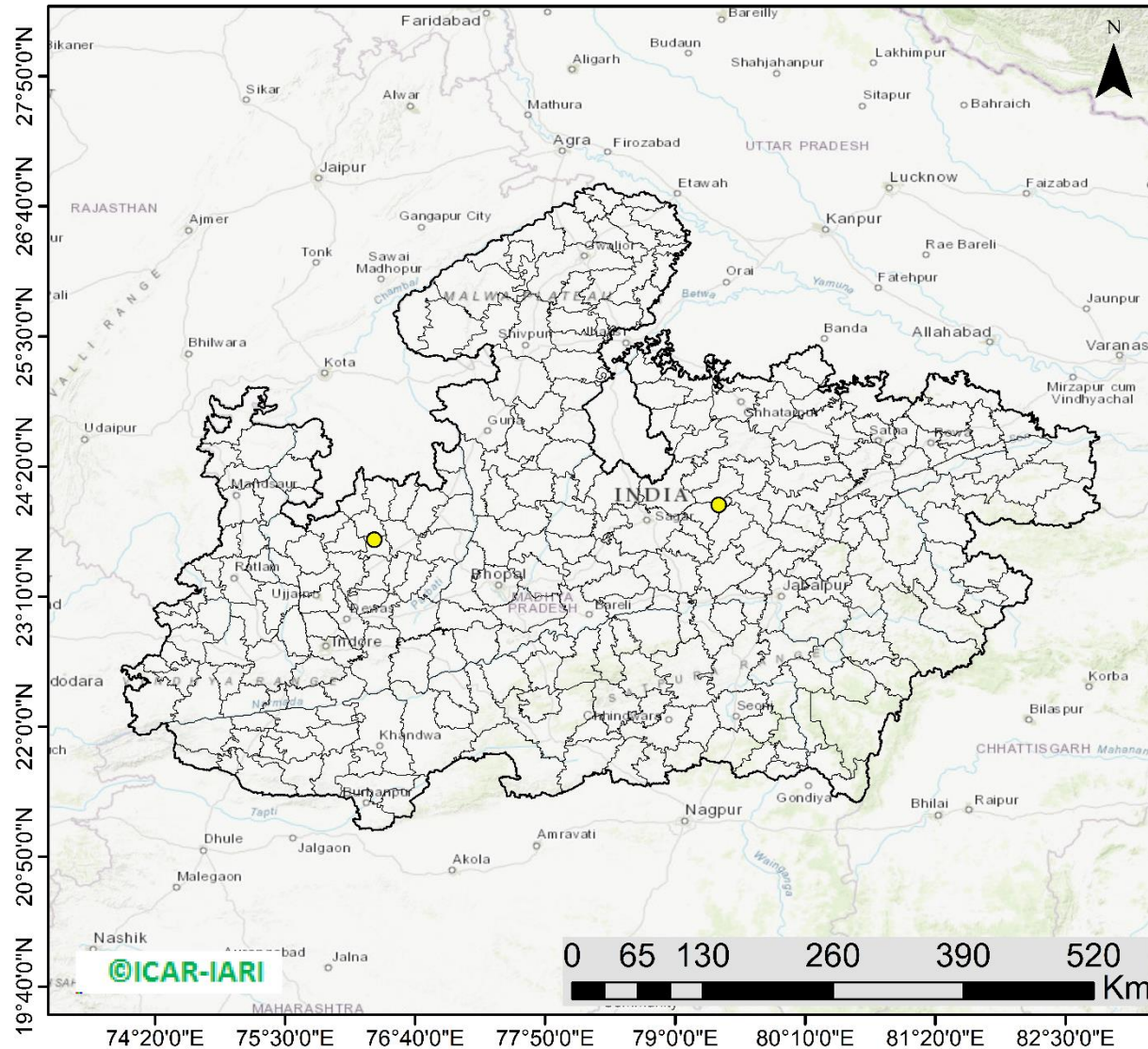


## District-wise cumulative number of residues burning events in Uttar Pradesh (15Sep-28Sep-2023)



# Madhya