

# Linking Past to Present in European Russia's Temperate Forests

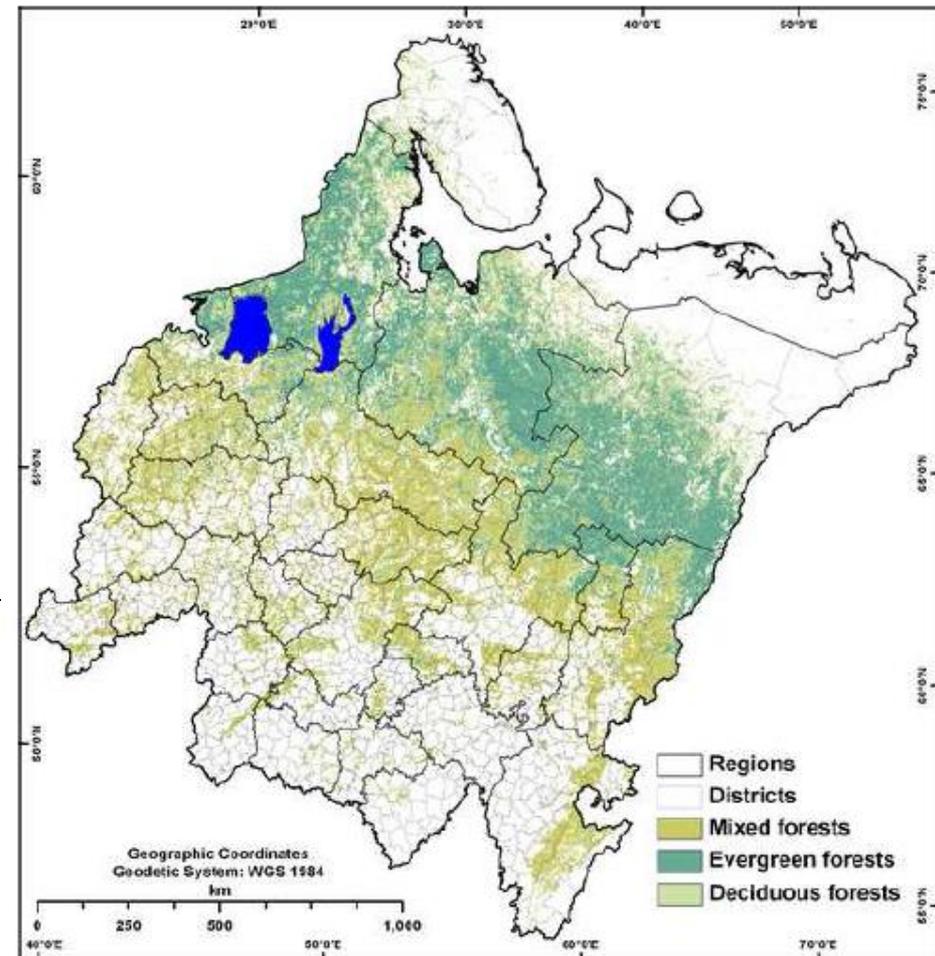
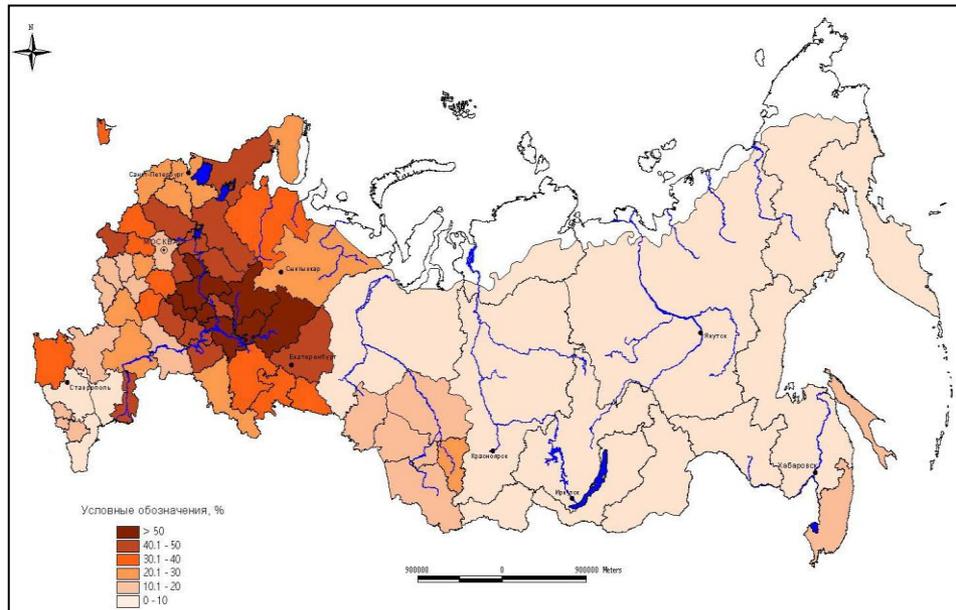
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# Research setting

- Temperate forests of European Russia are changing rapidly
- Socioeconomic changes, greater population density, access to markets
- However, temperate forests are less studied despite their higher productivity
- Our goal is to monitor patterns of change using satellite records and explain these patterns using socioeconomic and biophysical drivers

