

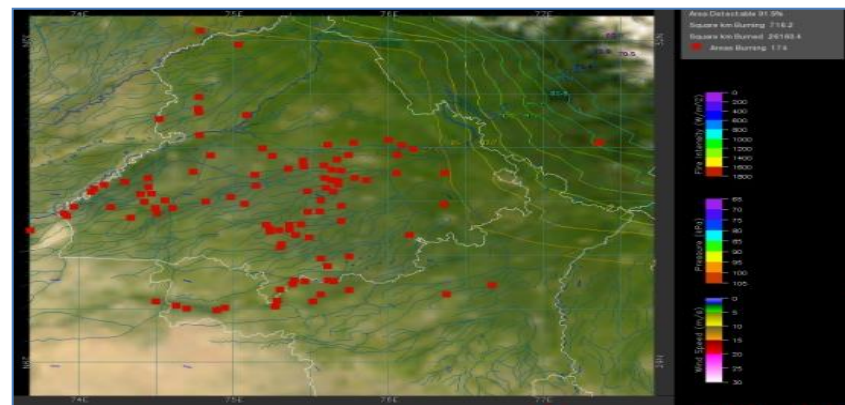
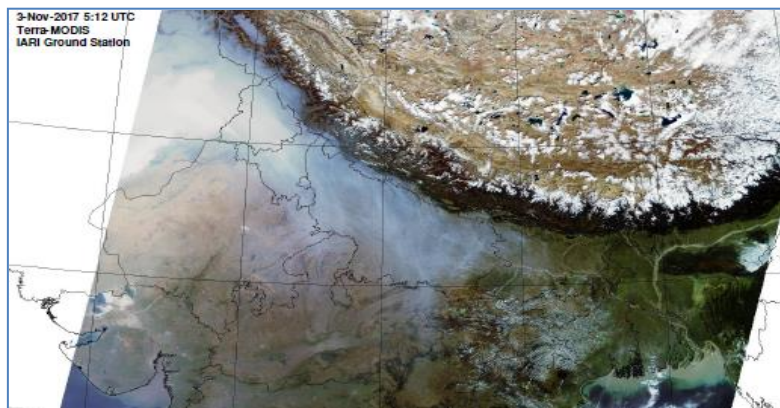


MONITORING PADDY RESIDUE BURNING IN INDIA USING SATELLITE REMOTE SENSING DURING 2023

Bulletin
No. 13

Events Date:
27-Sep-2023

Issued on:
27-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

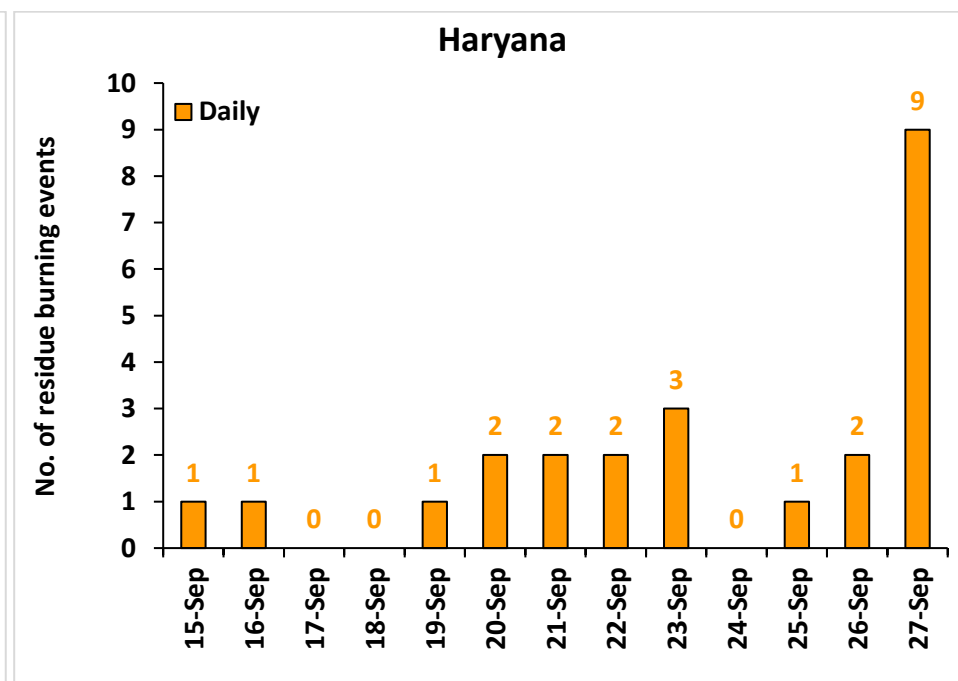
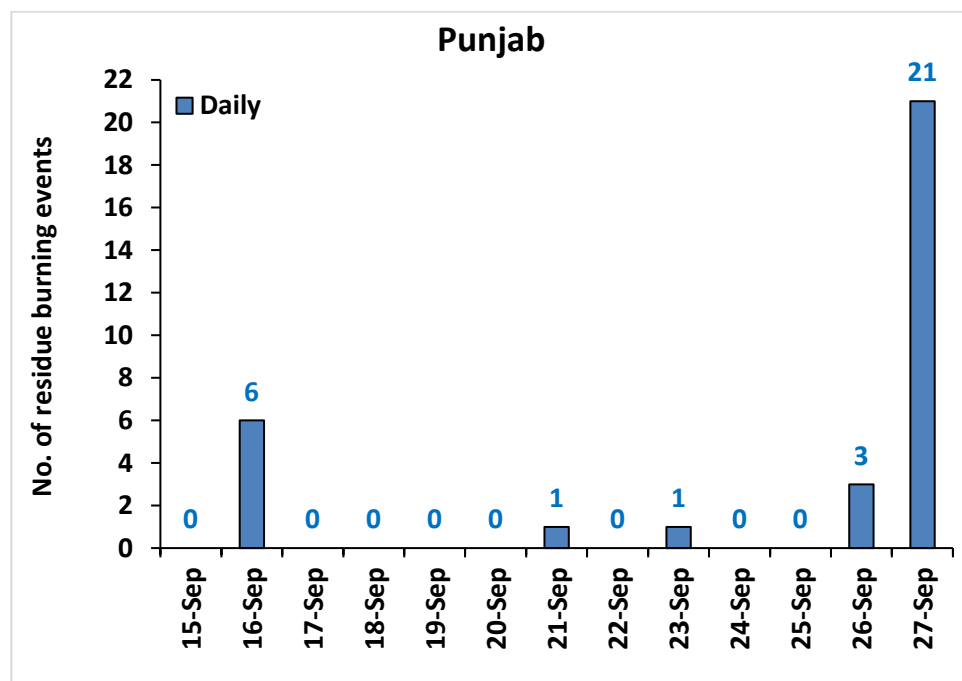
<http://creams.iari.res.in>



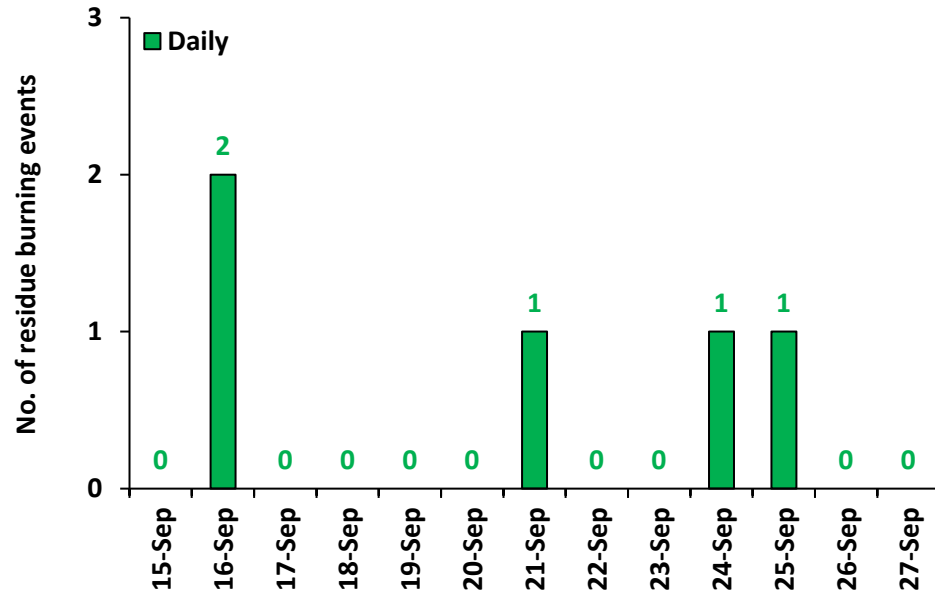
Highlights for 27-Sep-2023

- 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 **30** residue burning events in the six study States on 27-Sep-2023.
- The state wise events detected on 27-Sep-2023 were **21** in Punjab, **09** in Haryana, **00** in UP, **00** in Delhi, **00** in Rajasthan and **00** in MP.
- Total **65** burning events were detected in the six states between 15-Sept-2023 and 27-Sep-2023, which are distributed as **32, 24, 05, 01, 00** and **03** in Punjab, Haryana, UP, Delhi, Rajasthan and MP, respectively.
- Detection of residue burning events was hampered by the presence of clouds over Uttar Pradesh, Rajasthan and Madhya Pradesh states.

