Mitigating Open Agricultural Burning

Benefits to Farmers, Air Quality, Climate and Food Security

INTERNATIONAL CRYOSPHERE CLIMATE INITIATIVE

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CLIMATE & CLEAN AIR COALITION
TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

Basics of Open Burning Mitigation: Improving Health, Food Security, Biodiversity Protection and Climate

Pam Pearson, Director, ICCI

INTERNATIONAL CRYOSPHERE
CLIMATE INITIATIVE
www.iccinet.org

What is "Open Agricultural Burning"?

- **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**
  - ✓ **Does NOT include prescribed burns on wildlands or emergency fire prevention**

- **Important: Primary fire source, not lands burning: so includes wildfires that spread from the original fire**

Open Burning Impacts: Wildfires, Infrastructure, Accidents

Wildfires spread from set agricultural fires compound other impacts (multiple orders of magnitude)

- **Loss of forestry and pastureland resources**
- **Loss of biodiversity from valuable natural woodlands and grasslands**
- **Infrastructure loss and damage**
- **Loss of life from accidents, firefighting**
- **Wildfires extremely "hot," inject higher into atmosphere, spread pollution and BC much further**

BOTTOM LINE: Defining wildfires originating from set ag fires as "natural" a barrier to proper mitigation

Health Impacts: Growing Understanding

- **Burning a PRIMARY source of air pollution as other sources (energy, diesel transport) come under greater control**
- **Despite its EPISODIC or SEASONAL NATURE**
- **In a rapidly changing, more extreme climate**

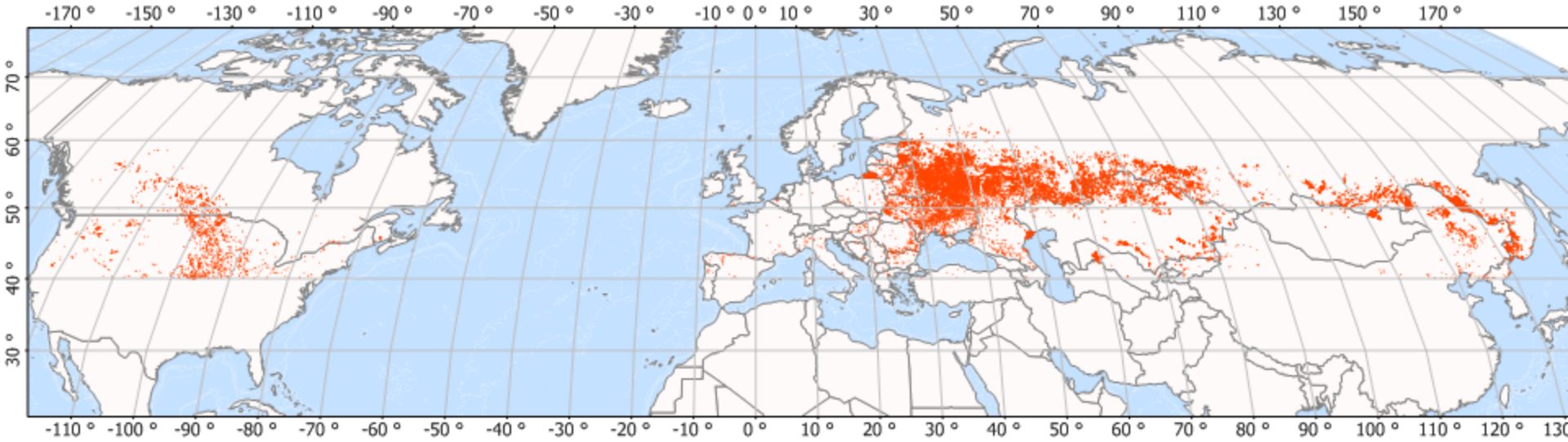
  - ✓ **Higher mortality from respiratory or cardiac illness, especially among young and elderly**
  - ✓ **Higher morbidity INCLUDING LONG AFTER FIRE EVENT from respiratory illness (asthma, pneumonia)**
  - ✓ **Increased mortality/morbidity due to accidents**
  - ✓ **Also in cities!**

Impacts: Climate

(especially “cryosphere”)

