

Monitoring crop stubble burning in Haryana using satellite data

Crop stubble burning in both rabi and kharif seasons has emerged as a major environmental menace in the northern Indo-Gangatic Plains, causing server health problems. Though Haryana and Punjab Governments have made it a punishable offence, yet the conviction is very poor, for want of timely information. Hisar based Haryana Space Applications Centre (HARSAC) under Department of Science and Technology, Haryana has made excellent use of the satellite data to provide Crop Fire Alerts to the enforcement agencies on day to day basis.

SUOMI National Polar-Orbiting Partnership (NPP) Visible Infrared Imaging Radiometer (Suomi NPP-VIIRS) active fire products with spatial resolution of 375 m available at the NASA Website are being used to provide daily active fire locations. Thermal sensors onboard this satellite capture thermal anomalies at the earth surface during day and night time. Though it is a coarse resolution data, yet because of its daily repeat cycle it can indicate major fire points on daily basis.

HARSAC has developed a 'Crop Fire Alert' System through which the daily crop fire locations are being sent to various officers at the state and district level through SMS alert so as to initiate immediate action against the delinquent. The crop fire map indicates district, block and village name along with the latitude and longitudes of the point. The application can also indicate the shortest/ optimum route from the current location of the official to any fire location in the state to enable enforcement agencies to reach at the exact location.

During 2016 kharif season 12862 active crop fire locations were identified as compared to 12417 points during current (2017) kharif season. Thus there is a marginal decrease of about 3.4% in the crop residue fire locations as compared to last year. District wise highest crop fire locations have been observed in Fatehabad, Sirsa, Karnal and Kaithal districts during both the years. At district level significant decrease was observed for Yamunanagar and Faridabad districts.

HARSAC is also estimating the paddy stubble burning areas in the 10 major paddy growing districts of Haryana since 2013 using Resourcesat AWIFS satellite data which provides information at 5 days interval. The rice stubble burning area decreased from 247.4 thousand ha in 2013 to 168.9 thousand ha in 2014 and again to 163.0 thousand ha in 2015. But the area increased to 202.3 thousand ha in 2016 and 207.7 thousand ha in 2017. On an average paddy stubble burning occurred in about 14% to 24% of the rice growing area in the project districts in the state. Major paddy stubble burning was observed in Karnal, Kurukshetra, Kaithal, Fatehabad and Sirsa districts during all the previous five years. Total rice stubble burning area in project districts decreased by 31.7%, 34.1%, 18.2% and 16.0% for the 2014, 2015, 2016 and 2017 respectively (Table 5) as compared to 2013. Study indicates the decreasing trend from 2013 to 2015 than onwards showing a increasing trend till current year. Decrease in rice stubble burnt area was 78.4 thousand hectares, 84.4

thousand hectares, 45.11 thousand hectares and 39.6 thousand hectares for the years 2014, 2015, 2016 and 2017 respectively as compared to 2013.