# Research setting

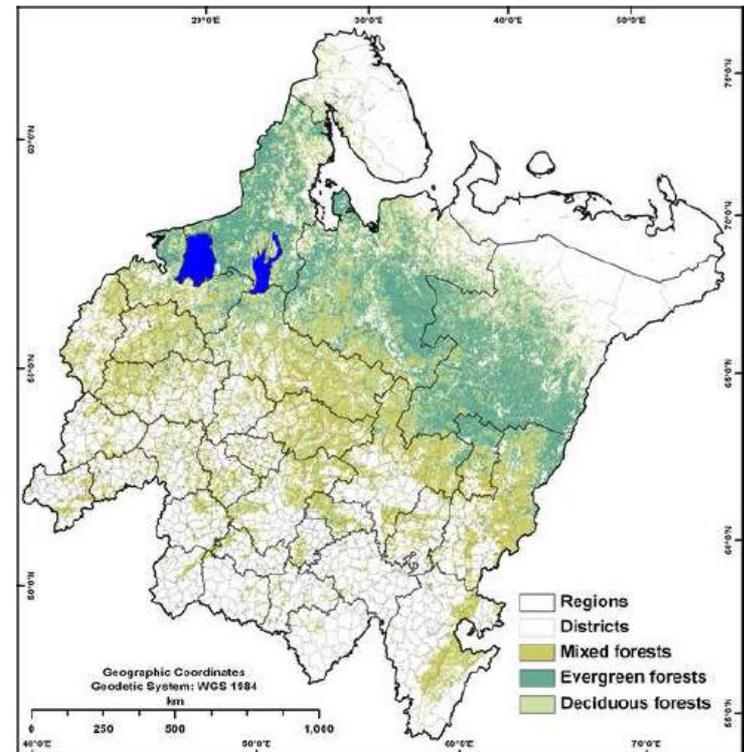
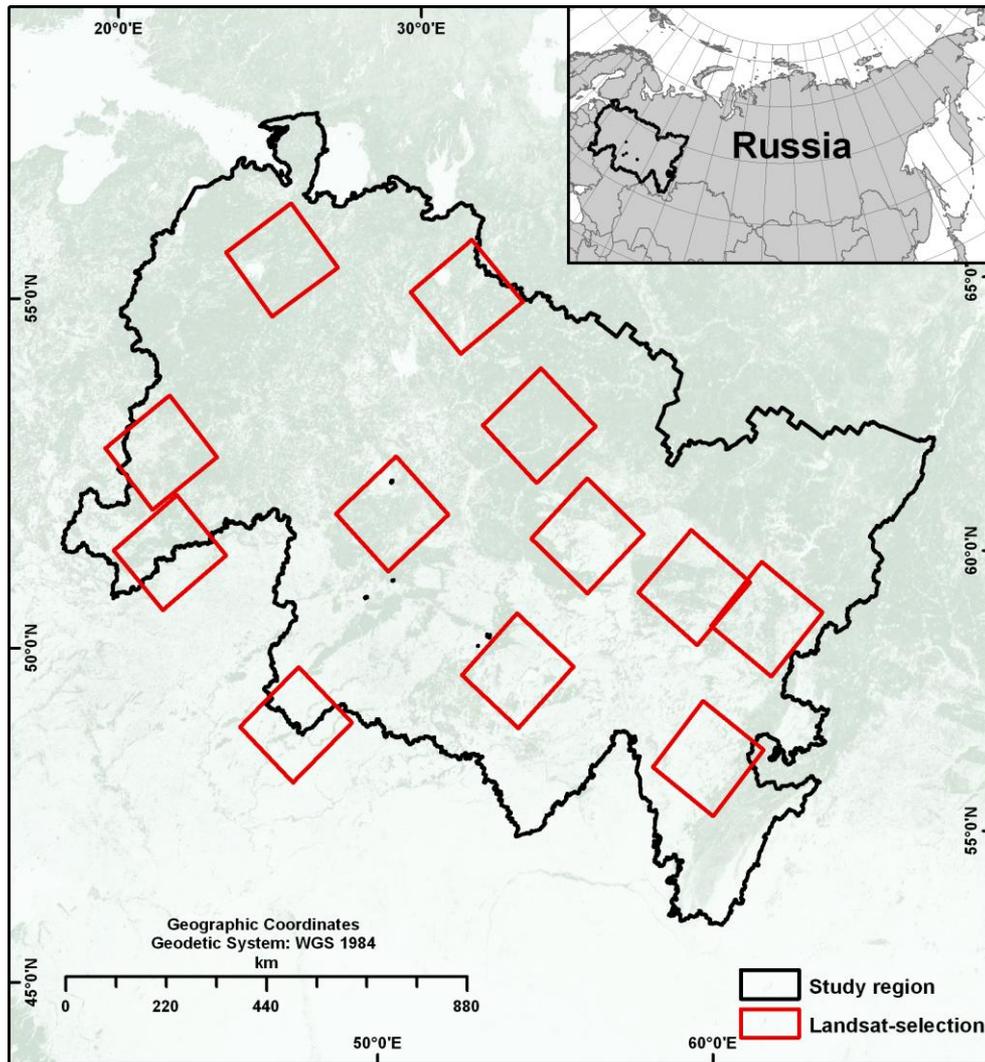