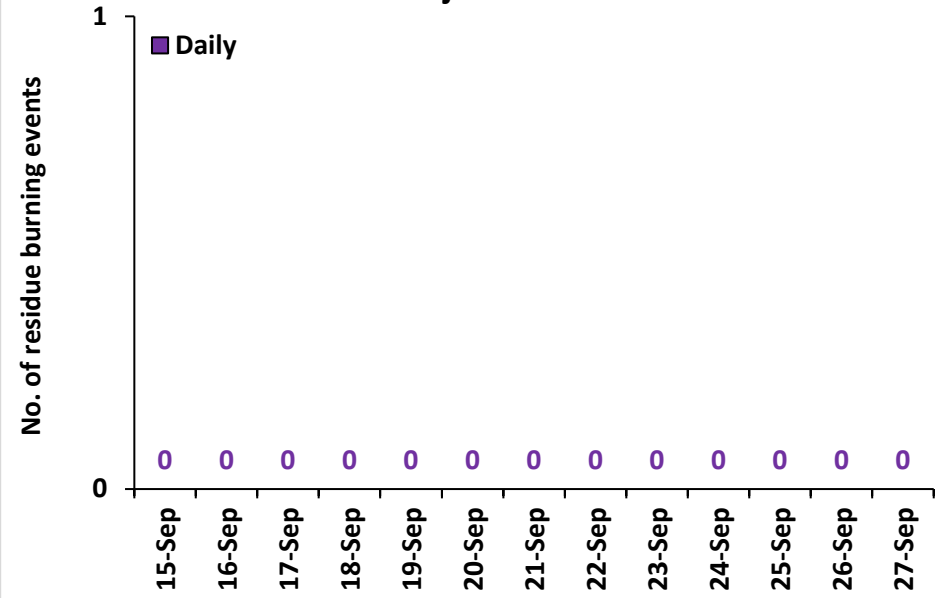
Temporal distribution of rice residue burning events for the study States in 2023



