



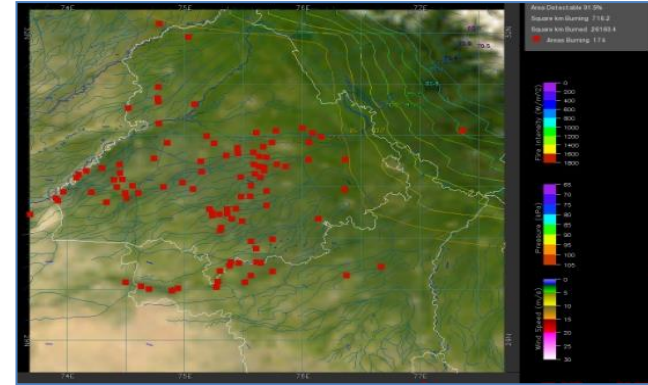
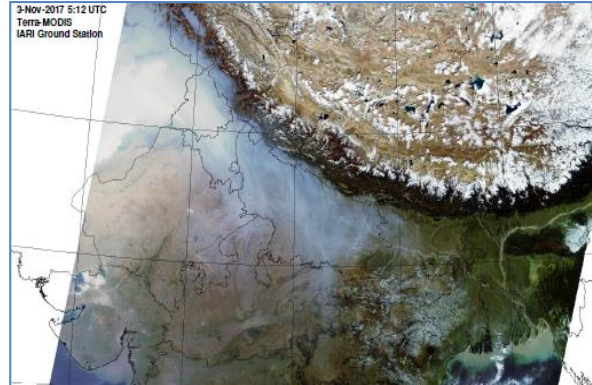
Bulletin No. 16

Events Date:
30-Sep-2021

Issued on:
30-Sep-2021



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



Prepared by:

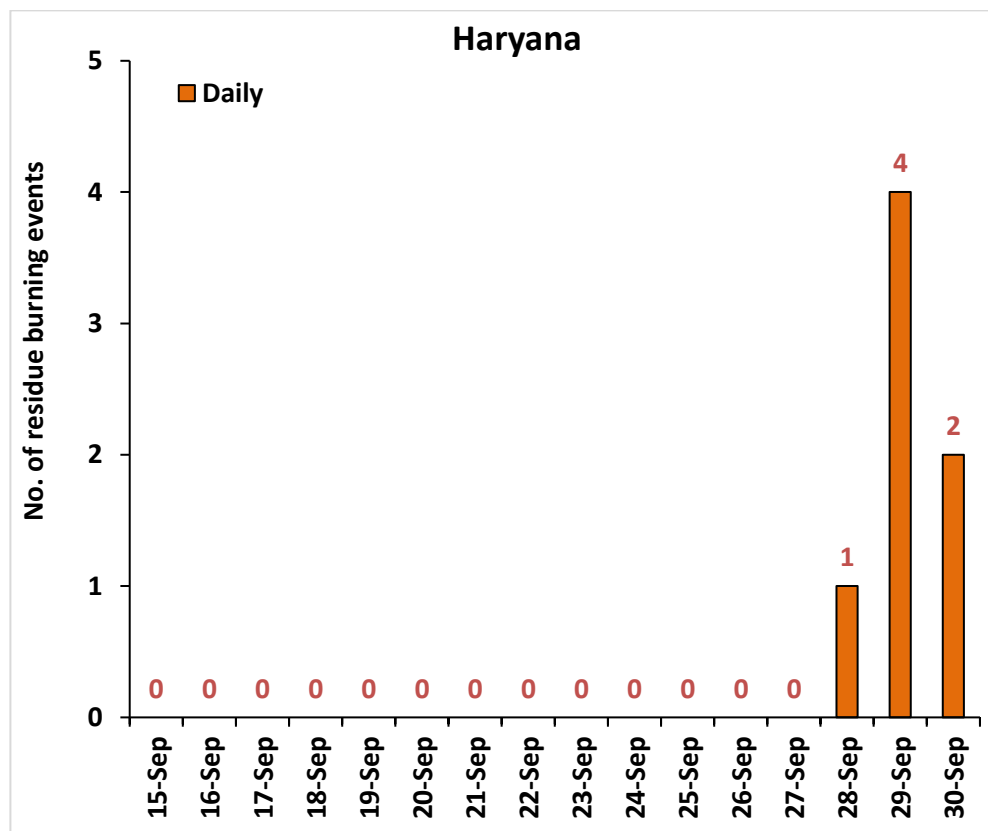
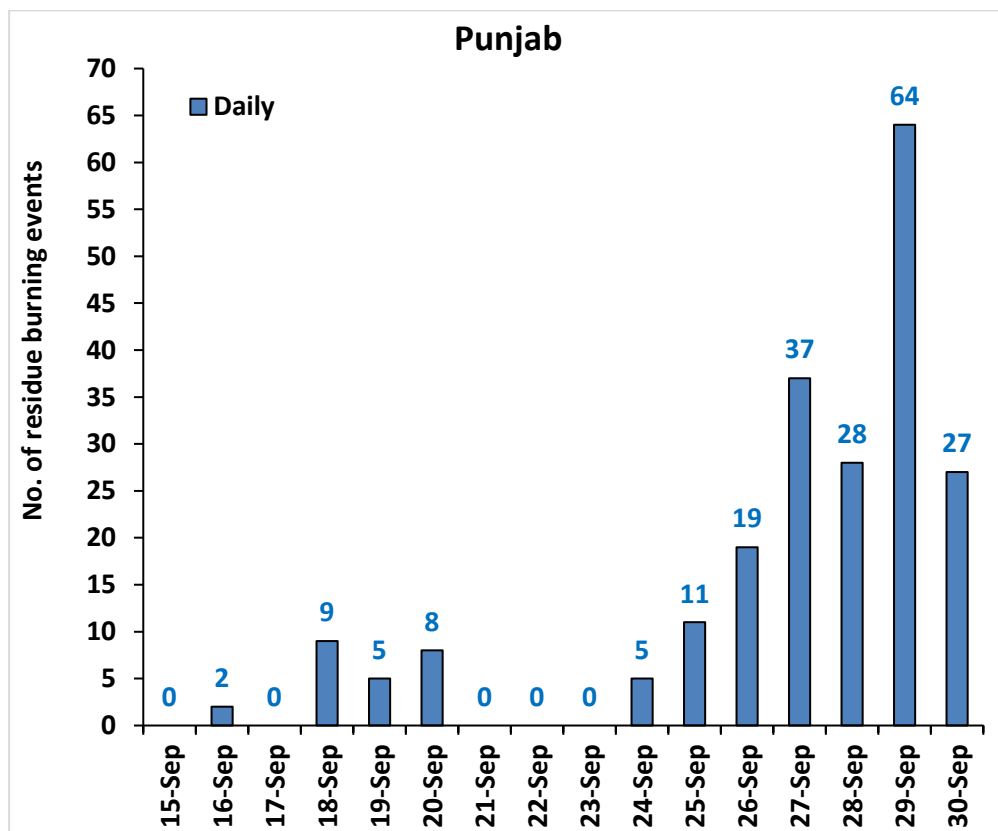
Consortium for Research on Agroecosystem Monitoring and Modeling from Space (CREAMS) Laboratory,
Division of Agricultural Physics, ICAR – Indian Agricultural Research Institute, New Delhi – 110012

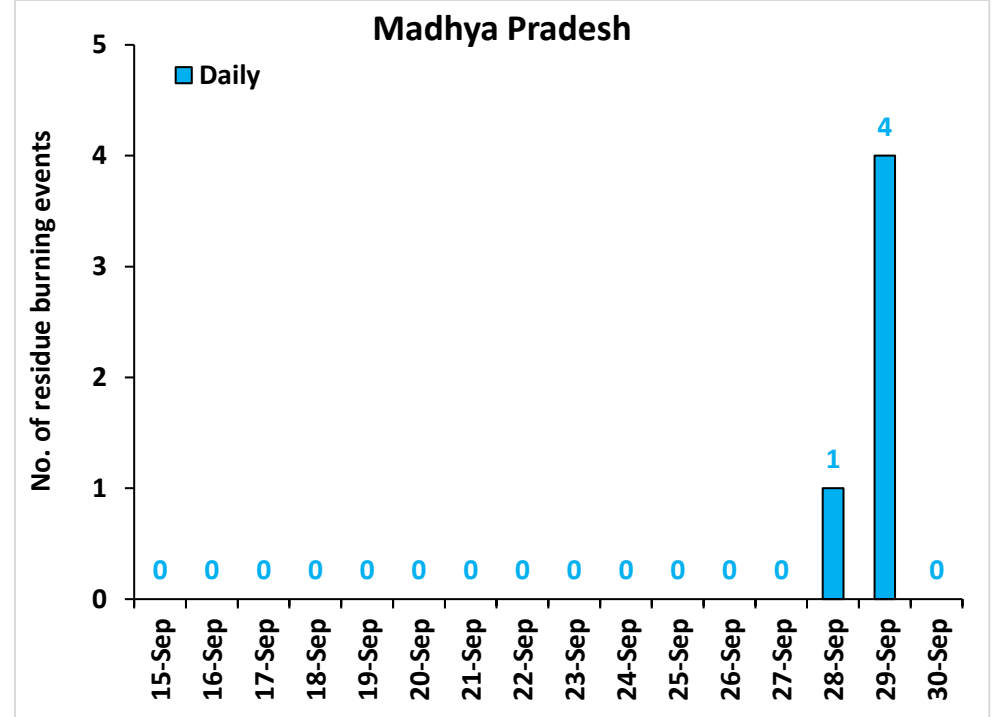
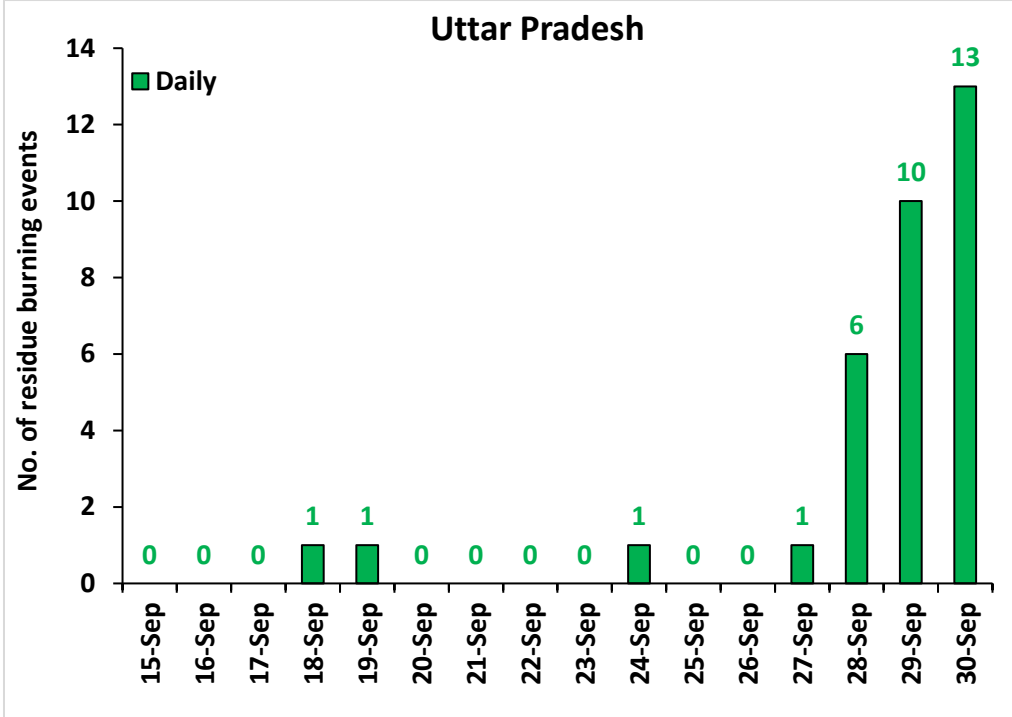
<http://creams.iari.res.in>

