

- Earth Observations
  - Polar Orbiting – thermal anomalies & burned area
    - Space for Time
  - Geostationary – thermal anomalies & fire radiative power
    - Time for Space



Karnal, Haryana, India, October 9, 2018. REUTERS/Adnan Abidi

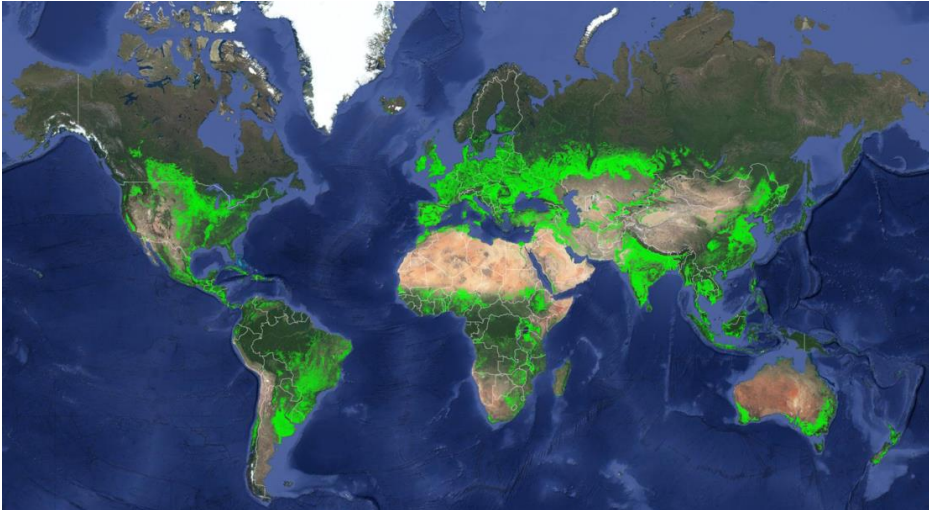
1

- In situ observations
  - Laws & policies protecting agricultural management vs. Bans and fines
  - Burning at sunset, plowing before sunrise



Karnal, Haryana, India, October 9, 2018. REUTERS/Adnan Abidi

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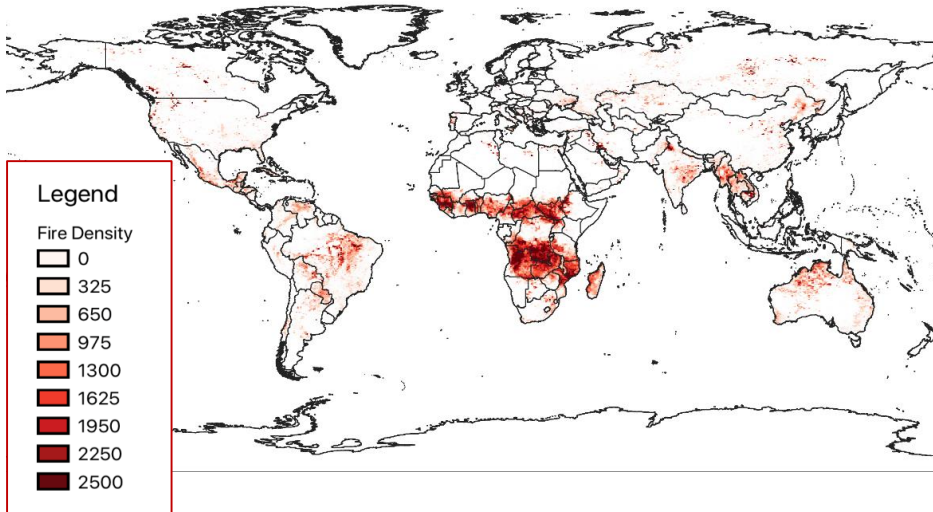


**In 2015, total of 1.874 billion hectares (roughly 12.6 % of global terrestrial area) of croplands in the world.**

Source: 30 m GFSAD30 Project of USGS <https://www.croplands.org/app/map>.

