



**SLCPs and Agricultural Burning:
Promoting Alternatives to Open Burning
in Russia and Ukraine
Experiences and Future Initiatives**

**Gail Stevenson, Alex Gittelson,
Svante Bodin, ICCI**

**International Cryosphere Climate Initiative (ICCI) and Nordic Environment
Finance Corporation (NEFCO)**

Background

Svante Bodin

Open Burning

- **Open burning (burning on agricultural or arable lands) globally is a significant source of black carbon (soot) and other harmful particles**
- **Open burning has considerable climate impacts, especially close to cryosphere (snow and ice) regions, like the Arctic, where it deposits, darkening the surface and causes greater melting and warming.**
- **Agricultural burning negatively impacts soil quality, may decrease crop yields, endanger food security and diminish farmer economic opportunity**
- **Impacts on human health can be severe: can lead to much higher mortality (i.e. fires of 2010: estimated 35,000 additional deaths).**
- **Causes accidents due to low visibility also source of mortality/morbidity**

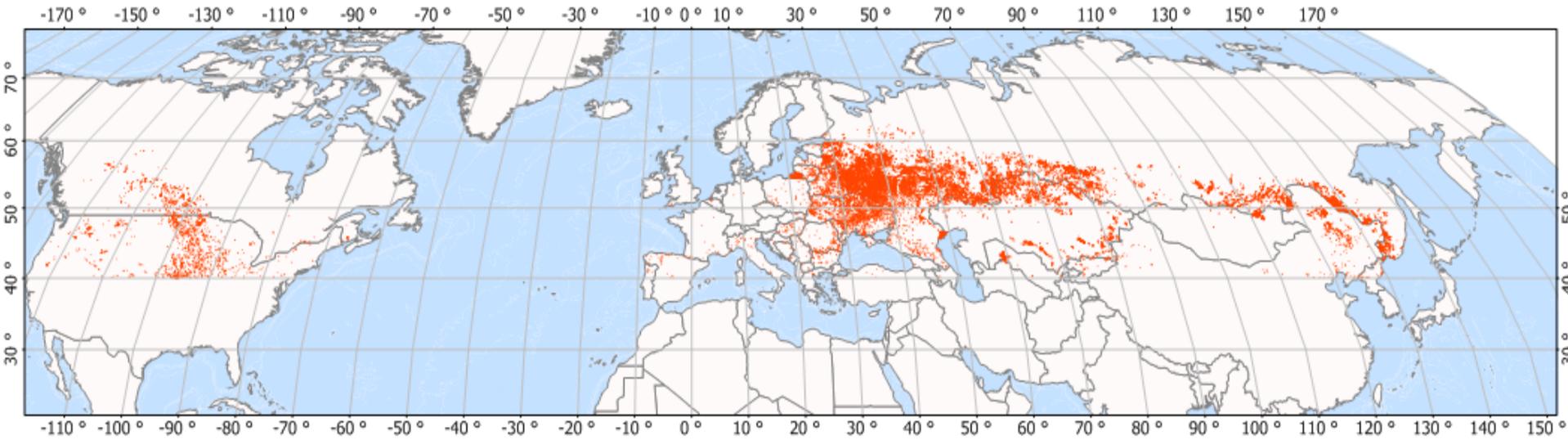
Impacts both regional and local

- **Fires burn out of control, spreading and causing forest and field fires that release additional BC (as well as methane, CO, CO₂)**
- **Smoke and climate impacts can travel great distances. Example to follow**
- **Each burn damages the soil more by destroying organic matter deeper (less humus content), also increases erosion and creates need for more fertilizer**

By the numbers...