# Approach

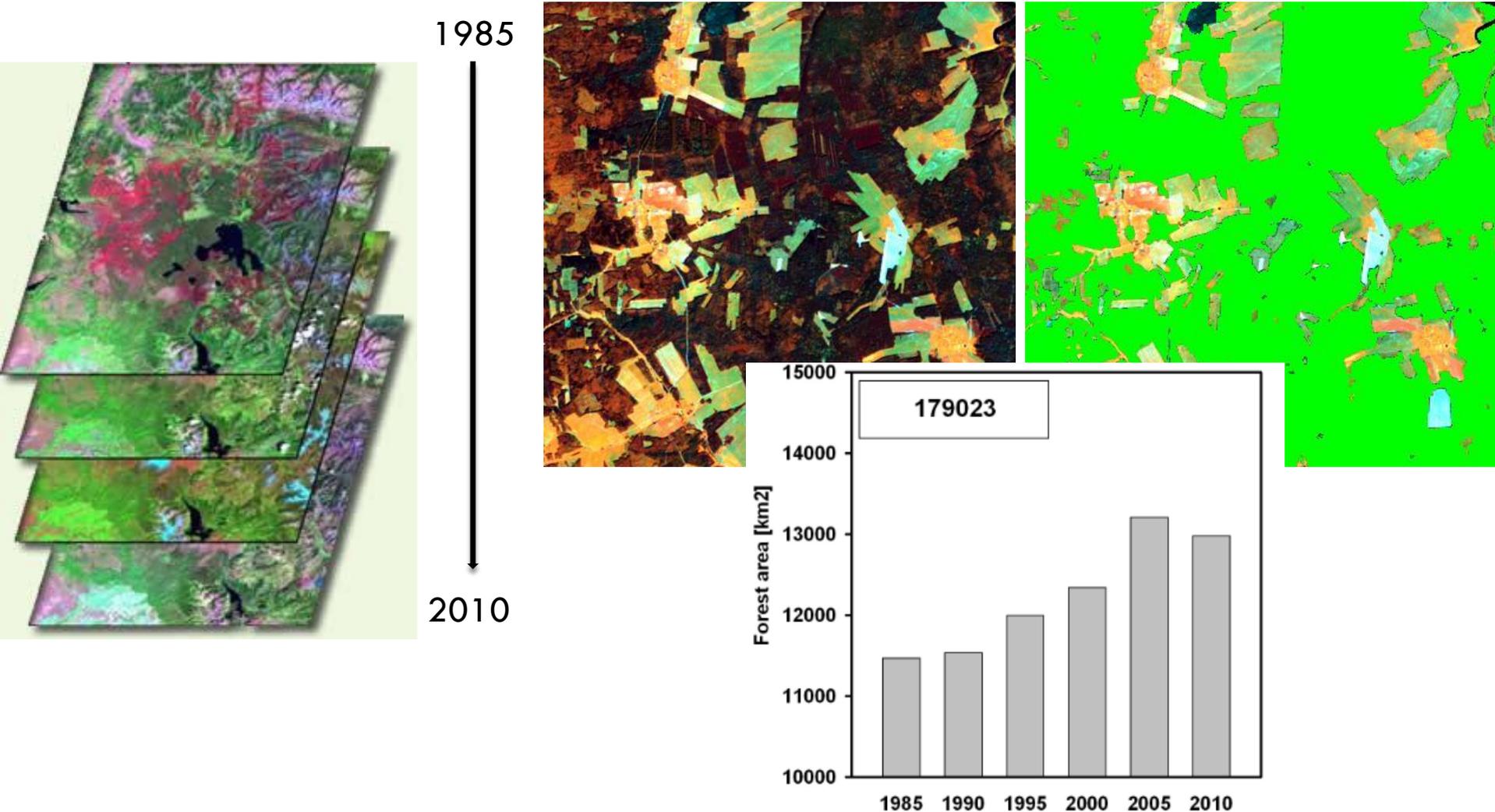


- Monitor forest cover at 5-year increments between 1985 and 2010
- Propose socioeconomic and biophysical drivers of forest change across different time periods
- Assess the spatial resolution issues that are at the heart of forest monitoring in the temperate zone

