

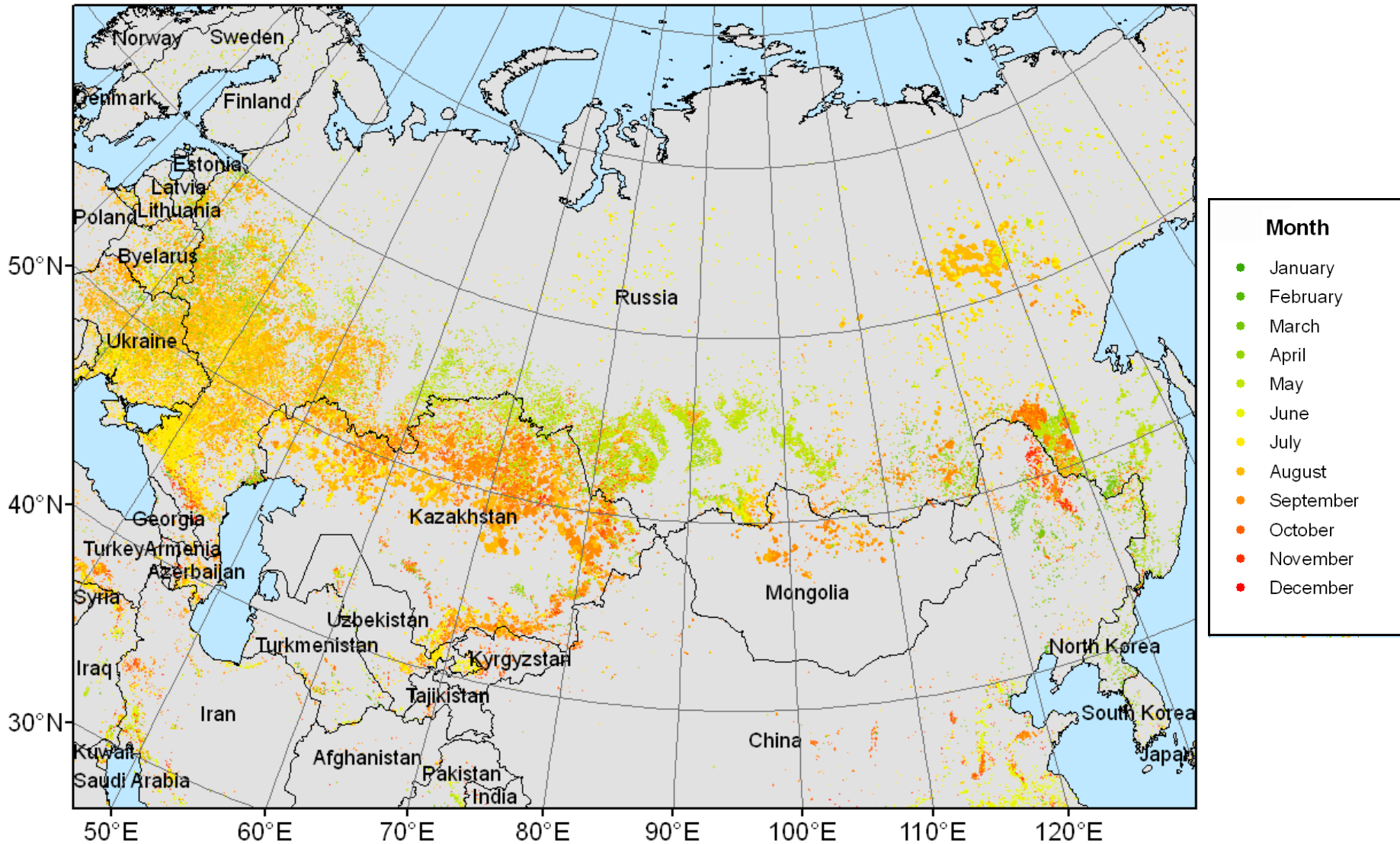
Daily and Seasonal Variability of Fire Activity in Northern Eurasia from 2002 to 2010 & Validation of FS MODIS Burned Area Algorithm

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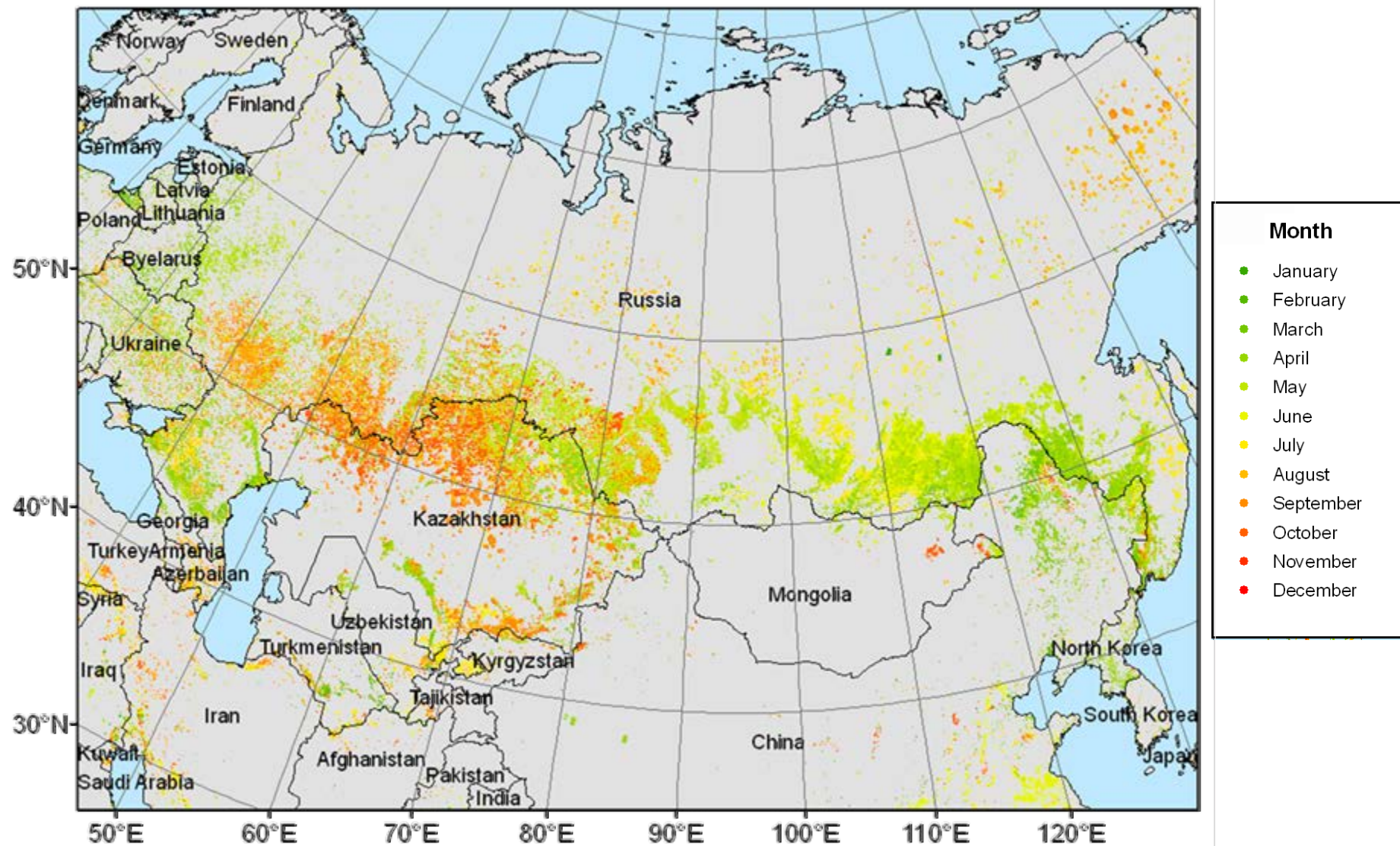
Objectives