Highlights for 30-September-2021

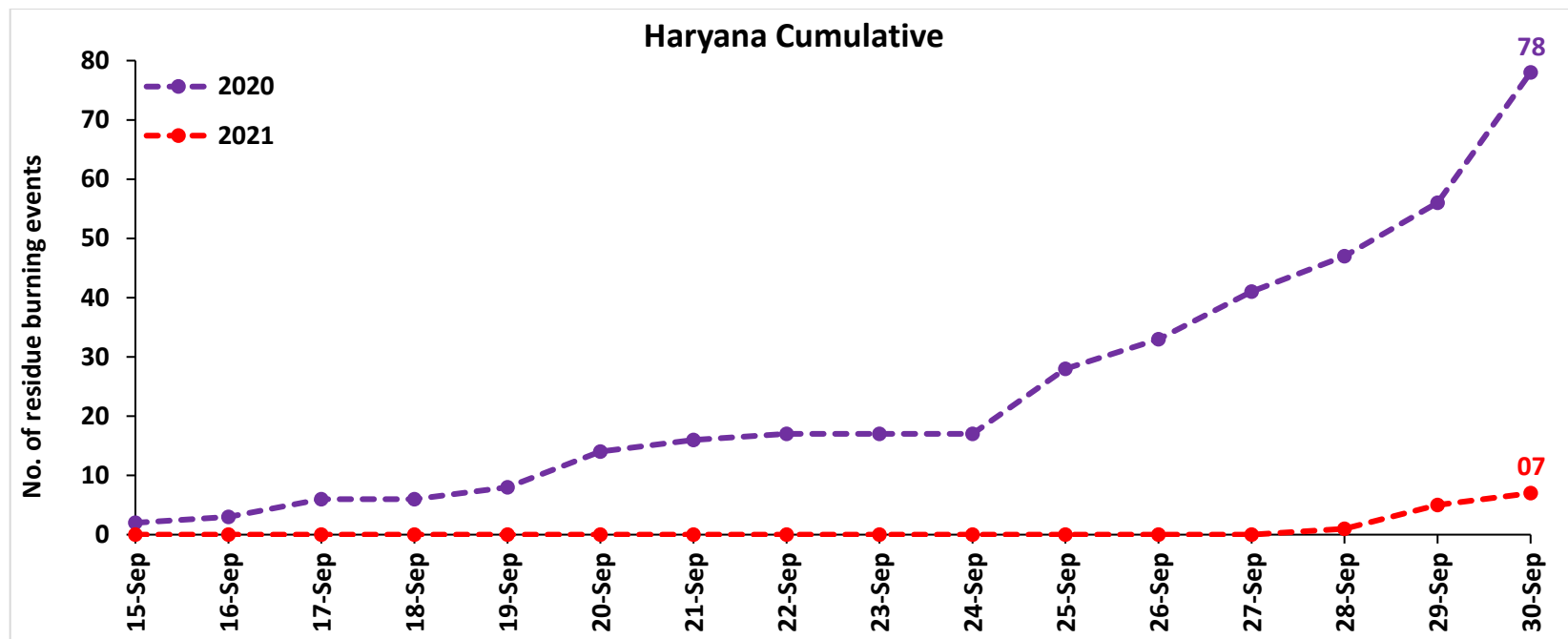
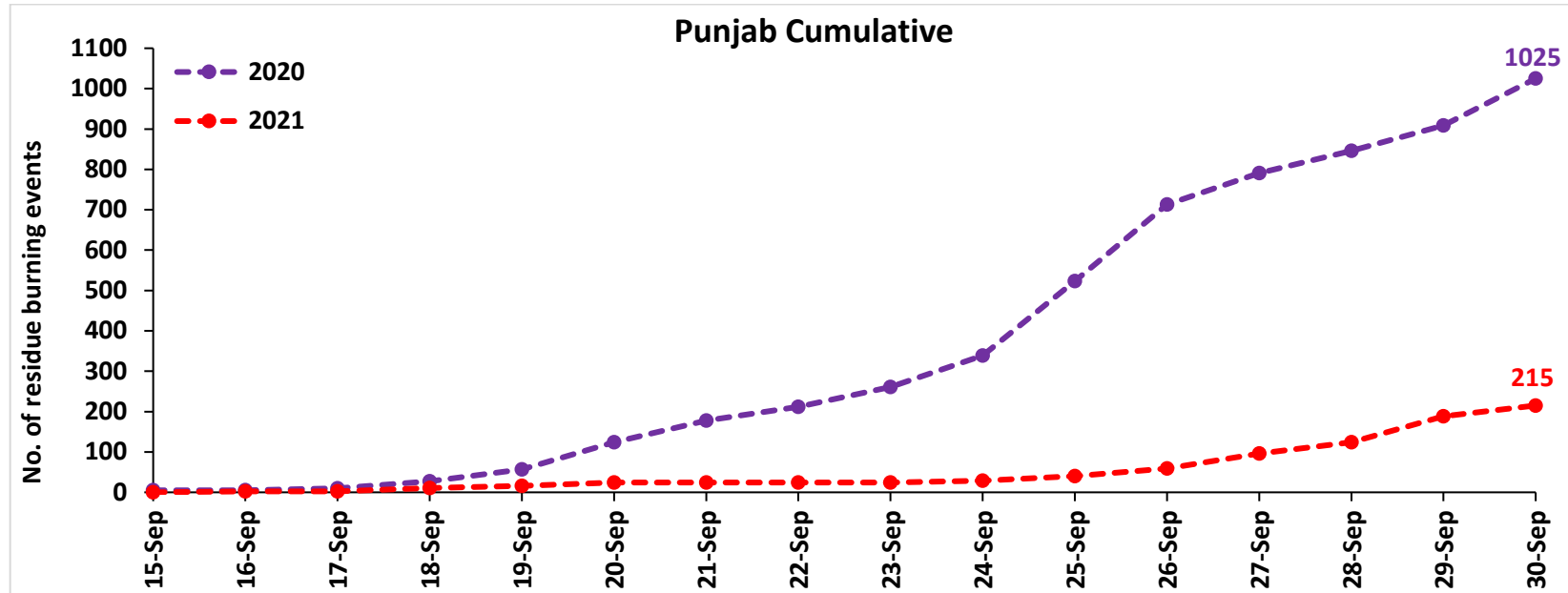
- The active fire events due to rice residue burning were monitored using satellite remote sensing, following the new "Standard Protocol for Estimation of Crop Residue Burning Fire Events using Satellite Data".
- Satellites detected **42** residue burning events in the six study States on 30-Sep-2021.
- The state wise events detected on 30-Sep-2021 were **27** in Punjab, **2** in Haryana, **13** in UP, **0** in Delhi, **0** in Rajasthan and **0** in MP.
- Detection of burning events by satellites was hampered due to cloud cover over Southern Rajasthan.