Pradesh

## RICE RESIDUE BURNING IN MADHYA PRADESH



**02** burning events detected in MP on (28th Sep 2023)

### Fire Intensity (W/m<sup>2</sup>)

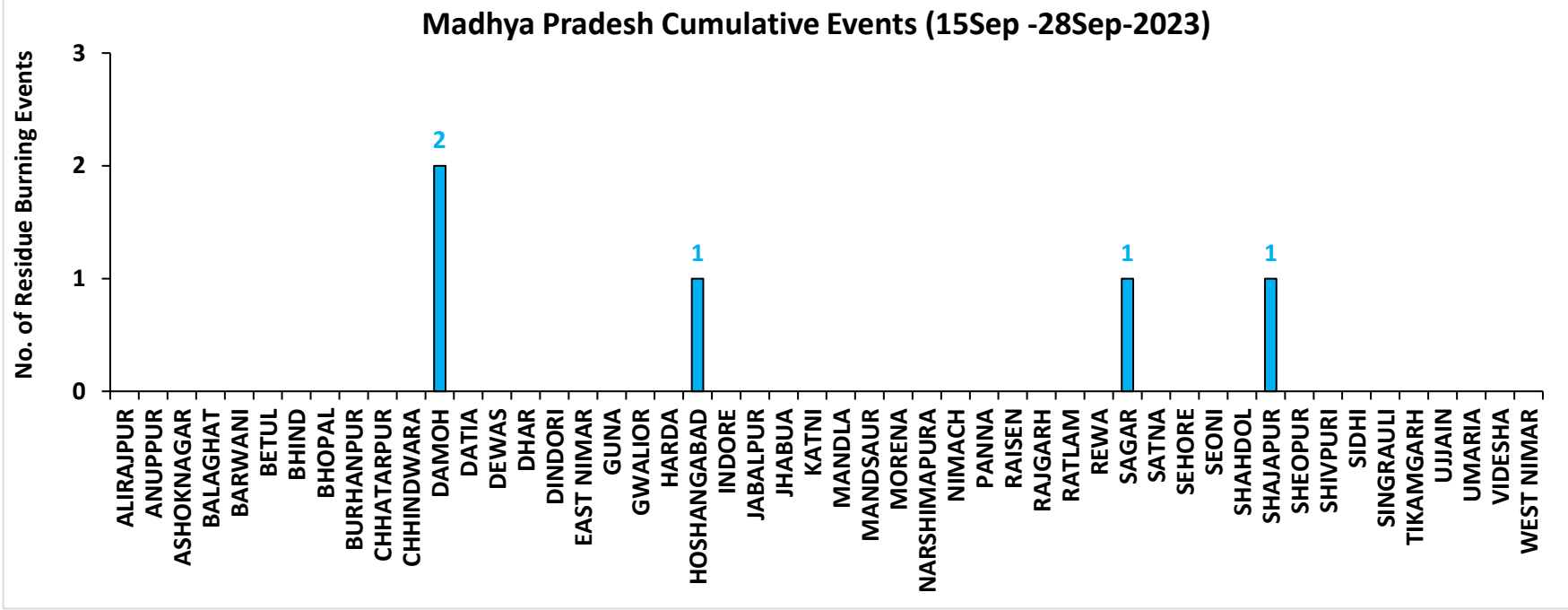
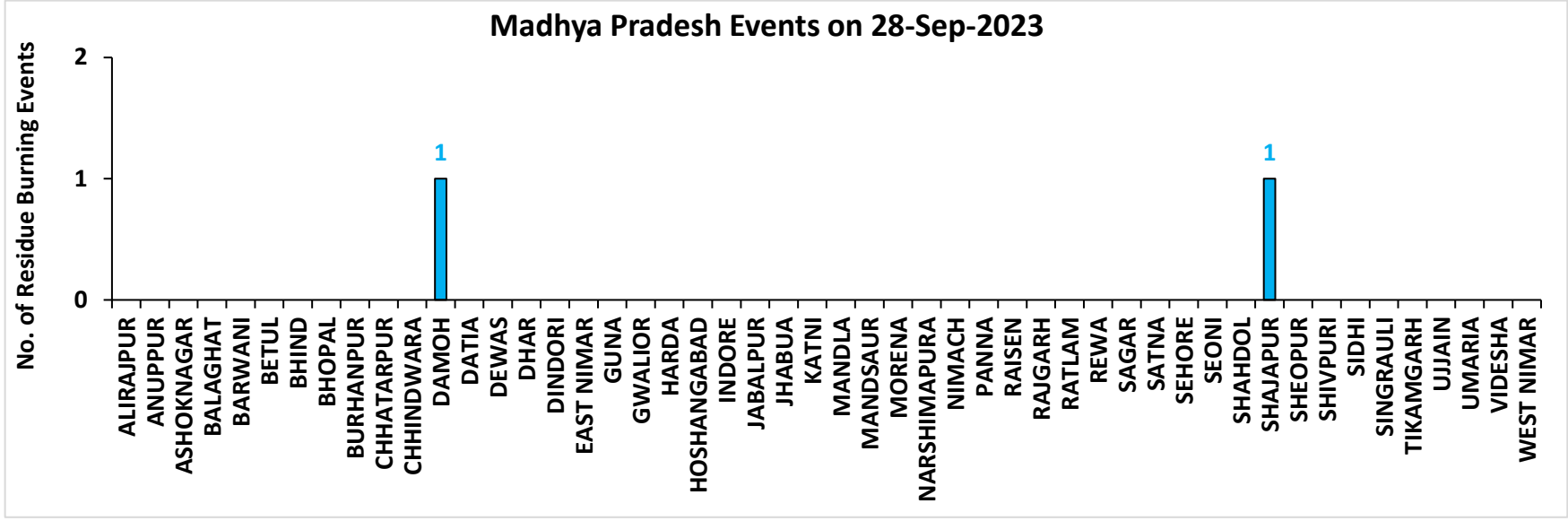
- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- >20