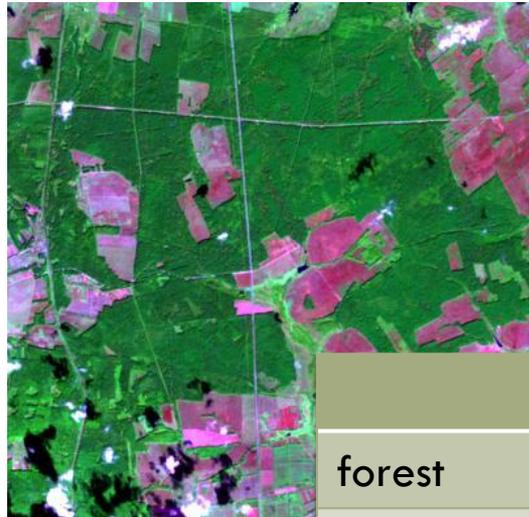
# Forest monitoring



# Forest monitoring

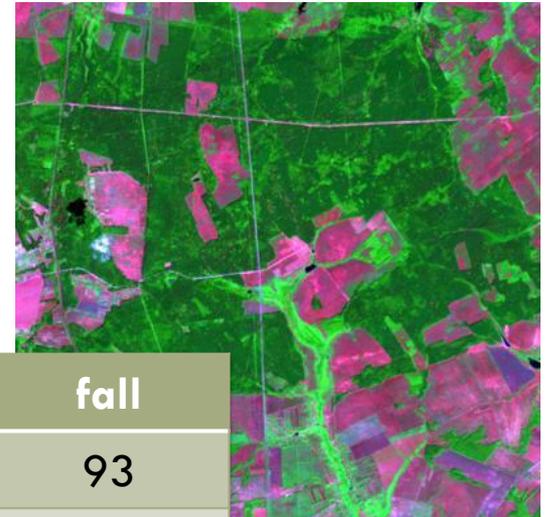


# Value of winter snow imagery

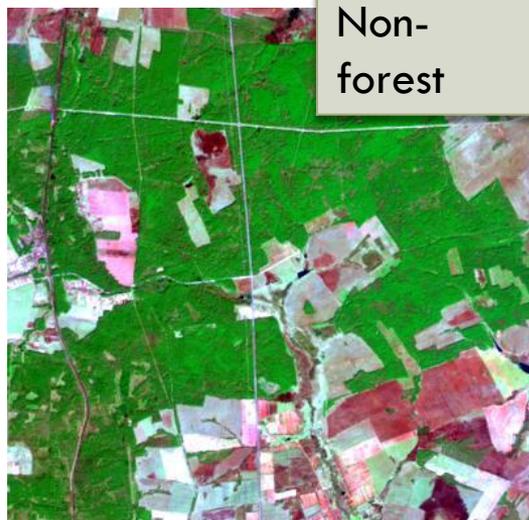


May  
2002

July  
2002



	winter	spring	summer	fall
forest	96	92	89	93
Non-forest	94	90	91	93

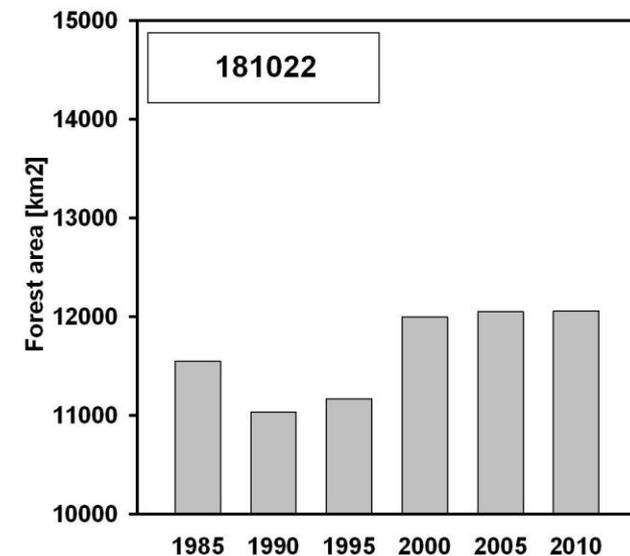
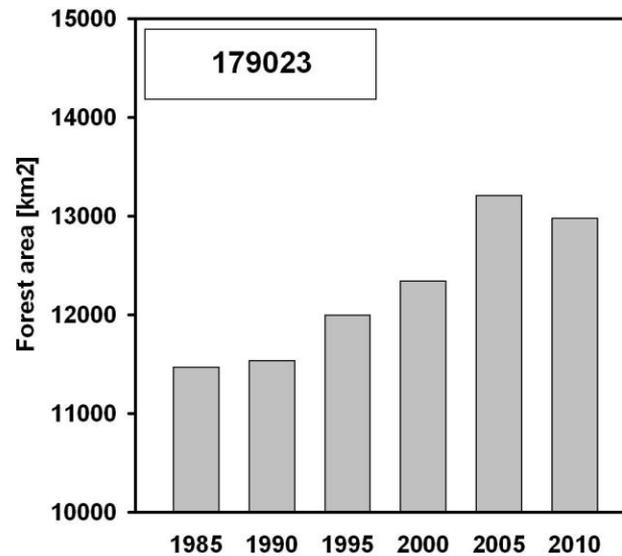
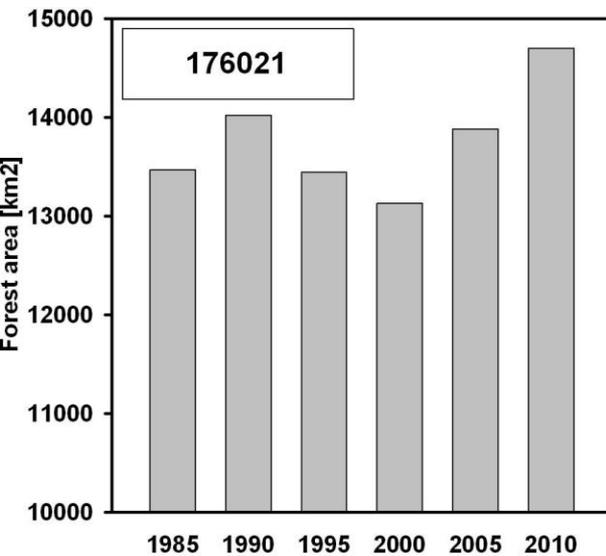


Aug  
2002

Feb  
2003

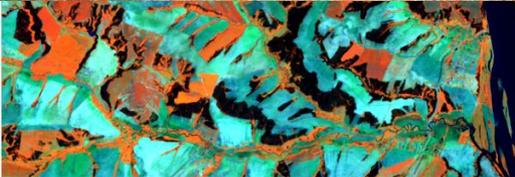
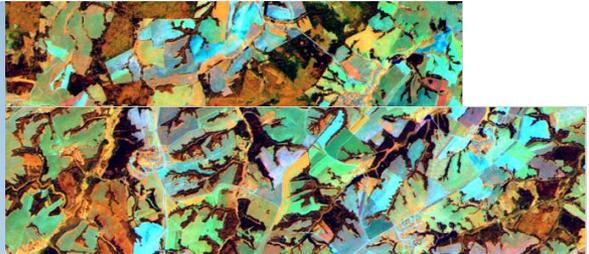