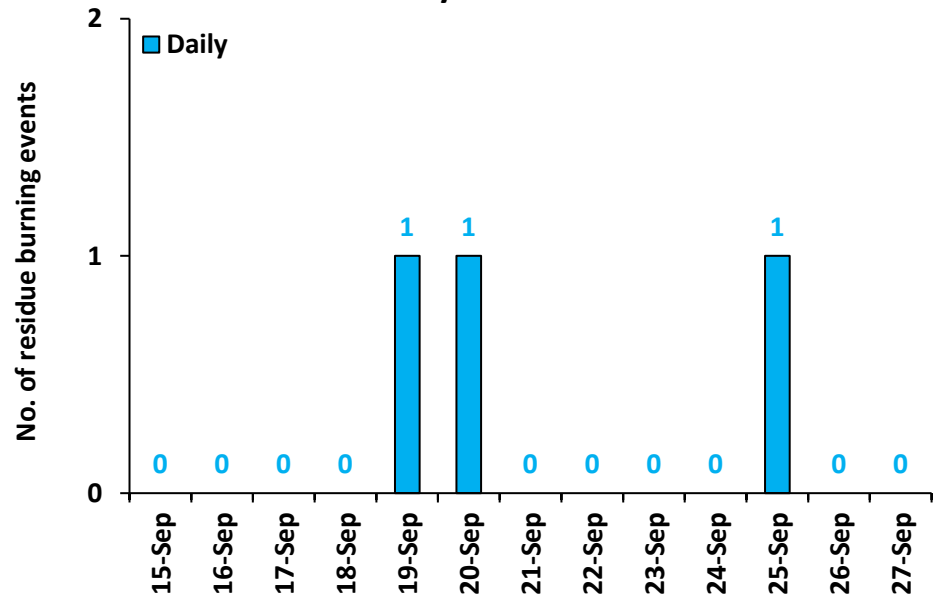
Uttar Pradesh



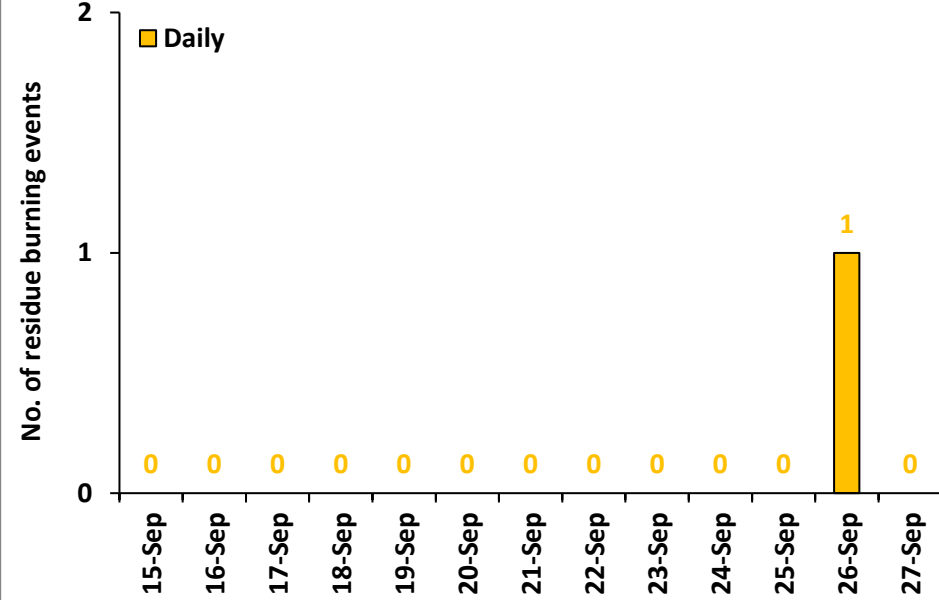
Rajasthan



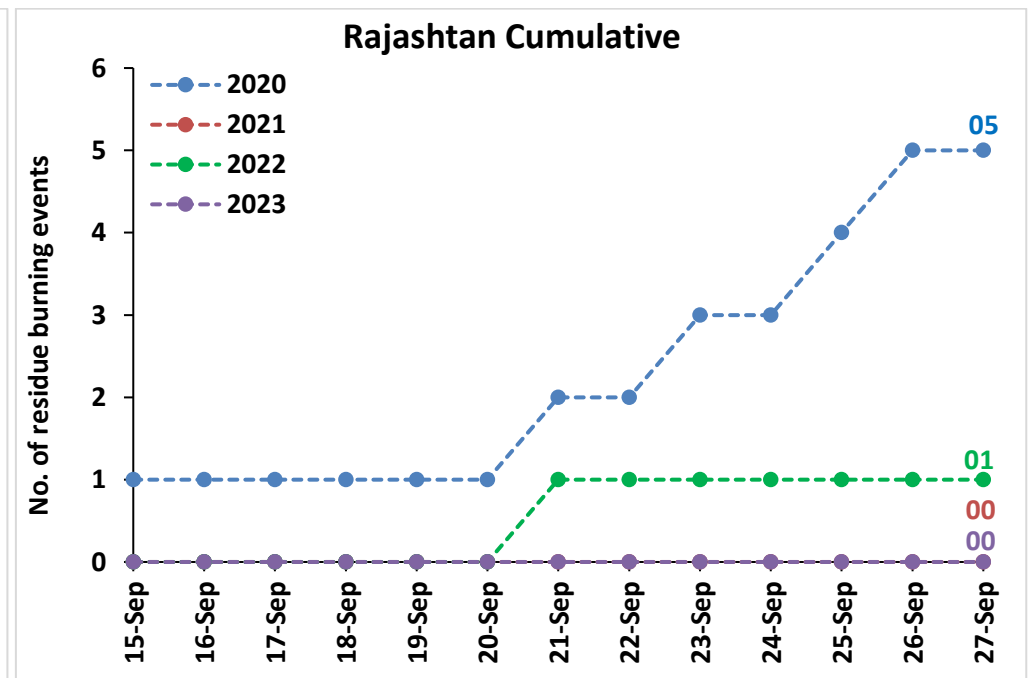
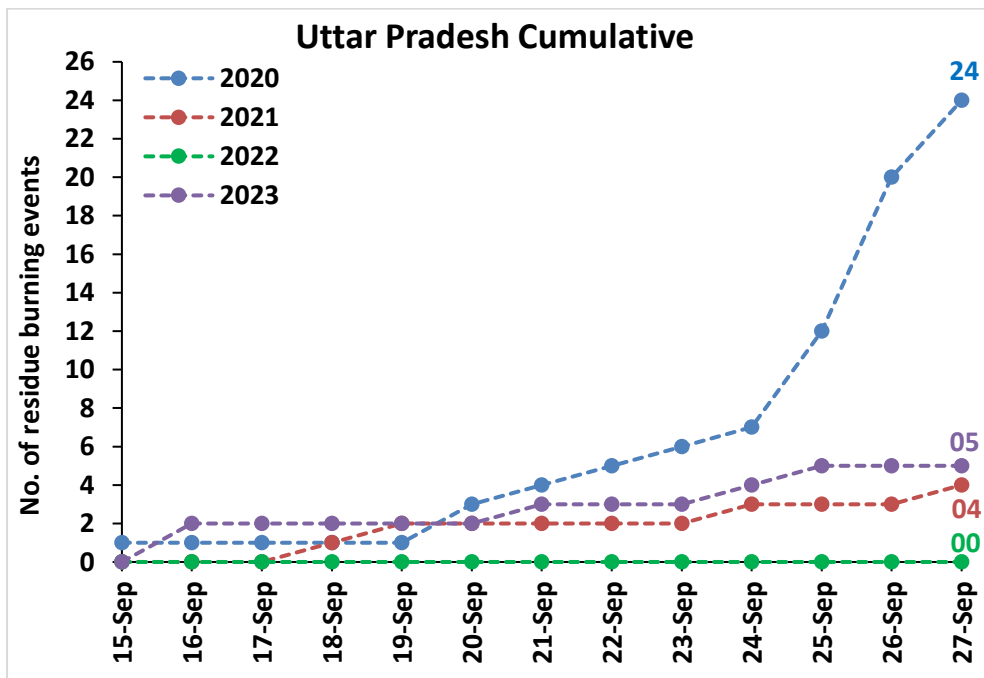
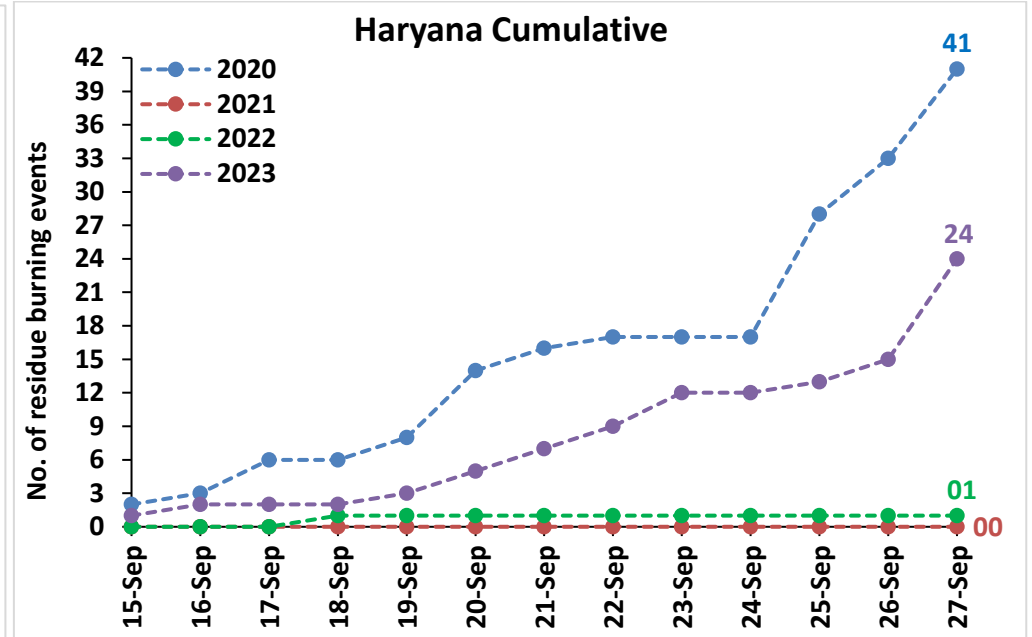
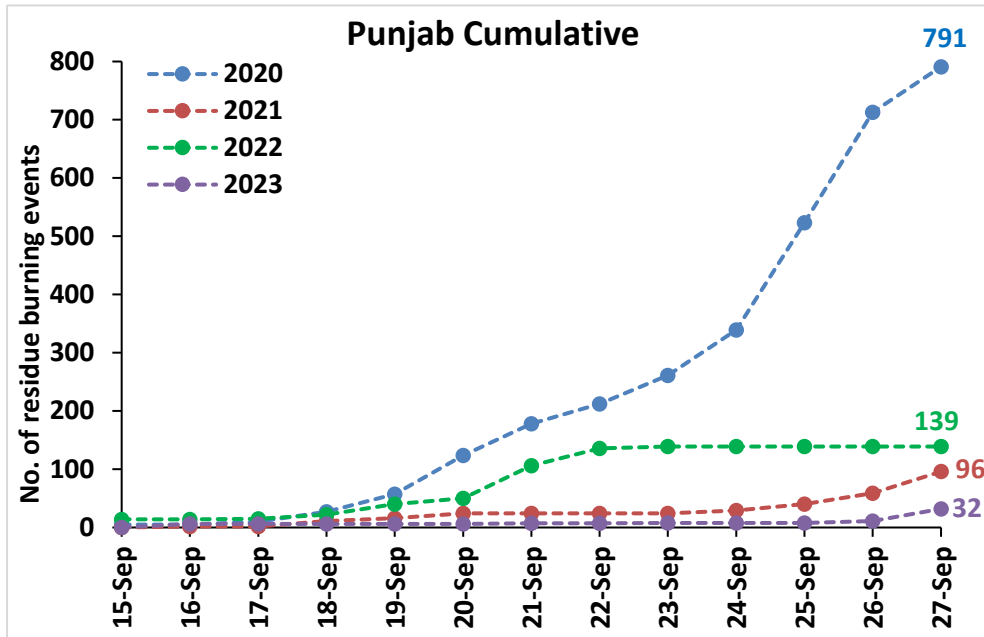
Madhya Pradesh