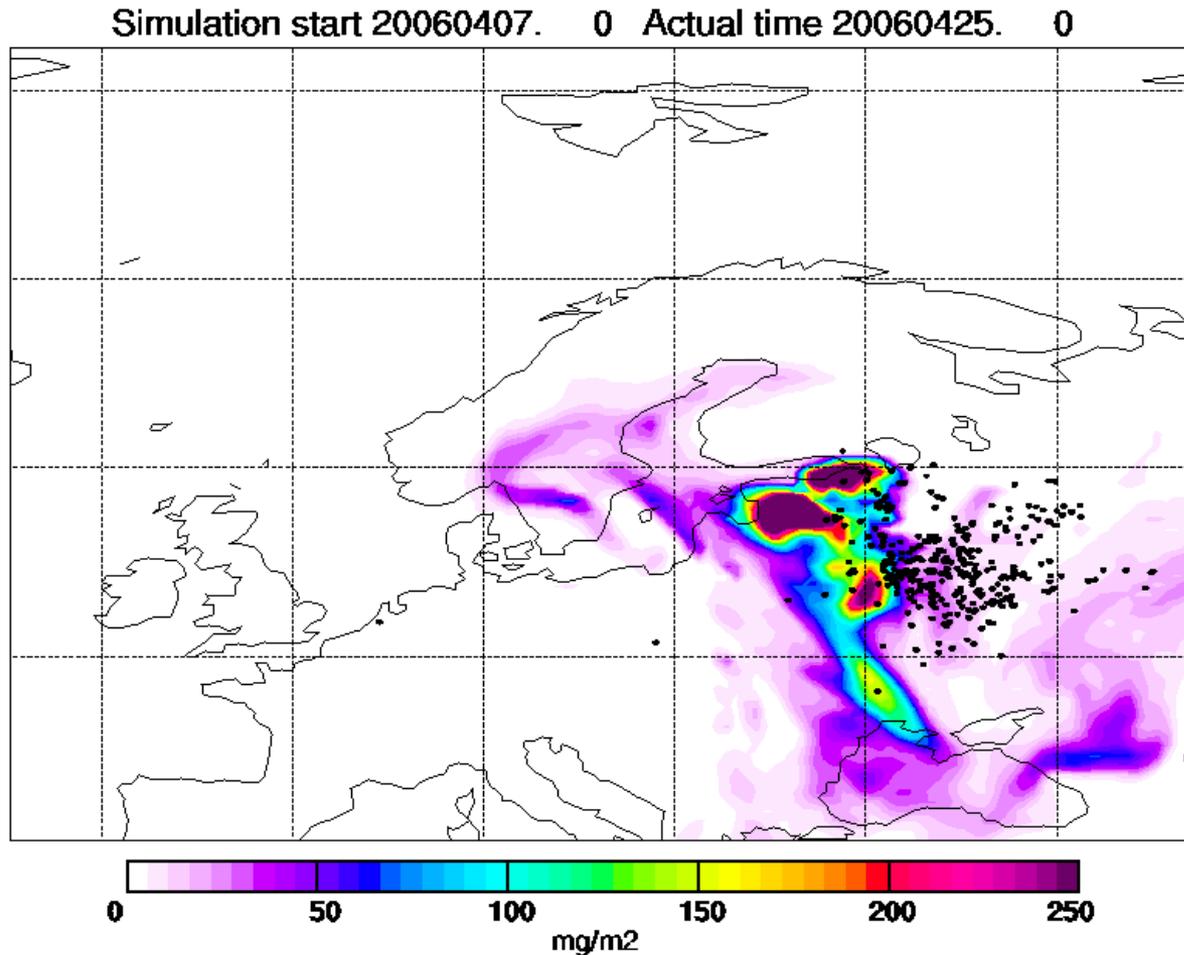
- **Global BC emissions from Open burning, including the agriculture and forestry sectors, vary between 35% (UNEP) and 45% (UNFCCC), but these are double or triple the amount of other sources (diesel, residential biofuel or coal)**
- **But most forest fires originate from agricultural burning**
- **In Russia, estimates range from 30% and up to 90% of forest fires stem from burning of agricultural and arable lands**
- **According to 2010 Arctic Council Working Group study (Lamarque et al, ACP), about 170 Kton per year of black carbon emissions in Russia come from grass and forest fires, compared to about than 40 Kton/yr in Canada and 25 Kton/yr in the United States, and almost 0 in Nordic countries**

Agricultural Fires* - April 2006



*all fires north of 40N Latitude

Transport of Ag Burning Emissions into the European Arctic (NILU animation)



15-08-14

Extreme air pollution



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Picture courtesy: Ann-Christine Engvall

Extreme air pollution



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Picture courtesy: Ann-Christine Engvall