# Forest monitoring



- 1985-1995 period seems to be the “shock” period with various forest change patterns
- 2000-2010 period shows consistent forest recovery
- Early period possibly characterized by lack of regulation but also other
- Later period characterized by forest regrowth on abandoned lands

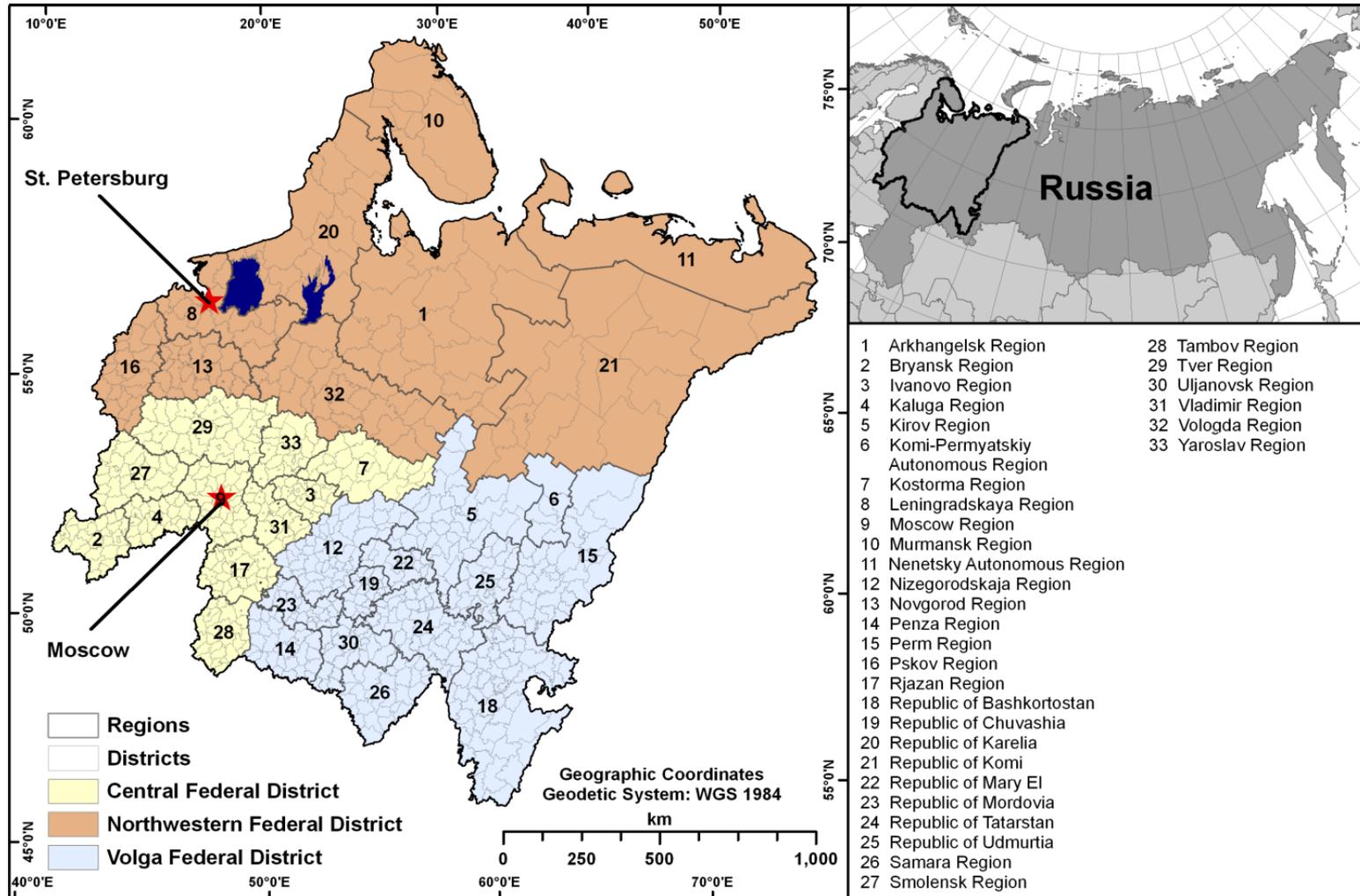
# Forest monitoring



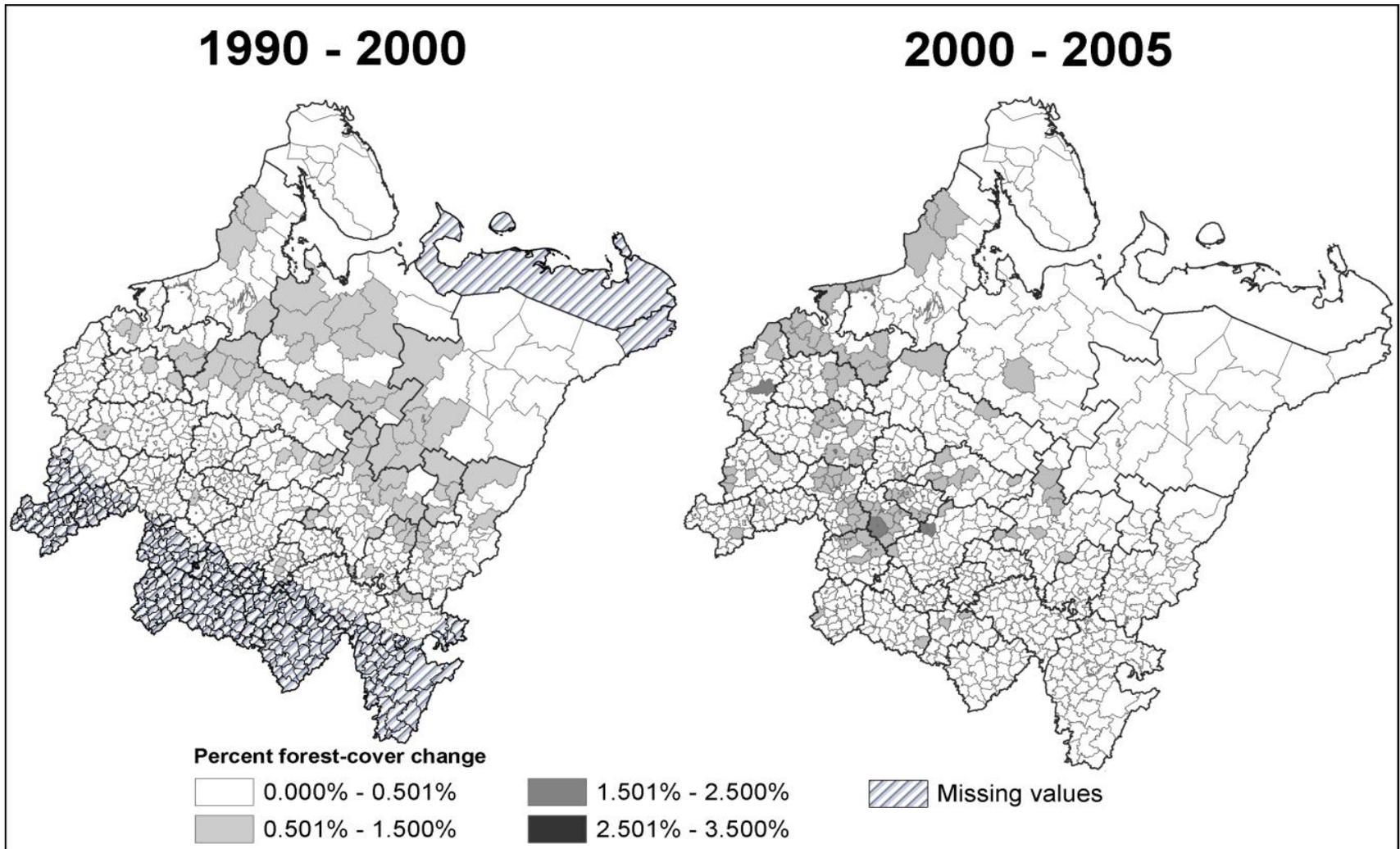
# Drivers of forest harvest

- Despite the large institutional changes in the forestry sector, there are no quantitative analysis of drivers of forest disturbance in European Russia
- Knowing these drivers may help understand the spatial and temporal patterns of forest change
- Combine remote sensing with economic theory of timber supply to statistically estimate the drivers of forest harvest
- Focus on difference between regions and districts