- Emissions and impacts travel (regional/hemisphere)
- Set fires, AND the fires that spread from them, release methane, CO, CO2, black carbon
- Largest single BC source globally (36%),close to cryosphere = more intense regional warming/glacier and snow melt
- Wildfires spread from set agricultural fires lead to additional pollution and climate impacts.
- Not (really) carbon neutral due to wildfire spread
- Not (really) carbon-neutral due to humus C loss

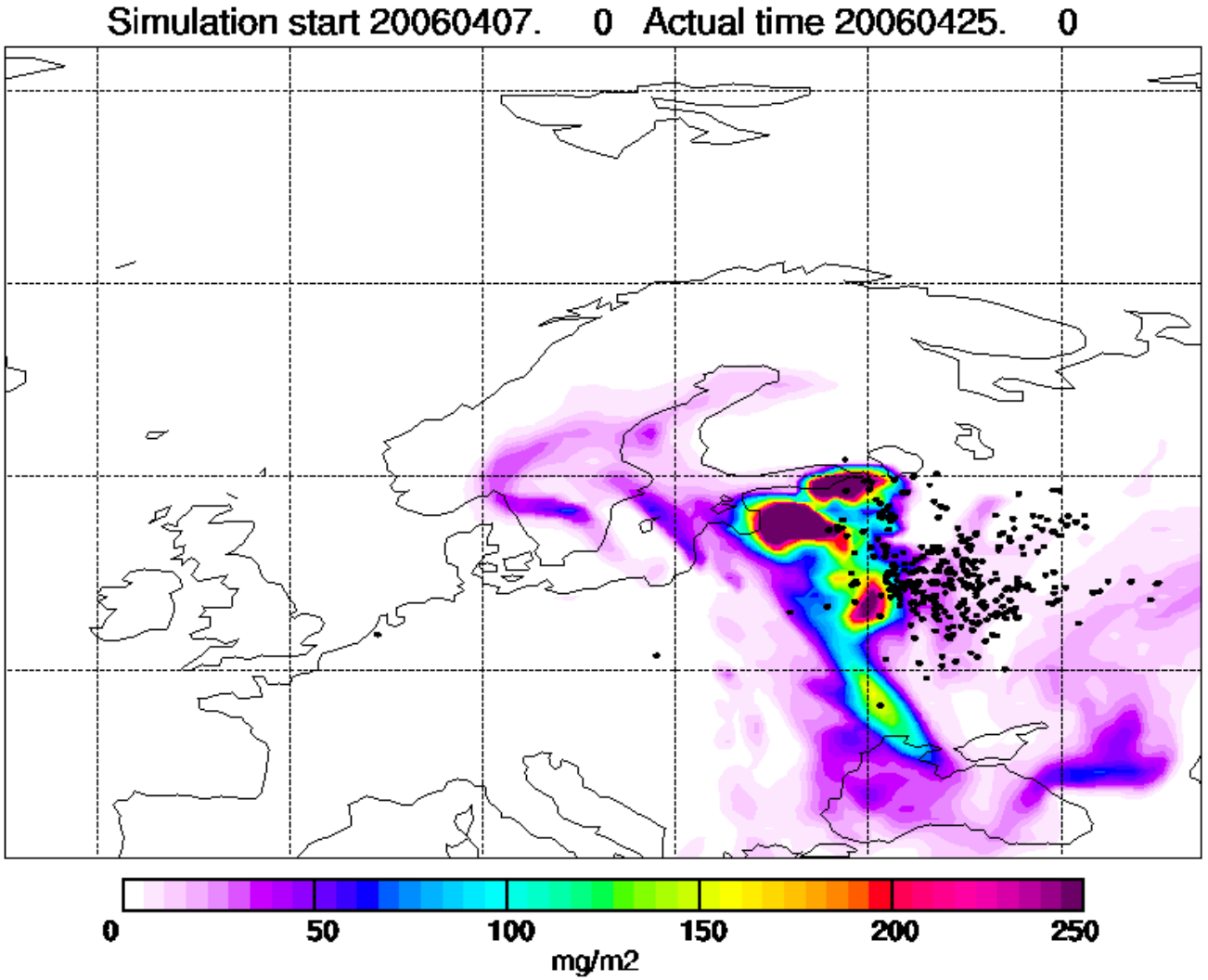
Agricultural Fires* - April 2006



*all fires north of 40N Latitude

International Cryosphere
Climate Initiative

Transport of Ag Burning Emissions into the European Arctic (NILU animation, Stohl et al)