- Development of high spatial (1 km x 1 km) and temporal (daily) distribution of black carbon emissions from fires in Northern Eurasia from 2002 to 2010
- Analysis of major sources of fires in different regions: agriculture, grassland, shrubland, and forest
- Seasonal and interannual variability of transport and deposition of black carbon from fires in Northern Eurasia to Arctic ice
- Impact and mitigation of black carbon emissions from fires based on various agricultural and forest practices

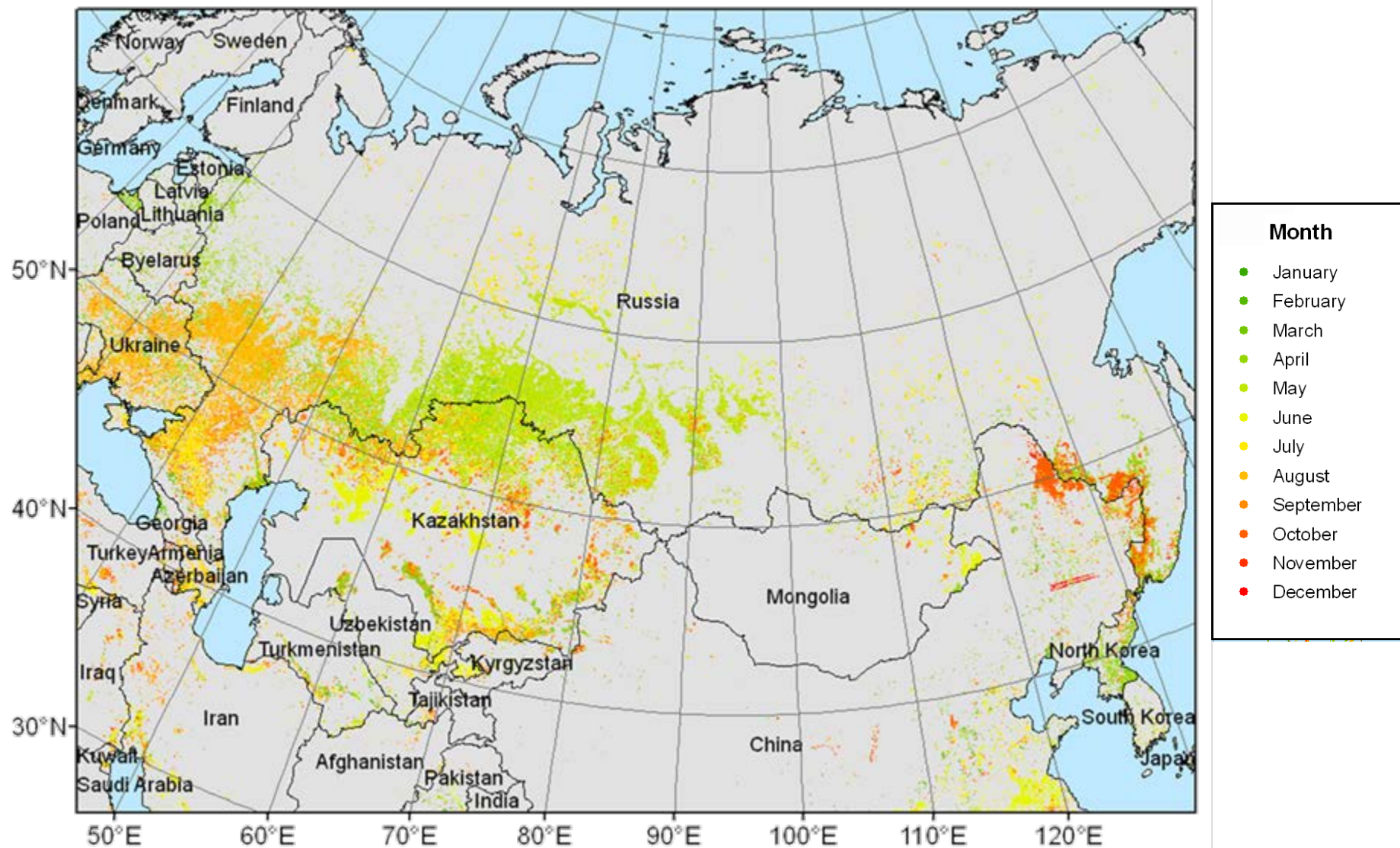
2002



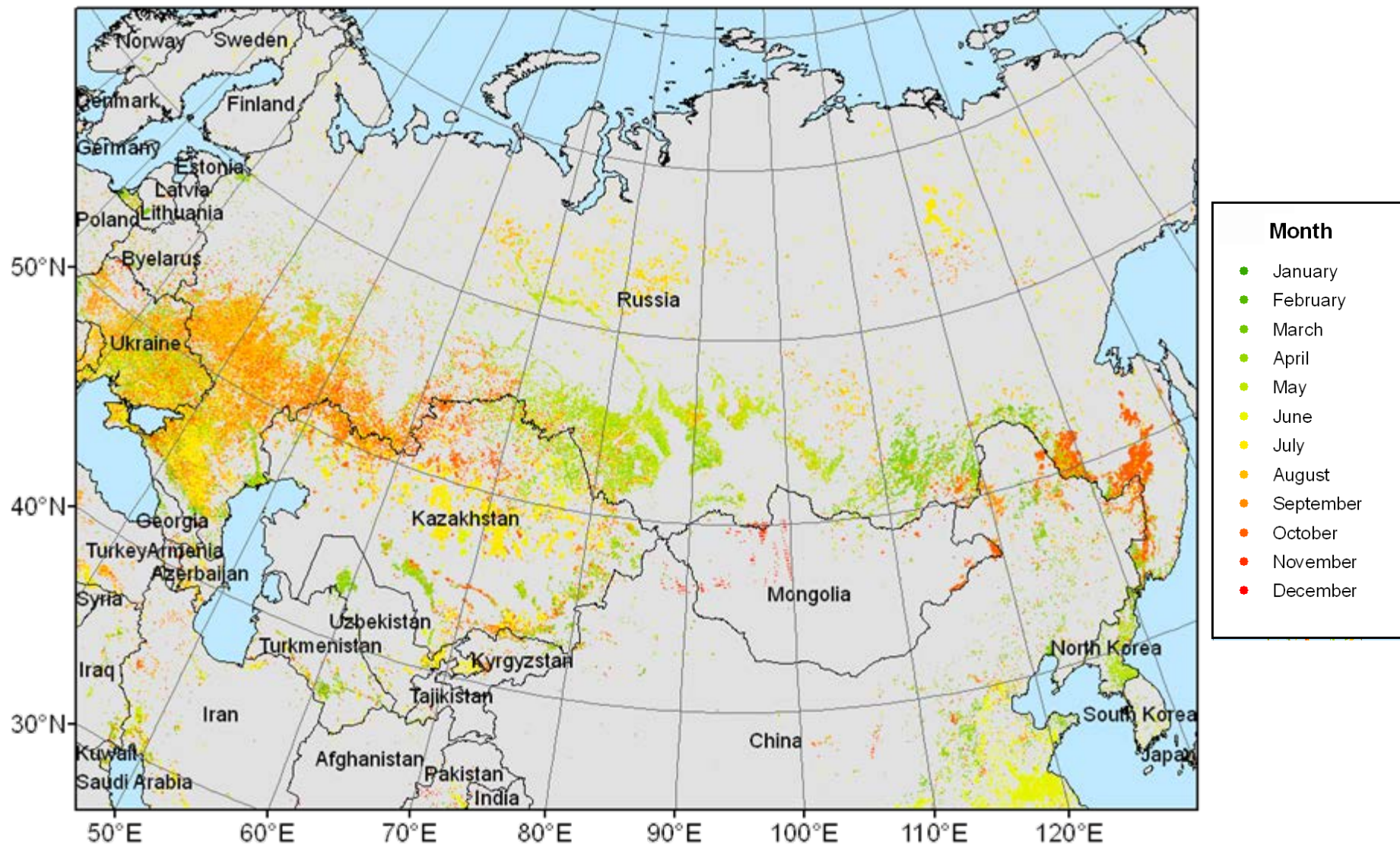
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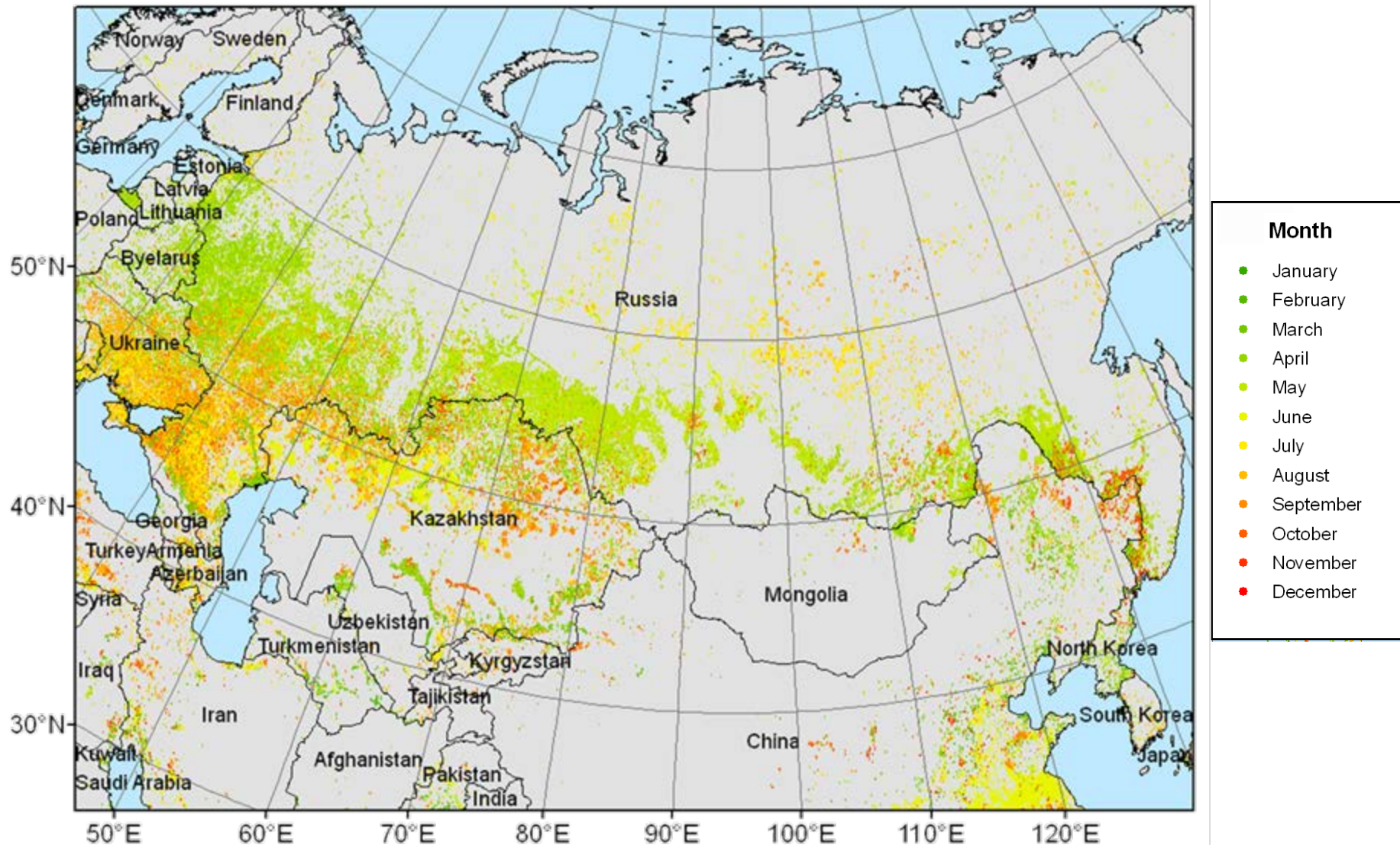