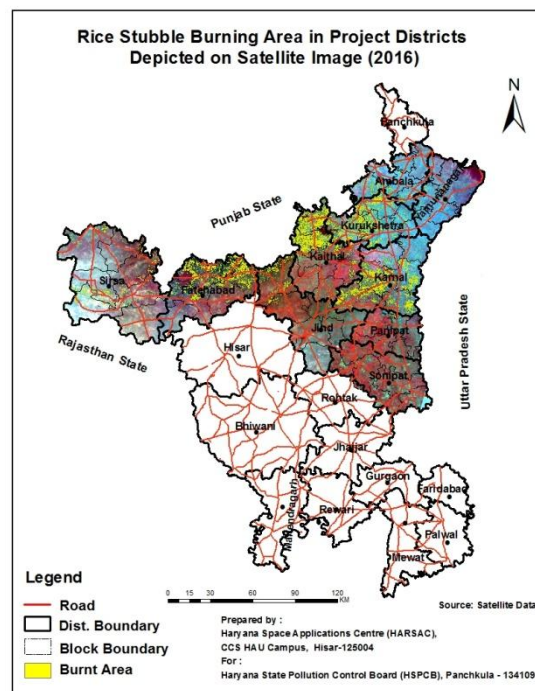
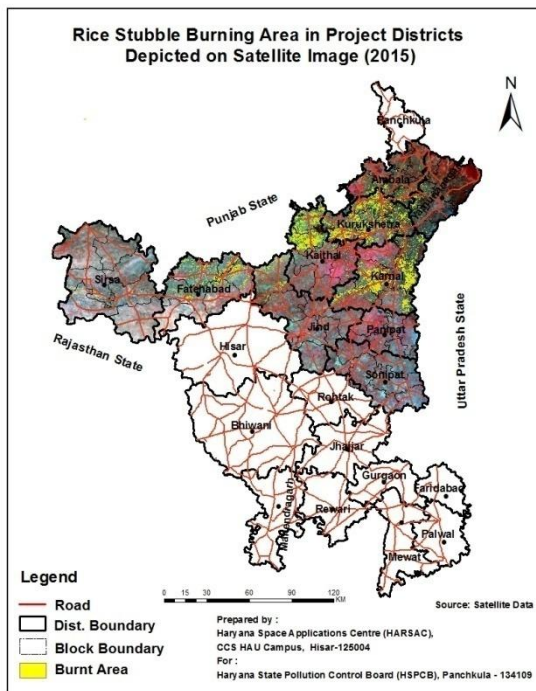
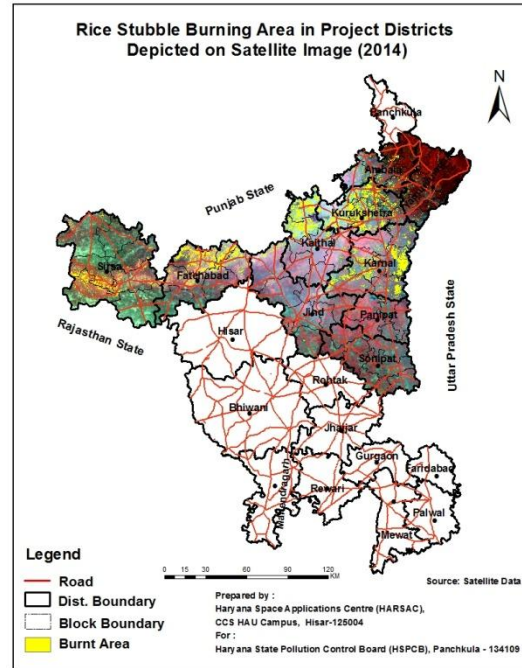
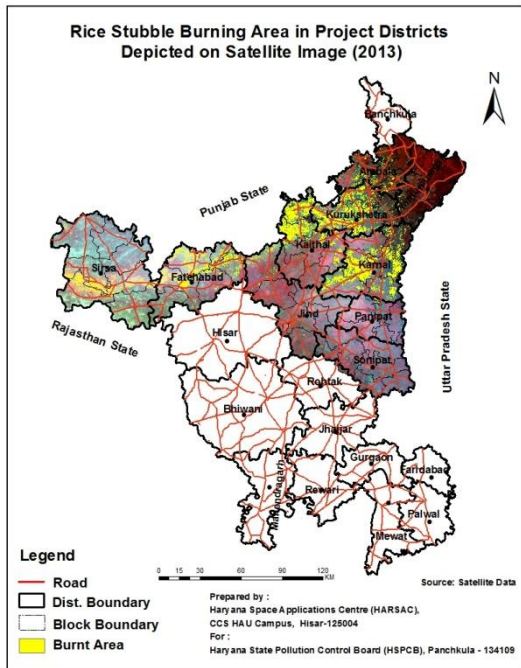
Table 1. Rice Residue Active Fire Locations for the years 2016 and 2017 (Oct. 07 to Nov. 30) in districts of Haryana

Sr. No.	Districts	2016	2017
1	Ambala	395	462
2	Fatehabad	4178	3800
3	Hisar	344	204
4	Jind	846	905
5	Kaithal	1346	1332
6	Karnal	1363	1372
7	Kurukshetra	826	988
8	Rohtak	97	96
9	Panipat	82	101
10	Palwal	259	341
11	Sirsa	2705	2347
12	Sonipat	181	85
13	Yamunanagar	148	305
Total		12769	12338