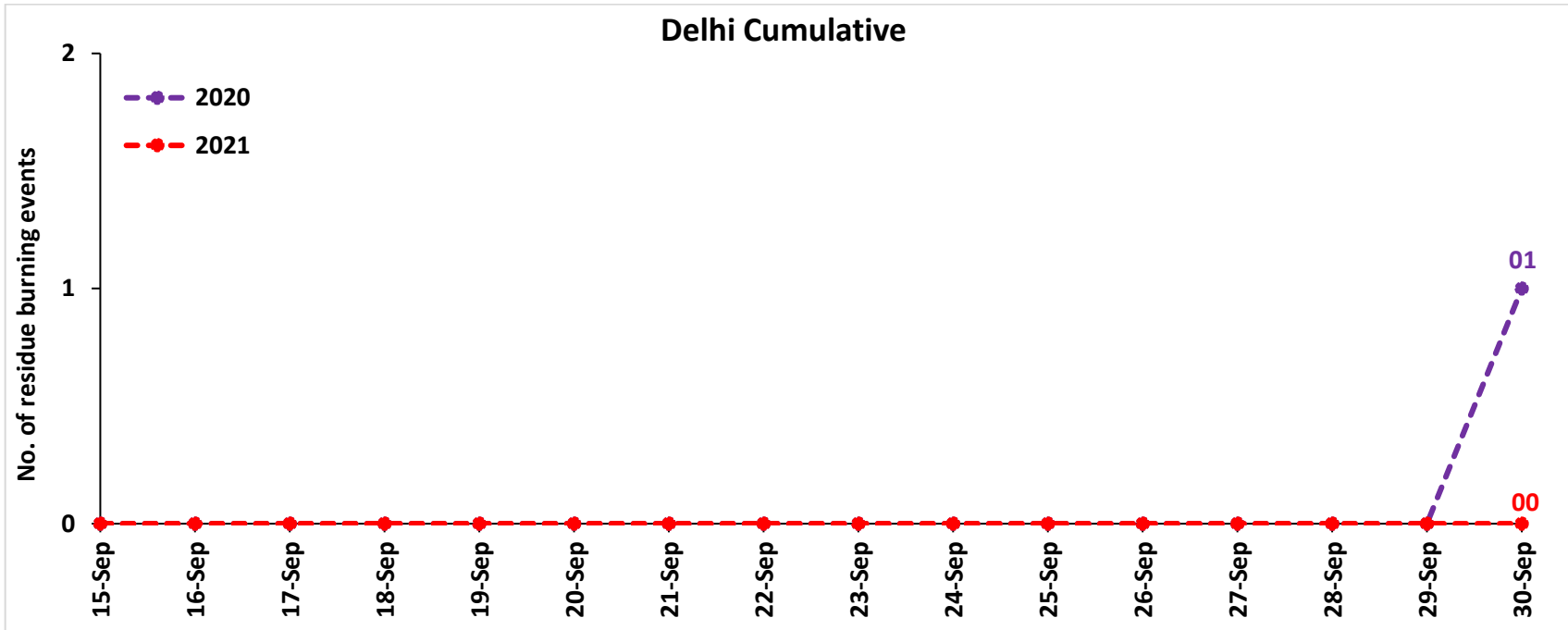
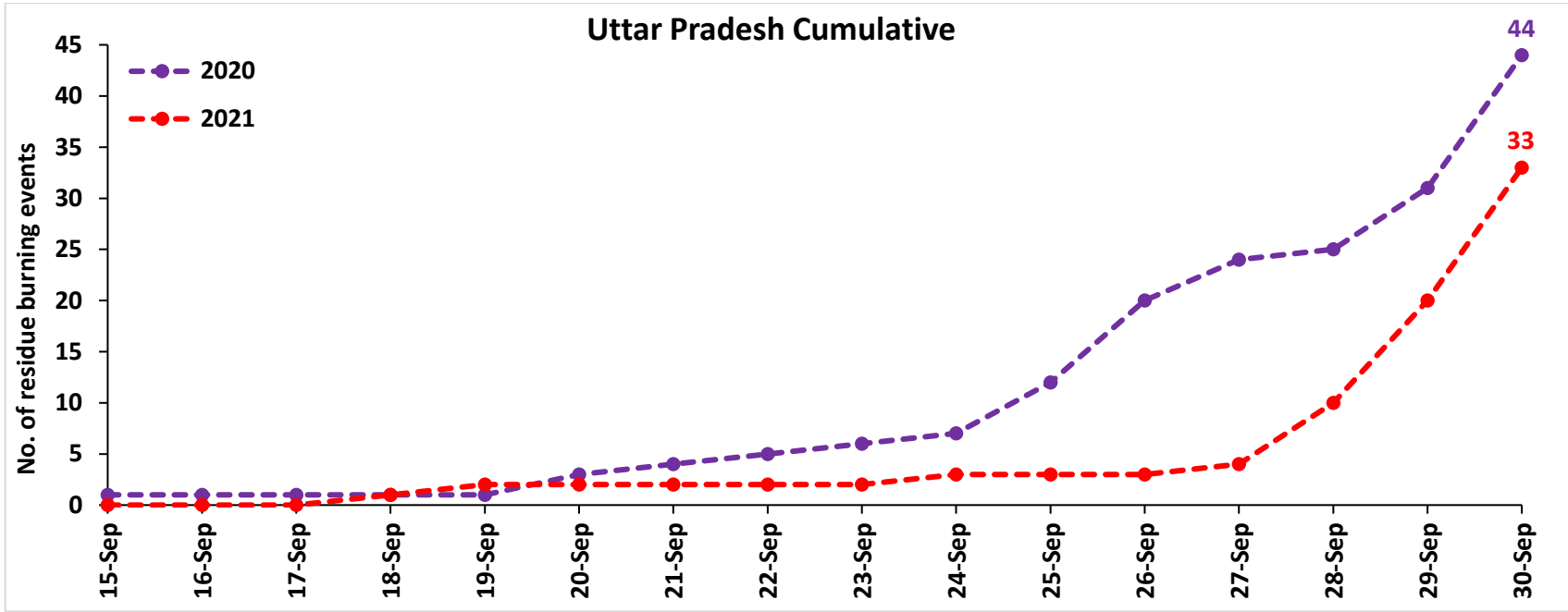
Temporal distribution of rice residue burning events for the study States in 2021

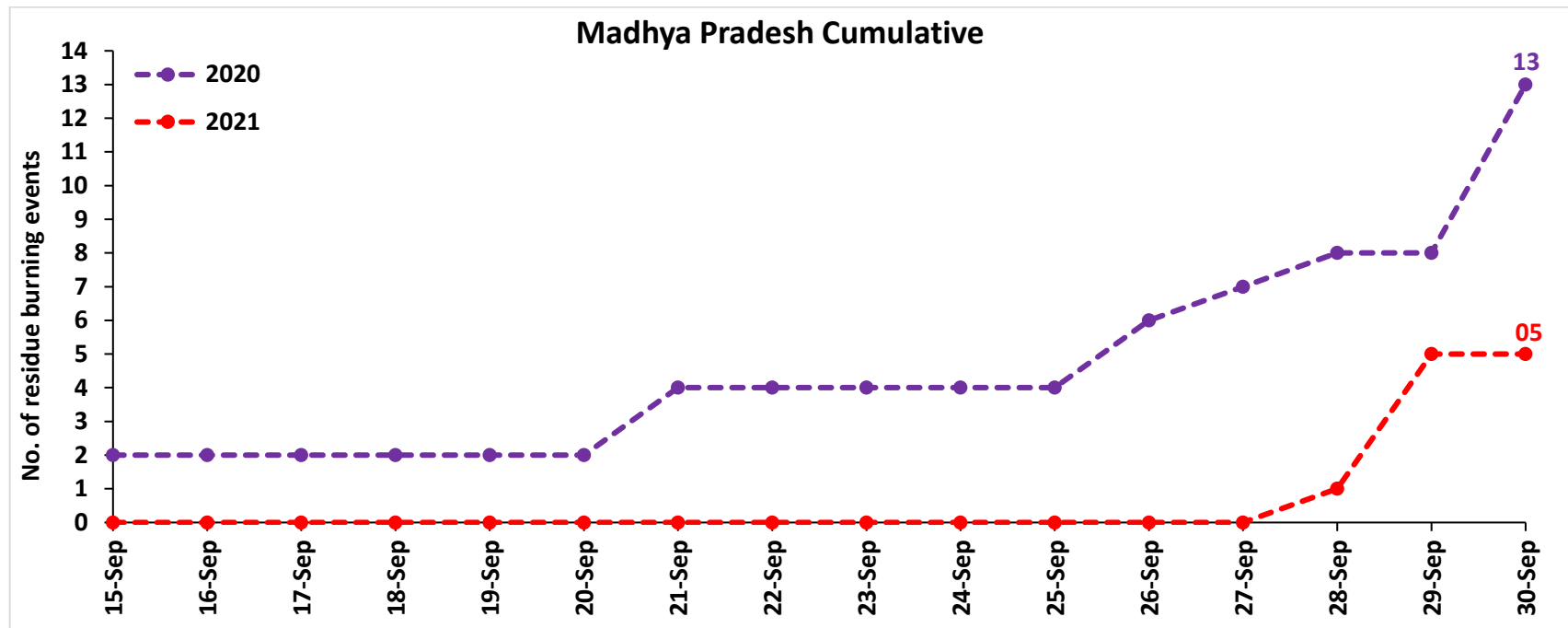
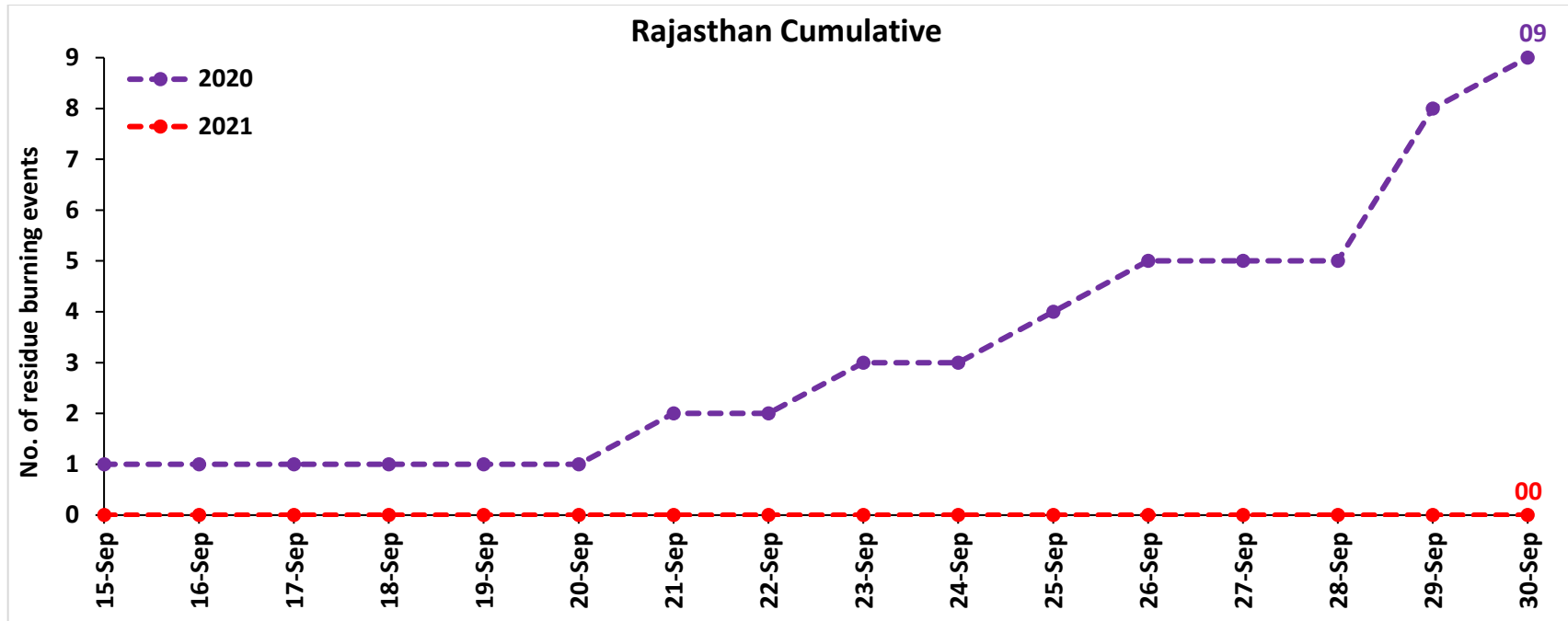