Open Burning and SLCP

- **Reduction of agricultural burning may be one of the largest AND most cost-effective mitigation option for SLCPs affecting not only the Arctic, but other cryosphere regions: impacts more certain over ice and snow**
- **Strong benefits for farmers, health, infrastructure if non-burning alternatives are introduced**
- **But alternatives highly crop dependent and regional differences are important, but these methods ascendant across the board and benefit climate, adaptation to extreme events, fix carbon in addition to air quality benefits**

Open Burning in a Global Policy Context

- Ties to international air quality commitments, e.g. the revised Gothenburg Protocol (LRTAP), Male Declaration and the Arctic Council Framework for Action on SLCP
- Agricultural burning easy “win” for meeting PM2.5 commitments.
- FAO already engaged on GHGs, decreasing burning should be added from food security, development and climate perspective
- CCAC- Climate and Clean Air Coalition- is looking at initiating pilot projects on eliminating open agricultural burning in the *Himalayan and Andean regions* applying similar methodologies as has been developed in Russia but adapted to regional circumstances.

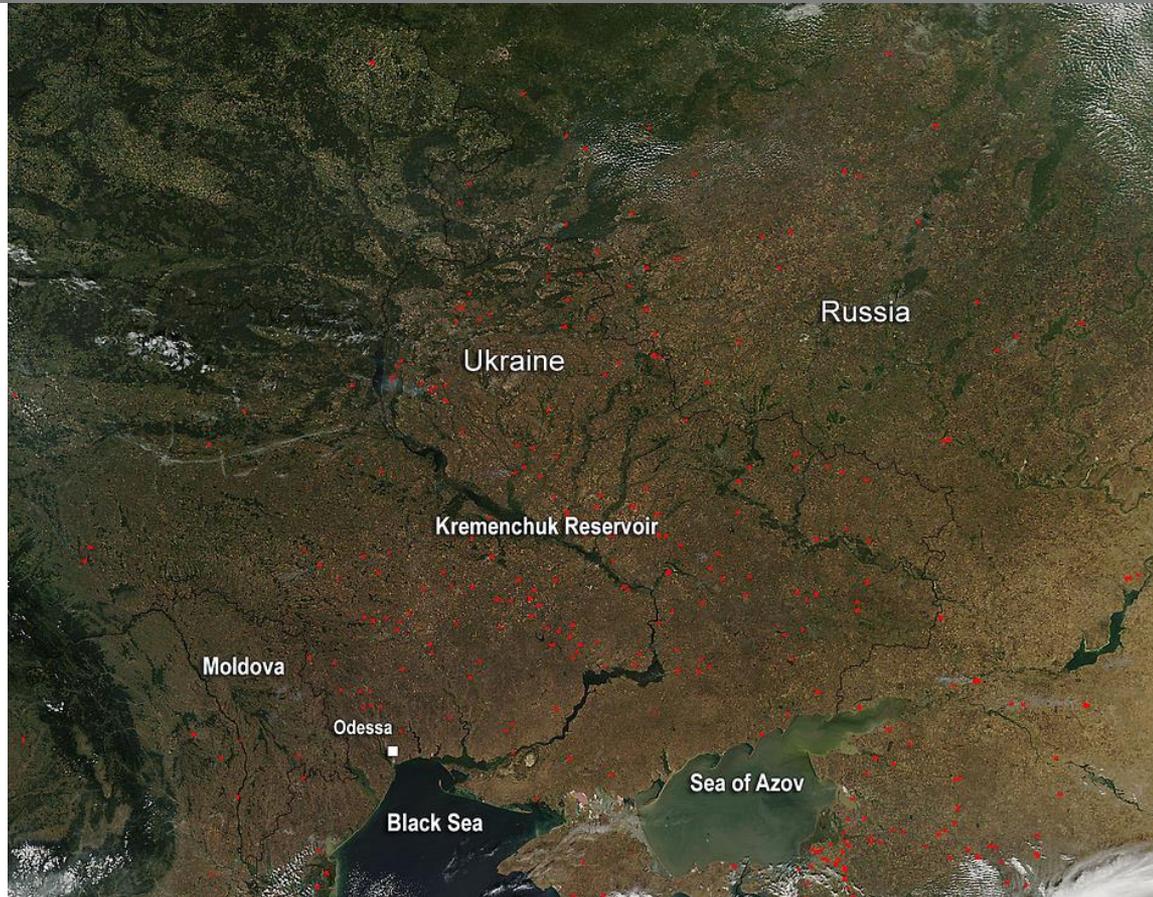
Russian Project

Gail Stevenson

Decreasing Impacts from Burning: Early Project Approach

- **Where does burning take place?**
- **What crops are being burned, and when in the season?**
- **Why do farmers burn these particular lands?**
- **What are the available alternatives (no-till, low till, strip till, etc)?**
- **What are the barriers to their implementation?**