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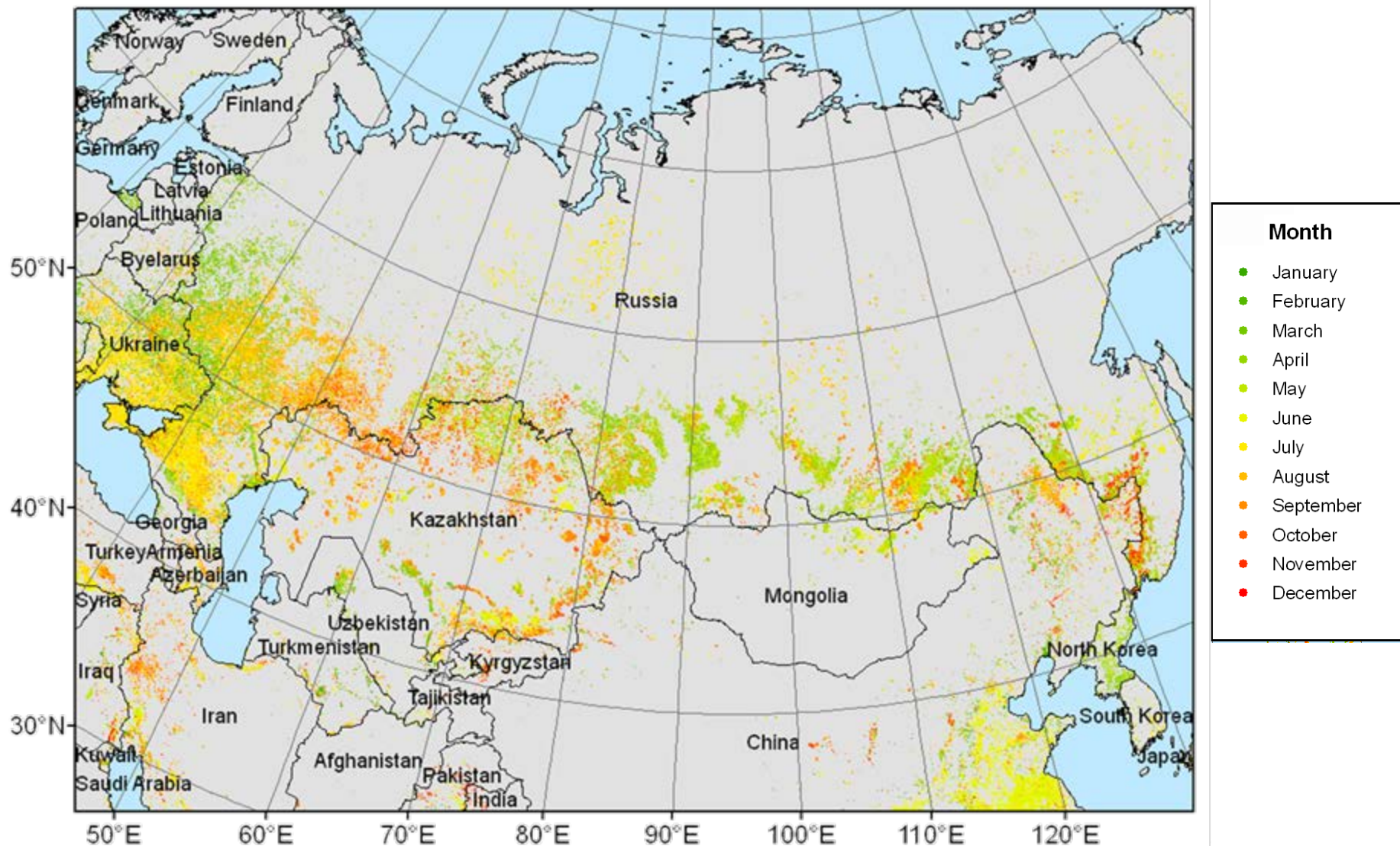
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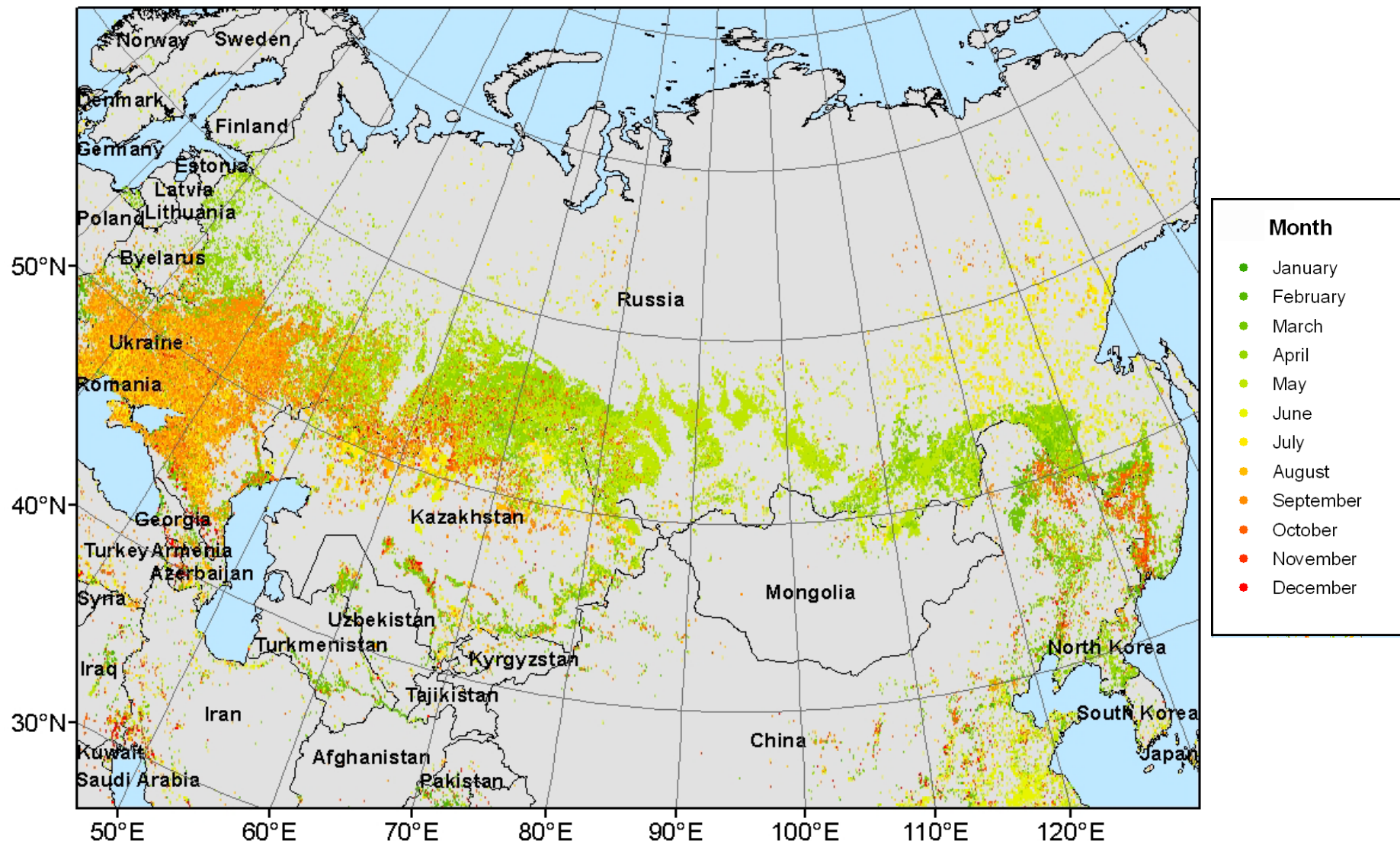
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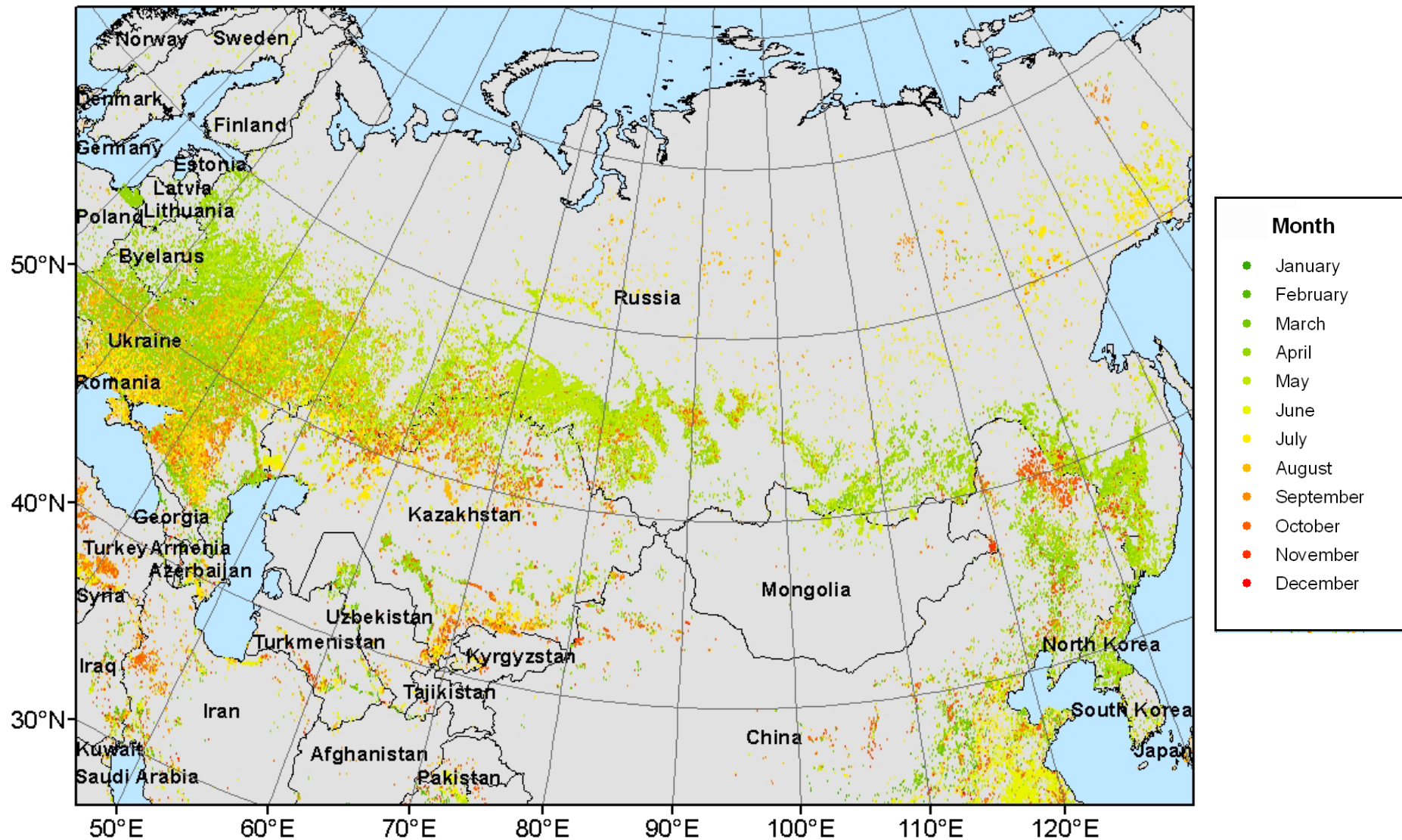
2007