# Drivers of forest harvest



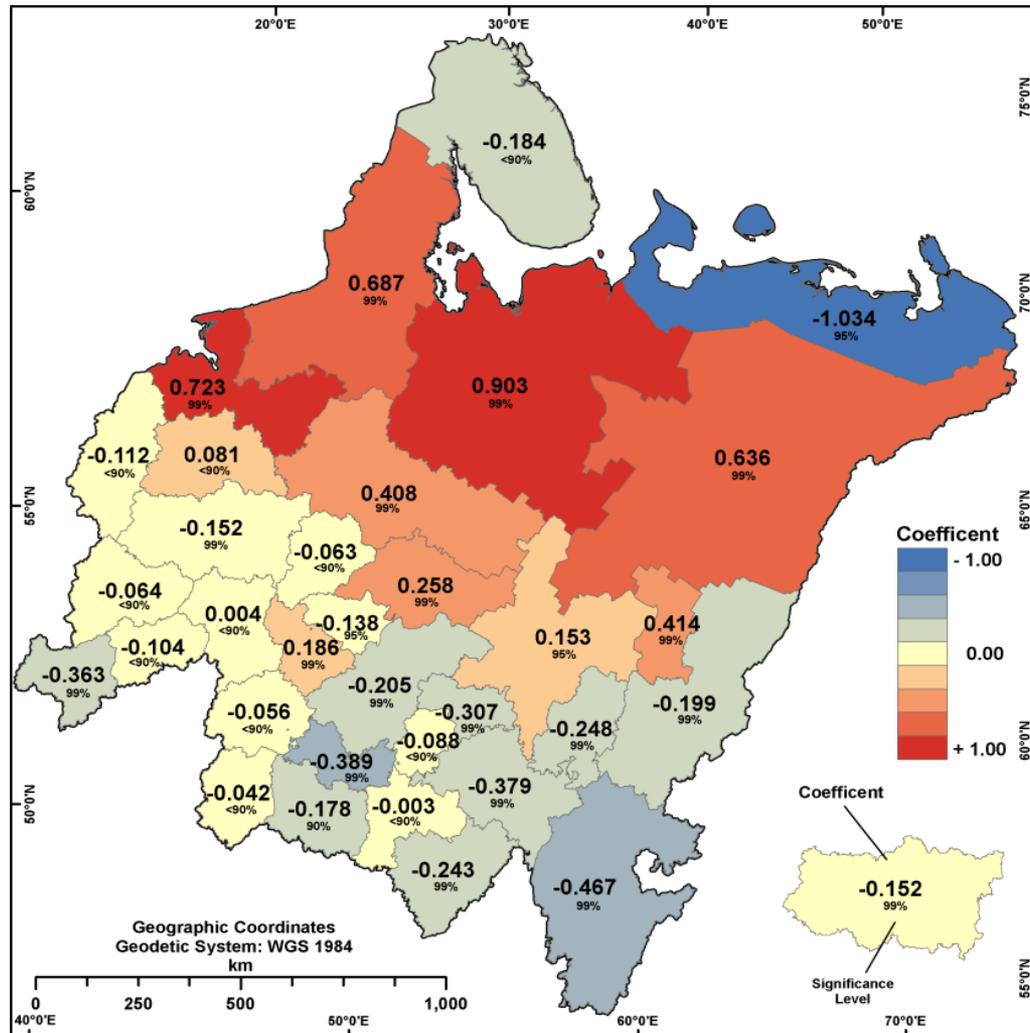
# Drivers of forest harvest



# Drivers of forest harvest (district)

- Drivers of forest harvest are consistent with classical economic theory of timber supply
- Forest area (more forest area = more harvest)
- Conifer proportion (more valuable timber = more harvest)
- Slope (more access = more harvest)
- Road density (more harvest = more harvest)
- Market location (more access = more harvest)

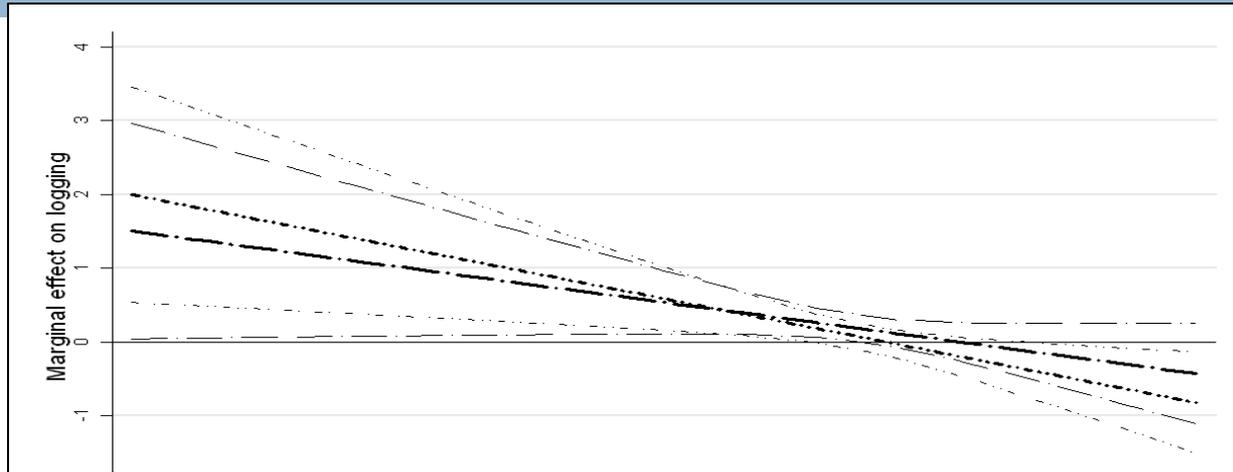
# Drivers of forest harvest (regional)



Map of magnitude and significance of regional effects on forest disturbance