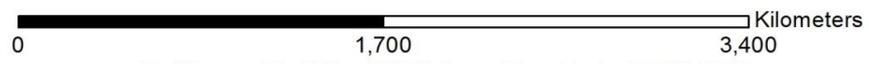
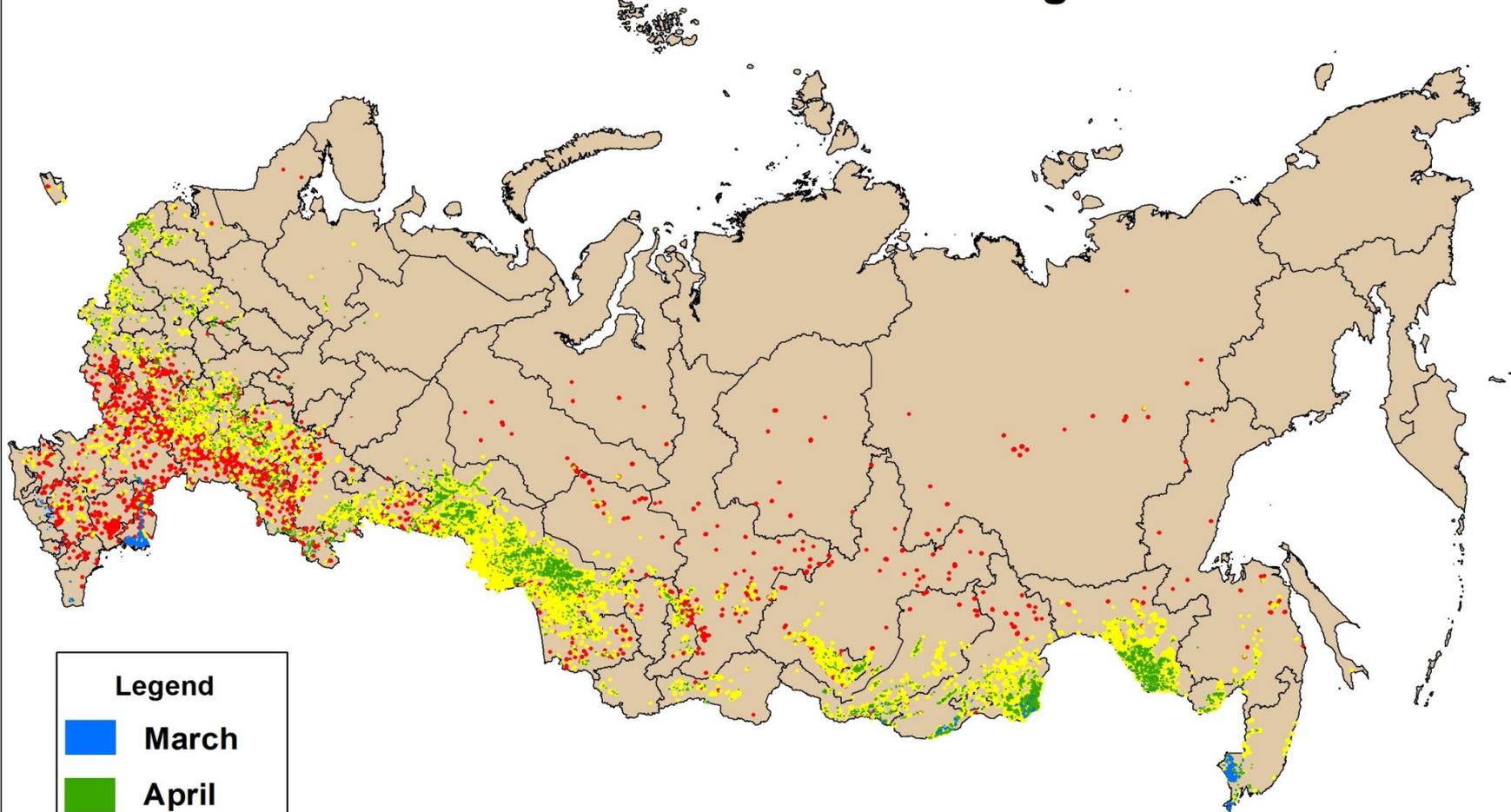
September 2014 fire hotspot: Ukraine and Russia