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



**District-wise cumulative number of residues burning events in Madhya Pradesh (15Sep-28Sep-2023)**



**District-wise cumulative number of residues burning events detected in 2020, 2021, 2022 and 2023**  
**(Period: 15 September-28 September)**

**(a) Punjab**

District	15 Sep-28 Sep			
	2020	2021	2022	2023
Amritsar	646	100	121	54
Barnala	1	0	0	0
Bathinda	0	0	0	0
Faridkot	1	3	0	0
Fatehgarh Sahib	0	0	0	0
Fazilka	0	0	0	0
Firozpur	2	1	0	3
Gurdaspur	21	0	1	2
Hoshiarpur	1	0	0	1
Jalandhar	2	1	0	0
Kapurthala	8	0	0	0
Ludhiana	12	2	0	0
Mansa	1	0	0	0
Moga	4	0	0	0
Muktsar	1	0	0	0
Pathankot	0	0	0	0
Patiala	19	4	1	0
Rupnagar	0	0	0	0
Sangrur	3	1	0	1
SAS NAGAR (Mohali)	5	0	1	1
SBS Nagar	0	0	1	0
Tarn Taran	119	12	14	3
<b>Total</b>	<b>846</b>	<b>124</b>	<b>139</b>	<b>65</b>

**(b) Haryana**

District	15 Sep-28 Sep			
	2020	2021	2022	2023
AMBALA	4	0	0	3
BHIWANI	0	0	0	0
CHARKHI DADRI	0	0	0	0
FARIDABAD	0	0	0	0
FATEHABAD	4	0	0	3
GURGAON	0	0	0	0
HISAR	1	0	0	0
JHAJJAR	0	0	0	0
JIND	0	0	1	2
KAITHAL	5	0	0	0
KARNAL	20	0	0	11
KURUKSHETRA	8	0	0	7
MAHENDRAGARH	0	0	0	0
MEWAT	0	0	0	0
PALWAL	0	0	0	0
PANCHKULA	0	0	0	0
PANIPAT	3	0	0	0
REWARI	0	0	0	0
ROHTAK	0	0	0	1
SIRSA	1	0	0	0
SONIPAT	0	0	0	2
YAMUNANAGAR	1	1	0	3
<b>Total</b>	<b>47</b>	<b>1</b>	<b>1</b>	<b>32</b>

(c) Uttar Pradesh

District	15 Sep-28 Sep													
	2020	2021	2022	2023	GAUTAMBUDHNAGAR	0	0	0	0	MUZAFARNAGAR	0	0	0	0
AGRA	0	0	0	0	GAZIPUR	0	0	0	0	PILHIBHIT	1	0	0	1
ALIGARH	1	0	0	2	GHAZIABAD	1	0	0	0	PRATAPGARH	0	0	0	0
ALLAHABAD	0	0	0	0	GONDA	0	0	0	0	RAIBEARELI	1	0	0	0
AMBEDKARNAGAR	0	0	0	0	GORAKHPUR	0	0	0	0	RAMPUR	0	2	0	0
AMETHI	0	0	0	0	HAMIRPUR	0	0	0	0	SAMBHAL	3	0	0	0
AMROHA	0	0	0	0	HAPUR	1	0	0	0	SANTKABIRNAGAR	0	0	0	0
AURAIYA	1	0	0	2	HARDOI	0	0	0	0	SANTRAVIDASNAGAR	0	0	0	0
AZAMGARH	0	0	0	0	HATHRAS	0	0	0	0	SHAHJAHANPUR	2	6	0	1
BADAUN	0	0	0	0	JALAUN	0	0	0	0	SHAMLI	6	0	0	0
BAGHPAT	1	0	0	0	JAUNPUR	0	0	0	0	SHARANPUR	1	0	0	0
BAHRAICH	0	0	0	0	JHANSI	2	0	0	0	SHRAWASTI	0	0	0	0
BALLIA	0	0	0	0	KANNAUJ	0	0	0	0	SIDDHARTHANAGAR	0	0	0	0
BALRAMPUR	0	0	0	0	KANPUR	0	1	0	0	SITAPUR	0	0	0	0
BANDA	0	0	0	0	KANPUR DEHAT	0	0	0	0	SONBHADRA	0	0	0	0
BARABANKI	0	0	0	0	KASGANJ	0	0	0	0	SULTANPUR	0	0	0	0
BAREILLY	0	0	0	0	KAUSHAMBI	0	0	0	1	UNNAO	0	0	0	0
BASTI	0	0	0	0	KHERI	0	0	0	0	VARANASI	0	0	0	0
BIJNOR	1	0	0	0	KUSHINAGAR	0	0	0	0	<b>Total</b>	<b>25</b>	<b>10</b>	<b>0</b>	<b>9</b>
BULANDSAHAR	0	0	0	0	LALITPUR	0	0	0	0					
CHANDAULI	0	0	0	0	LUCKNOW	0	0	0	0					
CHITRAKOOT	0	0	0	0	MAHARAJGANJ	0	0	0	0					
DEORIA	0	0	0	2	MAHOBA	0	0	0	0					
ETAH	1	0	0	0	MAINPURI	0	0	0	0					
ETAWAH	0	0	0	0	MATHURA	0	1	0	0					
FAIZABAD	0	0	0	0	MAU	0	0	0	0					
FARRUKHABAD	0	0	0	0	MEERUT	2	0	0	0					
FATEHPUR	0	0	0	0	MIRZAPUR	0	0	0	0					
FIROZABAD	0	0	0	0	MORADABAD	0	0	0	0					