Comparison of residue burning events in current year (2021) with previous year (2020) for the study States

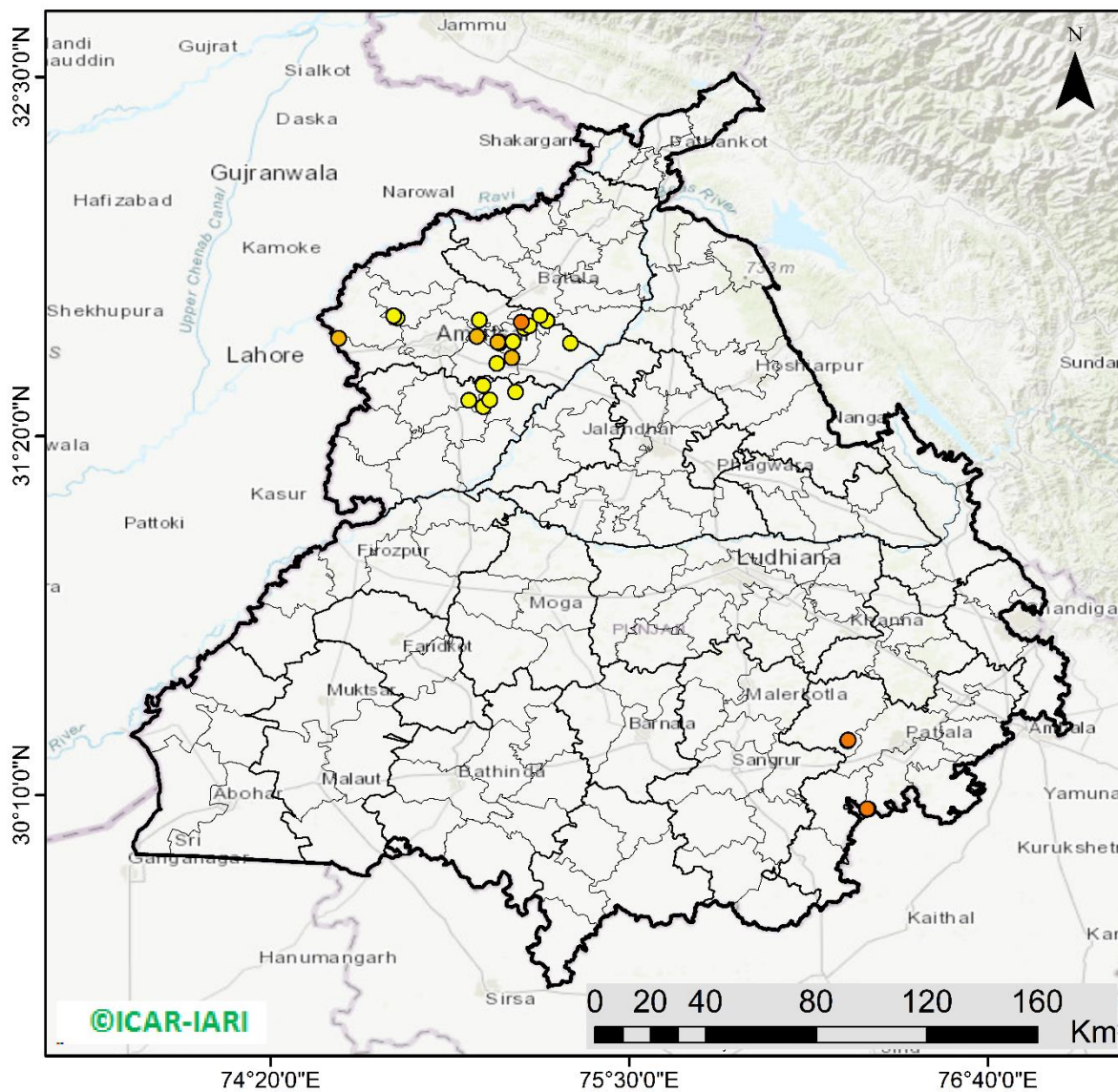






Punjab

RICE RESIDUE BURNING IN PUNJAB



27 burning events detected in Punjab on 30th September 2021

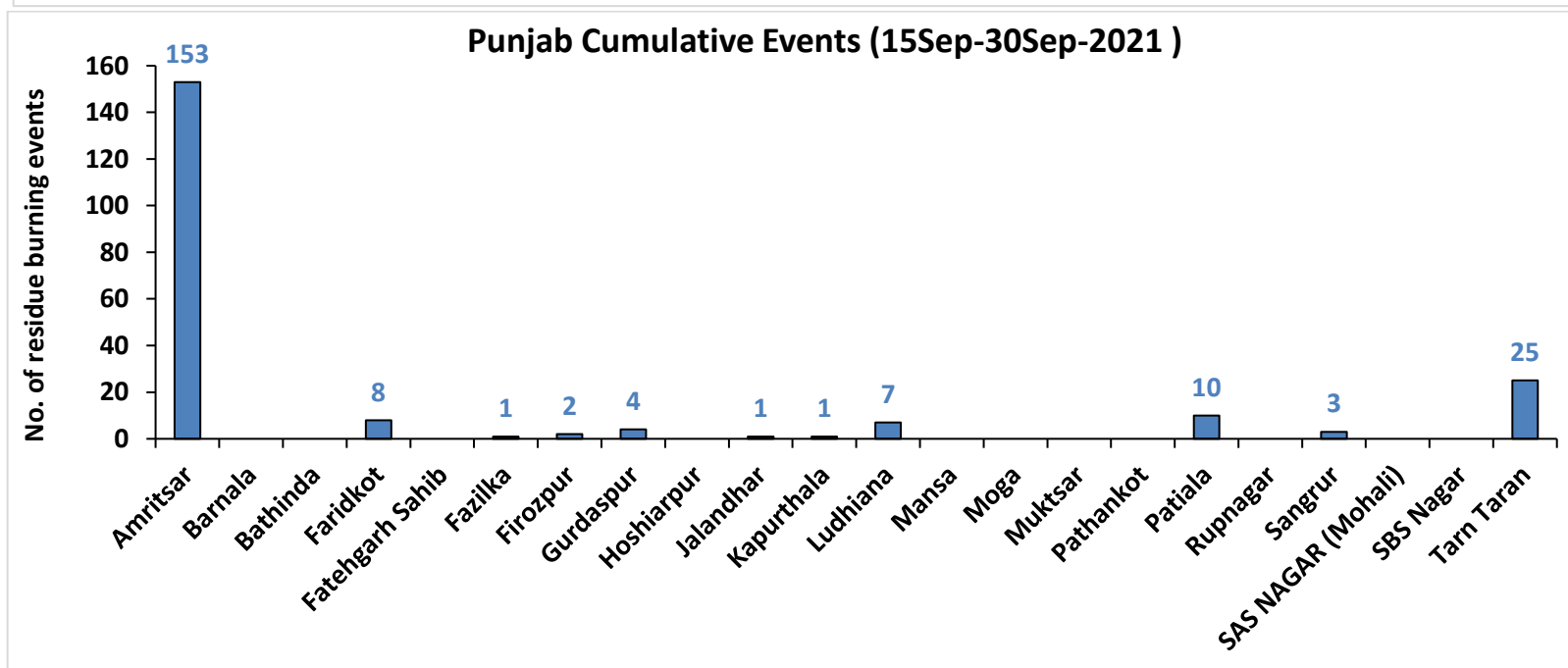
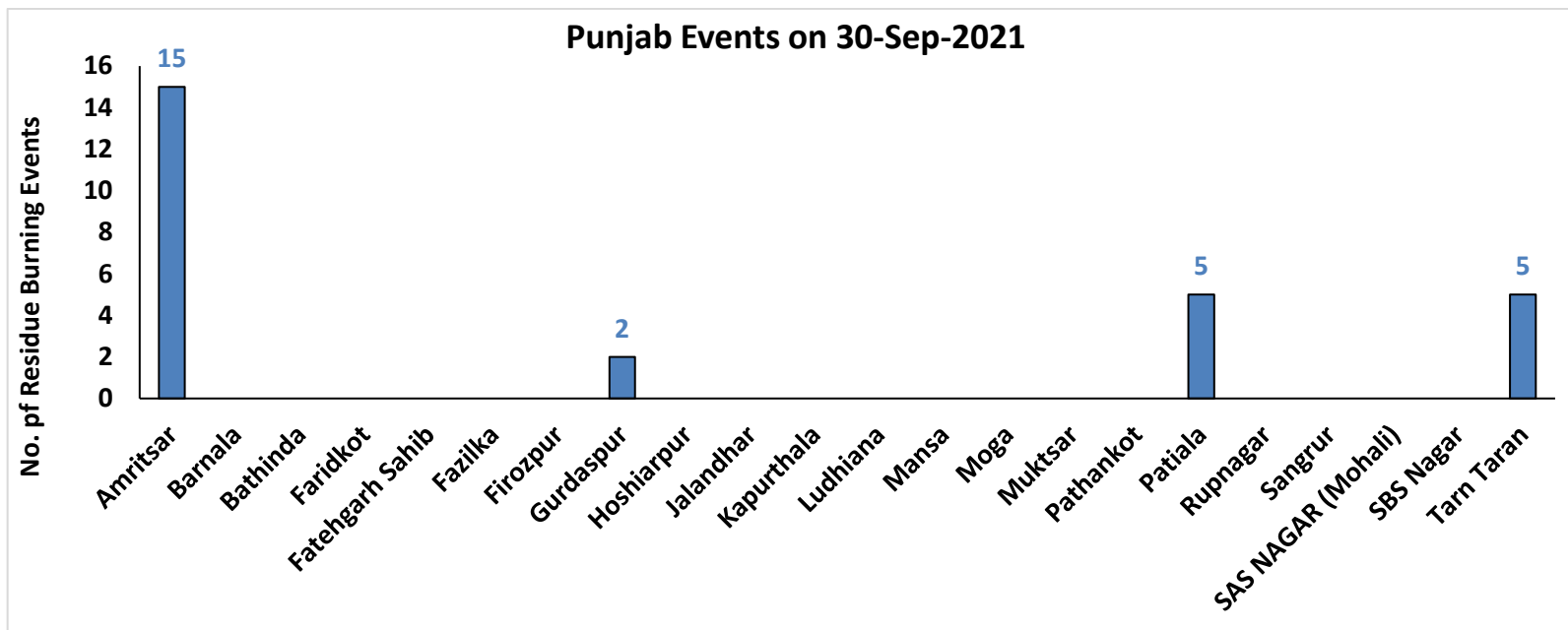
Fire Intensity (W/m²)

