



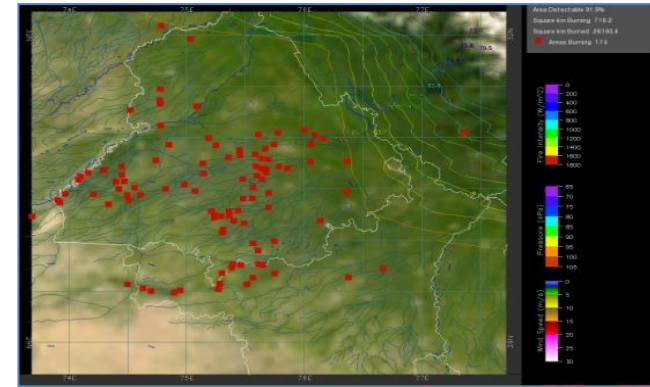
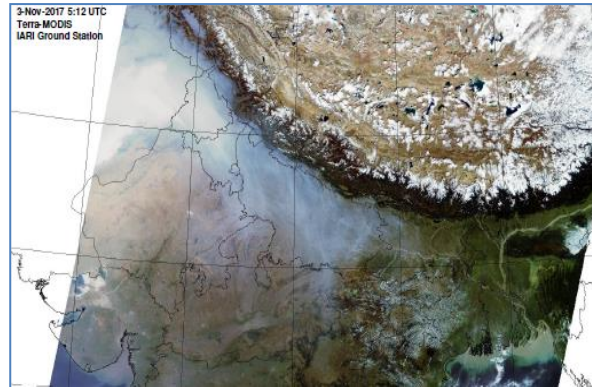
Bulletin No. 15

Events Date:
29-Sep-2021

Issued on:
29-Sep-2021



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



Prepared by:

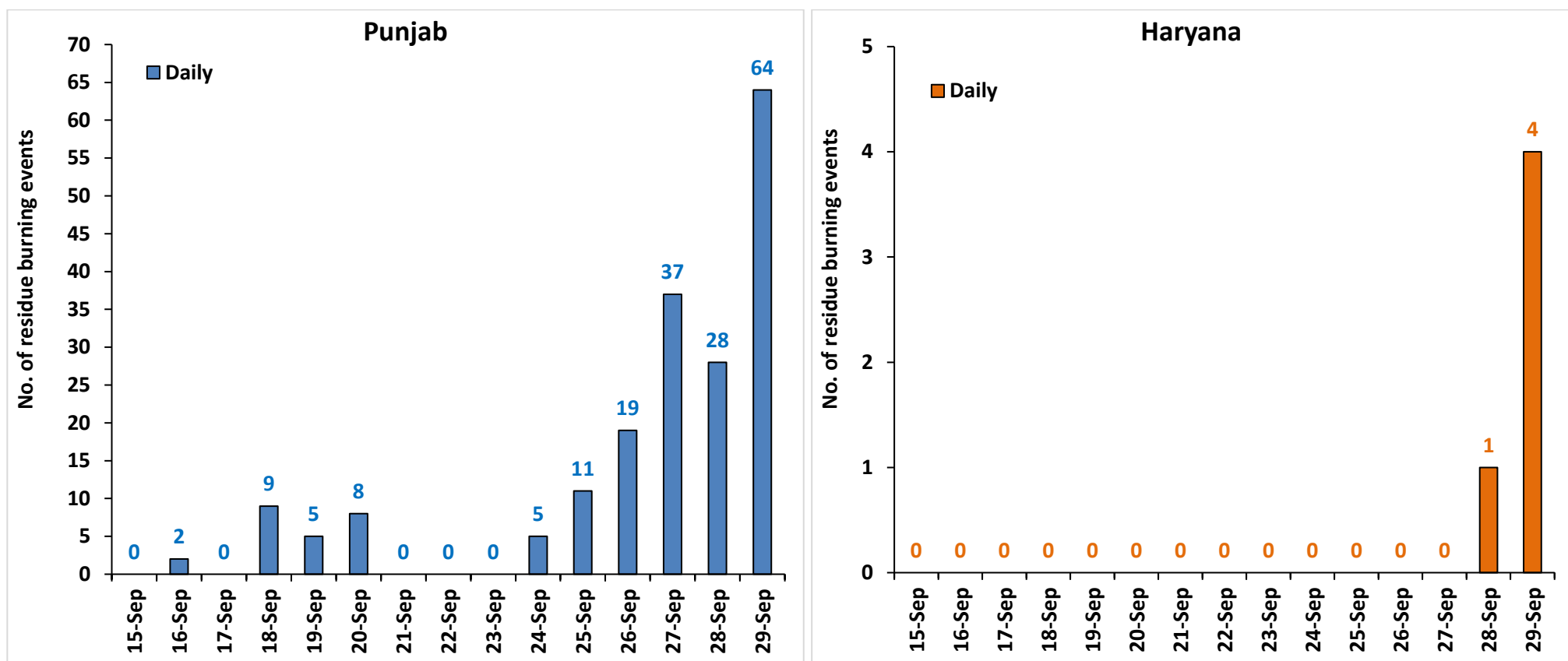
Consortium for Research on Agroecosystem Monitoring and Modeling from Space (CREAMS) Laboratory,
Division of Agricultural Physics, ICAR – Indian Agricultural Research Institute, New Delhi – 110012

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

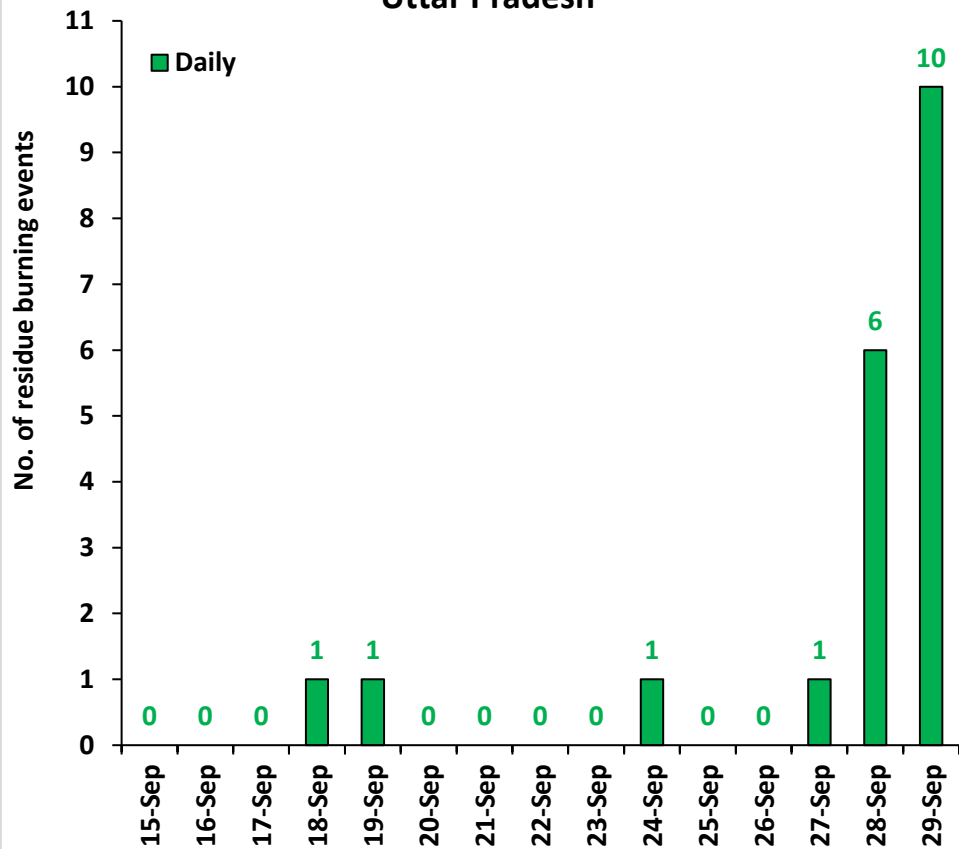
Highlights for 29-September-2021

- 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 **82** residue burning events in the six study States on 29-Sep-2021.
- The state wise events detected on 29-Sep-2021 were **64** in Punjab, **4** in Haryana, **10** in UP, **0** in Delhi, **0** in Rajasthan and **4** in MP.
- Detection of burning events by satellites was hampered due to cloud cover over Southern Madhya Pradesh.

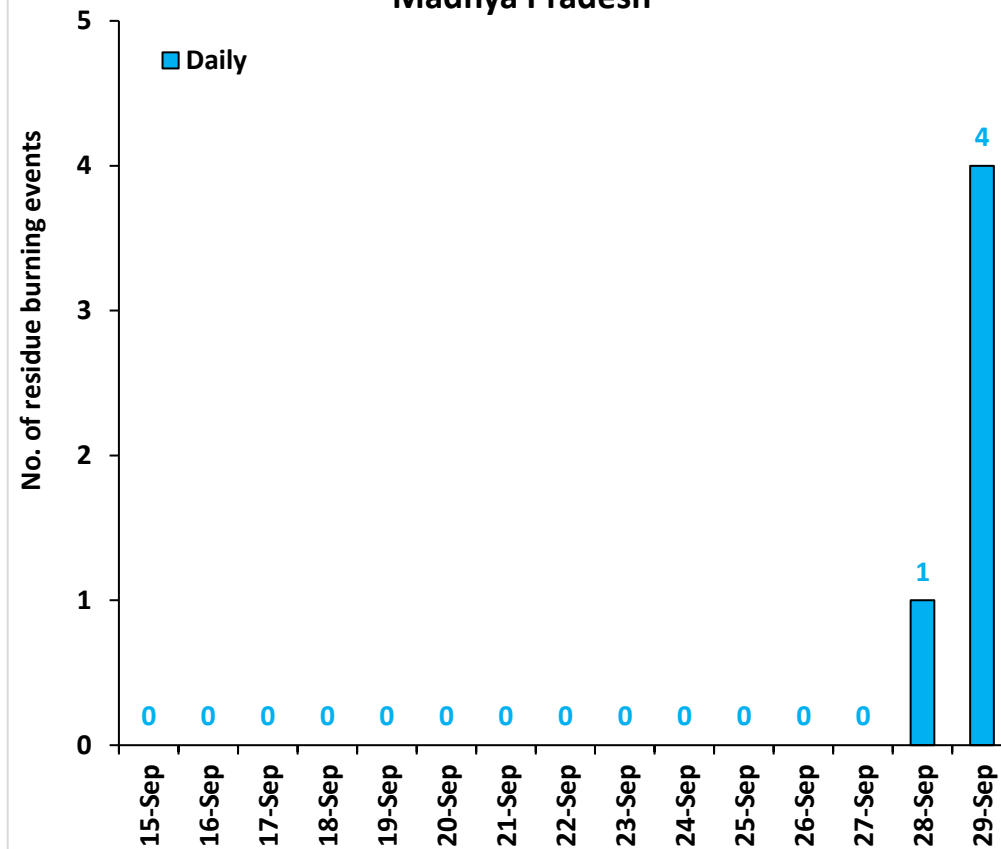
Temporal distribution of rice residue burning events for the study States in 2021