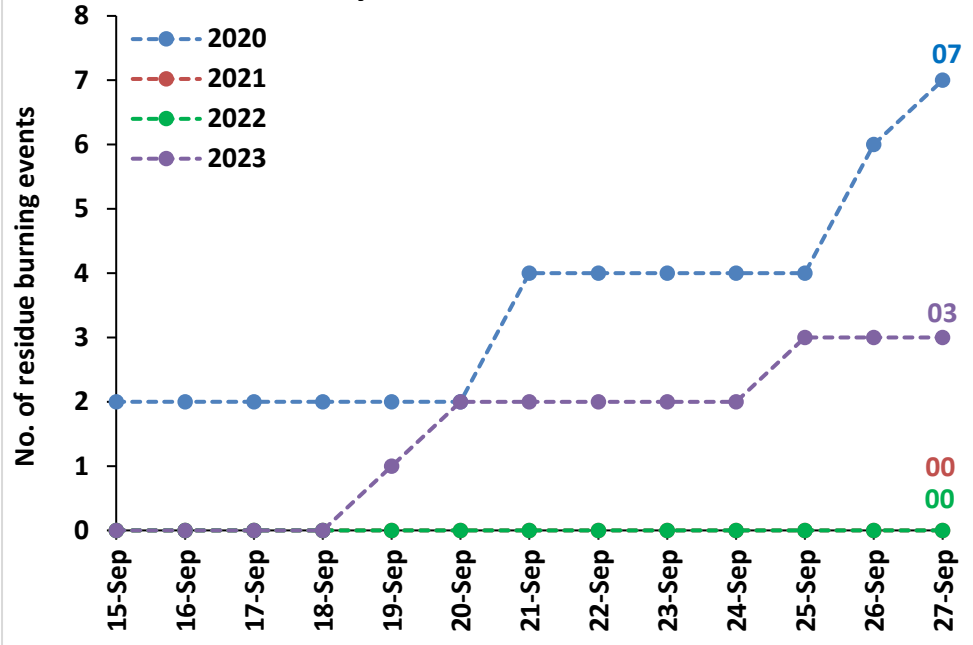
Delhi



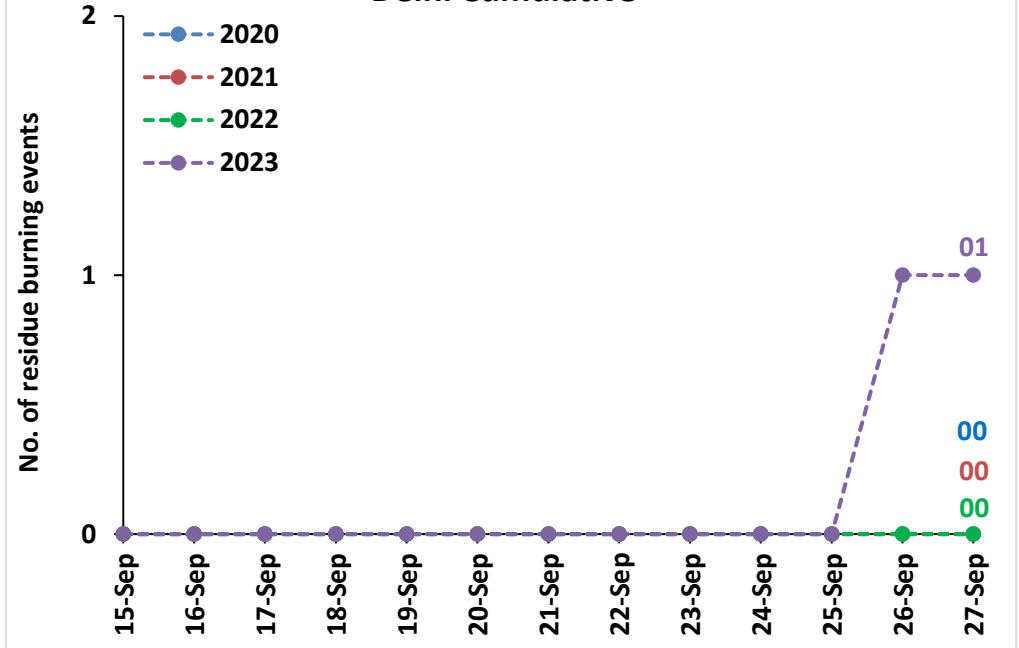
Comparison of residue burning events in current year (2023) with previous years (2020, 2021 and 2022) for the study State



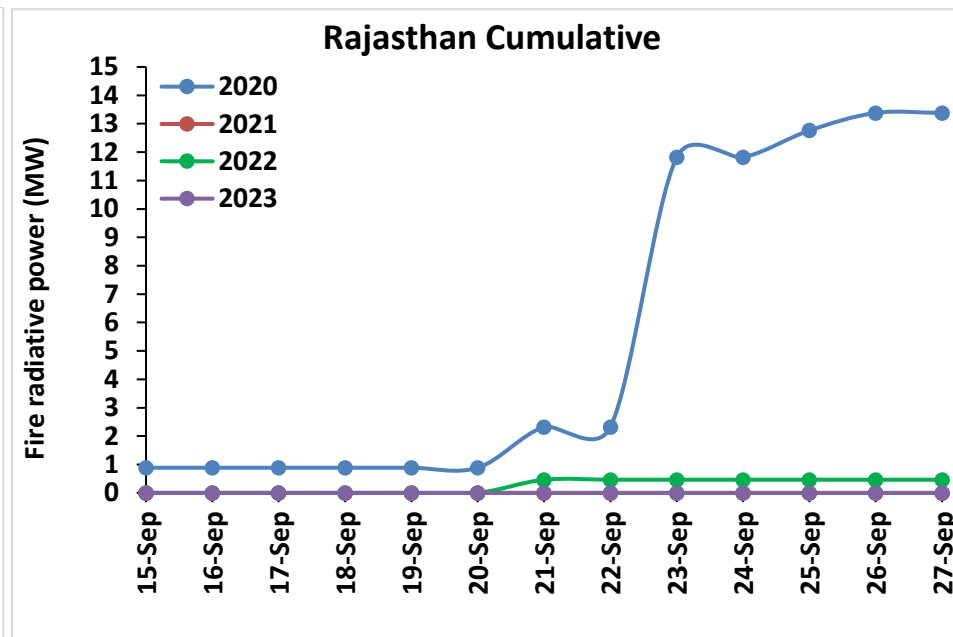
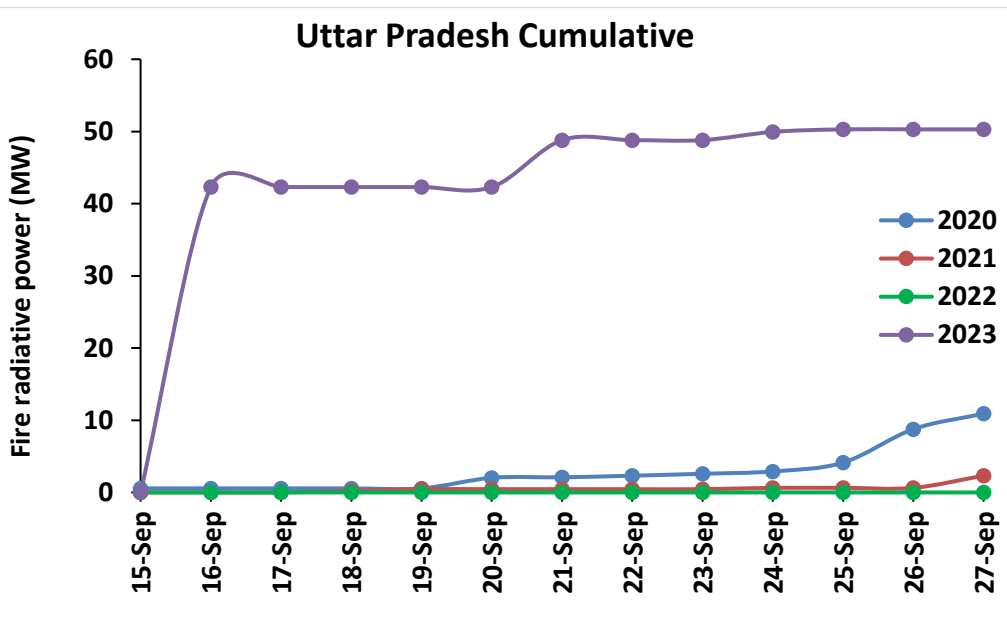
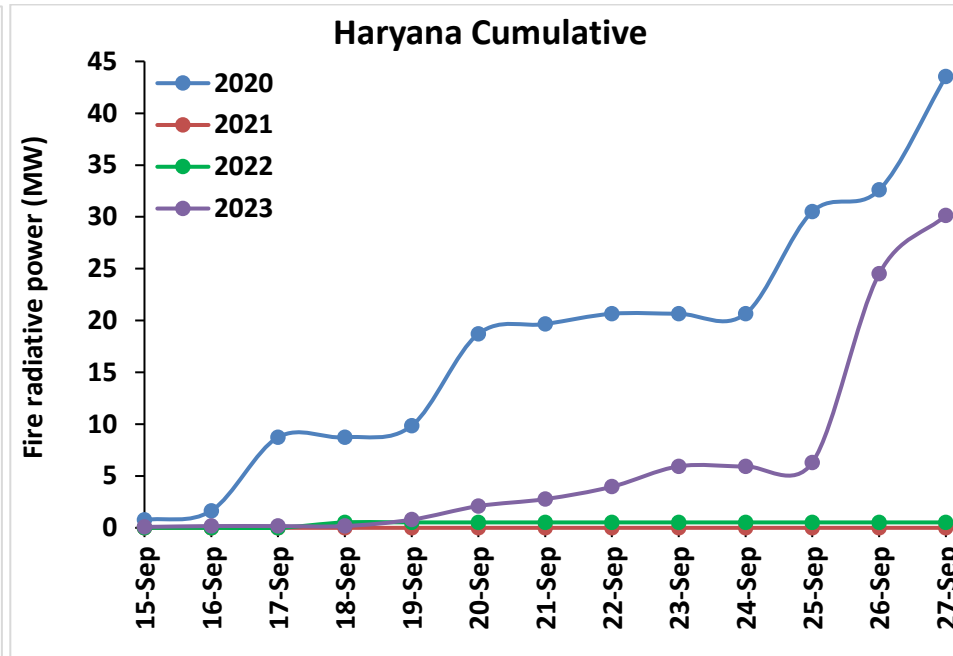
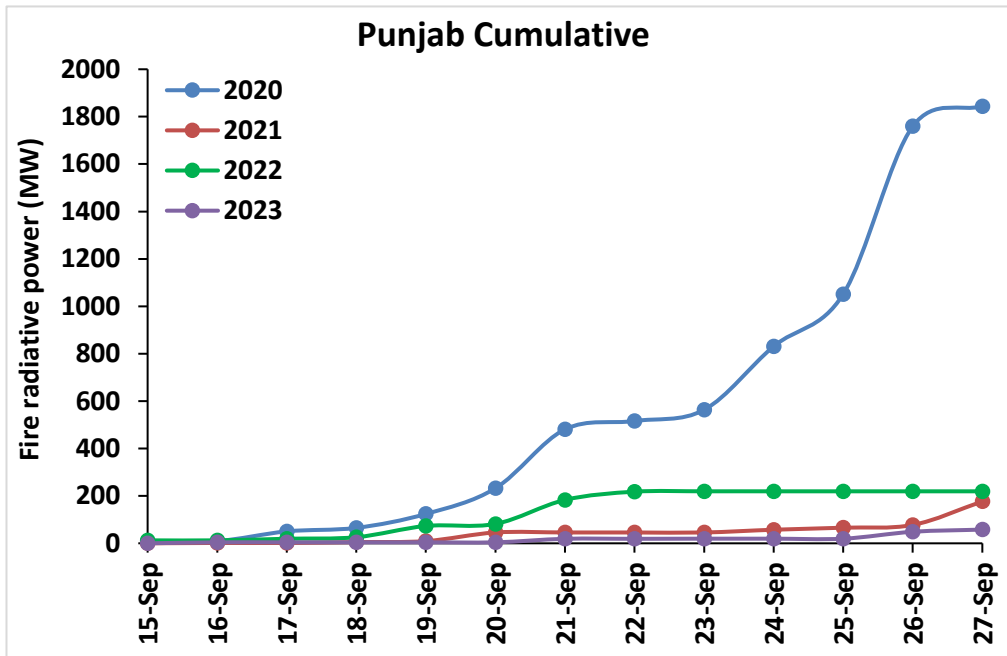
Madhya Pradesh Cumulative

