



Review of TFTEI Guidance Document on Agricultural Residue Burning

**Pam Pearson, Co-Chair, CCAC Agriculture Initiative
And Director, ICCI**

**INTERNATIONAL CRYOSPHERE
CLIMATE INITIATIVE**
www.iccinet.org
www.openburning.org

Definition and Types of Fire Use: “Agricultural Residue Burning” (ARB)

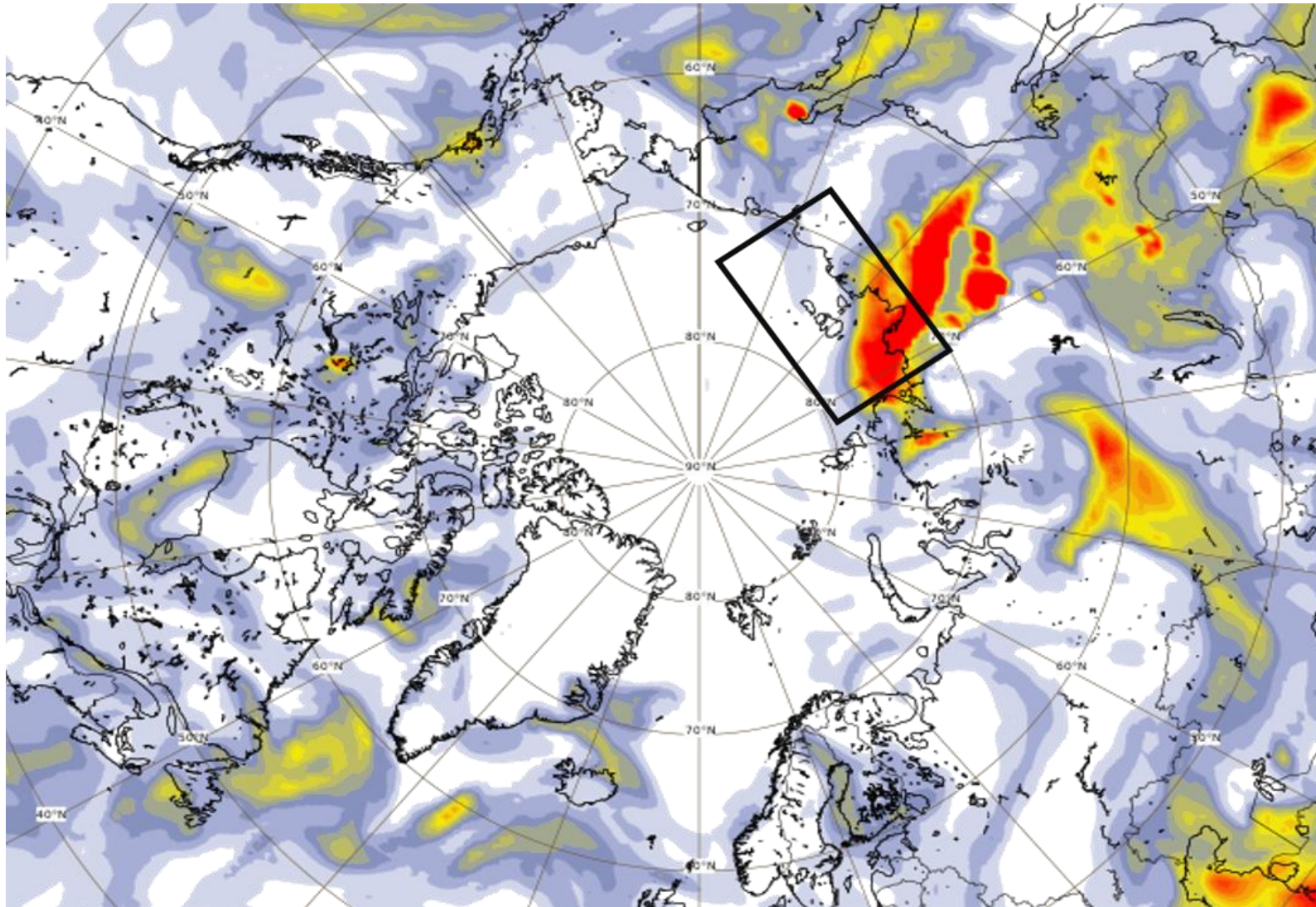
- Use of fire for any purpose in agro-forestry sector:
 - ✓ Burning of crop stubble prior to next planting
 - ✓ Clearing of weeds/parasites in fields or orchards
 - ✓ Clearing of land for cultivation (“first use;” reclaiming; slash-and-burn)
 - ✓ Pasture burning to “renew” grass
 - ✓ Clearing of understory prior to lumber harvest
 - ✓ *Wildfires* that spread from all of the above
 - ✓ Does NOT include ecosystem-based and cultural burns on wildlands; nor emergency fire prevention
- Important: For mitigation purposes, consider primary fire source, not lands burning: so inventories should include wildfires that spread from the original fire