Each hot spot, which appears as a red mark, is an area where the thermal detectors on the MODIS instrument recognized temperatures higher than background. When accompanied by plumes of smoke, as in this image, such hot spots are diagnostic for fire. Image courtesy of Jeff Schmaltz, MODIS Rapid Response Team.

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2006 Spring Burning in the Russian Federation (All Land Cover Types) Burned Areas 500 m² or Larger



*As Observed By 500 m MODIS Burned Area Product (MCD45A1)

Analysis and cartography completed by Dr. Jessica McCarty,
Research Scientist II, Michigan Tech Research Institute, USA



2008 Fall Cropland Burning in the Russian Federation

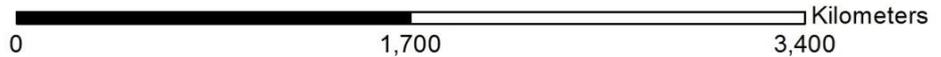
Burned Areas 500 m² or Larger



Legend

- August
- September
- October
- November

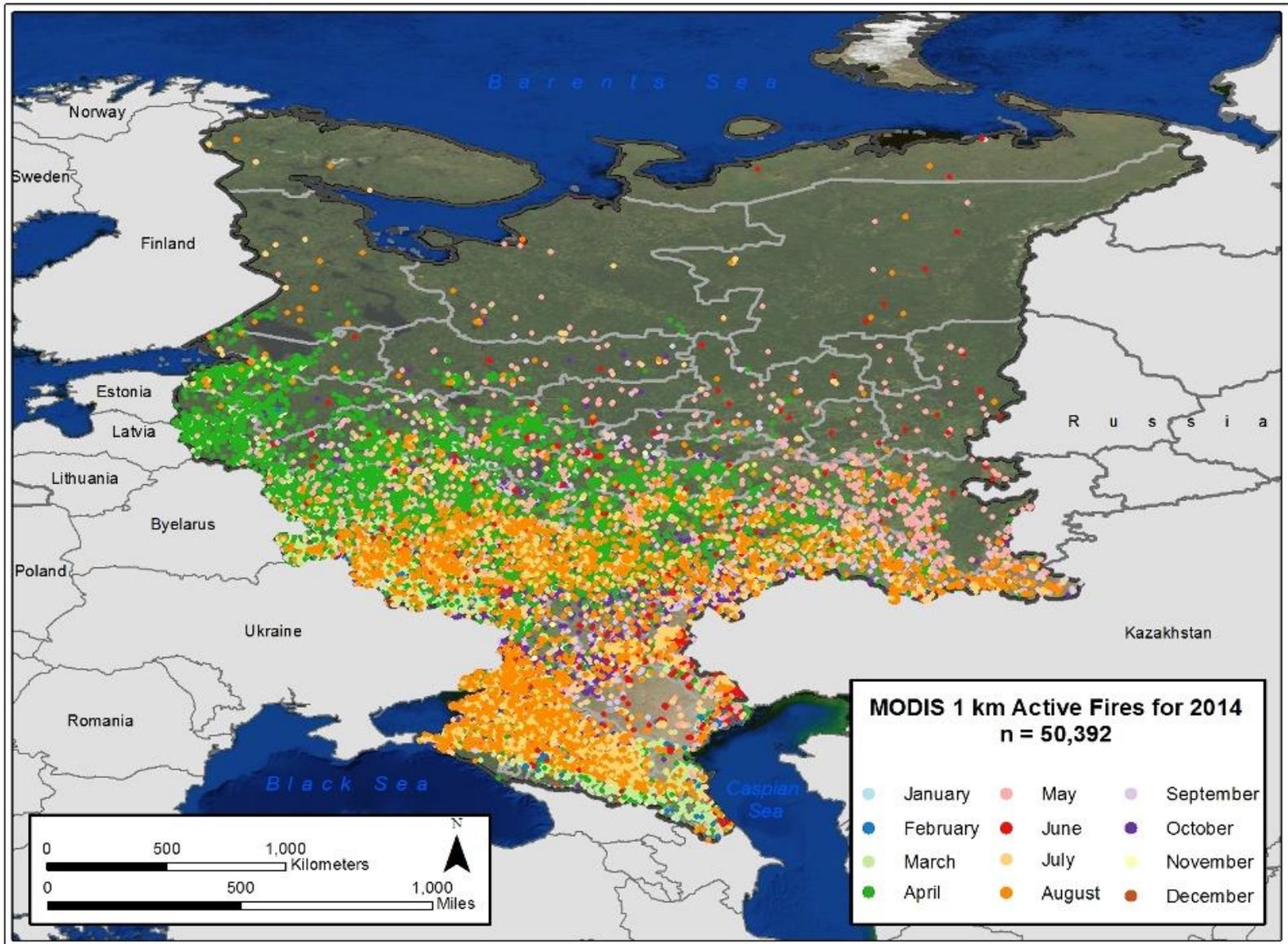
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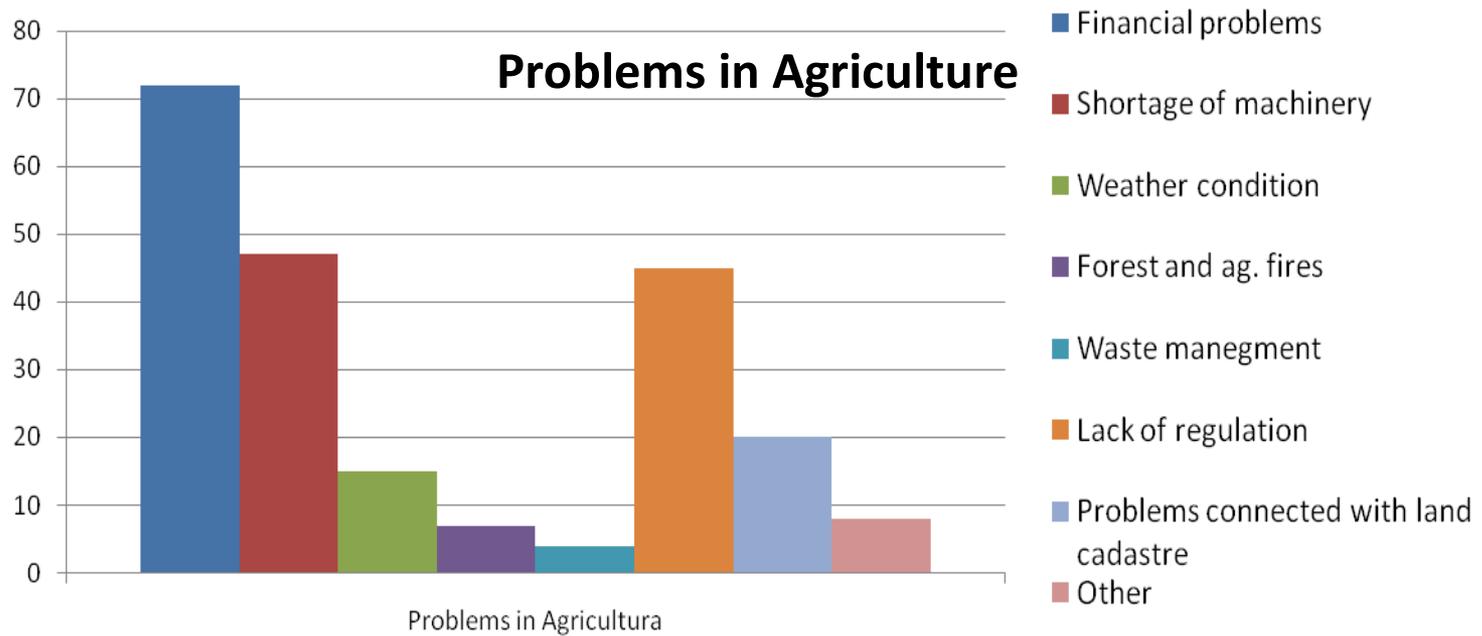
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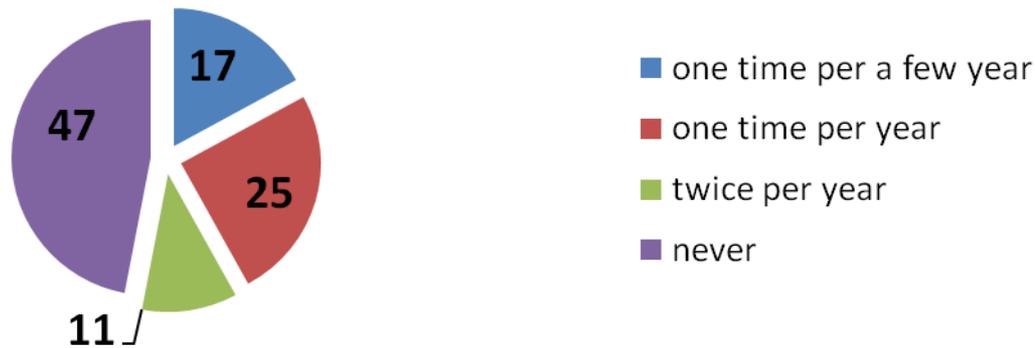