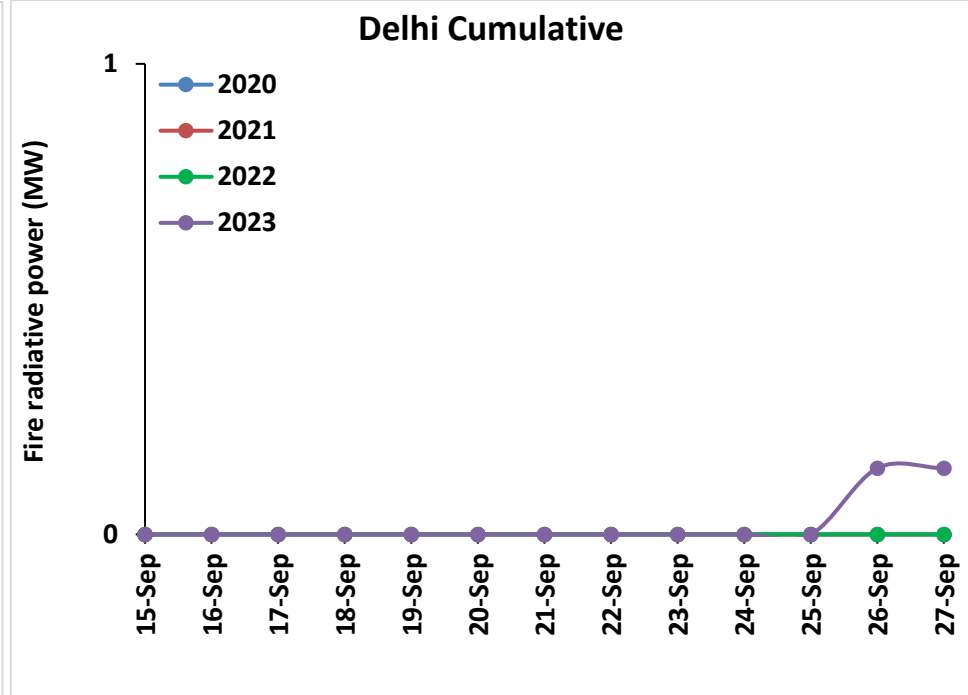
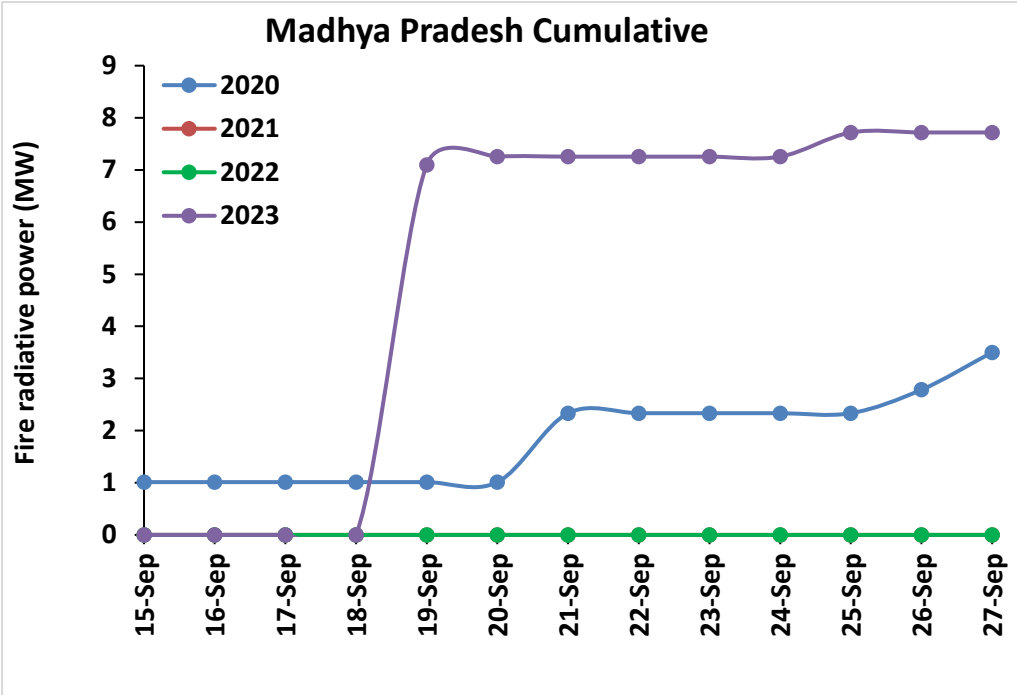


