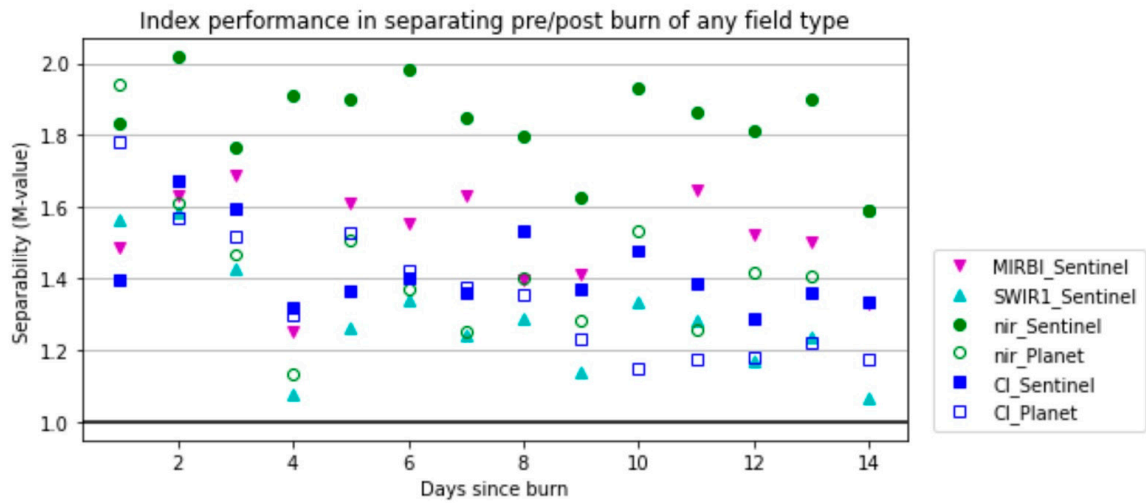
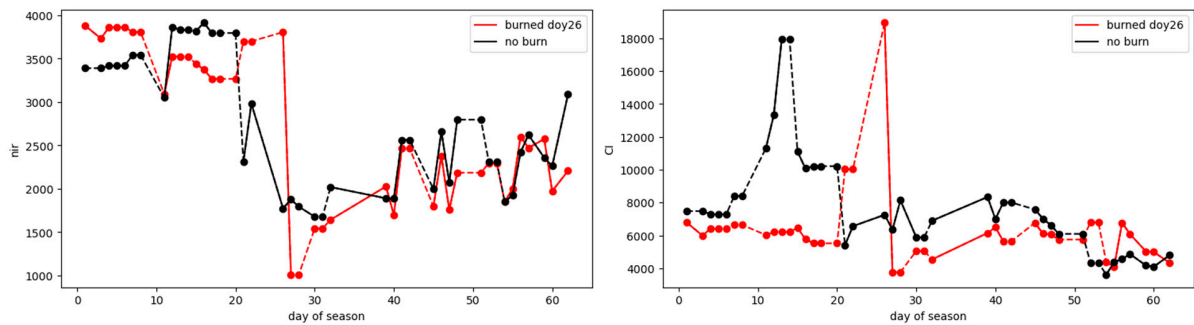


**Figure S1.** Median NDVI of 3168 rice plots visited on ground prior to burn season from Sentinel-2 observation on (a) 21-Aug-2019 and (b) 05-Sept-2019. These fields are assumed to be in production at this time, thus NDVI could be used to filter rice fields from other land use. However, the spread is wide. Even with a cutoff of 0.60 for masking fields, 100 fields (3%) are excluded from the analysis.



**Figure S2.** Index performance in separating pre- and post-burned fields with increasing time from the burn event. Indices showing the best separability, based on the parametric M-statistic, are shown here. Separability is considered to be good if the M-statistic is above one and excellent around two.



**Figure S3.** (a) NIR band and (b) char index (CI) signatures across the burn season (day of season 0 = 10-Oct-2019) for a pixel burned on day 26 (red) and a pixel not burned in the season (black). Dashed lines indicate that subsequent observations are more than one day apart. These represent ideal cases where image differencing is able to separate the burn signal because there is a clear pre and post burn observation with a single day separation. This may not be the case for a large portion of the data. Prior to developing a custom model of CRB, a signal-to-noise analysis with a time-series tool like the one used here is recommended to home in on the targeted signal and determine whether it will be detectable for high enough percentage of burned plots given noise in the imagery and likely missed observations.