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



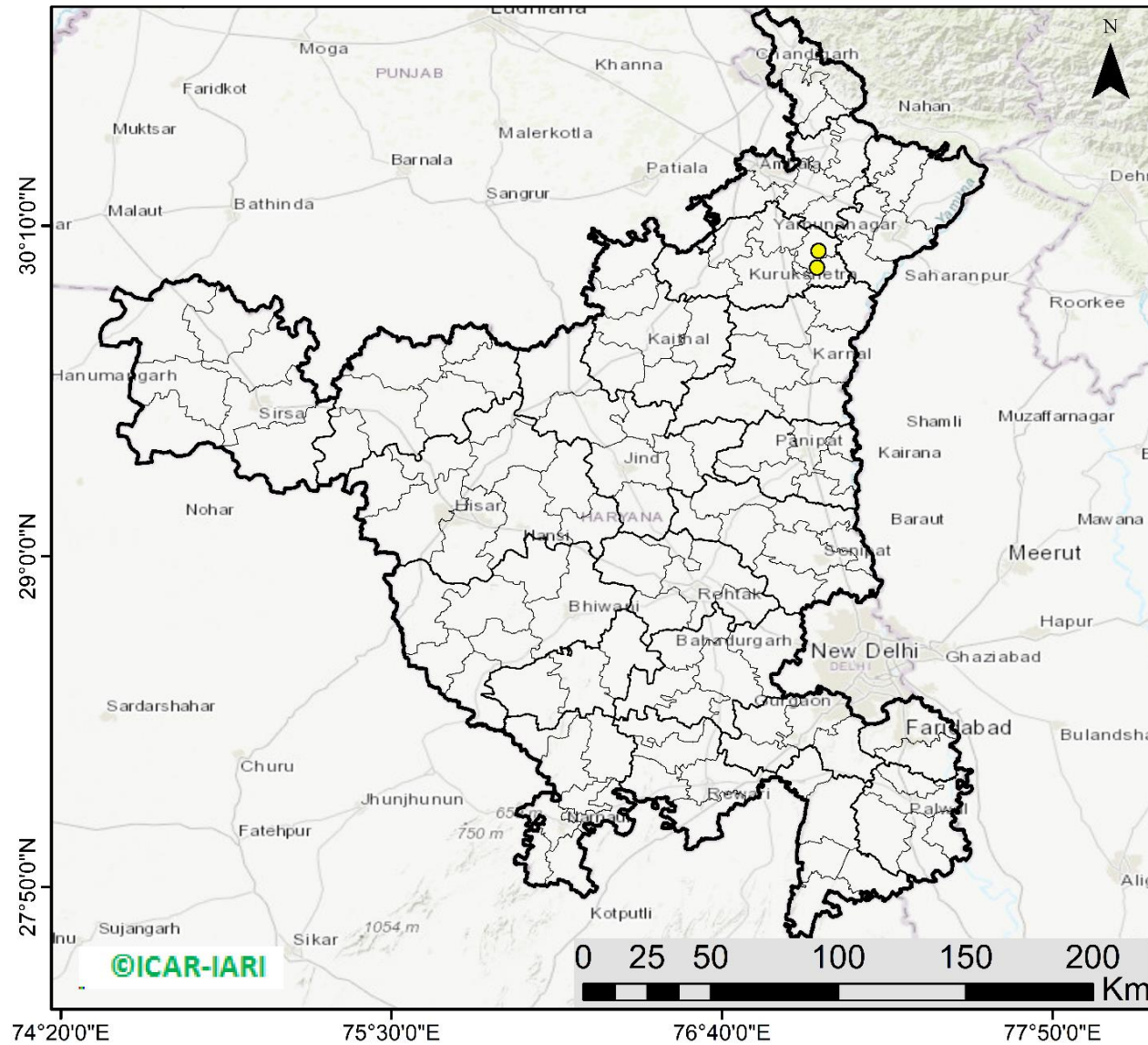
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Punjab (15-30 Sep-2021)