Delhi Cumulative



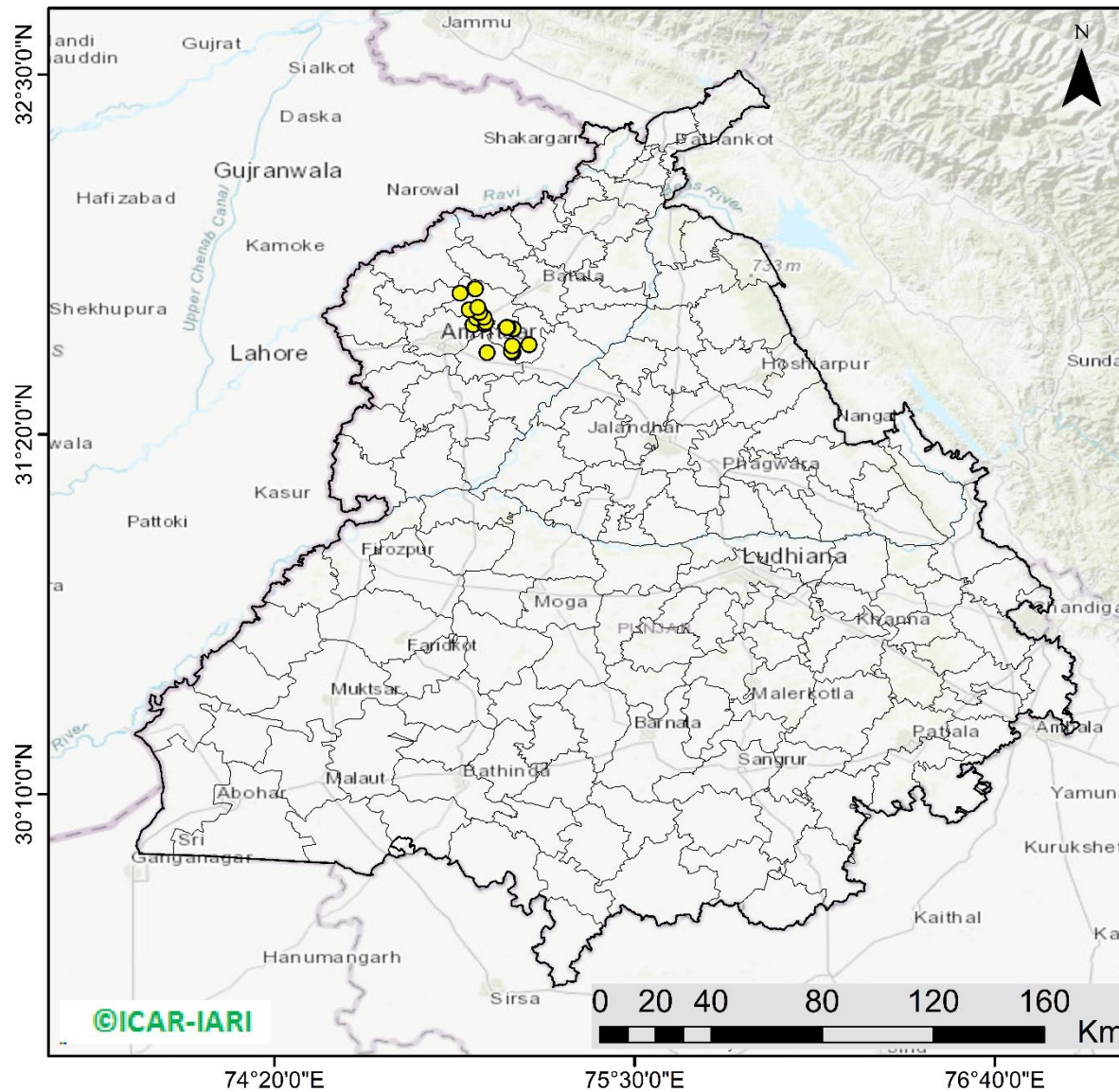
Comparison of residue burning fire power in current year (2023) with previous years (2020, 2021 and 2022) for the study States





Punjab

RICE RESIDUE BURNING IN PUNJAB



21 burning events
detected in Punjab during
(27th Sep 2023)

Fire Intensity (W/m²)

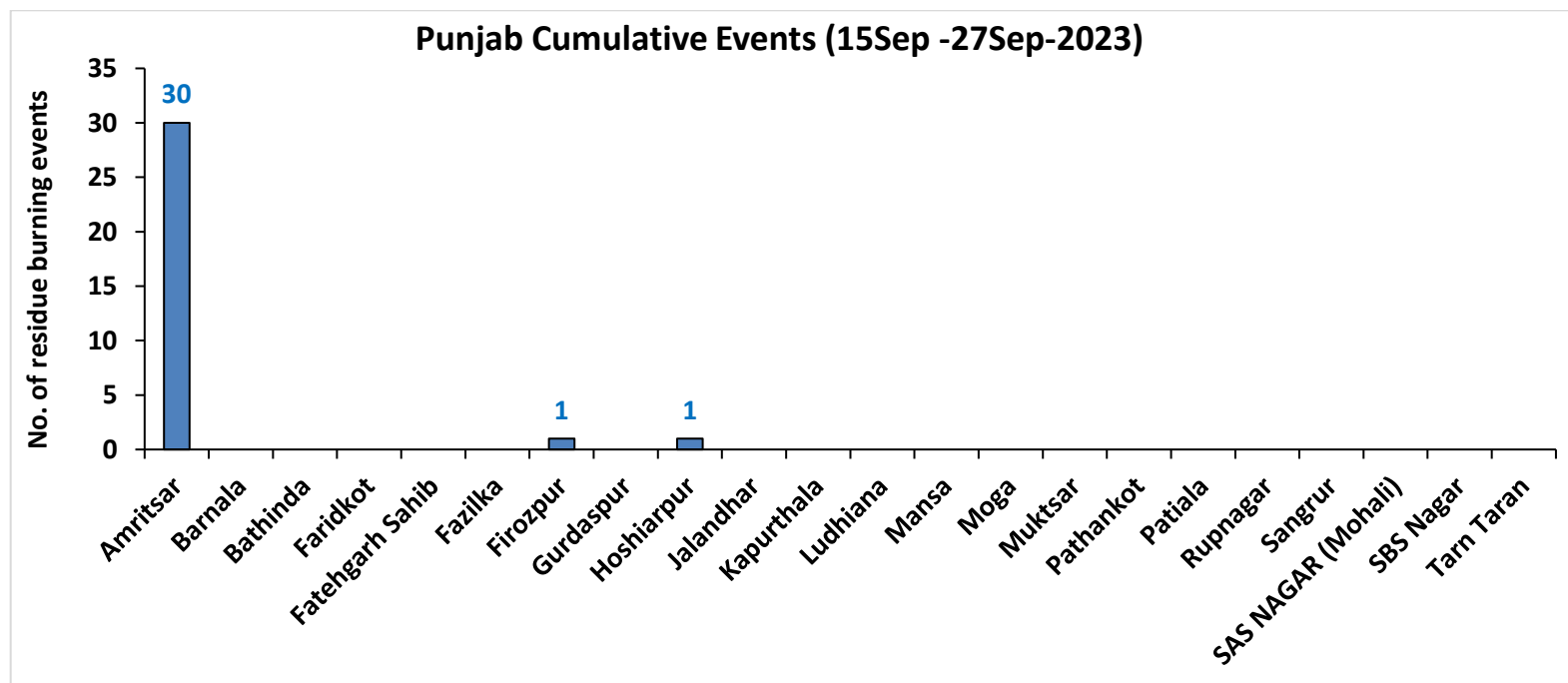
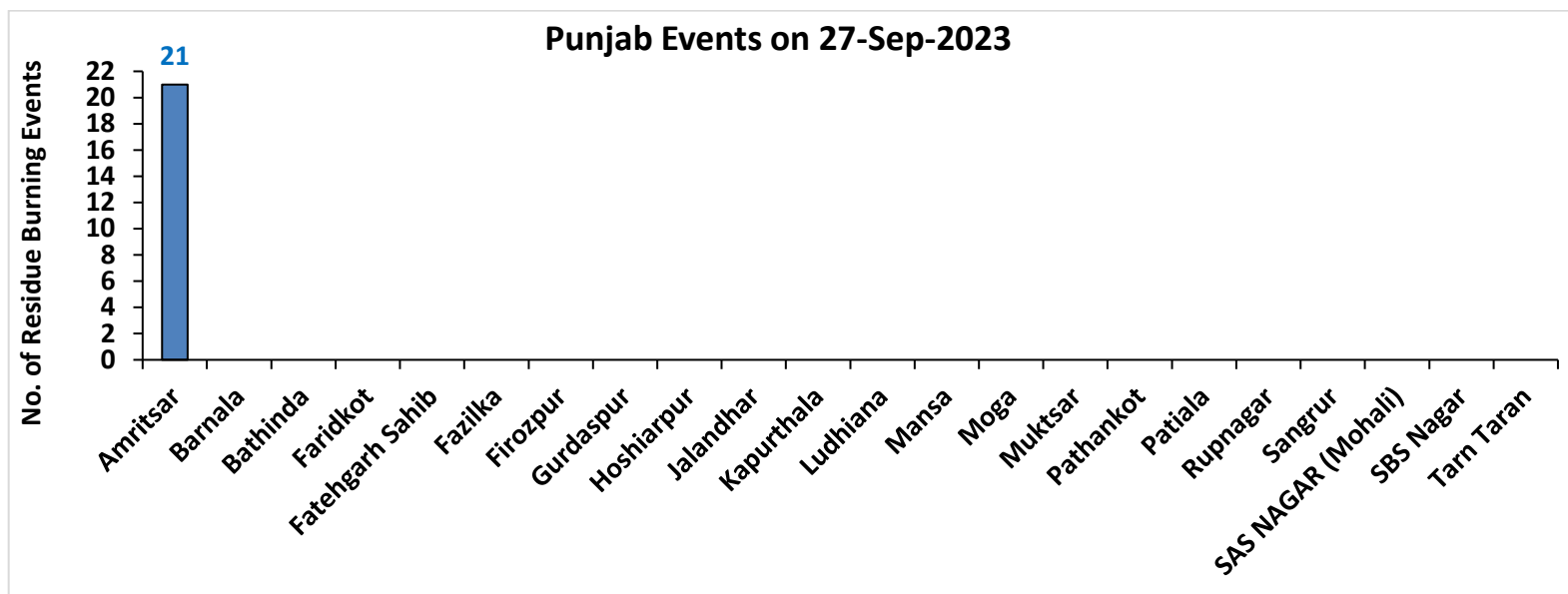
- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- >20