**Table S1.** Articles processed in quantitative literature review on remote sensing of crop residue burning

article	article year	location	focus <sup>1</sup>	period	crop type	MODIS _BA	MODIS _AF	VIIRS _AF	other sensors	validation <sup>2</sup>
[1]	2016	India	6	2002-12	rice, wheat		1		MODIS EVI	
[2]	2022	Romania	8	2015			1		atm CALIOP /OMI	gbem
[3]	2006	India	1,6	2005	rice, wheat				AWiFS	

[4]	2009	India	6	2007		1		atm CALIOP	gbem
[5]	2009	Arabian	5	2007	all		1		
[6]	2021	China	8	2013-20	all	1			
[7]	2020	India	6	2008				atm	
[8]	2022		6	-				atm	
[9]	2023	India	6	2006-22	All		1		
[10]	2019	India	6	2016-17	rice, wheat	1			
[11]	2019	India	4	2013-14	rice		1		none
[12]	2010	SE Asia	6	2000-06	All	1		L3JRC	
[13]	2013	Taiwan	1	2009	rice			Formosat-2	116 ground plots
[14]	2017	India	6	2017				atm column	
[15]	2022	India	5	-				atm column	
[16]	2020	India	1	2014-18	rice			Landsat 8	50 "ground truth points" (no elaboration)
[17]	2019	China	3	2018	all		1	1	
[18]	2020	China	1	2014-15		1	1		GF-1 images (16m)
[19]	2022	China	1,7	2018-19	all		1	1	Himawari-8
[20]	2010	India	5	2016			1		PlanetScope
[21]	2021	India	1	2019	rice			Sentinel-2	visual inspection (mention "ground truth", no elaboration)
[22]	1996	UK	1	1995				AVHRR	
[23]	2023	India	1,6	2021	rice	1			
[24,25]	2022	India	1	2019-21	wheat			Sentinel-2	PlanetScope
[26]	2008	China	1	2006		1			
[27]	2021	China	6	2003-19	all		1		
[28]	2010	China	5	2007			1		
[29]	2016	Russia	1	2013	wheat, all	1	1	custom BA	digitized pixels in VHR images (burn, plow, residue, bare), >2000 train + 2000 test
[30]	2021	Ukraine	1,7	2016-17	all			1	digitized samples from Planet, Sentinel-2 and Landsat
[31]	2021	Ukraine	1,7	2016-17	wheat, corn	1		Fire CCI	digitized samples from Landsat, Sentinel-2, PlanetScope
[32]	2009	Ukraine	1	2002-08			1		
[33]	2020	China	3	2013-15	rice		1		
[34]	2023	China	8	-	all			local	
[35]	2023	China	6	2016-20	all			Himawari-8	
[36]	2019	China	9	-	corn				
[37]	2015	Pakistan	6	2016-17	all				
[38]	2018	India	4,6	2013-16	rice		1	atm (CALIOP, OMI)	gbem

[39]	2019	India	4	2002-16	rice, wheat		1		MODIS-NDVI	
[40]	2022	India	7,8	2017-21	rice, wheat		1	1		predicted vs. observed fires in VIIRS
[41]	2019	India	1	2017	rice				Landsat-8	
[42]	2018	China	6	2000-14	all		1			
[43]	2018	Thailand	6	2018	rice	1				
[44]	2020	China	2,3	2006-17	all		1			
[45]	2022	India	3	2002-20	rice, wheat		1			
[46]	2020	India	5	-						
[47]	2014	India	5	2012	all		1			
[48]	2022	India	5	2020	all			1		
[49]	2012	India	6	2008	all		1			
[50]	2022	India	1	2002-22			1			
[51]	2021	India	6	2017	rice			1		
[52]	2019	India	2	2001-18		1	1			
[53]	2020	India	5	2018	all		1			
[54]	2021	India	6	2007-20	all		1			
[55]	2017	Vietnam	6	2015	rice				Sentinel-1	
[56]	2018	Vietnam	6	2012-16			1			
[57]	2020	Vietnam	6	2015-17	rice				Sentinel-1	
[58]	2022	Vietnam	1,2	2020					Sentinel-1	
[59]	2021	China	5	2015	all		1			
[60]	2016	China	6	2012	rice	1				
[61]	2022	China	6	2012-20	all			1		
[62]	2019	India	8	2016	rice	1			Landsat	household surveys (pts per village, not field)
[63]	2013	Taiwan	1	2008-09	rice				FORMOSAT-2	
[64]	2015	China	1	2013-14	wheat		1			
[65]	2020	India	1	2003-18	rice		1	1		household surveys
[66]	2020	China	4	2013-15	rice		1			
[67]	2022	India	2	2003-19	rice		1			
[68]	2018	China	5	2006-14	wheat		1			
[69]	2022	India	1,5,6	2018-21		1				
[70]	2007	USA	1	2004			1			
[71]	2008	USA	1	2003-06	rice, wheat				MODIS-dNBR	29 plowed fields (training); Aster (30m)
[72]	2012	Russia	1	2008-09		1	1			
[73]	2020	China	5	2014-19			1			
[74]	2022	India	1	2012-20				1		
[75]	2023	China	3	2001-16					MODIS	
[76]	2022	USA	6	2012-18	sugar				particle	
[77]	2021	Malawi	5	2004-16					atm column	
[78]	2022	India	1,4	2019				1	FRP	