- differences within the forestry sector (Soviet legacies)
- divergences in regional institutional and political conditions
- rate of return from other economic sectors within regions

# The effects of governance



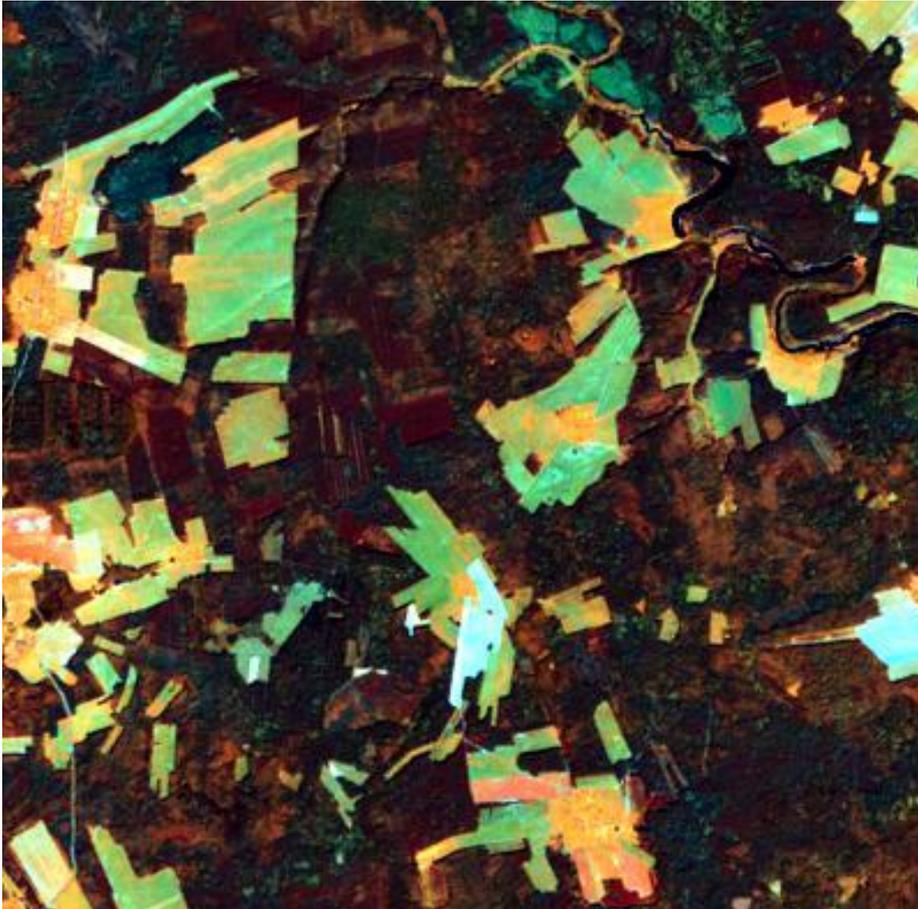
- governance has a nonmonotonic effect on logging rates
- regions that currently rank at low levels of governance, a marginal improvement in governance would increase logging rates
- regions that currently rank at high levels of governance, a marginal improvement in governance would decrease logging rates
- the nonmonotonic effect of governance on timber harvest differs from the governance effects on deforestation