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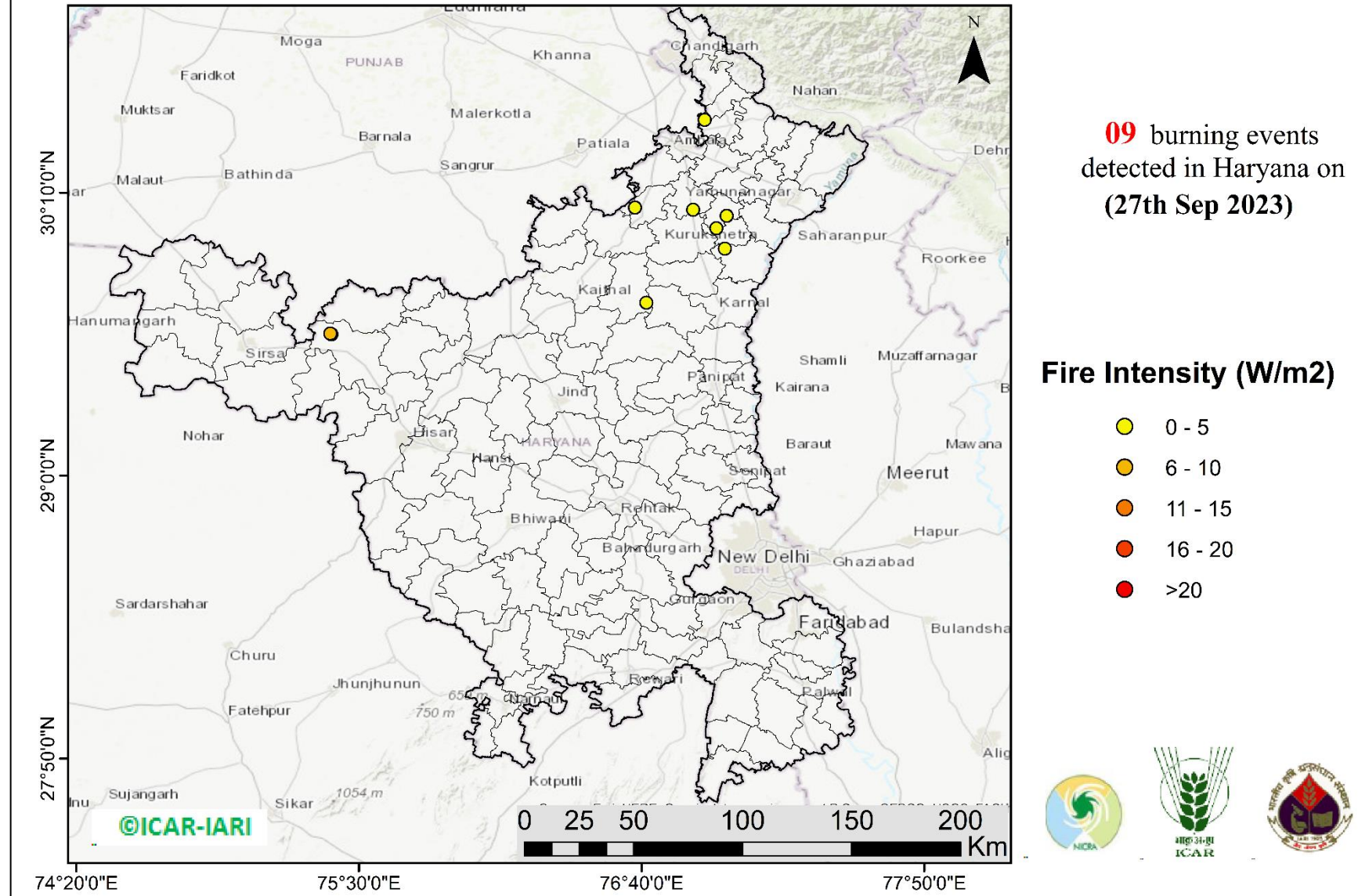
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Punjab (15Sep- 27Sep-2023)



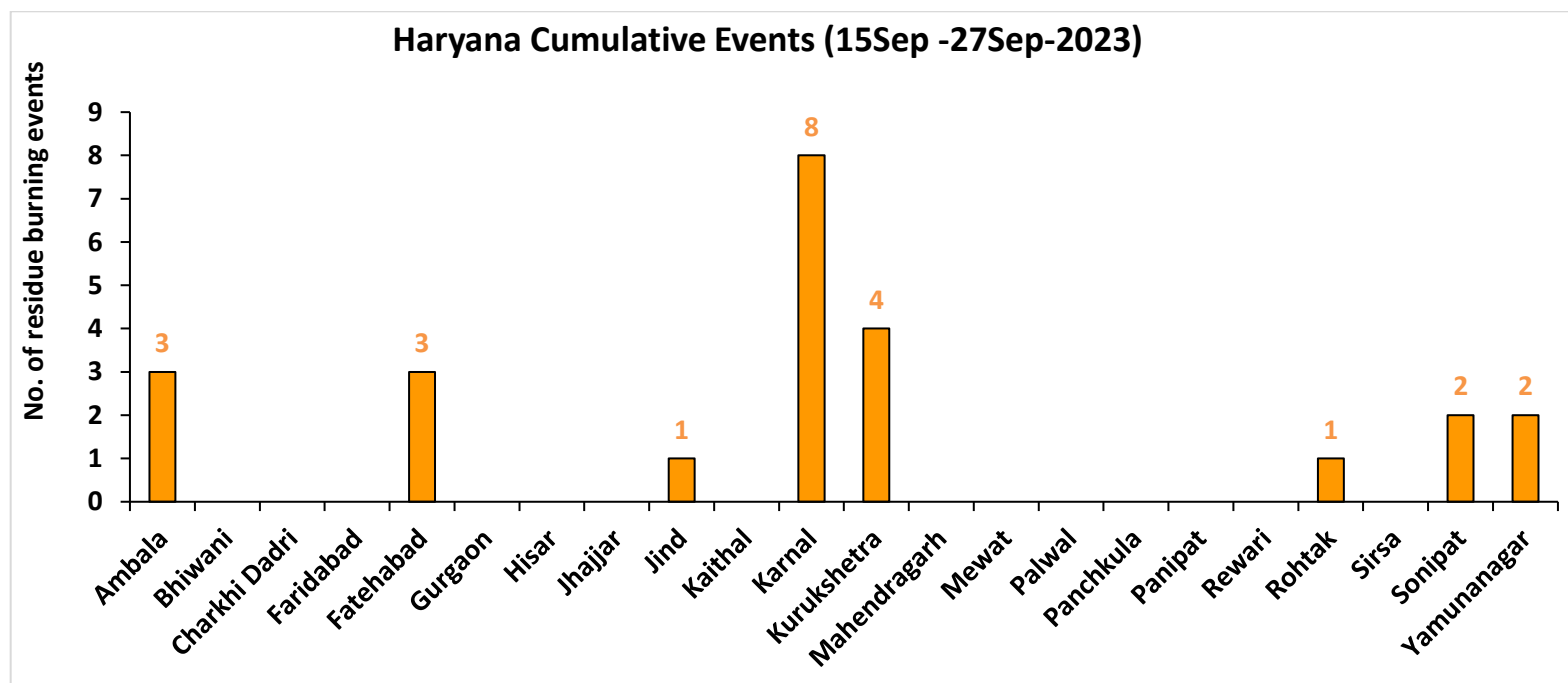
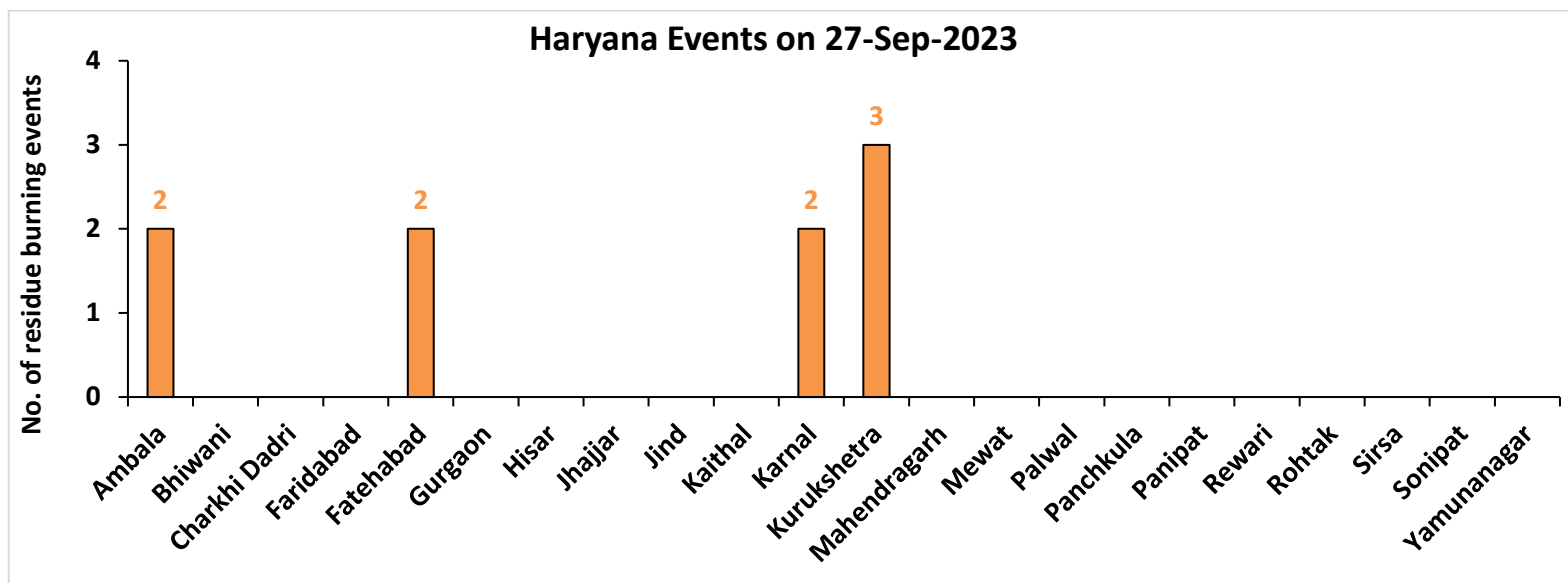
Haryana