**(d) Delhi**

District	15 Sep-28 Sep			
	2020	2021	2022	2023
CENTRAL	0	0	0	0
EAST	0	0	0	0
NEW DELHI	0	0	0	0
NORTH	0	0	0	1
NORTH EAST	0	0	0	0
NORTH WEST DELHI	0	0	0	0
SHAHADRA	0	0	0	0
SOUTH	0	0	0	0
SOUTH EAST	0	0	0	0
SOUTH WEST DELHI	0	0	0	0
WEST DELHI	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>

**(e) Rajasthan**

District	15 Sep-28 Sep			
	2020	2021	2022	2023
AJMER	0	0	0	0
ALWAR	0	0	0	0
BANSWARA	0	0	0	0
BARAN	0	0	0	0
BARMER	1	0	0	0
BHARATPUR	0	0	0	0
BHILWARA	1	0	0	0
BIKANER	0	0	0	0
BUNDI	0	0	1	0
CHITTAURGARH	0	0	0	0
CHURU	0	0	0	0
DAUSA	0	0	0	0
DHOLPUR	0	0	0	0
DUNGARPUR	0	0	0	0
GANGANAGAR	1	0	0	0
HANUMANGARH	0	0	0	0
JAIPUR	0	0	0	0
JAISELMER	1	0	0	0
JALOR	0	0	0	0
JHALAWAR	0	0	0	0
JHUNJHUNUN	0	0	0	0
JODHPUR	1	0	0	0
KARAULI	0	0	0	0
KOTA	0	0	0	0
NAGAU	0	0	0	0
PALI	0	0	0	0
PRATAPGARH	0	0	0	0
RAJSMAND	0	0	0	0
SIKAR	0	0	0	0
SIROHI	0	0	0	0
SWAIMADHOPUR	0	0	0	0
TONK	0	0	0	0
UDAIPUR	0	0	0	0
<b>Total</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>0</b>

(f) Madhya Pradesh

District	15 Sep-28 Sep								
	2020	2021	2022	2023					
					PANNA	0	0	0	0
ALIRAJPUR	0	0	0	0	RAISEN	0	0	0	0
ANUPPUR	0	0	0	0	RAJGARH	0	0	0	0
ASHOKNAGAR	0	0	0	0	RATLAM	0	0	0	0
BALAGHAT	0	0	0	0	REWA	0	0	0	0
BARWANI	0	0	0	0	SAGAR	2	0	0	1
BETUL	0	0	0	0	SATNA	0	0	0	0
BHIND	0	0	0	0	SEHORE	0	0	0	0
BHOPAL	0	0	0	0	SEONI	0	0	0	0
BURHANPUR	0	0	0	0	SHAHDOL	0	0	0	0
CHHATARPUR	0	0	0	0	SHAJAPUR	0	0	0	1
CHHINDWARA	0	0	0	0	SHEOPUR	0	0	0	0
DAMOH	0	0	0	2	SHIVPURI	0	0	0	0
DATIA	0	0	0	0	SIDHI	0	0	0	0
DEWAS	0	0	0	0	SINGRAULI	0	0	0	0
DHAR	0	0	0	0	TIKAMGARH	0	0	0	0
DINDORI	0	0	0	0	UJJAIN	0	0	0	0
EAST NIMAR	0	0	0	0	UMARIA	0	0	0	0
GUNA	2	1	0	0	VIDESHA	0	0	0	0
GWALIOR	2	0	0	0	WEST NIMAR	0	0	0	0
HARDA	2	0	0	0	Total	8	1	0	5
HOSHANGABAD	0	0	0	1					
INDORE	0	0	0	0					
JABALPUR	0	0	0	0					
JHABUA	0	0	0	0					
KATNI	0	0	0	0					
MANDLA	0	0	0	0					
MANDSAUR	0	0	0	0					
MORENA	0	0	0	0					
NARSHIMAPURA	0	0	0	0					
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-28 September)**