Haryana

RICE RESIDUE BURNING IN HARYANA



02 burning events detected in Haryana on 30th September 2021

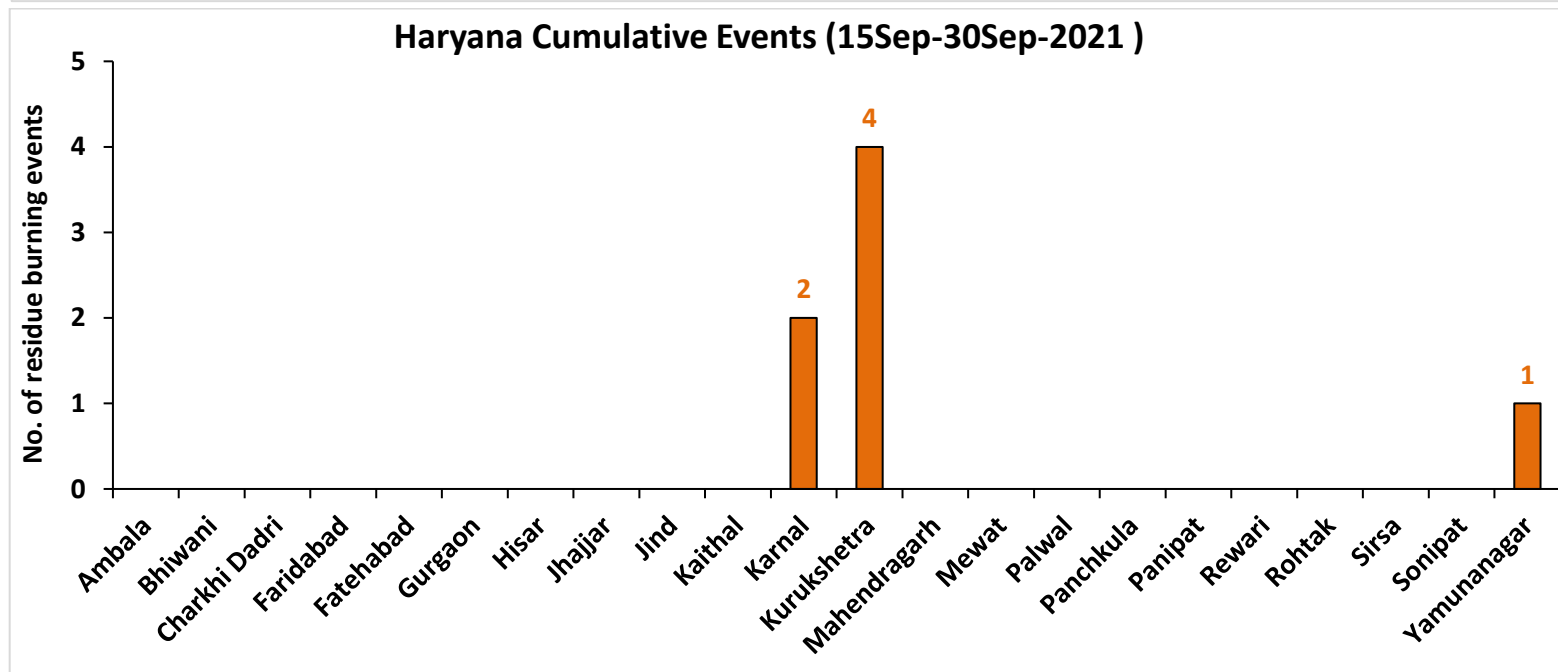
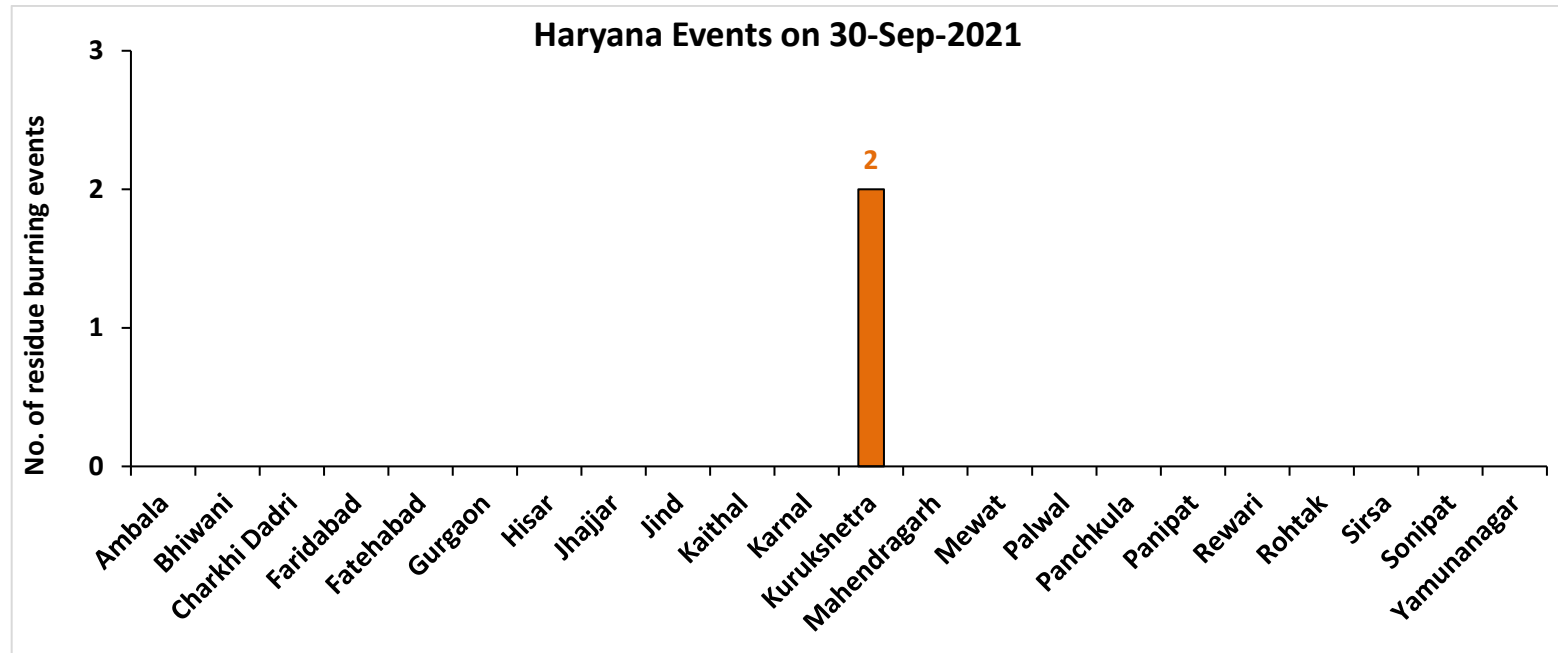
Fire Intensity (W/m²)

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



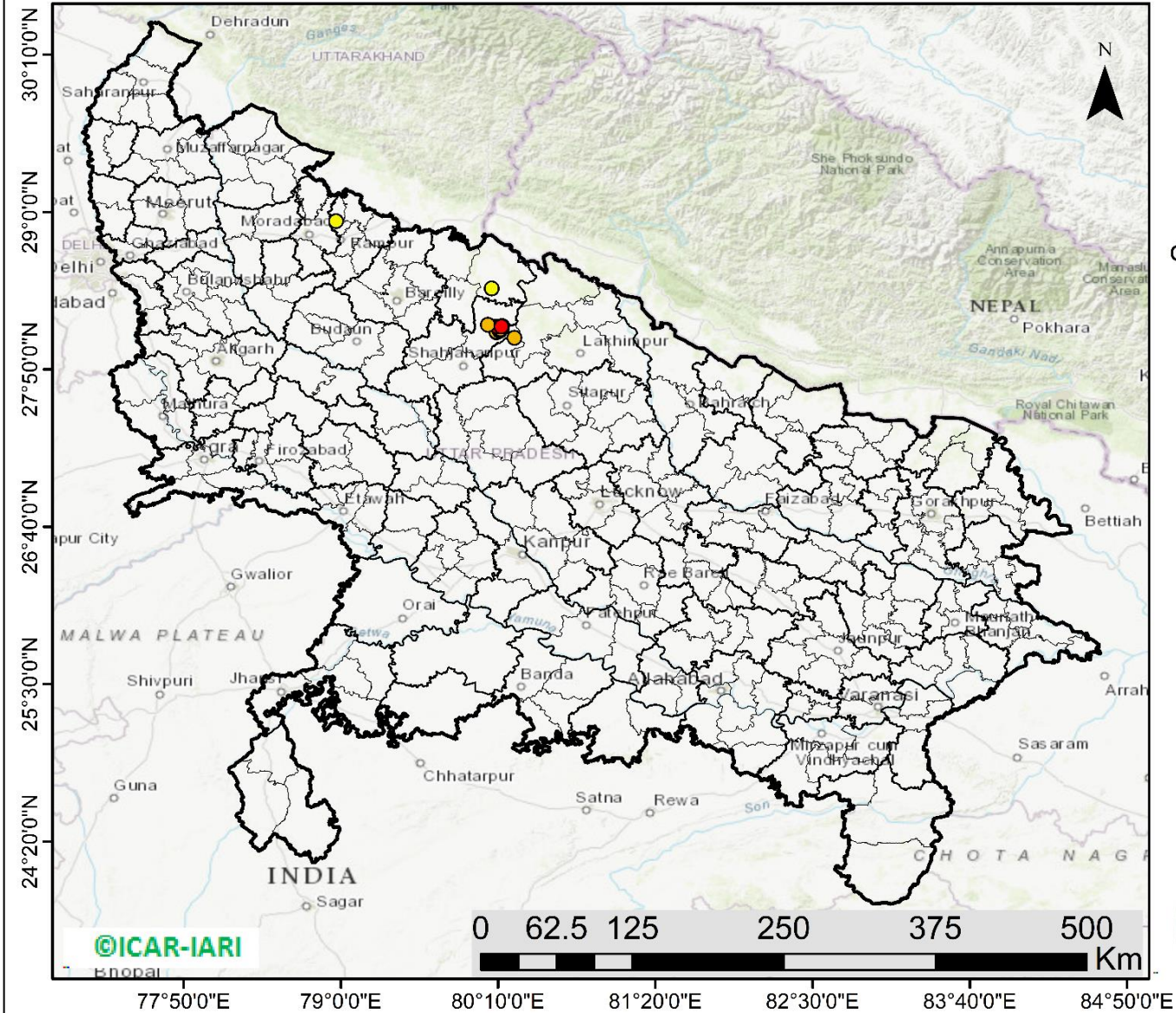
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Haryana (15-30 Sep-2021)



Uttar Pradesh

RICE RESIDUE BURNING IN UTTAR PRADESH



13 burning events detected in Uttar Pradesh on **30th September 2021**

Fire Intensity (W/m2)

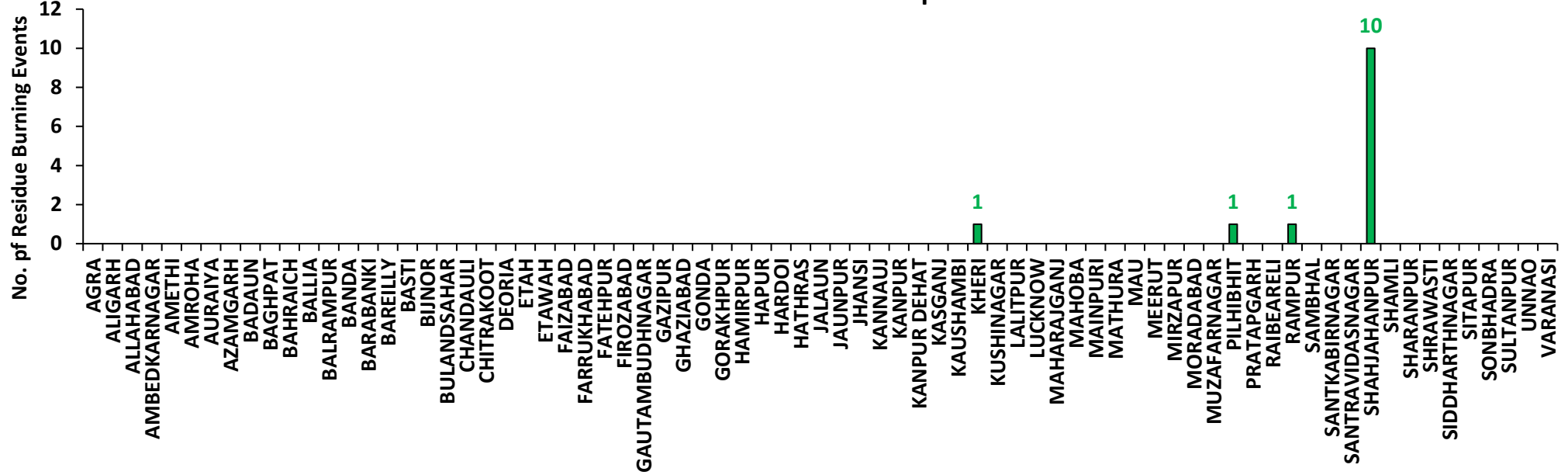
- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- >20