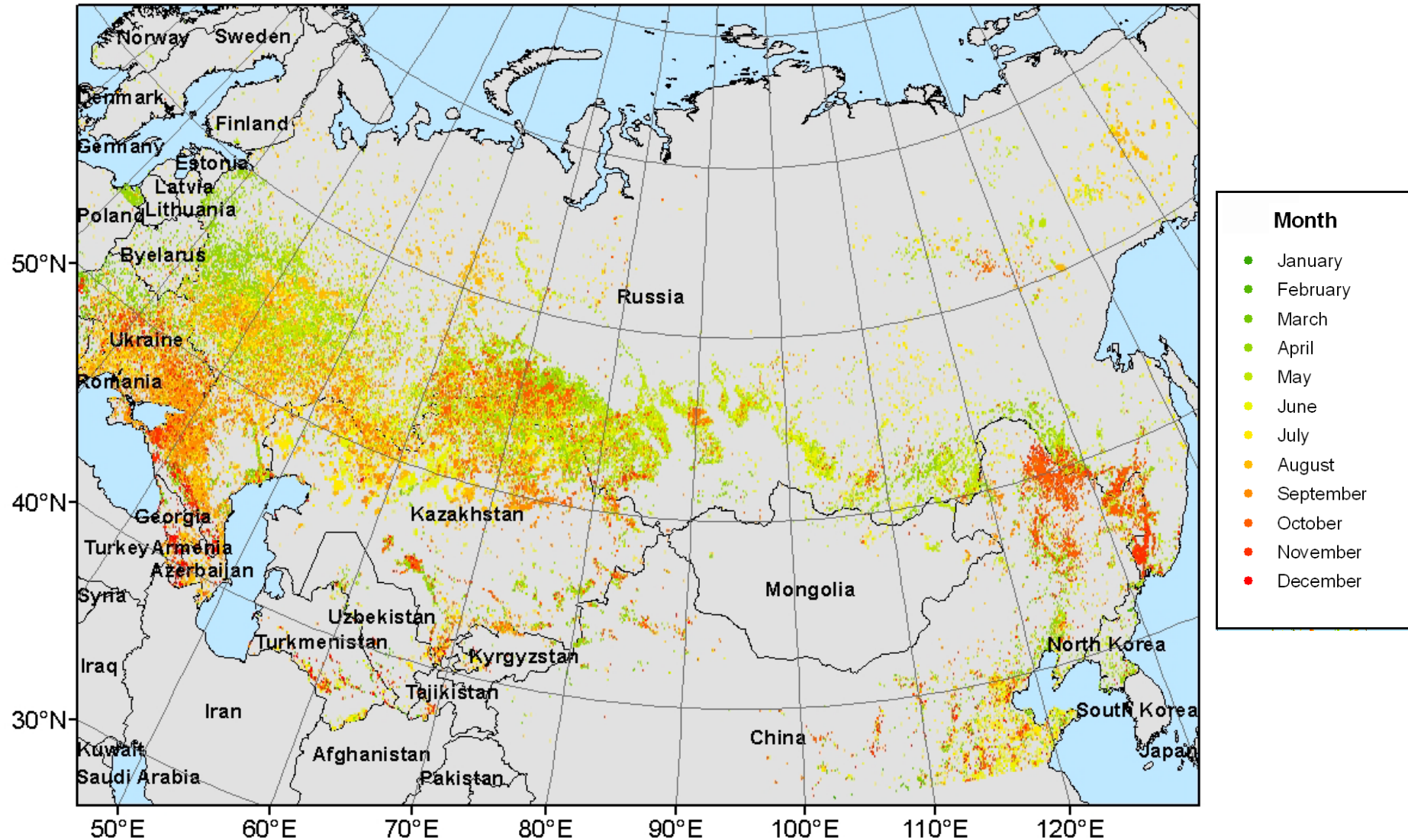
2008



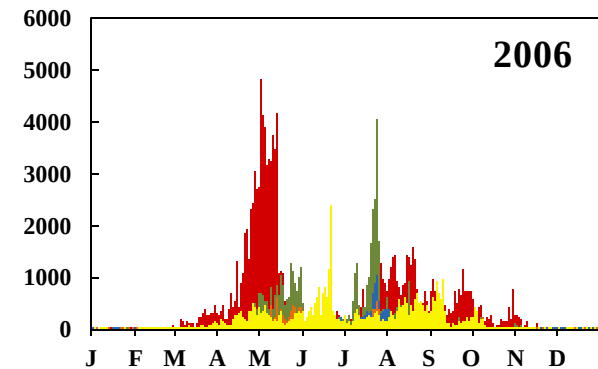
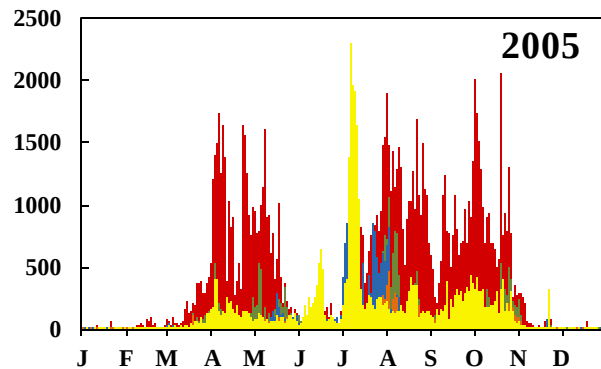
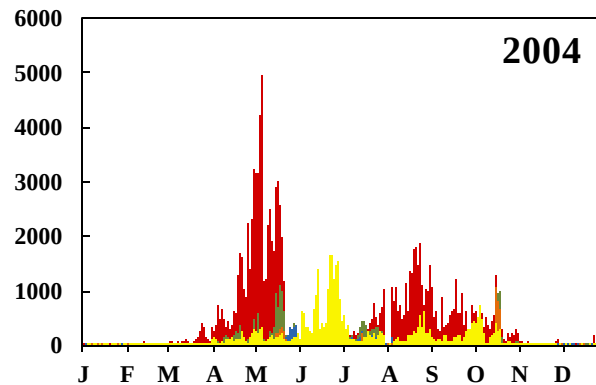
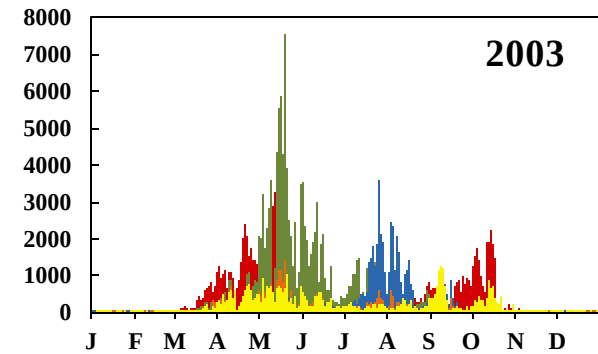
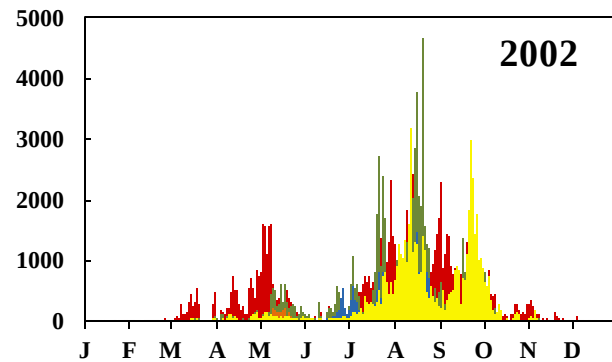
2009