**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
<b>Total</b>	<b>846</b>	<b>124</b>	<b>139</b>	<b>65</b>	<b>47</b>	<b>1</b>	<b>1</b>	<b>32</b>	<b>25</b>	<b>10</b>	<b>0</b>	<b>9</b>



## 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
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>5</b>

### Details of residue burning events in Punjab on 28-Sep-2023

S. No.	District	Tehsil / Block	Satellite	Latitude	Longitude	ACQ_TIME	Day / Night	Fire Power (W/m2)
1	AMRITSAR	AJNALA	S-NPP	31.87946	74.70035	13:54:25	D	5.60
2	AMRITSAR	JANDIALA GURU	S-NPP	31.57930	75.08058	13:54:25	D	6.30
3	AMRITSAR	JANDIALA GURU	S-NPP	31.59073	74.99172	13:54:25	D	2.60
4	AMRITSAR	JANDIALA GURU	S-NPP	31.59623	75.00397	13:54:25	D	2.30
5	AMRITSAR	JANDIALA GURU	S-NPP	31.61155	75.01108	13:54:25	D	3.00
6	AMRITSAR	MAJITHA	S-NPP	31.70724	75.08539	13:54:25	D	4.90
7	AMRITSAR	MAJITHA	S-NPP	31.72056	75.03167	13:54:25	D	5.20
8	AMRITSAR	MAJITHA	S-NPP	31.72632	74.96533	13:54:25	D	2.40
9	AMRITSAR	MAJITHA	S-NPP	31.73543	74.97276	13:54:25	D	2.70
10	AMRITSAR	MAJITHA	S-NPP	31.74366	74.97159	13:54:25	D	4.60
11	AMRITSAR	MAJITHA	S-NPP	31.75966	74.96497	13:54:25	D	3.10
12	AMRITSAR	MAJITHA	S-NPP	31.76423	74.96869	13:54:25	D	3.10
13	AMRITSAR	MAJITHA	S-NPP	31.78617	74.93951	13:54:25	D	4.10
14	AMRITSAR	MAJITHA	S-NPP	31.78663	74.94379	13:54:25	D	2.80
15	AMRITSAR	MAJITHA	S-NPP	31.78886	75.08377	13:54:25	D	2.90
16	AMRITSAR	MAJITHA	S-NPP	31.78932	75.08813	13:54:25	D	2.90
17	AMRITSAR	RAYYA	S-NPP	31.51291	75.14598	13:54:25	D	3.20
18	AMRITSAR	RAYYA	S-NPP	31.66029	75.28377	13:54:25	D	3.00
19	AMRITSAR	TARSIKKA	S-NPP	31.62449	75.18923	13:54:25	D	3.30
20	AMRITSAR	TARSIKKA	S-NPP	31.62545	75.18986	13:54:25	D	3.50
21	AMRITSAR	TARSIKKA	S-NPP	31.62563	75.14979	13:54:25	D	4.50
22	AMRITSAR	TARSIKKA	S-NPP	31.62684	75.07896	13:54:25	D	6.70
23	AMRITSAR	VERKA	S-NPP	31.65548	74.99181	13:54:25	D	2.50
24	AMRITSAR	VERKA	S-NPP	31.68200	74.96637	13:54:25	D	2.80
25	FIROZPUR	FIROZPUR	AQUA	30.96400	74.50800	13:29:38	D	17.70
26	FIROZPUR	FIROZPUR	AQUA	30.97000	74.51300	13:29:38	D	20.40
27	GURDASPUR	FATEHGARH CHURIAN	S-NPP	31.81547	75.04191	13:54:25	D	2.00
28	GURDASPUR	QADIAN	S-NPP	31.78155	75.29997	13:54:25	D	2.20
29	SANGRUR	ANDANA	S-NPP	29.76575	75.93797	13:54:25	D	2.60
30	SAS NAGAR (MOHALI)	DERABASSI	S-NPP	30.62766	76.85134	13:54:25	D	3.50