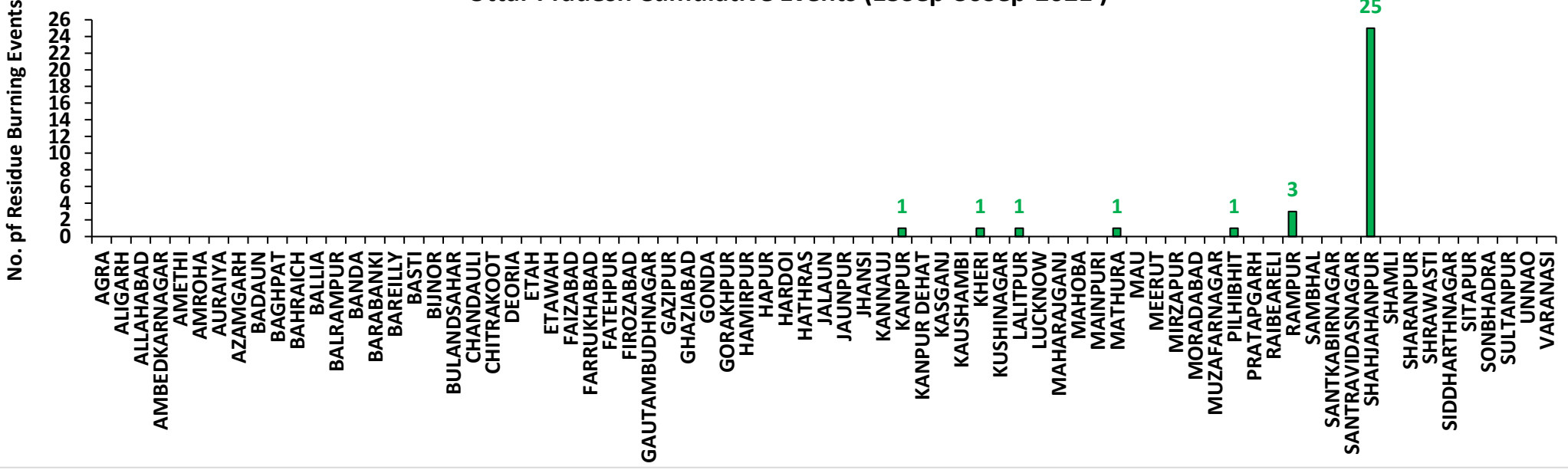
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Uttar Pradesh (15-30 Sep-2021)

Uttar Pradesh Events on 30-Sep-2021



Uttar Pradesh Cumulative Events (15Sep-30Sep-2021)



District-wise cumulative number of residues burning events detected in 2020 and 2021
(Period: 15-30 September)

(a) Punjab

District	15 Sep - 30 Sep	
	2020	2021
AMRITSAR	749	153
BARNALA	2	0
BATHINDA	0	0
FARIDKOT	1	8
FATEHGARH SAHIB	3	0
FAZILKA	0	1
FIROZPUR	5	2
GURDASPUR	27	4
HOSHIARPUR	1	0
JALANDHAR	4	1
KAPURTHALA	9	1
LUDHIANA	16	7
MANSA	1	0
MOGA	5	0
MUKTSAR	1	0
PATHANKOT	0	0
PATIALA	25	10
RUPNAGAR	1	0
SANGRUR	6	3
SAS NAGAR (MOHALI)	5	0
SBS NAGAR	1	0
TARN TARAN	163	25
TOTAL	1025	215

(b) Haryana

District	15 Sep - 30 Sep	
	2020	2021
AMBALA	9	0
BHIWANI	0	0
CHARKHI DADRI	0	0
FARIDABAD	0	0
FATEHABAD	8	0
GURGAON	0	0
HISAR	2	0
JHAJJAR	0	0
JIND	0	0
KAITHAL	10	0
KARNAL	24	2
KURUKSHETRA	14	4
MAHENDRAGARH	0	0
MEWAT	0	0
PALWAL	1	0
PANCHKULA	0	0
PANIPAT	3	0
REWARI	0	0
ROHTAK	0	0
SIRSA	1	0
SONIPAT	1	0
YAMUNANAGAR	5	1
Total	78	7

(c) Uttar Pradesh

District	15 Sep - 30 Sep							
	2020	2021	GAUTAMBUDHNAGAR	0	0	MUZAFARNAGAR	0	0
AGRA	0	0	GAZIPUR	0	0	PILHIBHIT	1	1
ALIGARH	2	0	GHAZIABAD	1	0	PRATAPGARH	0	0
ALLAHABAD	0	0	GONDA	0	0	RAIBEARELI	1	0
AMBEDKARNAGAR	0	0	GORAKHPUR	0	0	RAMPUR	0	3
AMETHI	0	0	HAMIRPUR	0	0	SAMBHAL	4	0
AMROHA	0	0	HAPUR	1	0	SANTKABIRNAGAR	0	0
AURAIYA	10	0	HARDOI	0	0	SANTRAVIDASNAGAR	0	0
AZAMGARH	0	0	HATHRAS	0	0	SHAHJAHANPUR	3	25
BADAUN	0	0	JALAUN	0	0	SHAMLI	6	0
BAGHPAT	1	0	JAUNPUR	0	0	SHARANPUR	3	0
BAHRAICH	0	0	JHANSI	2	0	SHRAWASTI	0	0
BALLIA	0	0	KANNAUJ	1	0	SIDDHARTHANAGAR	0	0
BALRAMPUR	0	0	KANPUR	0	1	SITAPUR	0	0
BANDA	0	0	KANPUR DEHAT	0	0	SONBHADRA	0	0
BARABANKI	0	0	KASGANJ	0	0	SULTANPUR	0	0
BAREILLY	0	0	KAUSHAMBI	1	0	UNNAO	2	0
BASTI	0	0	KHERI	0	1	VARANASI	0	0
BIJNOR	1	0	KUSHINAGAR	0	0	Total	44	33
BULANDSAHAR	0	0	LALITPUR	0	1			
CHANDAULI	0	0	LUCKNOW	0	0			
CHITRAKOOT	0	0	MAHARAJGANJ	0	0			
DEORIA	0	0	MAHOBA	0	0			
ETAH	1	0	MAINPURI	0	0			
ETAWAH	0	0	MATHURA	0	1			
FAIZABAD	0	0	MAU	0	0			
FARRUKHABAD	0	0	MEERUT	3	0			
FATEHPUR	0	0	MIRZAPUR	0	0			
FIROZABAD	0	0	MORADABAD	0	0			

(d) Delhi

District	15 Sep - 30 Sep	
	2020	2021
CENTRAL	0	0
EAST	0	0
NEW DELHI	0	0
NORTH	0	0
NORTH EAST	0	0
NORTH WEST DELHI	0	0
SHAHADRA	0	0
SOUTH	1	0
SOUTH EAST	0	0
SOUTH WEST DELHI	0	0
WEST DELHI	0	0
Total	1	0

(e) Rajasthan

District	15 Sep - 30Sep	
	2020	2021
AJMER	0	0
ALWAR	1	0
BANSWARA	0	0
BARAN	2	0
BARMER	2	0
BHARATPUR	0	0
BHILWARA	1	0
BIKANER	0	0
BUNDI	0	0
CHITTAURGARH	0	0
CHURU	0	0
DAUSA	0	0
DHOLPUR	0	0
DUNGARPUR	0	0
GANGANAGAR	1	0
HANUMANGARH	0	0
JAIPUR	0	0
JAISELMER	1	0
JALOR	0	0
JHALAWAR	0	0
JHUNJHUNUN	0	0
JODHPUR	1	0
KARAULI	0	0
KOTA	0	0
NAGAUR	0	0
PALI	0	0
PRATAPGARH	0	0
RAJSMAND	0	0
SIKAR	0	0
SIROHI	0	0
SWAIMADHOPUR	0	0
TONK	0	0
UDAIPUR	0	0
Total	9	0

(f) Madhya Pradesh

District	15 Sep - 30 Sep				
	2020	2021			
			PANNA	0	0
ALIRAJPUR	0	0	RAISEN	0	0
ANUPPUR	0	0	RAJGARH	0	0
ASHOKNAGAR	3	0	RATLAM	0	0
BALAGHAT	0	0	REWA	0	0
BARWANI	0	0	SAGAR	2	2
BETUL	0	0	SATNA	0	0
BHIND	0	0	SEHORE	0	0
BHOPAL	0	0	SEONI	0	0
BURHANPUR	0	0	SHAHDOL	0	0
CHHATARPUR	0	0	SHAJAPUR	0	0
CHHINDWARA	0	0	SHEOPUR	0	0
DAMOH	0	0	SHIVPURI	0	0
DATIA	0	0	SIDHI	0	0
DEWAS	0	0	SINGRAULI	0	0
DHAR	0	0	TIKAMGARH	0	0
DINDORI	0	0	UJJAIN	2	0
EAST NIMAR	0	0	UMARIA	0	0
GUNA	2	1	VIDESHA	0	1
GWALIOR	2	0	WEST NIMAR	0	0
HARDA	2	1	Total	13	5
HOSHANGABAD	0	0			
INDORE	0	0			
JABALPUR	0	0			
JHABUA	0	0			
KATNI	0	0			
MANDLA	0	0			
MANDSAUR	0	0			
MORENA	0	0			
NARSHIMAPURA	0	0			
NIMACH	0	0			

State-wise and date-wise number of paddy residue burning events detected in 2020 and 2021
(Period: 15 - 30 September)

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
Total	1025	215	78	7	44	33	1	0	9	0	13	5