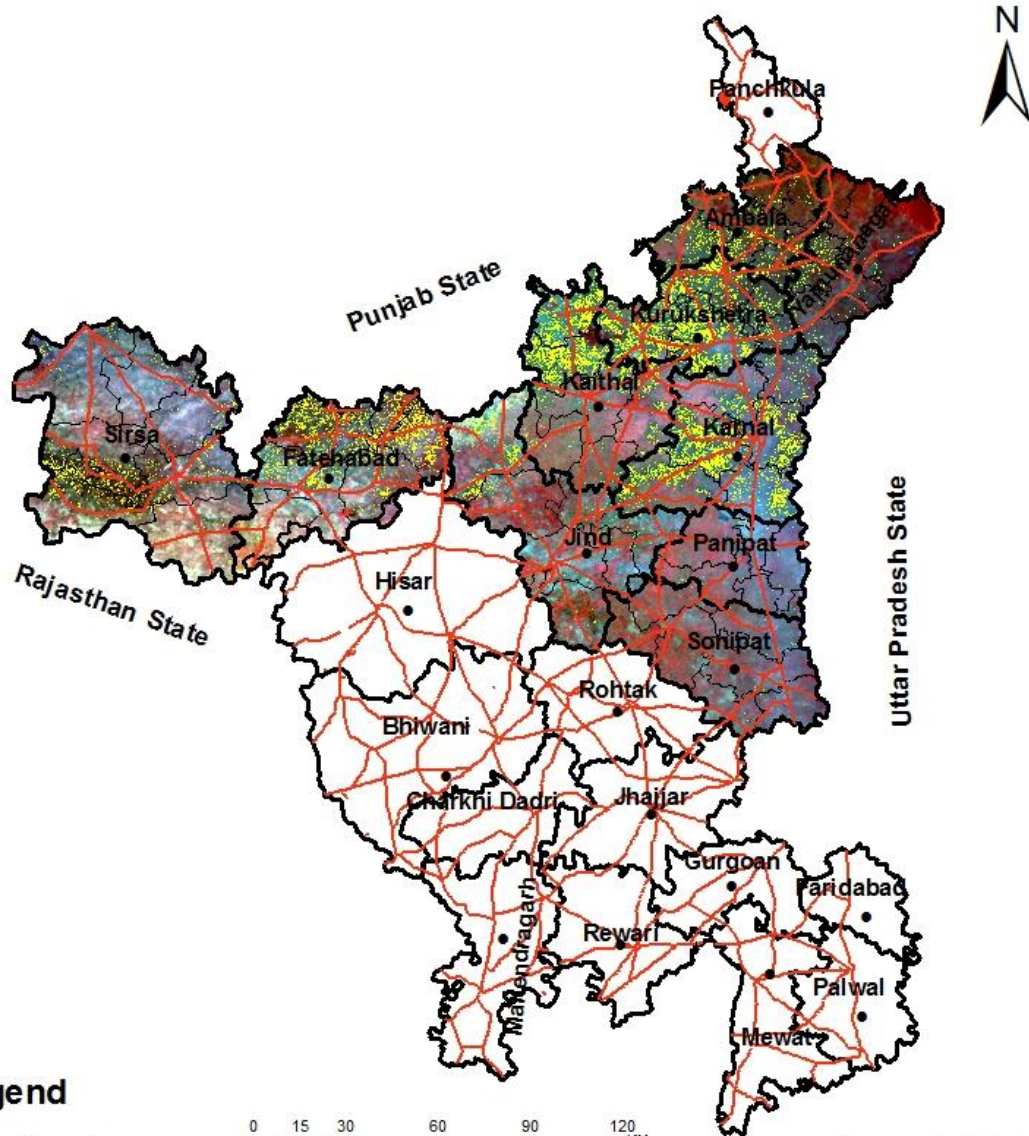
Table 2. Rice Stubble Burning Area in Project Districts for the year 2013 to 2017

S. No.	Rice Stubble Burning Area '000 ha.					
	District	2013	2014	2015	2016	2017
01	Ambala	15.6	10.8	9.0	9.9	12.9
02	Fatehabad	33.5	29.1	23.8	41.0	38.5
03	Jind	4.6	3.7	4.0	8.5	8.5
04	Kaithal	48.3	26.6	28.9	39.8	36.6
05	Karnal	67.7	34.4	44.0	45.8	46.1
06	K/Shetra	51.8	38.8	40.6	34.5	42.4
07	Panipat	1.0	1.2	0.5	0.9	1.0
08	Sirsa	19.9	18.1	6.3	18.5	16.1
09	Sonipat	1.5	1.8	0.1	0.5	0.5
10	Yamunanagar	3.4	4.5	5.7	3.0	5.1
	Total	247.4	168.9	163.0	202.3	207.7

Paddy Stubble Burning Area in 10 major Districts for the year 2013 to 2017. Stubble burning areas are depicted in yellow colour on the satellite Image



Rice Stubble Burning Area in Project Districts Depicted on Satellite Image (2017)



Legend

- Road
- Dist. Boundary
- Block Boundary
- Burnt Area



Source: Satellite Data

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