[79]	2022	Brazil	1,2,3	2008-12	sugar				Landsat	
[80]	2017	USA	1,4	2014			1	1	GOES	
[81]	2020	India	4	2017-18					atm column	
[82]	2002	India	2,4	1987-98						DMSp-OLS (nighttime satellite)
[83]	2008	India	1	2005			1		AWiFS	
[84]	2021	Iraq	1	2001-19	1					
[85]	2022	India	4,5	2016-19					atm column	
[86]	2019	Mexico	1	2003-14	all		1			
[87]	2020	China	1	2015			1			
[88]	2021	India	1	2018	all		1			
[89]	2013	India	2,4	2012			1			
[90]	2018	India	2,4	2003-17			1			
[91]	2022	Pakistan	2,4	2007-15					atm column	
[92]	2019	India	1, 2	2003-17			1			
[93]	2014	China	1, 2	2014-16			1			
[94]	2021	China	5	2001-17	1					
[95]	2021	China	4,5	2016-17			1			
[96]	2021	China	1	2001-17	all	1	1			
[97]	2015	NE Asia	1,7	2000-13	all	1	1			
[98]	2011	India	1	2006-09			1			
[99]	2020	India	1	2018	rice				Sentinel-2(dNBR)	"160 ground truth samples" (no elaboration)
[100]	2020	India	1,4	2017-18				1		
[101]	2021	India	2	2017-19				1		
[102]	2021	India	2,3	2001-18			1			Sentinel images (trained with some ground info)
[103]	2007	Australia	1	2005		1				
[104]	2016	China	6	2005-12	wheat					sensitivity analysis
[105]	2021	China	4,5	2007-19					atm column	
[106]	2022	China	2,3	2003-18			1			
[107]	2015	Pakistan	5	2010					atm column	
[108]	2016	Pakistan	5	2013					atm column	
[109]	2020	India	1	2014			1	1		
[110]	2022	Vietnam	2,6	2003-21	rice		1			
[111]	2011	India	5	2003-11	all		1			
[112]	2018	India	1,7	2003-16			1	1		
[113]	2006	India	8	2001	all		1			
[114]	2019	India	1 / 2	2002-16	all	1				
[115]	2018	China	8	0					Landsat	
[116]	2020	China	1 / 2	2003-17	all		1			
[117]	2018	China	1,6	2003-15	1		1			
[118]	2014	India	1	2010	rice, wheat				AWiFS, LIS-III (NDVI)	ground data from burned rice and wheat fields

[119]	2006	China	6	2000				GBA2000 (SPOT)
[120]	2020	China	2,3,4	2015-18		1	Himawari-8	
[121]	2019	China	5	2015		1		
[122]	2021	China	2	2001-18		1		
[123]	2012	Ghana	1	1989-06	all		Landsat	
[124]	2019	China	1,6	2014-16		1		
[125]	2016	China	1,6	1997-13	1			
[126]	2017	China	8	-		1		
[127]	2018	China/India	1,7	2016		1		Sentinel
[128]	2020	China	1,6	2012-15		1	Himawari-8	
[129]	2022	China	1,7	2015-19	1		Fire-CCI	
[130]	2021	China	3	2003-18		1		
[131]	2021	China	2	2012-19		1		
[132]	2012	China	5	2008	all	1		
[133]	2018	China		2003-17		1		
[134]	2020	China	8	2015	wheat		Landsat	GF-1 images (16m)
[135]	2021	China	1,7	2015	wheat		Landsat	Landsat
[136]	2022	China	3	2015-16		1		

<sup>1</sup> main focus/foci of article: 1-area estimation, 2-spatial/temporal trends in burning, 3- policy effect: impact evaluation/correlation with policy, 4-/correlation with externalities (pollution, etc.), 5-pollution source/transport/tracing, 6-pollution/emissions estimate, 7-product assessment/comparison, 8-methods development, 9-policy recommendations.

<sup>2</sup> gbem = ground-based aerosol/emissions measures

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