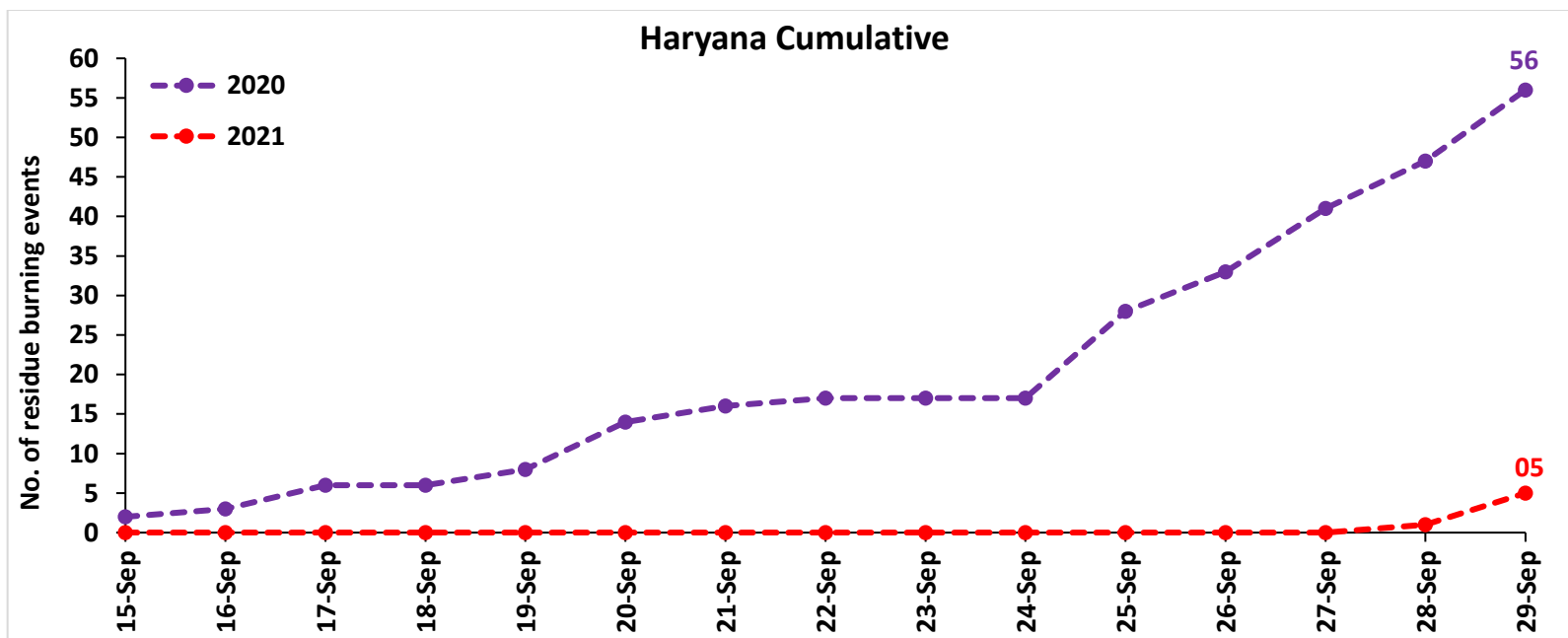
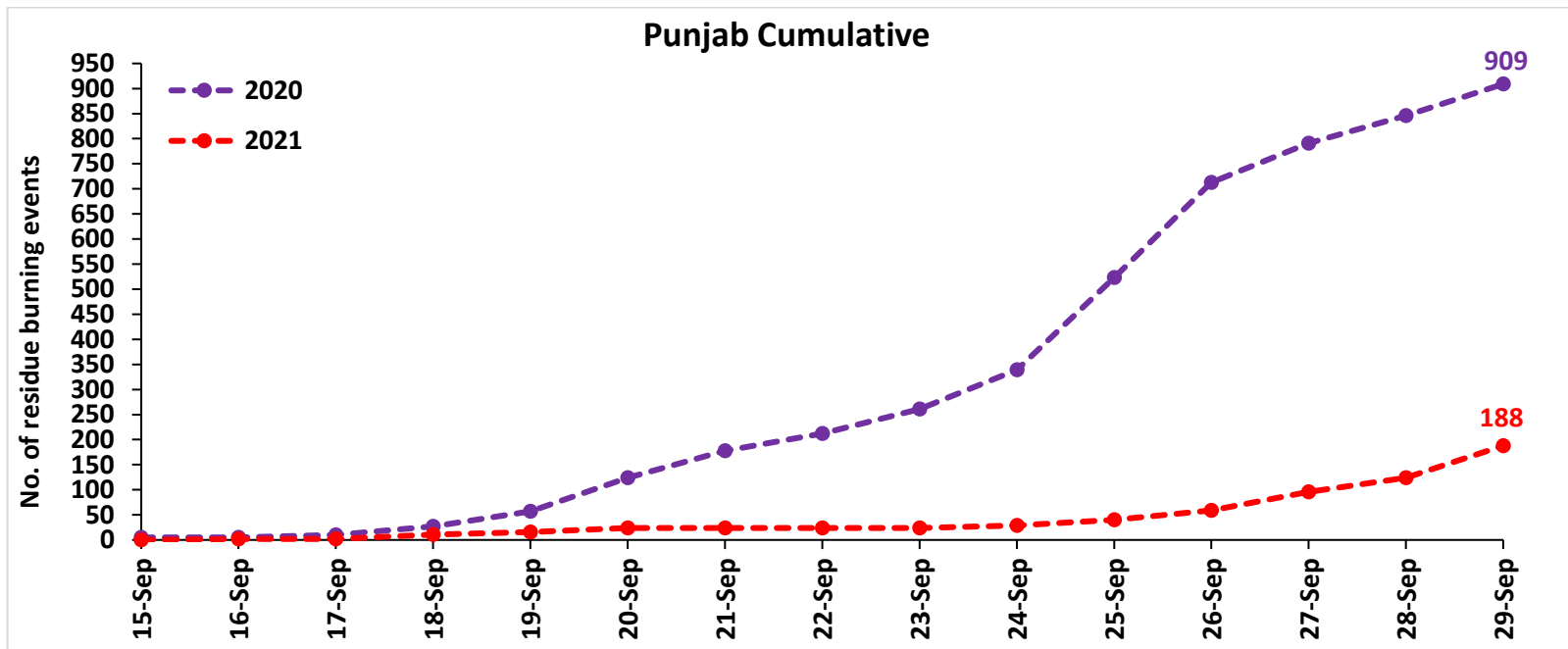
Uttar Pradesh

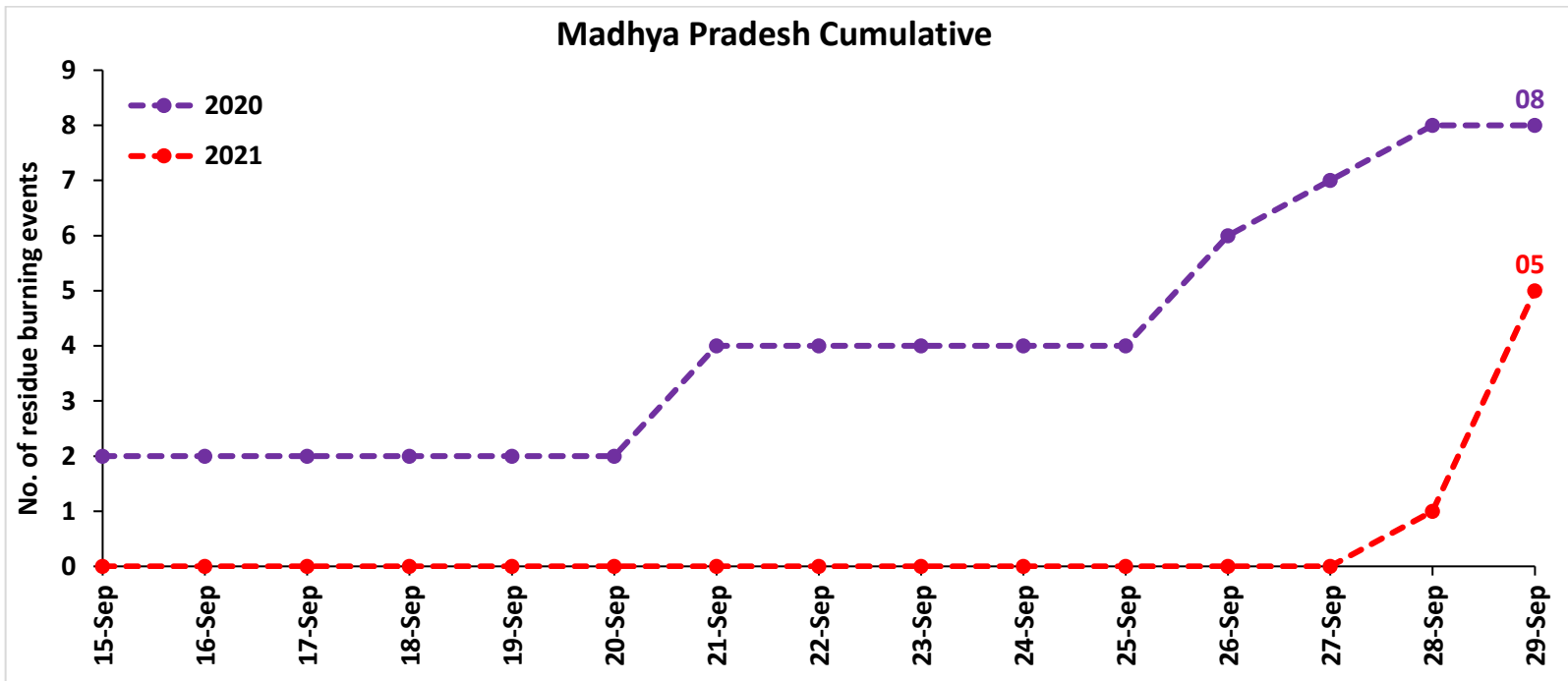
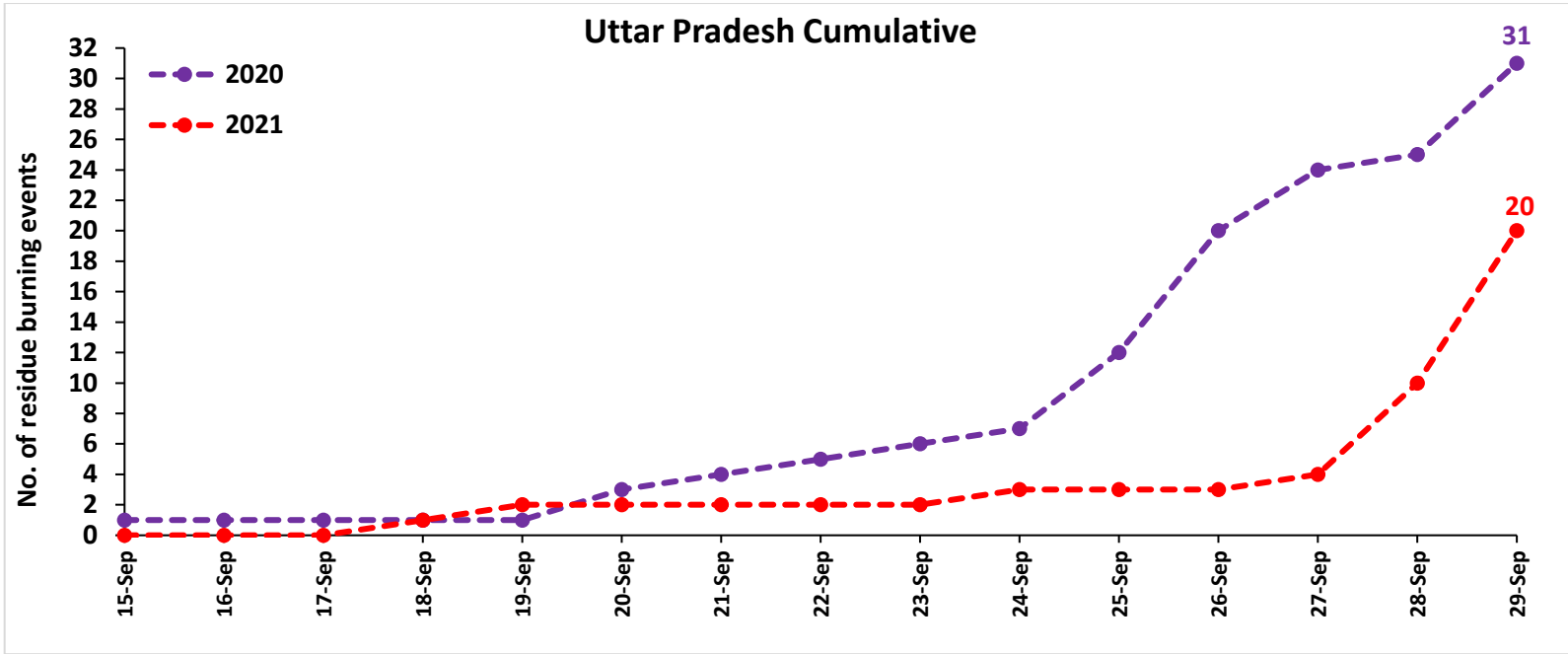