Impacts

- **HEALTH:**
 - Higher mortality from respiratory/cardiac illness, despite episodic nature
 - Increasingly a primary pollution source, especially as other sources decrease and wildfire risks increase in warmer/drier climate
- **ENVIRONMENT**
 - Also water pollution and biodiversity loss
 - Soil degradation and erosion
- **CLIMATE**
 - Largest BC source (when all ARB-origin fires included, also wildfires)
 - Large OC portion less relevant in reflective Arctic
- **CROP YIELDS/FOOD SECURITY**
 - Decreases yields/increases fertilizer needs 20-35%
 - Brittle, nutrient-depleted (including C) soils

Record Arctic Circle Fire Emissions 2019 and 2020

*Fires and Smoke Transport Over Arctic Ocean, July 12, 2020
(estimated that nearly all fires spread from ARB)*



Reducing ARB Emissions: Alternatives

- **Good BAP and BAT (or “good practices”) nearly always exist, but very crop- and ecosystem specific**
- **Crop Stubble:**
 - **Low-Till: Incorporate stubble into soil (earliest alternative in EU)**
 - **No-till/direct seed: Plant through stubble**
 - **Conservation agriculture: No-till suite with cover crops, often manure injection, etc – strong adaptation benefits by further lowering water use and soil erosion**
 - **“Harvest” and monetize straw: bio-energy (esp with manure), bedding, fodder**
- **Pasture: Harvest for hay (burning annually does not “fertilize”)**

Alternatives to ARB

- **Clearing Fallow Lands: Mechanical removal, mulching and incorporation (some single machine technology, such as “The Beast” cutter and mulcher)**
- **Forest Understory:**
 - **Mechanical removal, “forest mulching” and incorporation;**
 - **Removal for production of bio-energy (pellets, wood chips)**
 - **Pile burning if good control possible**
- **Orchard Understory: Mow and mulch, similar co-benefits to low-till**
- **Importance of farmer-supportive measures (extension services, financing, subsidies etc.) in addition to regulatory measures**

Monitoring and Potential Emissions Inventories Greatly Improved: 2017 Fire Emissions in Cropland-Dominated Landscapes (375 m VIIRS NH Active Fire Detections)