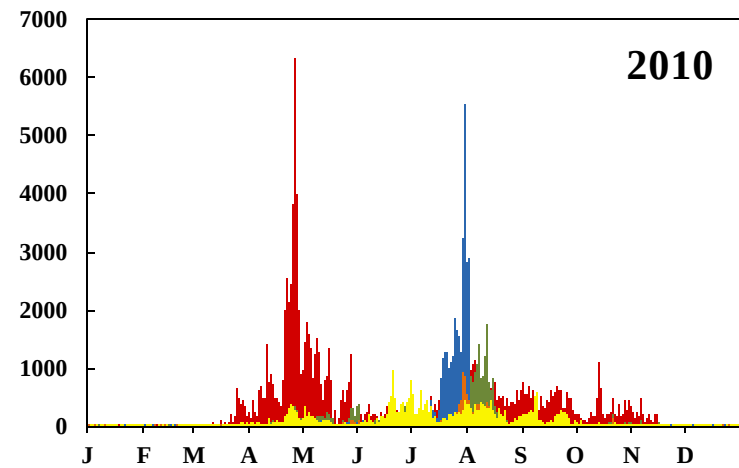
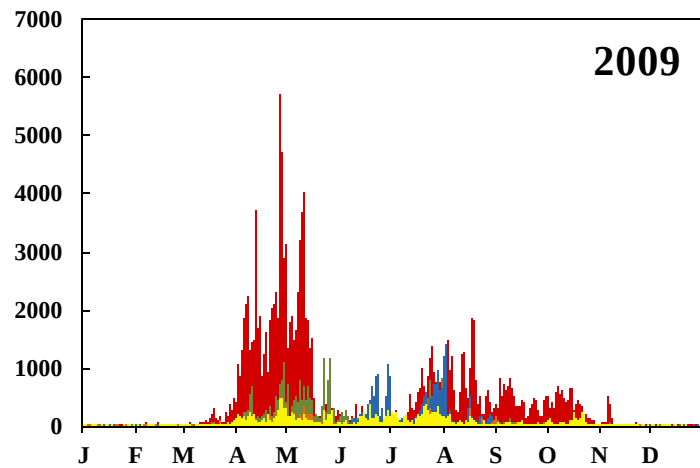
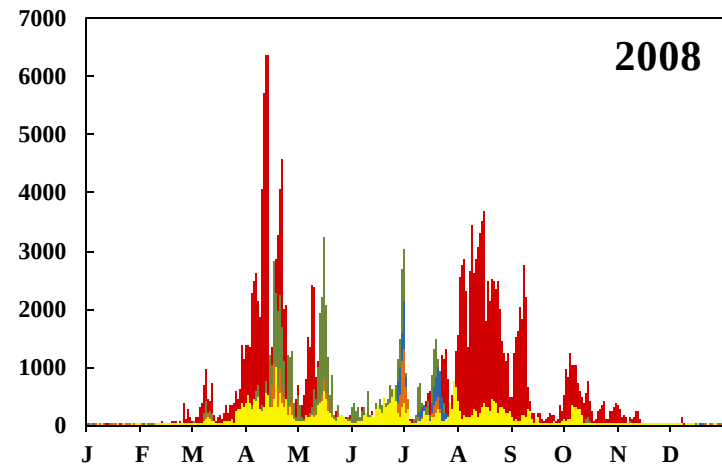
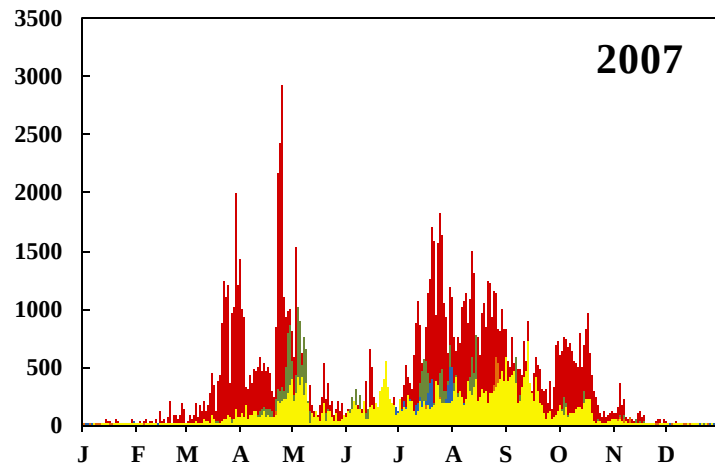
2010



Variability of Daily Active Fires in Northern Eurasia, 2002–2010



■ Agriculture ■ Forest ■ Shrubland ■ Savanna ■ Grassland

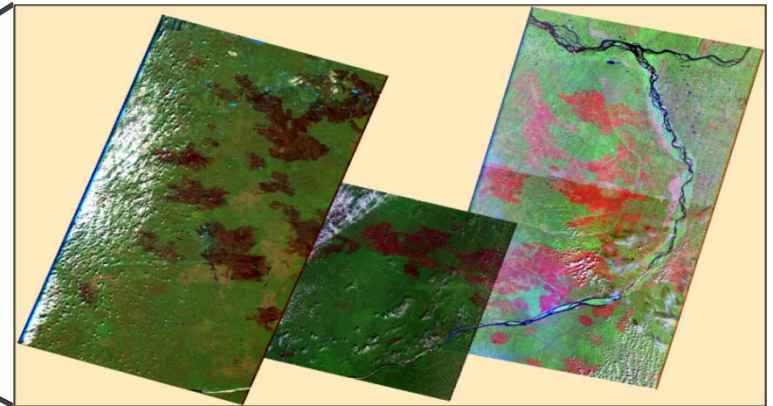


■ Agriculture ■ Forest ■ Shrubland ■ Savanna ■ Grassland

Total Number of MODIS Detected Daily Hotspots in Different Regions of Northern Eurasia from 2002 to 2010

	Forest	Agriculture	Grassland	Shrubland	Savanna	Total	%
Russia	394,398	853,097	111,996	173,070	130,451	1,663,012	60.8
Eastern Europe	5,530	217,168	1,039	464	879	225,080	8.2
Western Europe	2,106	4,581	192	241	912	8,032	0.3
Southern Europe	18,401	50,087	2,612	7,471	25,036	103,607	3.8
Northern Europe	3,911	3,529	221	332	782	8,775	0.3
Eastern Asia	30,295	75,612	31,670	8,561	14,076	160,214	5.9
Central & Western Asia	3,761	206,864	326,954	24,686	3,719	565,984	20.7
Total	458,402	1,410,938	474,684	214,825	175,855	2,734,704	
%	16.8	51.6	17.4	7.9	6.4		