3

**Density of 2017 Open Burning in Cropland Dominated Landscapes;  
375 m VIIRS in a 0.5° grid**



4

**2017 Open Burning Emissions (Metric Tonnes);  
375 m VIIRS Active Fire Detections**

Rank	Country	BC	CO2	CH4	Rank	Country	BC	CO2	CH4
1	China	23,435	49,525,771	181,855	20	Slovakia	162	341,879	1,255
2	Russia	15,503	32,763,177	120,304	21	Hungary	103	217,282	798
3	Ukraine*	7,588	16,035,270	58,880	22	Czechia	52	108,918	400
4	United States	5,298	11,195,690	41,110	23	Denmark	47	98,790	363
5	Kazakhstan	1,758	3,714,738	13,640	24	Netherlands	42	87,967	323
6	Canada	1,429	3,020,158	11,090	25	Portugal	22	45,649	168
7	Italy	1,395	2,947,870	10,824	26	Luxembourg	7	14,985	55
8	Turkey	1,226	2,590,035	9,510	27	Lithuania	5	9,712	36
9	Romania	930	1,964,414	7,213	28	Latvia	2	3,469	13
10	Germany	696	1,471,160	5,402	29	Mongolia	1	2,497	9
11	Bulgaria	509	1,074,753	3,946	30	Sweden	1	1,526	6
12	Spain	412	869,959	3,194	31	Estonia	0.4	832	3
13	France	328	693,470	2,546	32	Slovenia	0.3	555	2
14	Poland	314	663,222	2,435	33	Finland	0	0	0
15	Belgium	258	545,979	2,005	33	Ireland	0	0	0
16	Croatia	232	489,924	1,799	33	Malta	0	0	0
17	Greece	207	437,199	1,605	33	Norway	0	0	0
18	Austria	171	361,720	1,328	33	Iceland	0	0	0
19	United Kingdom	170	358,528	1,316					

EU 27 countries  
\* Seeking to join EU

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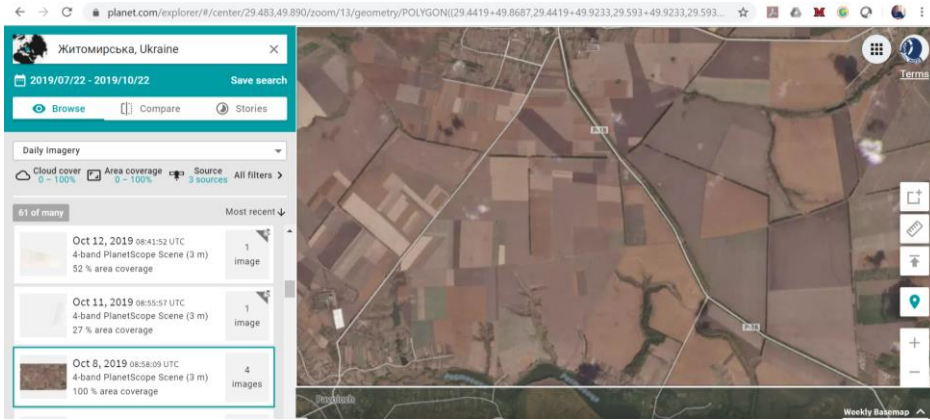
**375 m VIIRS active fires  
Southwest of Kyiv, Ukraine**



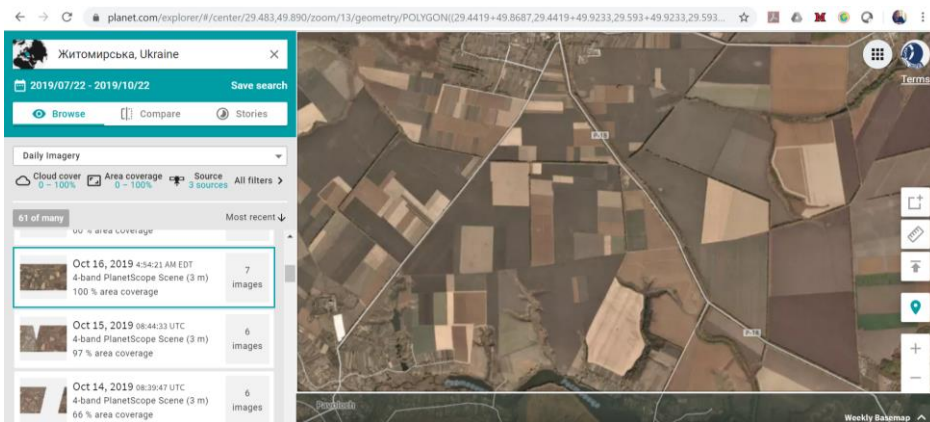
**1 km MODIS active fires  
Southwest of Kyiv, Ukraine**



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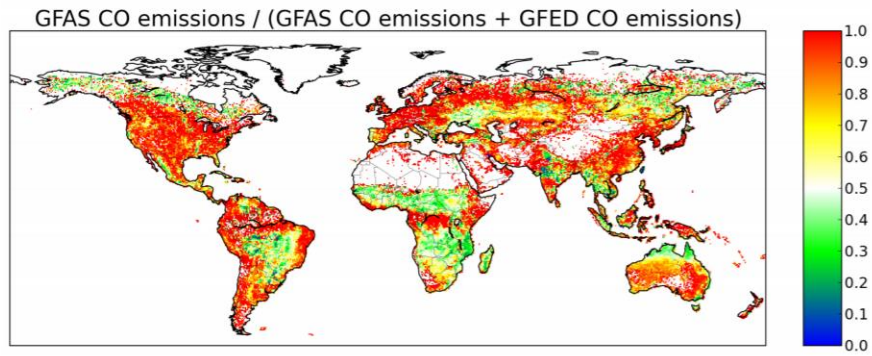


Figure 2.4: Ratio of GFAS / (GFED + GFAS) CO emissions. A value of 0.5 (white) indicates that both products predict equal emissions.