Madhya Pradesh



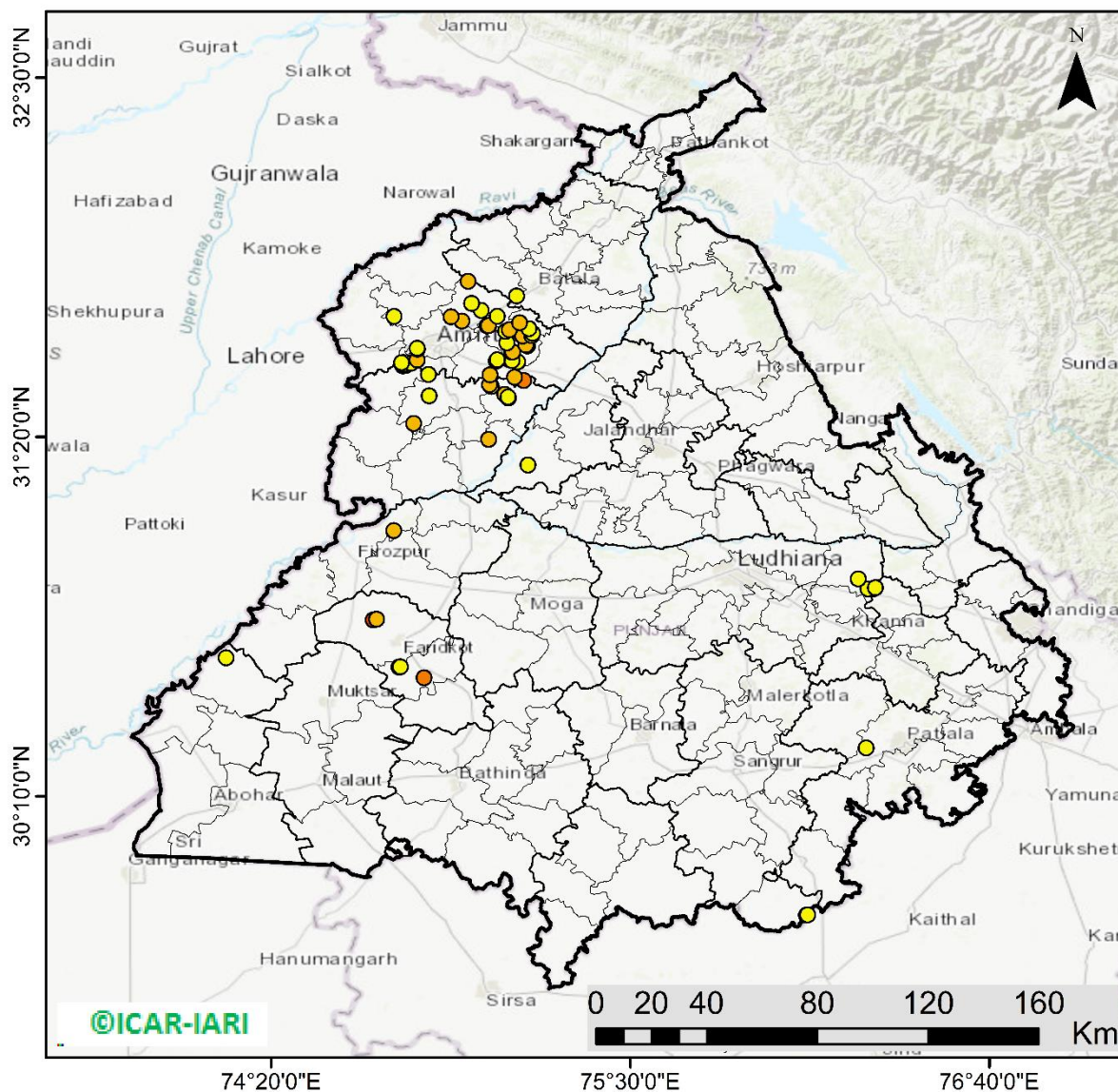
Comparison of residue burning events in current year (2021) with previous year (2020) for the study States





Punjab

RICE RESIDUE BURNING IN PUNJAB



64 burning events detected in Punjab on 29th September 2021

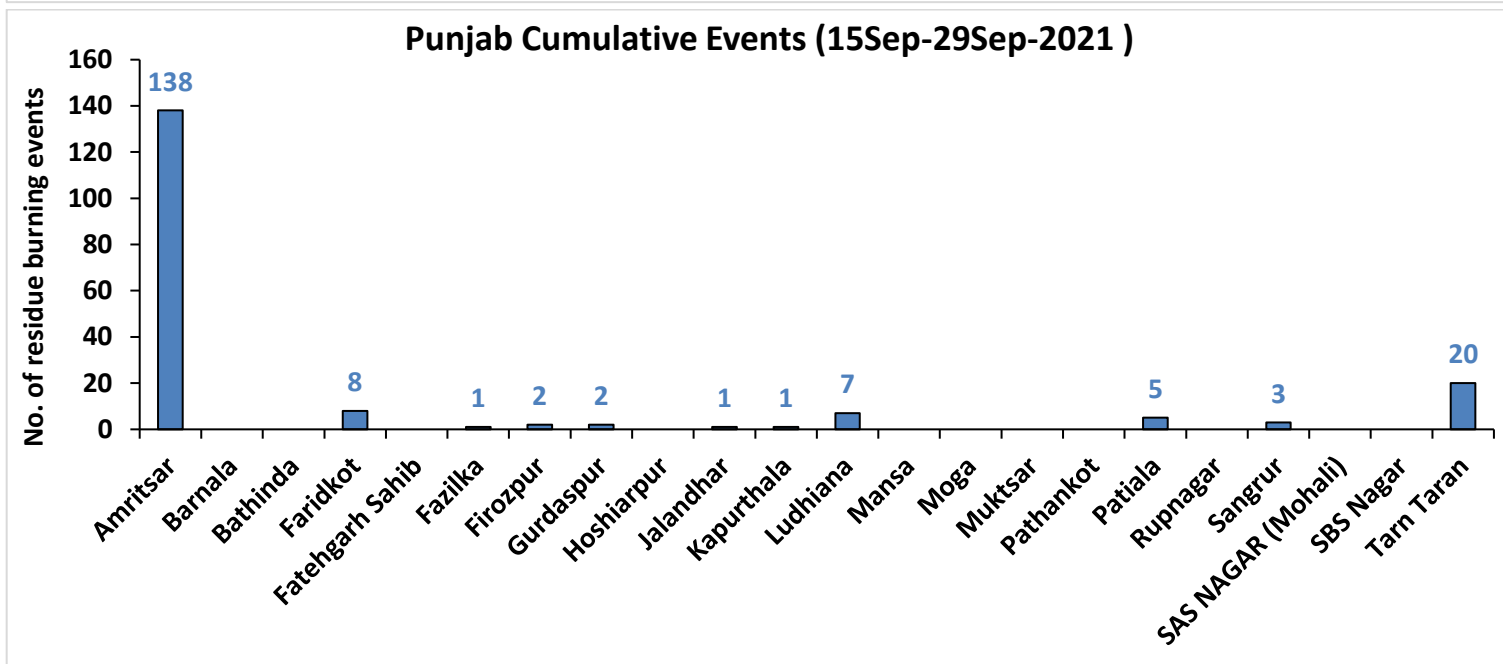
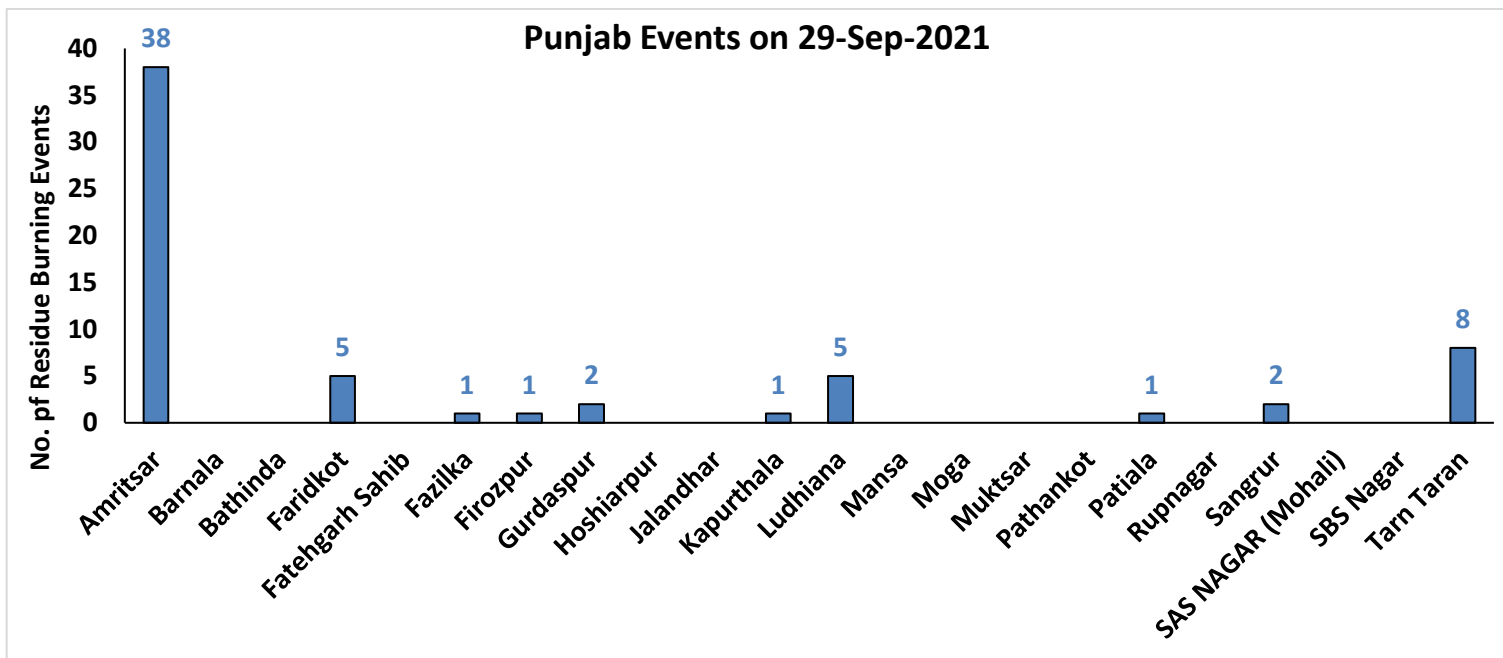
Fire Intensity (W/m²)