Details of residue burning events in Punjab on 30-Sep-2021

S. No.	District	Block	Satellite	Latitude	Longitude	ACQ_DATE	ACQ_TIME	Day / Night	Fire Power (W/m ²)
1	AMRITSAR	ATTARI	S-NPP	31.65070	74.55470	9/30/2021	13:04:43	D	6.30
2	AMRITSAR	HARSHA CHHINA	S-NPP	31.71710	74.74500	9/30/2021	13:04:43	D	2.40
3	AMRITSAR	HARSHA CHHINA	S-NPP	31.72350	74.73380	9/30/2021	13:04:43	D	4.30
4	AMRITSAR	JANDIALA GURU	S-NPP	31.56890	75.06920	9/30/2021	13:04:43	D	4.80
5	AMRITSAR	JANDIALA GURU	S-NPP	31.65650	75.00450	9/30/2021	13:04:43	D	5.40
6	AMRITSAR	MAJITHA	S-NPP	31.70970	75.01240	9/30/2021	13:04:43	D	2.20
7	AMRITSAR	RAYYA	S-NPP	31.63510	75.30910	9/30/2021	13:04:43	D	2.70
8	AMRITSAR	TARSIKKA	S-NPP	31.58760	75.11810	9/30/2021	13:04:43	D	7.40
9	AMRITSAR	TARSIKKA	S-NPP	31.63500	75.07790	9/30/2021	13:04:43	D	2.50
10	AMRITSAR	TARSIKKA	S-NPP	31.63740	75.07770	9/30/2021	13:04:43	D	6.20
11	AMRITSAR	TARSIKKA	S-NPP	31.63820	75.07250	9/30/2021	13:04:43	D	5.50
12	AMRITSAR	TARSIKKA	S-NPP	31.63960	75.12160	9/30/2021	13:04:43	D	4.20
13	AMRITSAR	TARSIKKA	S-NPP	31.68410	75.15890	9/30/2021	13:04:43	D	3.60
14	AMRITSAR	TARSIKKA	S-NPP	31.69160	75.17470	9/30/2021	13:04:43	D	3.50
15	AMRITSAR	TARSIKKA	S-NPP	31.70340	75.14910	9/30/2021	13:04:43	D	10.50
16	GURDASPUR	BATALA	S-NPP	31.70770	75.23220	9/30/2021	13:04:43	D	4.30
17	GURDASPUR	BATALA	S-NPP	31.72440	75.21000	9/30/2021	13:04:43	D	4.00
18	PATIALA	NABHA	S-NPP	30.34200	76.21060	9/30/2021	13:04:43	D	7.90
19	PATIALA	NABHA	S-NPP	30.34450	76.21210	9/30/2021	13:04:43	D	10.10
20	PATIALA	SANAUR	S-NPP	30.11910	76.27250	9/30/2021	13:04:43	D	7.00
21	PATIALA	SANAUR	S-NPP	30.12030	76.27830	9/30/2021	13:04:43	D	9.70
22	PATIALA	SANAUR	S-NPP	30.12140	76.27420	9/30/2021	13:04:43	D	14.70
23	TARN TARAN	KHADUR SAHIB	S-NPP	31.42840	75.02530	9/30/2021	13:04:43	D	4.60
24	TARN TARAN	KHADUR SAHIB	S-NPP	31.45010	75.04670	9/30/2021	13:04:43	D	1.70
25	TARN TARAN	KHADUR SAHIB	S-NPP	31.47590	75.13010	9/30/2021	13:04:43	D	4.70
26	TARN TARAN	KHADUR SAHIB	S-NPP	31.49720	75.02450	9/30/2021	13:04:43	D	2.10
27	TARN TARAN	TARN TARAN	S-NPP	31.44890	74.97840	9/30/2021	13:04:43	D	2.10

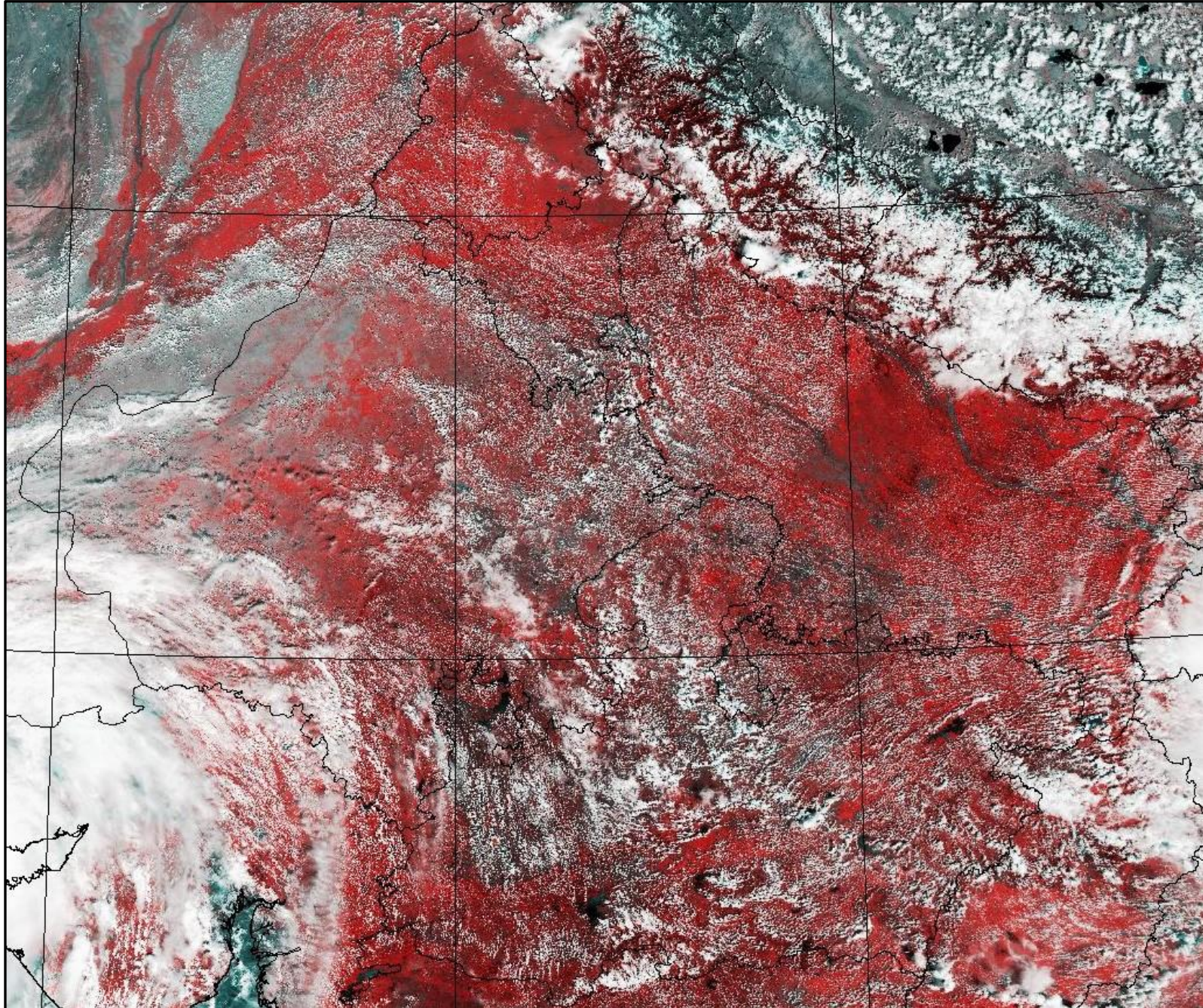
Details of residue burning events in Haryana on 30-Sep-2021

S. No.	District	Block	Satellite	Latitude	Longitude	ACQ_DATE	ACQ_TIME	Day / Night	Fire Power (W/m ²)
1	KURUKSHETRA	BABAIN	S-NPP	30.07700	77.00750	9/30/2021	13:04:43	D	4.90
2	KURUKSHETRA	LADWA	S-NPP	30.01840	77.00250	9/30/2021	13:04:43	D	3.50

Details of residue burning events in Uttar Pradesh on 30-Sep-2021

S. No.	District	Block	Satellite	Latitude	Longitude	ACQ_DATE	ACQ_TIME	Day / Night	Fire Power (W/m ²)
1	KHERI	MOHMADI	S-NPP	28.06680	80.28870	9/30/2021	13:04:43	D	7.60
2	PILHIBHIT	PURANPUR	S-NPP	28.43260	80.11970	9/30/2021	01:54:01	N	0.50
3	RAMPUR	TANDA	S-NPP	28.93140	78.96450	9/30/2021	01:54:01	N	2.00
4	SHAHJAHANPUR	PUWANYA	S-NPP	28.10770	80.15470	9/30/2021	13:04:43	D	5.80
5	SHAHJAHANPUR	PUWANYA	S-NPP	28.11070	80.15480	9/30/2021	13:04:43	D	10.70
6	SHAHJAHANPUR	PUWANYA	S-NPP	28.11110	80.15400	9/30/2021	13:04:43	D	5.80
7	SHAHJAHANPUR	PUWANYA	S-NPP	28.11840	80.17910	9/30/2021	13:04:43	D	8.20
8	SHAHJAHANPUR	PUWANYA	S-NPP	28.13000	80.18530	9/30/2021	13:04:43	D	5.90
9	SHAHJAHANPUR	PUWANYA	S-NPP	28.15030	80.15930	9/30/2021	13:04:43	D	30.10
10	SHAHJAHANPUR	PUWANYA	S-NPP	28.15180	80.18920	9/30/2021	13:04:43	D	2.30
11	SHAHJAHANPUR	PUWANYA	S-NPP	28.15330	80.19760	9/30/2021	13:04:43	D	3.90
12	SHAHJAHANPUR	PUWANYA	S-NPP	28.16350	80.09130	9/30/2021	13:04:43	D	5.30
13	SHAHJAHANPUR	PUWANYA	AQUA	28.15000	80.19200	9/30/2021	12:49:42	D	31.90

TERRA (MODIS) Satellite image (FCC) of North and Central India Acquired on 30-Sep-2021 at 11:08:20 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)