RICE RESIDUE BURNING IN HARYANA



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

District-wise cumulative number of residues burning events in Haryana (15Sep-27Sep-2023)



District-wise cumulative number of residues burning events detected in 2020, 2021, 2022 and 2023
(Period: 15 September-27 September)

(a) Punjab

District	15 Sep-27 Sep			
	2020	2021	2022	2023
Amritsar	606	79	121	30
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	0	0	1
Gurdaspur	19	0	1	0
Hoshiarpur	0	0	0	1
Jalandhar	2	0	0	0
Kapurthala	8	0	0	0
Ludhiana	12	1	0	0
Mansa	1	0	0	0
Moga	4	0	0	0
Muktsar	1	0	0	0
Pathankot	0	0	0	0
Patiala	16	3	1	0
Rupnagar	0	0	0	0
Sangrur	3	1	0	0
SAS NAGAR (Mohali)	5	0	1	0
SBS Nagar	0	0	1	0
Tarn Taran	110	9	14	0
Total	791	96	139	32

(b) Haryana

District	15 Sep-27 Sep			
	2020	2021	2022	2023
AMBALA	3	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	0	0	0	0
JHAJJAR	0	0	0	0
JIND	0	0	1	1
KAITHAL	3	0	0	0
KARNAL	19	0	0	8
KURUKSHETRA	8	0	0	4
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	0	0	0	2
Total	41	0	1	24

(c) Uttar Pradesh

District	15 Sep-27 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	0	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	1	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	0	HARDOI	0	0	0	0	SANTRAVIDASNAGAR	0	0	0	0
AZAMGARH	0	0	0	0	HATHRAS	0	0	0	0	SHAHJAHANPUR	2	1	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	Total	24	4	0	5
BULANDSAHAR	0	0	0	0	LALITPUR	0	0	0	0					
CHANDAUJI	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	0	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-27 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
Total	0	0	0	1

(e) Rajasthan

District	15 Sep-27 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
Total	5	0	1	0

(f) Madhya Pradesh

District	15 Sep-27 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	0
CHHINDWARA	0	0	0	0	SHEOPUR	0	0	0	0
DAMOH	0	0	0	1	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	1	0	0	0	VIDESHA	0	0	0	0
GWALIOR	2	0	0	0	WEST NIMAR	0	0	0	0
HARDA	2	0	0	0	Total	7	0	0	3
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-27 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
Total	791	96	139	32	41	0	1	24	24	4	0	5

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
Total	0	0	0	1	5	0	1	0	7	0	0	3

Details of residue burning events in Punjab on 27-Sep-2023

S. No.	District	Tehsil / Block	Satellite	Latitude	Longitude	ACQ_TIME	Day / Night	Fire Power (W/m2)
1	AMRITSAR	JANDIALA GURU	S-NPP	31.59791	75.02269	14:13:21	D	2.00
2	AMRITSAR	JANDIALA GURU	S-NPP	31.59795	75.10585	14:13:21	D	3.50
3	AMRITSAR	JANDIALA GURU	S-NPP	31.69080	75.01400	14:13:21	D	4.40
4	AMRITSAR	JANDIALA GURU	S-NPP	31.69656	75.01762	14:13:21	D	4.40
5	AMRITSAR	MAJITHA	S-NPP	31.67894	75.08588	14:13:21	D	4.00
6	AMRITSAR	MAJITHA	S-NPP	31.67970	75.08624	14:13:21	D	1.60
7	AMRITSAR	MAJITHA	S-NPP	31.71107	74.98740	14:13:21	D	2.60
8	AMRITSAR	MAJITHA	S-NPP	31.71274	75.01207	14:13:21	D	1.90
9	AMRITSAR	MAJITHA	S-NPP	31.72806	74.99417	14:13:21	D	3.20
10	AMRITSAR	MAJITHA	S-NPP	31.72834	74.99828	14:13:21	D	3.20
11	AMRITSAR	MAJITHA	S-NPP	31.73702	74.96450	14:13:21	D	1.90
12	AMRITSAR	MAJITHA	S-NPP	31.74450	74.99274	14:13:21	D	4.60
13	AMRITSAR	MAJITHA	S-NPP	31.79060	74.93510	14:13:21	D	1.80
14	AMRITSAR	MAJITHA	S-NPP	31.80494	74.98196	12:33:03	D	3.90
15	AMRITSAR	MAJITHA	S-NPP	31.80497	74.98483	12:33:03	D	5.00
16	AMRITSAR	TARSIKKA	S-NPP	31.60318	75.10121	14:13:21	D	1.90
17	AMRITSAR	TARSIKKA	S-NPP	31.61999	75.10392	14:13:21	D	3.30
18	AMRITSAR	TARSIKKA	S-NPP	31.62365	75.15820	14:13:21	D	2.30
19	AMRITSAR	TARSIKKA	S-NPP	31.67477	75.10718	14:13:21	D	1.70
20	AMRITSAR	TARSIKKA	S-NPP	31.67921	75.09003	14:13:21	D	5.00
21	AMRITSAR	VERKA	S-NPP	31.68834	74.97701	14:13:21	D	2.60

Details of residue burning events in Haryana on 27-Sep-2023

S. No.	District	Tehsil / Block	Satellite	Latitude	Longitude	ACQ_TIME	Day / Night	Fire Power (W/m2)
1	AMBALA	AMBALA-II	S-NPP	30.10499	76.63960	12:33:03	D	4.30
2	AMBALA	SHAHZADPUR	S-NPP	30.46666	76.92712	14:13:21	D	3.40
3	FATEHABAD	FATEHABAD	S-NPP	29.58218	75.38663	12:33:03	D	7.20
4	FATEHABAD	FATEHABAD	S-NPP	29.58577	75.38200	12:33:03	D	8.80
5	KARNAL	CHIRAO	S-NPP	29.71299	76.68630	14:13:21	D	3.70
6	KARNAL	INDRI	S-NPP	29.93549	77.01028	14:13:21	D	2.60
7	KURUKSHETRA	BABAIN	S-NPP	30.01998	76.97533	14:13:21	D	2.40
8	KURUKSHETRA	BABAIN	S-NPP	30.07116	77.01821	14:13:21	D	4.40
9	KURUKSHETRA	SHAHBAD	S-NPP	30.09621	76.87936	12:33:03	D	3.20

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)