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



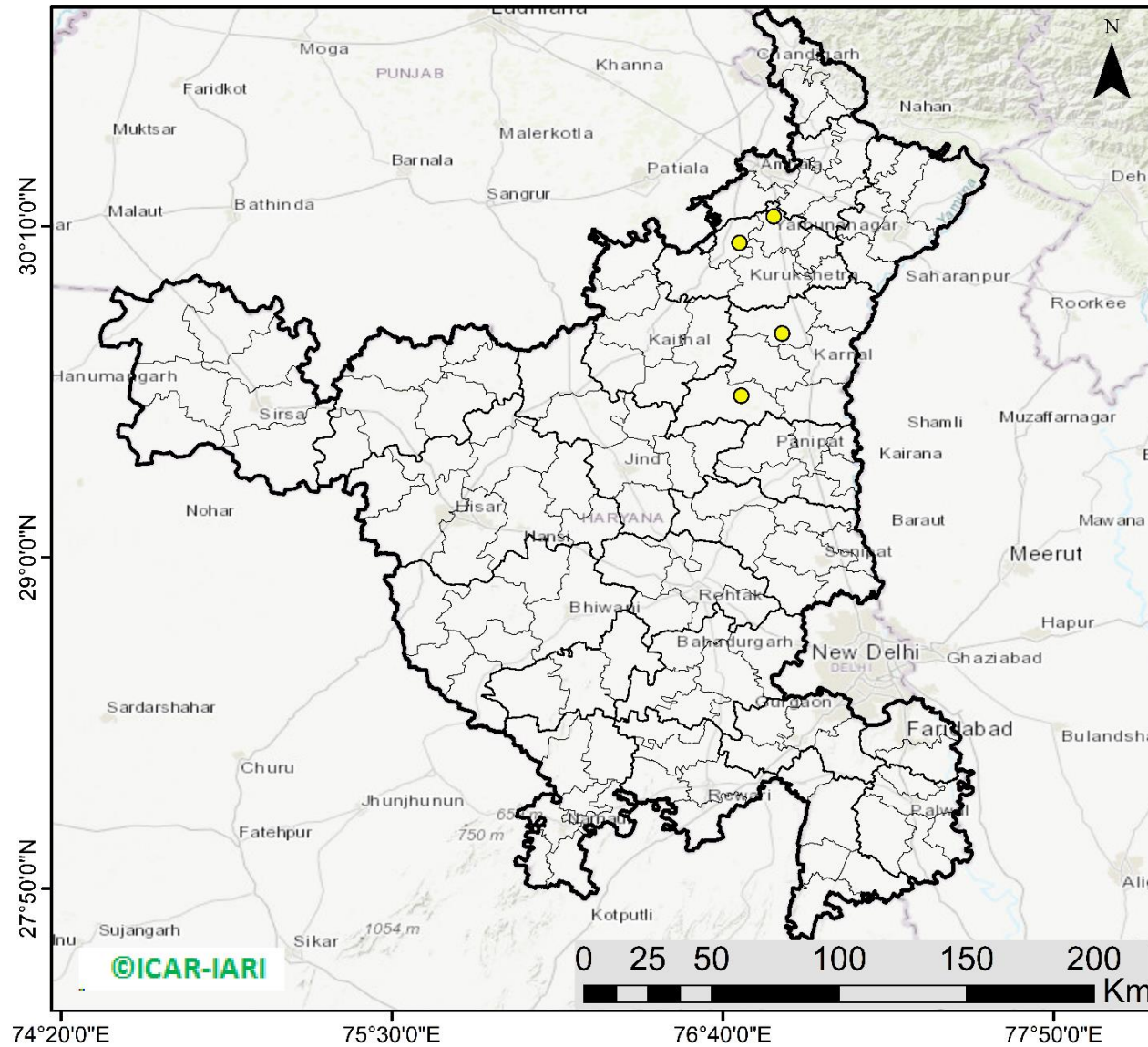
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Punjab (15-29 Sep-2021)



Haryana

RICE RESIDUE BURNING IN HARYANA



04 burning events detected in Haryana on **29th September 2021**

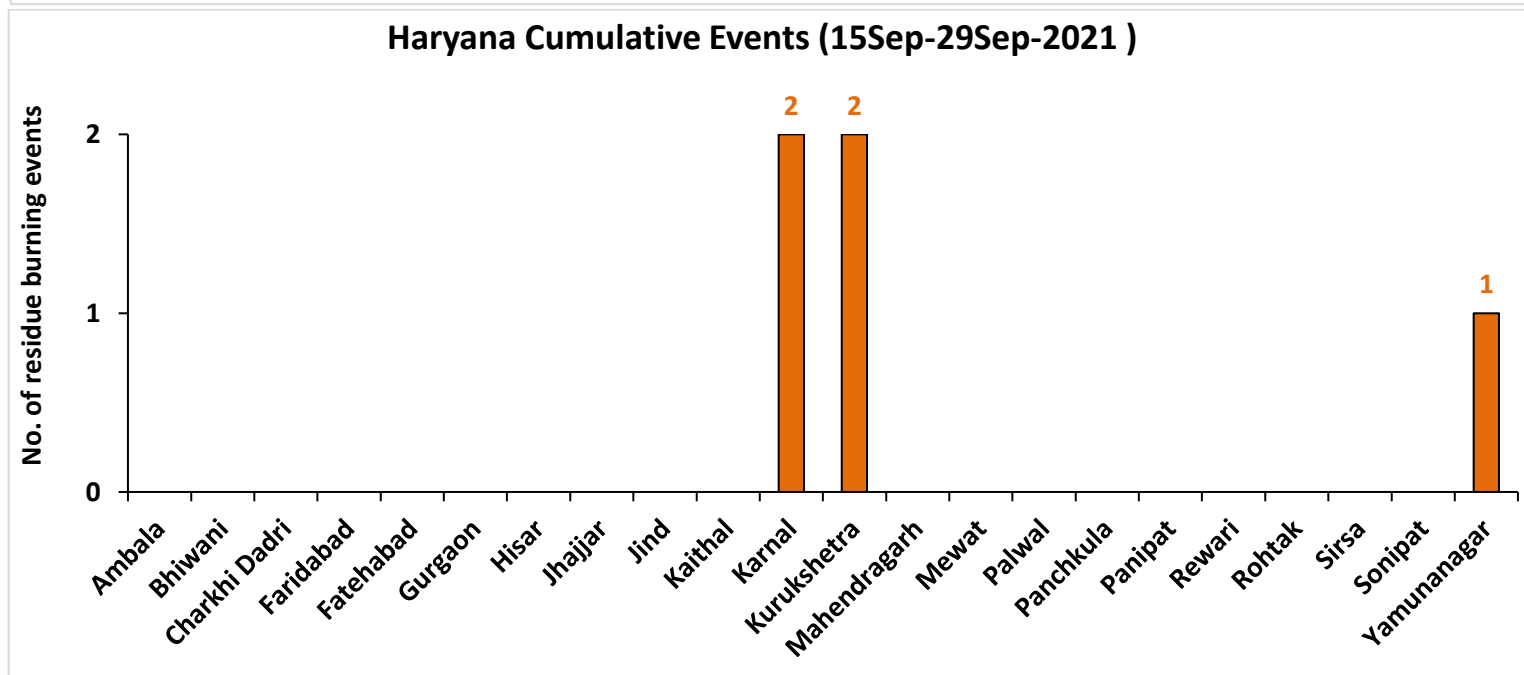
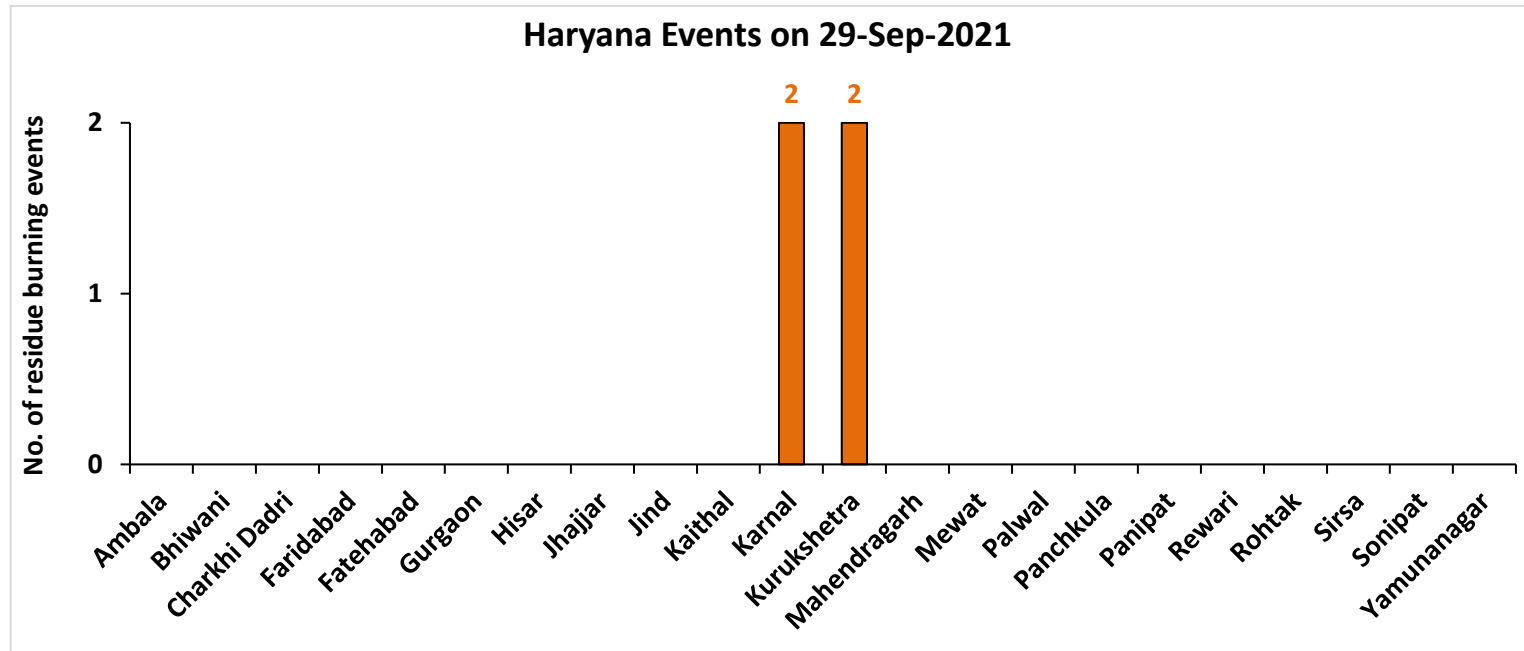
Fire Intensity (W/m²)