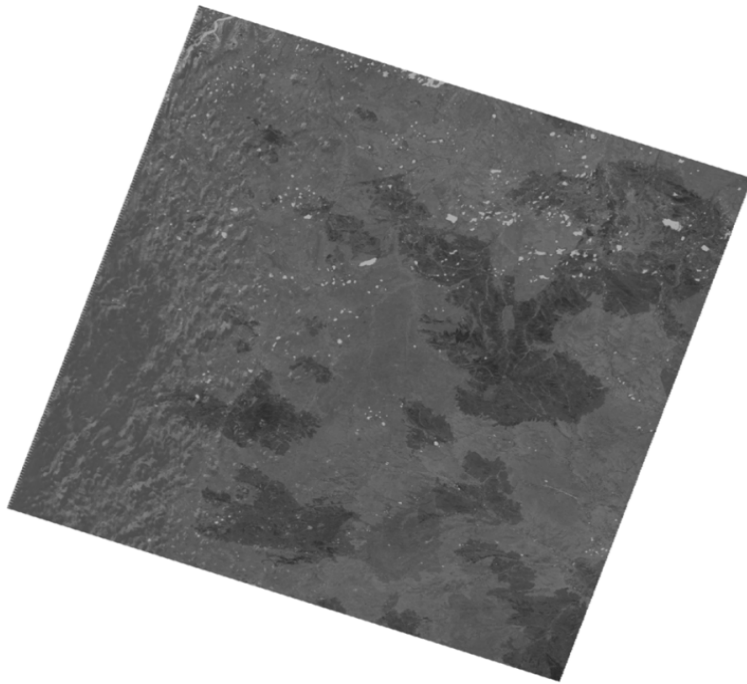
Validation Area for MODIS Burned Area Algorithm in Eastern Siberia