31	TARN TARAN	GANDIWIND TATLA	S-NPP	31.54305	74.81828	13:54:25	D	3.00
32	TARN TARAN	KHADUR SAHIB	S-NPP	31.43063	75.12222	13:54:25	D	9.50
33	TARN TARAN	KHADUR SAHIB	S-NPP	31.47105	75.10780	13:54:25	D	3.00

### Details of residue burning events in Haryana on 28-Sep-2023

S. No.	District	Tehsil / Block	Satellite	Latitude	Longitude	ACQ_TIME	Day / Night	Fire Power (W/m2)
1	JIND	UCHANA	S-NPP	29.50860	76.31812	13:54:25	D	9.80
2	KARNAL	GHARAUNDA	S-NPP	29.50573	76.87532	13:54:25	D	2.70
3	KARNAL	KARNAL	S-NPP	29.63230	76.98676	13:54:25	D	7.40
4	KARNAL	KARNAL	S-NPP	29.63280	76.99195	13:54:25	D	7.40
5	KURUKSHETRA	SHAHBAD	S-NPP	30.10645	76.86312	13:54:25	D	1.80
6	KURUKSHETRA	SHAHBAD	AQUA	30.12200	76.84600	13:29:38	D	12.60
7	KURUKSHETRA	THANESAR	S-NPP	30.01101	76.83105	13:54:25	D	4.40
8	YAMUNANAGAR	MUSTAFABAD	S-NPP	30.28455	77.18416	13:54:25	D	4.50

### Details of residue burning events in Uttar Pradesh on 28-Sep-2023

S. No.	District	Tehsil / Block	Satellite	Latitude	Longitude	ACQ_TIME	Day / Night	Fire Power (W/m2)
1	ALIGARH	KHAIR	S-NPP	27.99676	77.69582	13:54:25	D	4.50
2	ALIGARH	KHAIR	S-NPP	28.04383	77.66550	13:54:25	D	2.90
3	AURAIYA	BIDHUNA	S-NPP	26.64206	79.47880	01:04:08	N	0.90
4	AURAIYA	BIDHUNA	S-NPP	26.64442	79.47564	01:04:08	N	0.60

### Details of residue burning events in Madhya Pradesh on 28-Sep-2023

S. No.	District	Tehsil / Block	Satellite	Latitude	Longitude	ACQ_TIME	Day / Night	Fire Power (W/m2)
1	DAMOH	PATHARIA	S-NPP	23.98698	79.39098	01:04:08	N	0.50
2	SHAJAPUR	MOMAN BARODIY	S-NPP	23.67522	76.30102	13:54:25	D	4.60

**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**

ICAR - IARI	<b>Dr V.K. Sehgal</b>	Pr. Scientist & Nodal Officer	<a href="mailto:iaricreams@gmail.com">iaricreams@gmail.com</a>
	Dr Rajkumar Dhakar	Scientist	<a href="mailto:rajdhakar.iari@gmail.com">rajdhakar.iari@gmail.com</a>
	Mr Mohd Jahangir	Lab Assistant (KRISHI)	<a href="mailto:mjahangir198@gmail.com">mjahangir198@gmail.com</a>
ICAR - ATARI	Dr Parvender Sheoran	Director ATARI (Zone-I) Ludhiana	<a href="mailto:zcu1ldh@gmail.com">zcu1ldh@gmail.com</a>
	Dr. J.P. Mishra	Director ATARI (Zone-II) Jodhpur	<a href="mailto:jp.mishra67@gov.in">jp.mishra67@gov.in</a>
	Dr S.K. Dubey	Director ATARI (Zone-III) Kanpur	<a href="mailto:zpdicarkanpur@gmail.com">zpdicarkanpur@gmail.com</a>
ICAR - IASRI	Dr Rajender Parsad	Director	<a href="mailto:rajender.parsad@icar.gov.in">rajender.parsad@icar.gov.in</a>

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)

\*\*\*