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



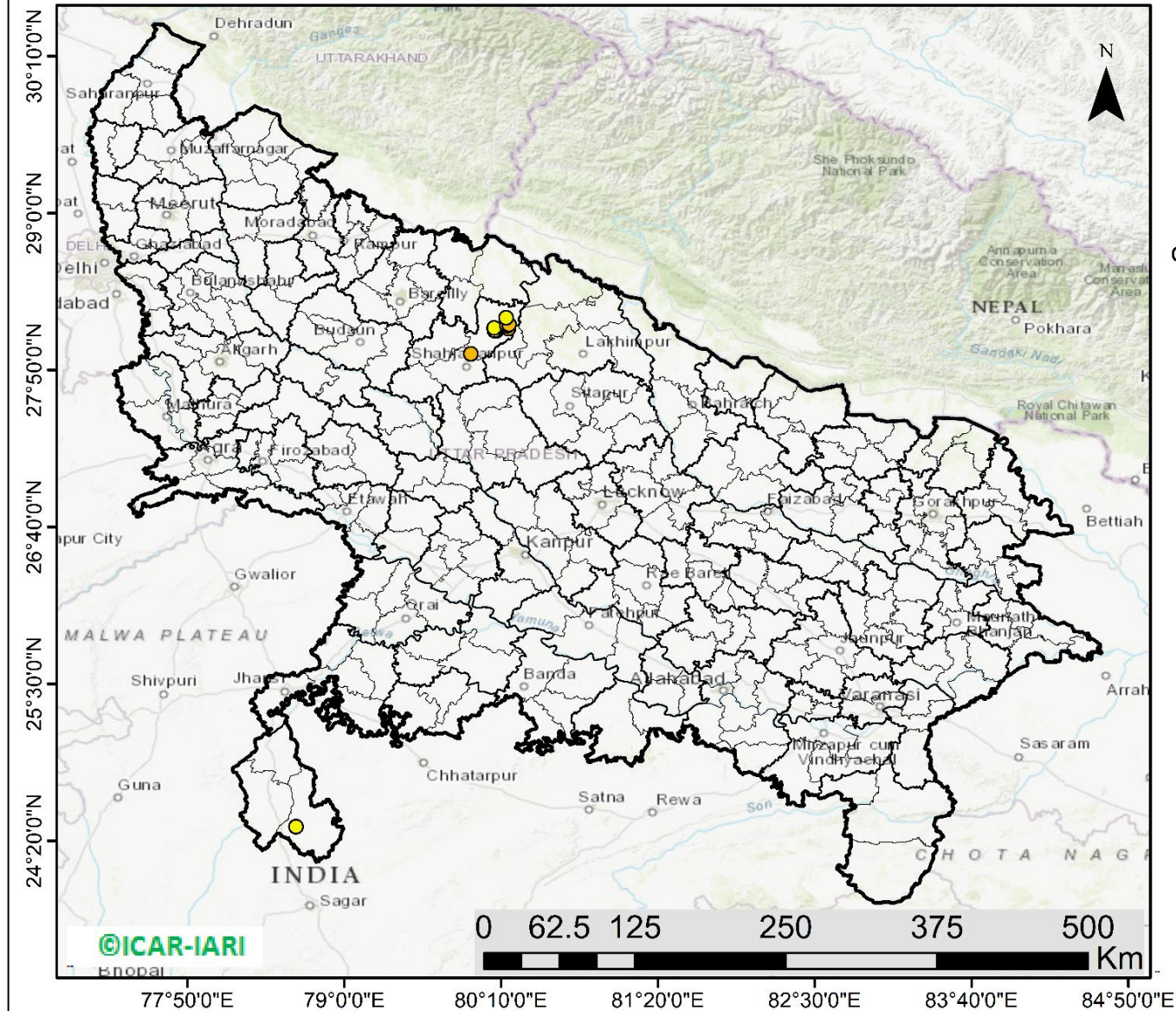
<http://geoportal.icar.gov.in:8080/geoexplorer/composer/>

District-wise cumulative number of residues burning events in Haryana (15-29 Sep-2021)



Uttar Pradesh

RICE RESIDUE BURNING IN UTTAR PRADESH



10 burning events detected in Uttar Pradesh on **29th September 2021**

Fire Intensity (W/m²)

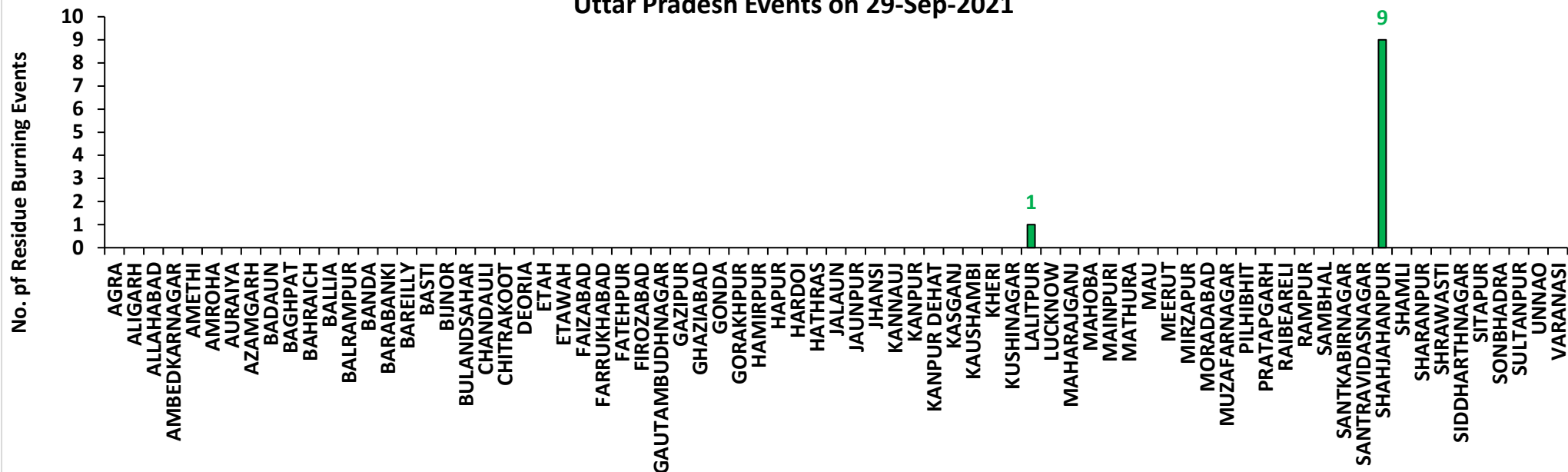
- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- >20