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How often do you have to burn ag. waste?



Initial Lessons Learned:

- **Although open burning of agricultural lands has a long history in Russia, the problem has become much worse in the past 20 years**
- **Agricultural burning negatively impacts soil quality and yield**
- **Spring, summer, fall burning all important for the Arctic**
- **The political-economic context is moving to support alternatives**
- **Positive interaction with authorities is desirable and possible**
- **Farmers see that climate in Russia is getting drier and warmer**
- **Education across stakeholders about all of the above is key**

Russia and Ukraine

Financing and

Opportunities in Ukraine

Alex Gittelson

Project Components: Multipronged and Iterative

- Surveys of farmers
- Project working group includes Russian field experts and lobbyists
- Satellite monitoring with groundtruthing missions
- Study tours to Sweden (or other Nordic countries welcome!)
- Field Days to share information
- Demonstrations farms
- Work with local authorities on legislation/political support
- Local field staff
- Wide dissemination of results and information to stakeholders
- Determination of barriers (financial, equipment, etc.) to success

Results

- **Multi-pronged approach key to rapid transition to alternative methods (Poland and Baltics, Krasnodarsky Krai)**
- **Studies of Krasnodarsky Krai show best results**
- **Tula close to Moscow and national officials for demonstration**
- **Design of financing mechanism to support farmers pursuing alternative methods**
- **Strong international presence among alternative equipment vendors (among Nordics especially Finland, Denmark and Sweden)**

Results (continued)

- **Seminars and expansion of model farm system locally key to showing how study tour information can be implemented locally**
- **Leningradskaya would benefit the most from a cooperative equipment-sharing system**
- **Local, regional, and national engagement key to policy changes**

Lessons Learned at Present

- **Small investments in new technology (choppers, collectors) would greatly quicken the pace of transition to non-burning methods**
- **Equipment loan/credit rates are sky-high (20-25%), which is what is stopping farmers from adoption**
- **Importance of impact on soil quality and crop yields to farmers (perhaps of greater concern than health and infrastructure risks)**
- **Food security, memory of 2010 fires important**
- **Window for great attention due to high incidence of 2015 fires**
- **Strong desire in Ukraine to adopt more European agricultural methods**

Lessons Learned at Present (continued)

- **Different motivations for burning on different land use types (time and weather specific nature of planting seasons, pasture vs deferred fall burning)**
- **The interest in alternative uses of straw for feed, heating, or energy depends on the individual farmer as well as feasibility (including financing)**
- **Small landowner or abandoned lands burned for “aesthetic” reasons as well as for pest and weed control**
- **Farmer education, combined with financing and legislative supports key to success**



www.iccinet.org

www.openburningcryosphere.org

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