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

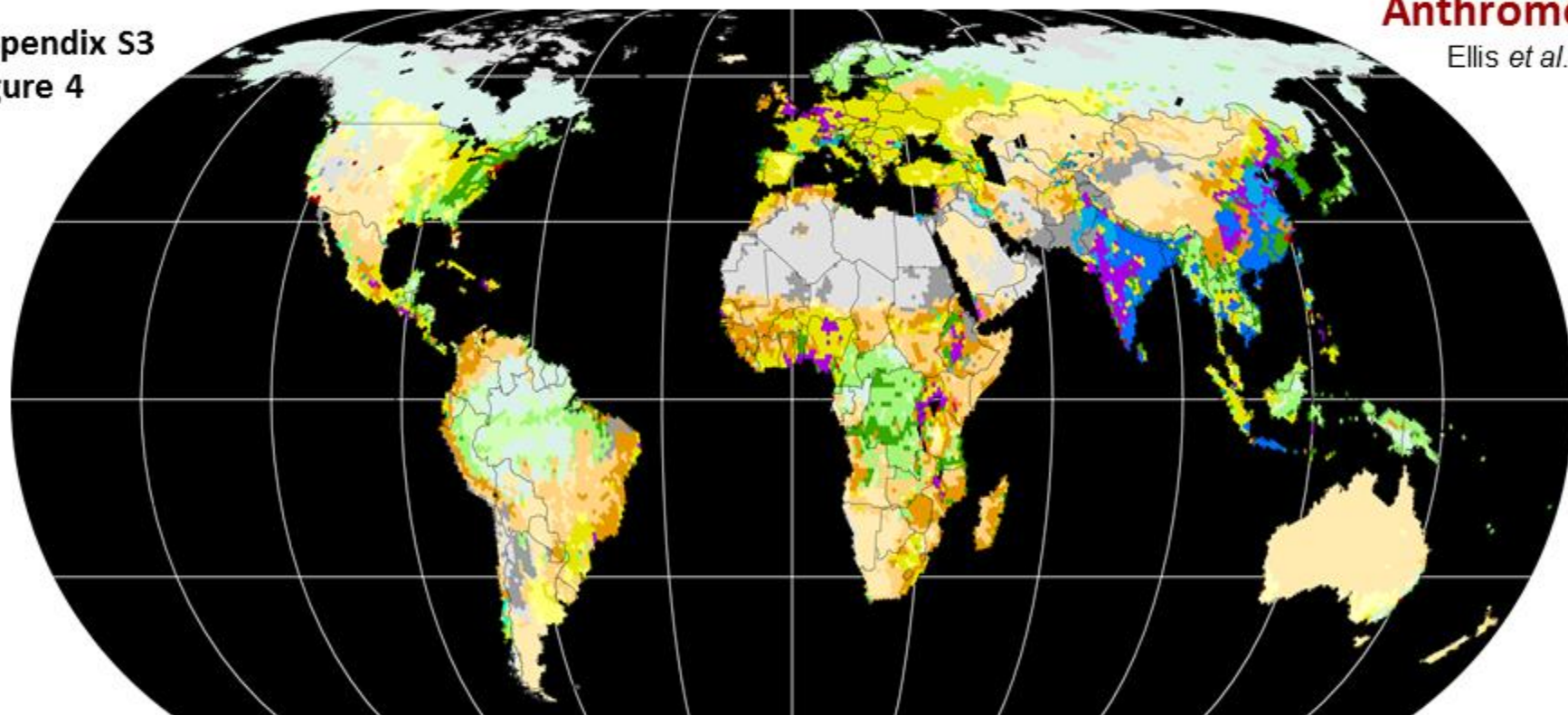
*Italics: EU 26
(Metric tonnes)*

Anthropogenic Biomes (v2)

Appendix S3
Figure 4

Anthromes 2

Ellis et al. 2010

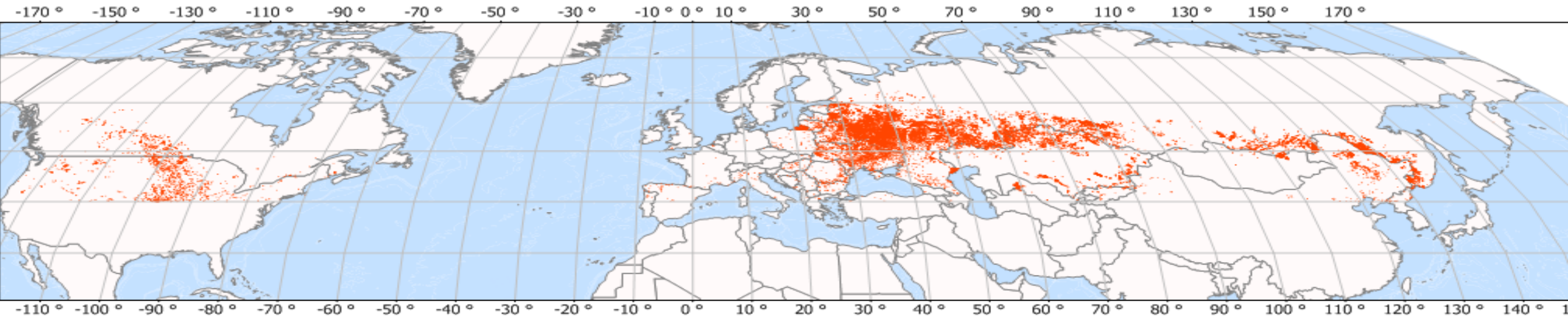


Open burning currently spreads from Croplands to other human-dominated landscapes.

What about the future?

High Reduction Potential in EECCA Countries

Agricultural Fires* - April 2006



*all fires north of 40N Latitude

Review Considerations

(With sincere thanks for welcome comments!)

- **Transition to norm of fire use being the exception, not the rule**
- **Nearly always negative cost to farmers (some exceptions) even without monetizing extensive health and environment benefits**
- **Challenge of interaction between air quality experts and agronomists/farmers**
- **Important to make connection to increasing wildfire spread from ARB and human activity (myth of “natural” fires) in warming climate**
- **Source of fire defines mitigation potential: prevention before firefighting**
- **Do not confuse ARB with fire prevention burns or wildland ecosystem burns**
- **More on forest management and scenarios for managed burns**
- **Good no-fire practices *nearly* always exist to use of fire**

ARB Emissions Reductions in Future

- **Reduction of ARB may be the single largest AND most cost-effective mitigation option for PM2,5 and BC reductions for health, food security and climate**
- **Different alternatives for different crops: but these methods almost always benefit farmers economically in long term (and sometimes in short-term) – speed up transition**
- **No-fire methods will need to become the norm, with fire use the exception, in order to prevent wildfire spread and also to aid adaptation and a more resilient agricultural sector**
- **Guidance Document an important UNECE signal and roadmap (also outside UNECE)**