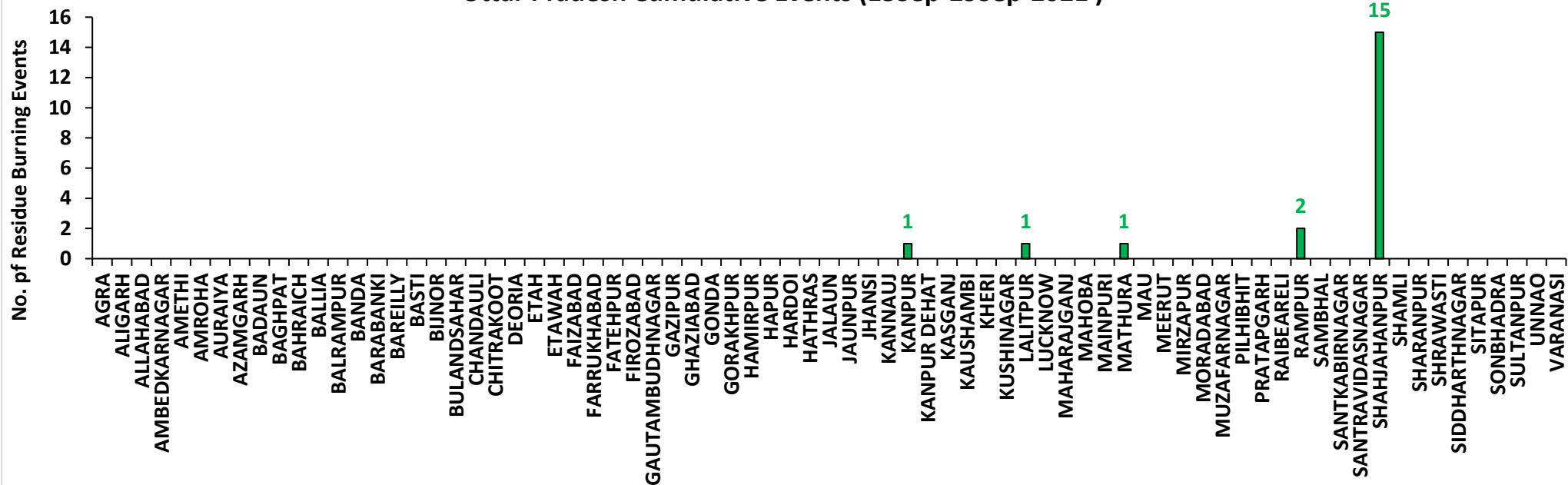
<http://geoportal.icar.gov.in:8080/geoplorer/composer/>

District-wise cumulative number of residues burning events in Uttar Pradesh (15-29 Sep-2021)

Uttar Pradesh Events on 29-Sep-2021

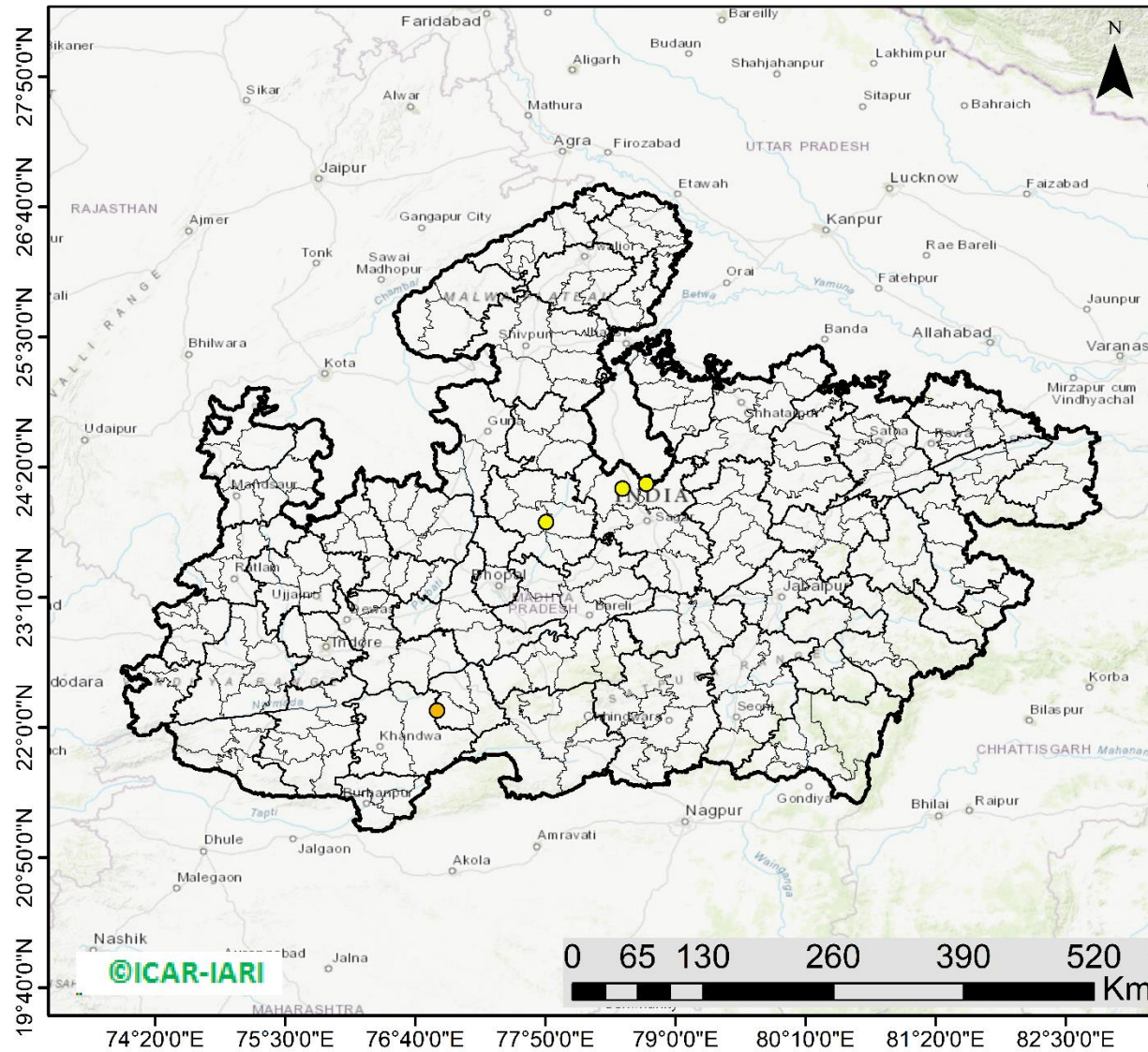


Uttar Pradesh Cumulative Events (15Sep-29Sep-2021)



Madhya Pradesh

RICE RESIDUE BURNING IN MADHYA PRADESH



04 burning events detected in MP on 28th September 2020

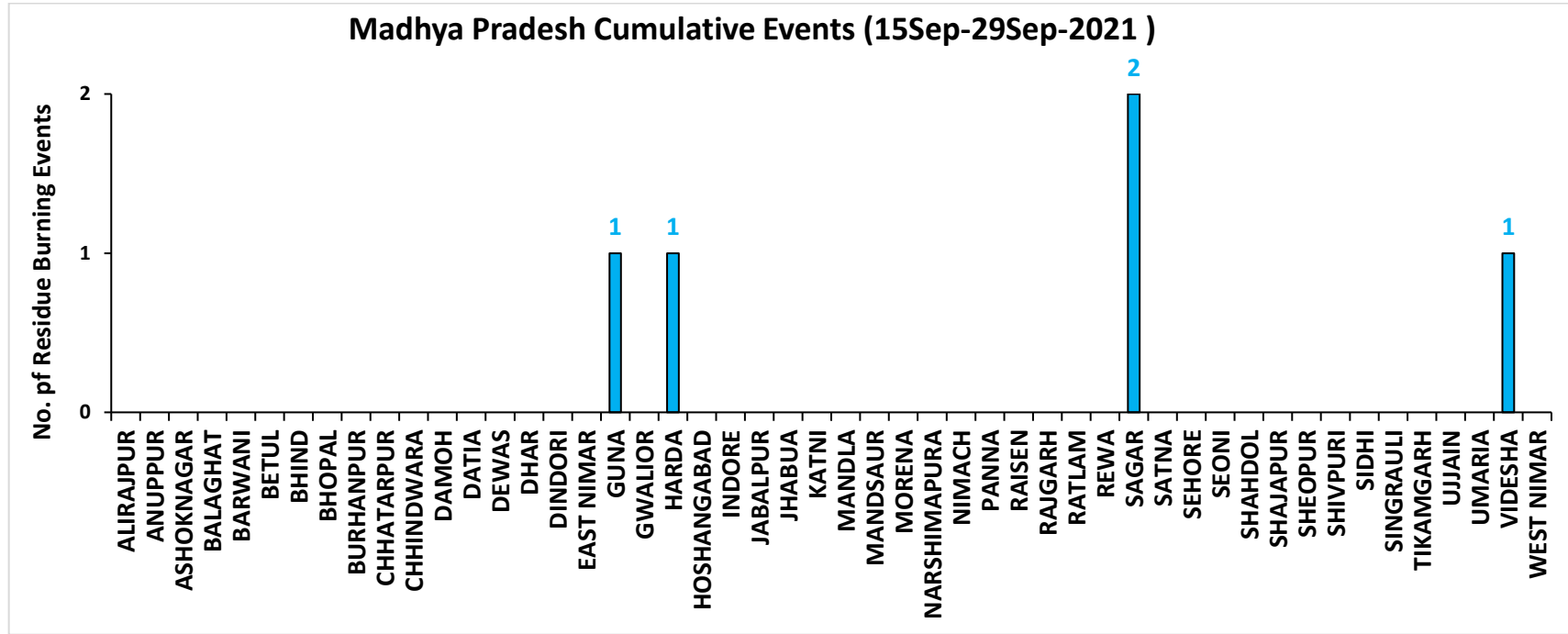
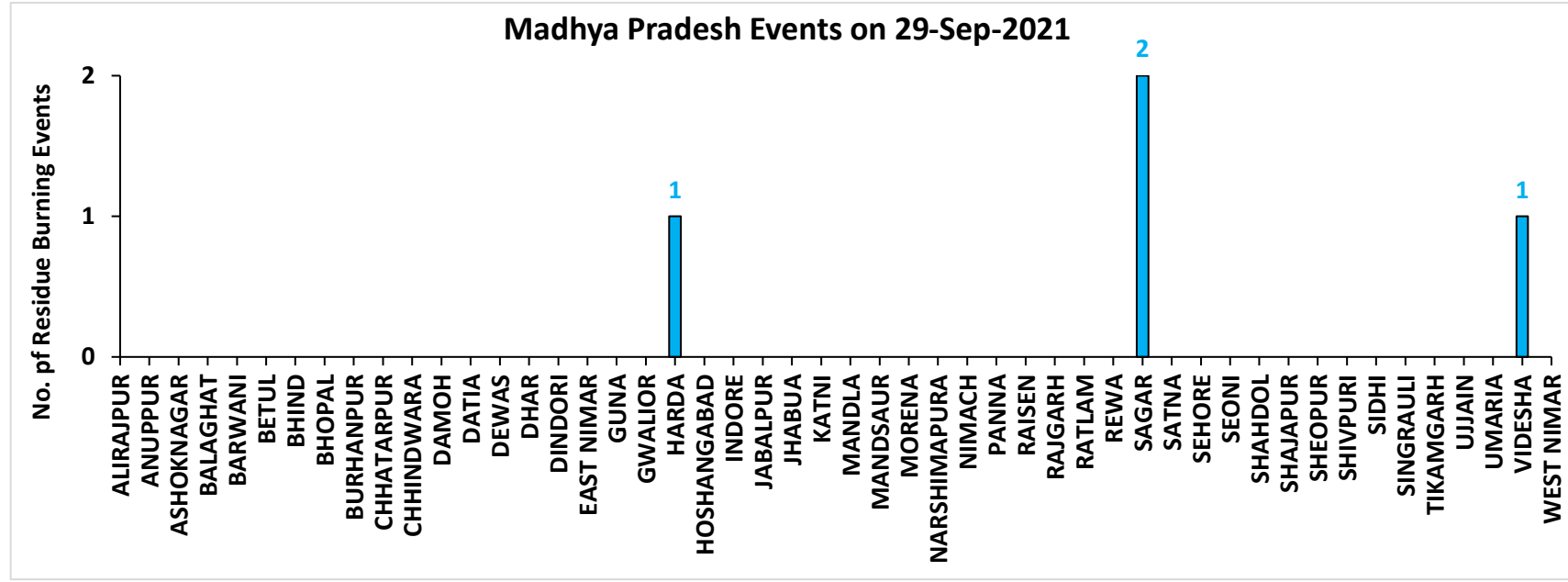
Fire Intensity (W/m2)