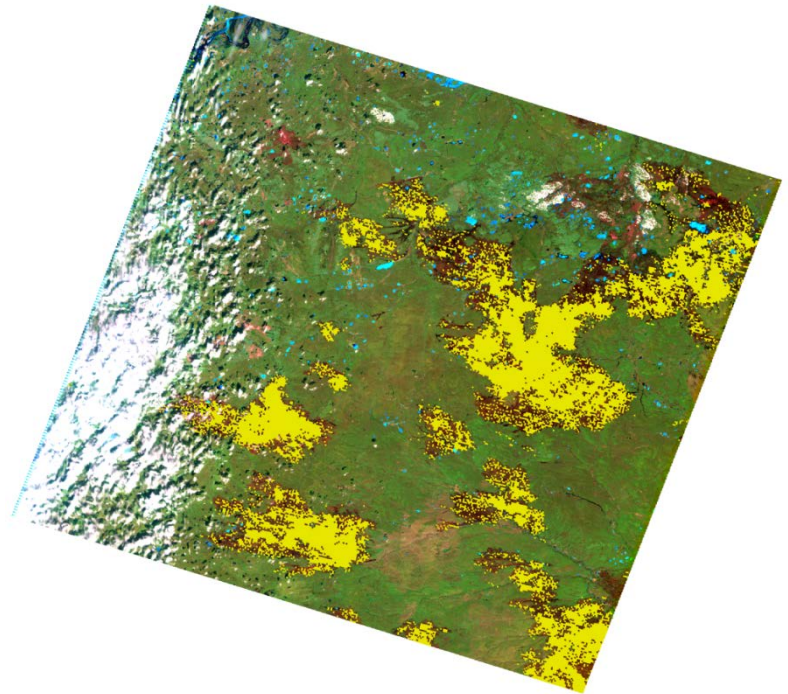
Landsat, August 2002

**Hao et al., 2012, this Proceedings
Urbanski et al., 2011, ACP**

Comparison of Landsat (30 m) vs. MODIS (500 m) Burned Area

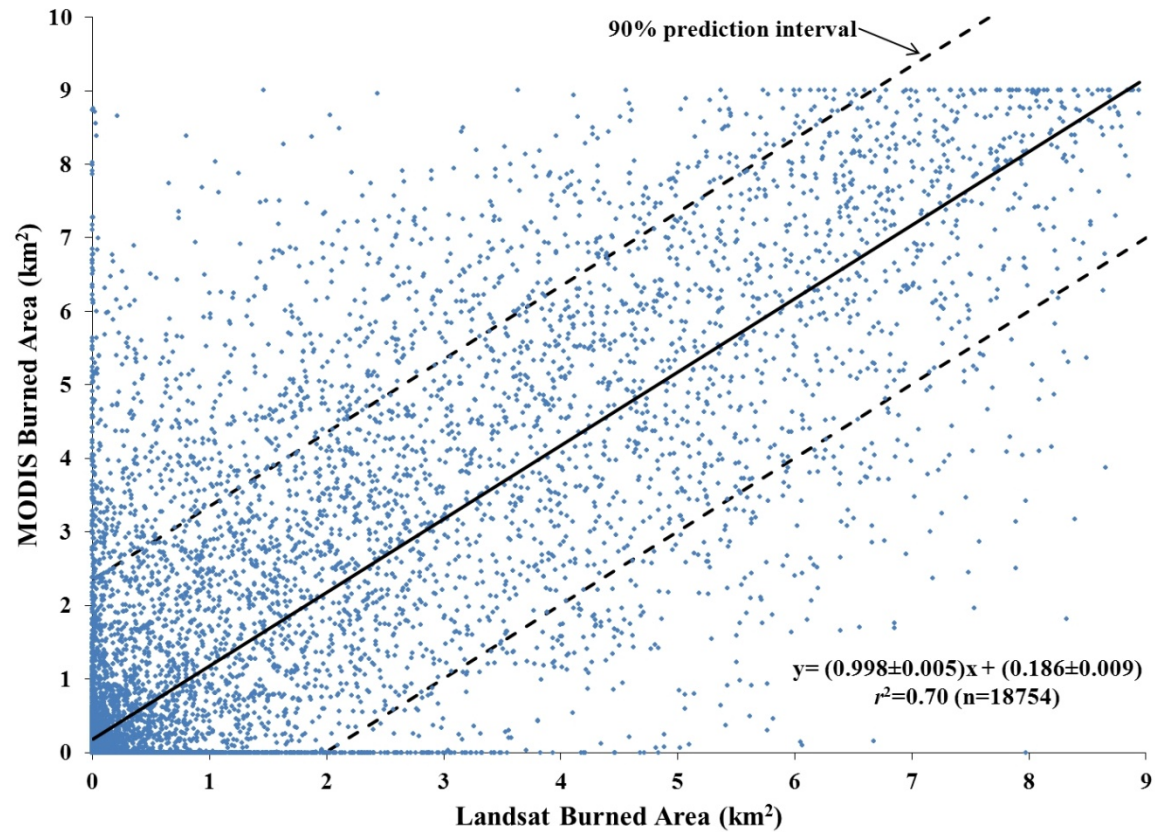


Landsat

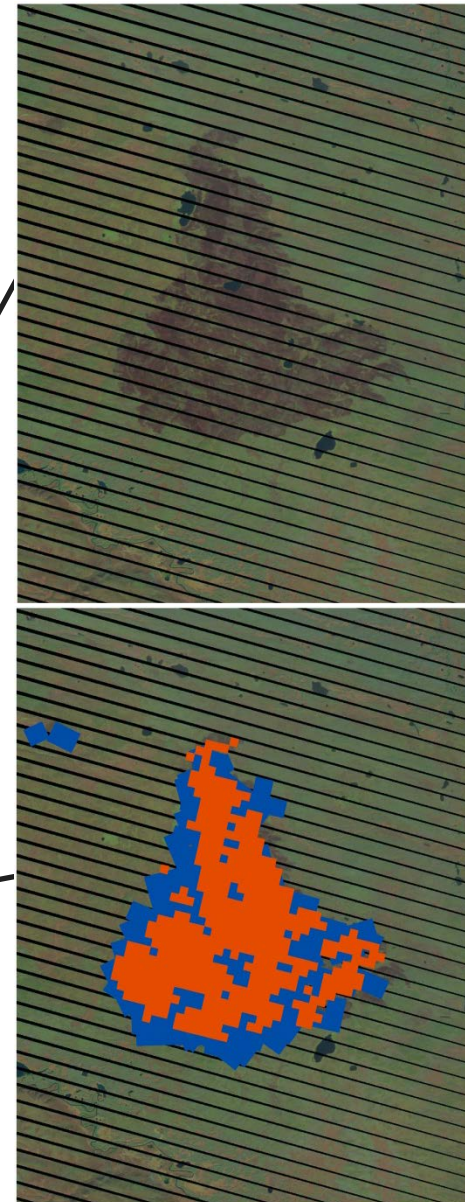


Landsat + MODIS

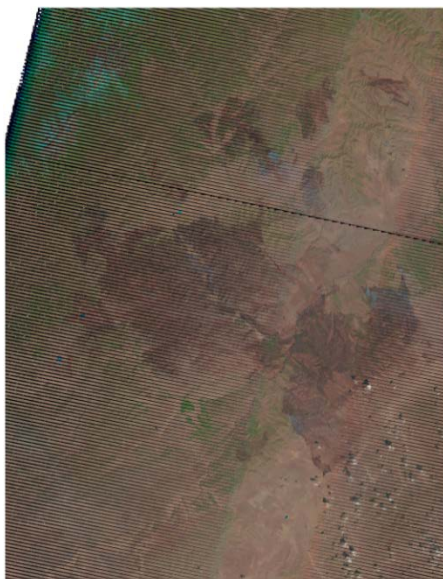
Comparison of Landsat vs. MODIS Burned Areas in 3 km x 3 km grid cells.



USFS & Sukachev Institute of Forest(SIF) MODIS Burned Area Algorithm vs. Landsat



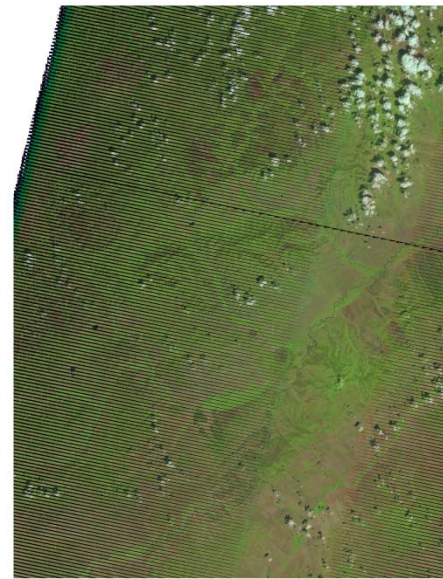
Landsat Scene: September 18, 2008



April 23, 2008

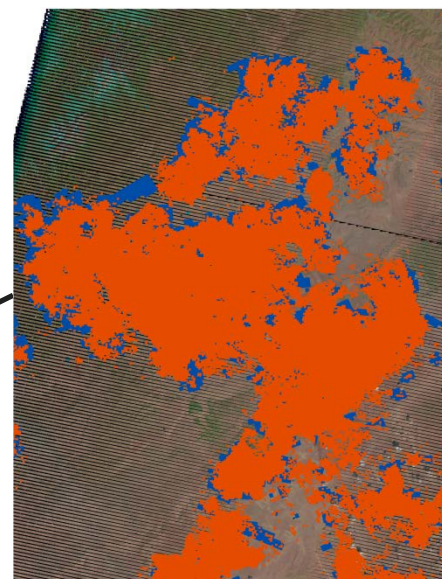


June 10, 2008



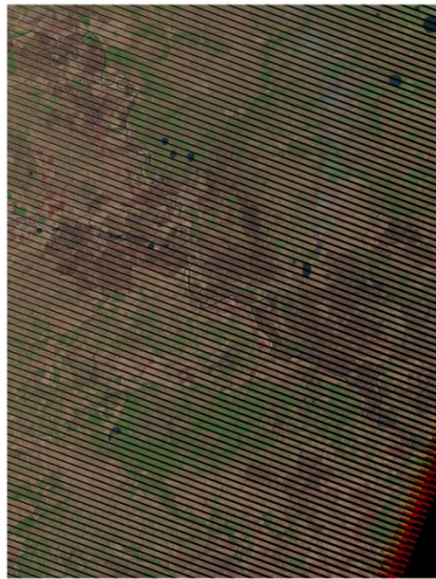
August 13, 2008

Landsat

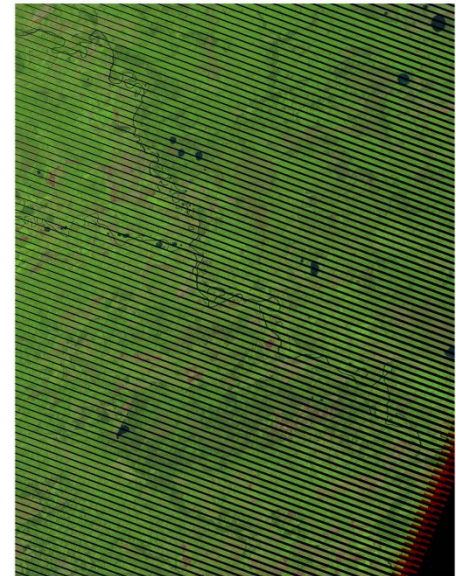


MODIS, 2008

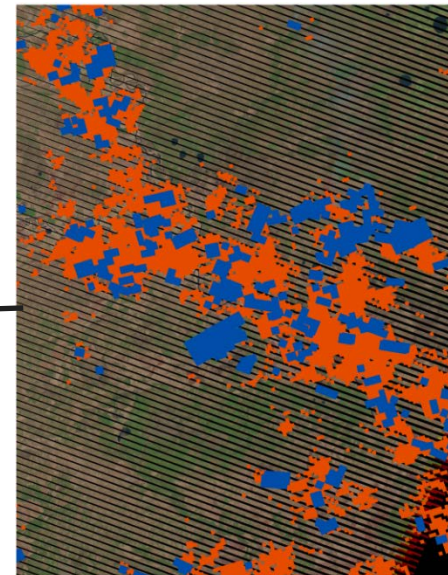
**USFS & Sukachev
Institute of Forest(SIF)
MODIS
Burned Area Algorithm
vs. Landsat**



May 7, 2008



June 24, 2008



MODIS, 2008

Future Research

- Validation of algorithms of different satellite sensors to map burn areas of agricultural, grassland, and forest fires in northern Eurasia.
- Acquisition of the land cover map and the fuel loading dataset.
- Cooperation with Russian scientists on areas, yields, production, and practices for different crops in different geographic regions.
- Development of daily fire emission sources of black carbon at a 1 km x 1 km resolution from 2002 to 2010.
- Analysis of sources, transport, and deposition of fire-emitted black carbon to Arctic ice using a global photochemical transport model GEOS-Chem.
- Effectiveness of various mitigation scenarios of black carbon emissions based on different changes of agricultural and forest management and practices.