Extreme Air Pollution

Picture courtesy: Ann-Christine Engvall

Farmer Impacts: Lower Crop Yields, Higher Fertilizer Use, Greater Erosion and Field run-off Water Pollution

- **Long-known impacts on humus (Soviet studies from 1930's)**
- **Only more recent: decreases soil fertility and crop yields by 25-30%**
- **Corresponding 25-35% greater fertilizer use: need to compensate lower soil fertility with fertilizer (UC-Davis studies during transition to no-burn early 2000's)**
- **More brittle soils and fertilizer use → More erosion, run-off and water pollution; and secondary air pollution (ammonia, PM2.5 formation)**

Climate Impacts: Methane Release

https://www.youtube.com/watch?time_continue=156&v=FWOhcSVW3p0&feature=emb_logo

https://www.ccacoalition.org/en/news/nasa-releases-first-3d-volumetric-visualisation-methane-our-atmosphere

Combined Benefits: Adaptation + Mitigation

- **Low-till and especially, no-till essential to adaptation**
- **Holds moisture during drought, holds soil during extreme rains**
- **Preserves water resources and less water pollution from fertilizer and erosion in time of water scarcity**
- **More reliable yields in changing climate**
- **“Negative emissions” and carbon drawdown (IPCC SR on Lands)**
- **Some controversy role of lands – but NOT of formerly burned lands**

= Carbon financing (national, GCF, GEF, NEFCO, EIB etc.)

CCAC Ag Initiative Approach

- **Step 1 (Always!): Mapping of fires nationally/regionally over at least a decade to detect clear patterns.**
- **Outreach to farmers, regional experts and governments through conferences and missions: Why do just these lands and farmers burn? What crops do they burn? What are the alternatives?**
- **Demonstration projects – show it can be done at local level – combined with policy work with local, regional, national governments.**
- **Continued mapping and public outreach (Twitter, etc.)**
- **International expert involvement and engagement ("Strategic Support Groups," mapping groups and networks).**

Better Monitoring Technology:
Better Tracking of Sources and Emissions

- **New VIIRS satellite mapping captures 4-6x more fires than older MODIS satellites**
- **VIIRS can differentiate crops and burning conditions (plant mass, dry/wet), with more reliable emissions estimates**
- **Burning is NOT carbon neutral: add to suite of negative-carbon tools**

Peru, 2015-17 from VIIRS

(compare with total 159,000,000 Mt CO2 in 2012):

YEAR	Black Carbon Mt	CO2 Mt	CH4 Mt	PM2.5 Mt
2015	54,605	170,856,059	537,797	940,285
2016	64,944	203,061,615	640,856	1,121,869
2017	45,189	141,136,684	446,023	772,418

Low-cost Alternatives

- **GOOD ALTERNATIVES EXIST: No-burn methods proven across the agricultural sector to increase yields/profits.**
- **Crop Stubble:**
  - **Low-Till: Incorporate stubble into soil**
  - **No-till/direct seed: Plant through stubble**
  - **Conservation agriculture: adds cover crops, manure**
  - **"Harvest" and monetize straw: for bedding, pellets, bricks**
- **Clearing Understory: Mechanical removal and incorporation or production of wood chips**
- **Pasture: Harvest for hay (burning does not "fertilize")**
- **FARMER EDUCATION, INCENTIVES KEY and may include micro-financing**

Lessons Learned:

- **NO-BURN ALTERNATIVES SUPPORT SDG GOALS: food security, greater economic security, adaptation/resilience, cleaner water, family health, soil and climate all benefit**

- **DON'T DEMONIZE THE FARMER: No farmer "likes" to burn, but lack reliable alternatives and support for transition – simply banning burning never works**

- **CHANGE CAN COME QUICKLY: Example of Baltics/Poland with EU accession; Argentina/Eastern Bolivia this decade**

"New Messages"

- **Health Impacts**
  - **Growing body of evidence from wildfire studies**
  - **Very young especially long-term impacts**

- **Yields and Fertilizer Use**
  - **Higher yields confirmed *when not offset by fertilizer***
  - **25-35% less fertilizer needed**

- **Erosion, water pollution and eutrophication**

- **Soils as carbon sink (or at least not source)**


Thank you!
www.openburning.org