- 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 (15-29 Sep-2021)



District-wise cumulative number of residues burning events detected in 2020 and 2021
(Period: 15-29 September)

(a) Punjab

District	15 Sep - 29 Sep	
	2020	2021
AMRITSAR	691	138
BARNALA	2	0
BATHINDA	0	0
FARIDKOT	1	8
FATEHGARH SAHIB	0	0
FAZILKA	0	1
FIROZPUR	4	2
GURDASPUR	22	2
HOSHIARPUR	1	0
JALANDHAR	2	1
KAPURTHALA	8	1
LUDHIANA	13	7
MANSA	1	0
MOGA	4	0
MUKTSAR	1	0
PATHANKOT	0	0
PATIALA	21	5
RUPNAGAR	0	0
SANGRUR	3	3
SAS NAGAR (MOHALI)	5	0
SBS NAGAR	0	0
TARN TARAN	130	20
TOTAL	909	188

(b) Haryana

District	15 Sep - 29 Sep	
	2020	2021
AMBALA	6	0
BHIWANI	0	0
CHARKHI DADRI	0	0
FARIDABAD	0	0
FATEHABAD	5	0
GURGAON	0	0
HISAR	1	0
JHAJJAR	0	0
JIND	0	0
KAITHAL	9	0
KARNAL	20	2
KURUKSHETRA	9	2
MAHENDRAGARH	0	0
MEWAT	0	0
PALWAL	0	0
PANCHKULA	0	0
PANIPAT	3	0
REWARI	0	0
ROHTAK	0	0
SIRSA	1	0
SONIPAT	0	0
YAMUNANAGAR	2	1
Total	56	5

(c) Uttar Pradesh

District	15 Sep - 29 Sep							
	2020	2021	GAUTAMBUDHNAGAR	0	0	MUZAFARNAGAR	0	0
AGRA	0	0	GAZIPUR	0	0	PILHIBHIT	1	0
ALIGARH	1	0	GHAZIABAD	1	0	PRATAPGARH	0	0
ALLAHABAD	0	0	GONDA	0	0	RAIBEARELI	1	0
AMBEDKARNAGAR	0	0	GORAKHPUR	0	0	RAMPUR	0	2
AMETHI	0	0	HAMIRPUR	0	0	SAMBHAL	3	0
AMROHA	0	0	HAPUR	1	0	SANTKABIRNAGAR	0	0
AURAIYA	2	0	HARDOI	0	0	SANTRAVIDASNAGAR	0	0
AZAMGARH	0	0	HATHRAS	0	0	SHAHJAHANPUR	3	15
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	0	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	0	0	UNNAO	2	0
BASTI	0	0	KHERI	0	0	VARANASI	0	0
BIJNOR	1	0	KUSHINAGAR	0	0	Total	31	20
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	2	0			
FATEHPUR	0	0	MIRZAPUR	0	0			
FIROZABAD	0	0	MORADABAD	0	0			

(d) Madhya Pradesh

District	15 Sep - 29 Sep				
	2020	2021			
			PANNA	0	0
ALIRAJPUR	0	0	RAISEN	0	0
ANUPPUR	0	0	RAJGARH	0	0
ASHOKNAGAR	0	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	0	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	8	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 - 29 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
Total	909	188	56	5	31	20	0	0	8	0	8	5

Details of residue burning events in Punjab on 29-Sep-2021

S. No.	District	Block	Satellite	Latitude	Longitude	ACQ_DATE	ACQ_TIME	Day / Night	Fire Power (W/m2)
1	AMRITSAR	ATTARI	S-NPP	31.53570	74.84410	9/29/2021	13:22:56	D	4.00
2	AMRITSAR	ATTARI	S-NPP	31.56720	74.75860	9/29/2021	13:22:56	D	2.40
3	AMRITSAR	ATTARI	S-NPP	31.56860	74.76700	9/29/2021	13:22:56	D	6.60
4	AMRITSAR	ATTARI	S-NPP	31.57220	74.78810	9/29/2021	13:22:56	D	4.50
5	AMRITSAR	ATTARI	S-NPP	31.57390	74.75700	9/29/2021	13:22:56	D	2.20
6	AMRITSAR	ATTARI	S-NPP	31.58250	74.80770	9/29/2021	13:22:56	D	5.50
7	AMRITSAR	ATTARI	AQUA	31.56400	74.76100	9/29/2021	13:44:27	D	9.00
8	AMRITSAR	ATTARI	AQUA	31.56500	74.77100	9/29/2021	13:44:27	D	8.00
9	AMRITSAR	HARSHA CHHINA	S-NPP	31.72430	74.73240	9/29/2021	13:22:56	D	2.10
10	AMRITSAR	JANDIALA GURU	S-NPP	31.53430	75.04440	9/29/2021	13:22:56	D	5.30
11	AMRITSAR	JANDIALA GURU	S-NPP	31.57930	75.06460	9/29/2021	13:22:56	D	4.20
12	AMRITSAR	JANDIALA GURU	S-NPP	31.58330	75.06800	9/29/2021	13:22:56	D	4.20
13	AMRITSAR	JANDIALA GURU	S-NPP	31.69340	75.03500	9/29/2021	13:22:56	D	3.60
14	AMRITSAR	JANDIALA GURU	S-NPP	31.69410	75.03920	9/29/2021	13:22:56	D	7.50
15	AMRITSAR	MAJITHA	S-NPP	31.72460	75.06770	9/29/2021	13:22:56	D	2.80
16	AMRITSAR	MAJITHA	S-NPP	31.74370	75.01580	9/29/2021	13:22:56	D	3.70
17	AMRITSAR	MAJITHA	S-NPP	31.76630	74.98470	9/29/2021	13:22:56	D	3.40
18	AMRITSAR	RAYYA	S-NPP	31.52670	75.12390	9/29/2021	13:22:56	D	6.70
19	AMRITSAR	RAYYA	AQUA	31.51600	75.15400	9/29/2021	13:44:27	D	11.00
20	AMRITSAR	TARSIKKA	S-NPP	31.57690	75.13420	9/29/2021	13:22:56	D	4.40
21	AMRITSAR	TARSIKKA	S-NPP	31.58080	75.11610	9/29/2021	13:22:56	D	4.80
22	AMRITSAR	TARSIKKA	S-NPP	31.60820	75.11420	9/29/2021	13:22:56	D	6.10
23	AMRITSAR	TARSIKKA	S-NPP	31.60890	75.11840	9/29/2021	13:22:56	D	6.40
24	AMRITSAR	TARSIKKA	S-NPP	31.62840	75.16610	9/29/2021	13:22:56	D	2.30
25	AMRITSAR	TARSIKKA	S-NPP	31.63110	75.16120	9/29/2021	13:22:56	D	8.70
26	AMRITSAR	TARSIKKA	S-NPP	31.63810	75.09930	9/29/2021	13:22:56	D	2.30
27	AMRITSAR	TARSIKKA	S-NPP	31.66040	75.15030	9/29/2021	13:22:56	D	5.30
28	AMRITSAR	TARSIKKA	S-NPP	31.66190	75.18010	9/29/2021	13:22:56	D	3.30
29	AMRITSAR	TARSIKKA	S-NPP	31.66920	75.18280	9/29/2021	13:22:56	D	3.00
30	AMRITSAR	TARSIKKA	S-NPP	31.67560	75.09520	9/29/2021	13:22:56	D	2.00
31	AMRITSAR	TARSIKKA	S-NPP	31.68100	75.10690	9/29/2021	13:22:56	D	5.30

32	AMRITSAR	TARSIKKA	S-NPP	31.68450	75.17070	9/29/2021	13:22:56	D	1.10
33	AMRITSAR	TARSIKKA	S-NPP	31.70380	75.14060	9/29/2021	13:22:56	D	8.80
34	AMRITSAR	TARSIKKA	AQUA	31.58300	75.10900	9/29/2021	13:44:27	D	14.00
35	AMRITSAR	VERKA	S-NPP	31.61750	74.80850	9/29/2021	13:22:56	D	3.20
36	AMRITSAR	VERKA	S-NPP	31.62090	74.80770	9/29/2021	13:22:56	D	3.20
37	AMRITSAR	VERKA	AQUA	31.70900	74.95300	9/29/2021	13:44:27	D	7.00
38	AMRITSAR	VERKA	AQUA	31.72300	74.91800	9/29/2021	13:44:27	D	8.00
39	FARIDKOT	FARIDKOT	AQUA	30.73900	74.66500	9/29/2021	13:44:27	D	16.00
40	FARIDKOT	FARIDKOT	AQUA	30.74100	74.67600	9/29/2021	13:44:27	D	7.00
41	FARIDKOT	KOT KAPURA	S-NPP	30.58580	74.74870	9/29/2021	13:22:56	D	3.50
42	FARIDKOT	KOT KAPURA	S-NPP	30.58660	74.75300	9/29/2021	13:22:56	D	3.50
43	FARIDKOT	KOT KAPURA	AQUA	30.55100	74.83000	9/29/2021	13:44:27	D	15.00
44	FAZILKA	JALALABAD	AQUA	30.61600	74.18700	9/29/2021	13:44:27	D	5.00
45	FIROZPUR	FIROZPUR	S-NPP	31.02880	74.73170	9/29/2021	13:22:56	D	6.20
46	GURDASPUR	FATEHGARH CHURIAN	S-NPP	31.79030	75.13050	9/29/2021	13:22:56	D	4.60
47	GURDASPUR	FATEHGARH CHURIAN	S-NPP	31.83830	74.97320	9/29/2021	13:22:56	D	5.30
48	KAPURTHALA	SULTANPUR LODHI	S-NPP	31.24190	75.16780	9/29/2021	13:22:56	D	2.40
49	LUDHIANA	MACHHIWARA	S-NPP	30.83820	76.28490	9/29/2021	13:22:56	D	4.90
50	LUDHIANA	MACHHIWARA	S-NPP	30.83890	76.28890	9/29/2021	13:22:56	D	4.90
51	LUDHIANA	MACHHIWARA	S-NPP	30.83970	76.27220	9/29/2021	13:22:56	D	3.60
52	LUDHIANA	MACHHIWARA	S-NPP	30.84350	76.29630	9/29/2021	13:22:56	D	3.20
53	LUDHIANA	MACHHIWARA	S-NPP	30.87220	76.24050	9/29/2021	13:22:56	D	2.40
54	PATIALA	PATIALA	S-NPP	30.32330	76.26670	9/29/2021	13:22:56	D	4.20
55	SANGRUR	ANDANA	S-NPP	29.78050	76.07230	9/29/2021	13:22:56	D	4.00
56	SANGRUR	ANDANA	S-NPP	29.78120	76.07630	9/29/2021	13:22:56	D	4.00
57	TARN TARAN	CHOHLA SAHIB	AQUA	31.32500	75.04000	9/29/2021	13:44:27	D	6.00
58	TARN TARAN	KHADUR SAHIB	S-NPP	31.45930	75.10380	9/29/2021	13:22:56	D	4.50
59	TARN TARAN	KHADUR SAHIB	S-NPP	31.46270	75.10310	9/29/2021	13:22:56	D	3.20
60	TARN TARAN	KHADUR SAHIB	S-NPP	31.49680	75.04860	9/29/2021	13:22:56	D	3.60
61	TARN TARAN	KHADUR SAHIB	S-NPP	31.50280	75.04290	9/29/2021	13:22:56	D	8.90
62	TARN TARAN	KHADUR SAHIB	AQUA	31.47100	75.09200	9/29/2021	13:44:27	D	10.00
63	TARN TARAN	TARN TARAN	S-NPP	31.37670	74.79630	9/29/2021	13:22:56	D	6.20
64	TARN TARAN	TARN TARAN	S-NPP	31.46640	74.84670	9/29/2021	13:22:56	D	2.50

Details of residue burning events in Haryana on 29-Sep-2021

S. No.	District	Block	Satellite	Latitude	Longitude	ACQ_DATE	ACQ_TIME	Day / Night	Fire Power (W/m ²)
1	KARNAL	ASSANDH	S-NPP	29.56910	76.73190	9/29/2021	13:22:56	D	2.70
2	KARNAL	NILOKHERI	S-NPP	29.78810	76.87600	9/29/2021	13:22:56	D	2.50
3	KURUKSHETRA	ISMAILABAD	S-NPP	30.10750	76.72590	9/29/2021	13:22:56	D	1.90
4	KURUKSHETRA	SHAHBAD	S-NPP	30.20030	76.84620	9/29/2021	13:22:56	D	4.50

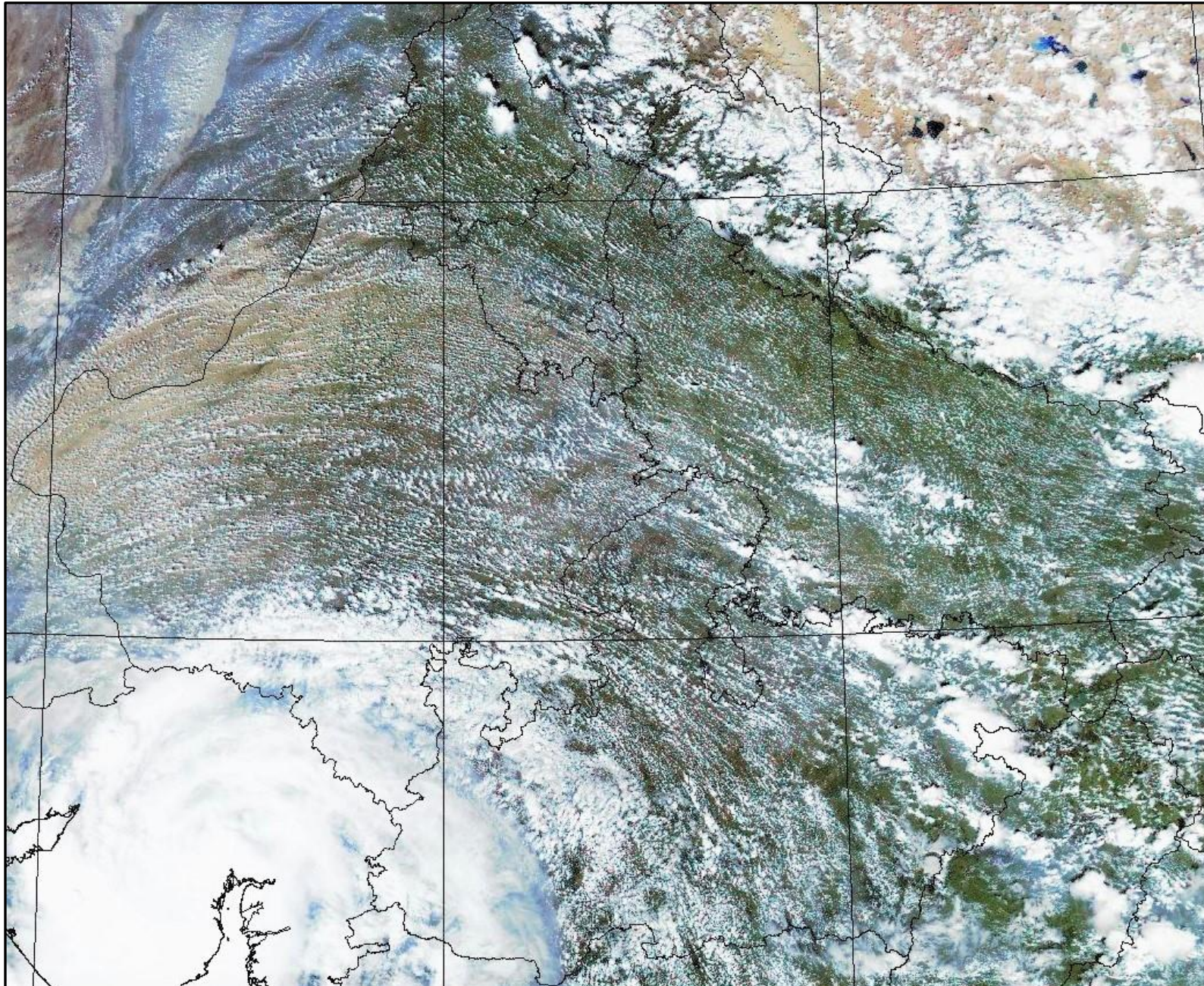
Details of residue burning events in Uttar Pradesh on 29-Sep-2021

S. No.	District	Block	Satellite	Latitude	Longitude	ACQ_DATE	ACQ_TIME	Day / Night	Fire Power (W/m ²)
1	LALITPUR	KHAGA	S-NPP	24.43810	78.64180	9/29/2021	13:22:56	D	2.50
2	SHAHJAHANPUR	PUWANYA	S-NPP	28.12440	80.13200	9/29/2021	13:22:56	D	4.50
3	SHAHJAHANPUR	PUWANYA	S-NPP	28.12610	80.11850	9/29/2021	13:22:56	D	2.80
4	SHAHJAHANPUR	PUWANYA	S-NPP	28.14020	80.22210	9/29/2021	13:22:56	D	6.20
5	SHAHJAHANPUR	PUWANYA	S-NPP	28.14520	80.11620	9/29/2021	13:22:56	D	2.90
6	SHAHJAHANPUR	PUWANYA	S-NPP	28.16180	80.21500	9/29/2021	13:22:56	D	7.80
7	SHAHJAHANPUR	PUWANYA	S-NPP	28.16820	80.20950	9/29/2021	13:22:56	D	3.40
8	SHAHJAHANPUR	PUWANYA	S-NPP	28.17050	80.22680	9/29/2021	13:22:56	D	5.90
9	SHAHJAHANPUR	PUWANYA	S-NPP	28.22090	80.20500	9/29/2021	13:22:56	D	2.10
10	SHAHJAHANPUR	SHAHJAHANPUR	S-NPP	27.95230	79.94250	9/29/2021	13:22:56	D	6.60

Details of residue burning events in Madhya Pradesh on 29-Sep-2021

S. No.	District	Block	Satellite	Latitude	Longitude	ACQ_DATE	ACQ_TIME	Day / Night	Fire Power (W/m ²)
1	HARDA	KHIRKIYAN	S-NPP	22.14970	76.86190	9/29/2021	13:22:56	D	5.70
2	SAGAR	BANDA	S-NPP	24.18170	78.73820	9/29/2021	13:22:56	D	1.70
3	SAGAR	KHURAI	S-NPP	24.13910	78.52540	9/29/2021	13:22:56	D	2.50
4	VIDESHA	NATERAN	S-NPP	23.83940	77.83920	9/29/2021	13:22:56	D	3.80

AQUA (MODIS) Satellite image (TCC) of North and Central India Acquired on 29-Sep-2021 at 13:40:43 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

Study Team

ICAR – HQ	Dr S.K. Chaudhari	DDG (AG. ENGG.)	ddgengg@icar.org.in
	Dr S. Bhasker	ADG (NRM)	adgagroandaf@gmail.com
	Dr K.K. Singh	ADG (AG. ENGG.)	kanchansingh044@gmail.com
ICAR - IARI	Dr V.K. Sehgal	Professor & Nodal Scientist	iaricreams@gmail.com
	Dr Rajkumar Dhakar	Scientist	raidhakar.iari@gmail.com
	Mr Mohd Jahangir	Lab Assistant (KRISHI)	mjahangir198@gmail.com
ICAR - ATARI	Dr Rajbir Singh	Director ATARI (Zone-I) Ludhiana	rajbirsingh.zpd@gmail.com
	Dr S.K. Singh	Director ATARI (Zone-II) Jodhpur	sushilsinghiipr@yahoo.co.in
	Dr Atar Singh	Director ATARI (Zone-III) Kanpur	zpdicarkanpur@gmail.com
ICAR - IASRI	Dr Rajender Parsad	Director	rajender.parsad@icar.gov.in

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)