# Spatial resolution effects

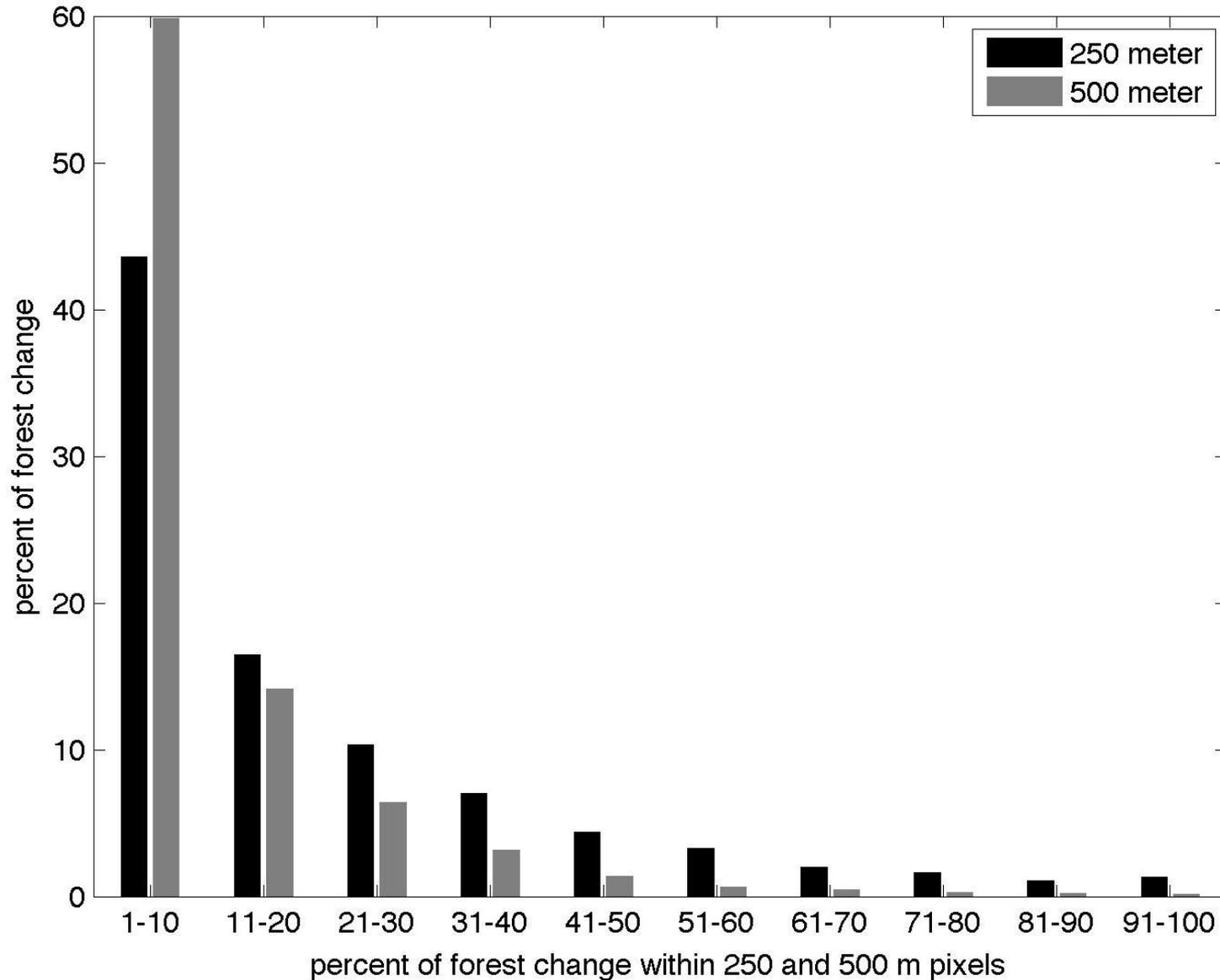
- Given the size of timber harvest plots and their distribution across the landscape, a question arises as to the impact of spatial resolution on forest harvest monitoring
- Test MODIS-like sensor effects on our ability to identify and map forest harvest
- Test across regions with different harvest rates and with other spatial resolutions

# Spatial resolution effects

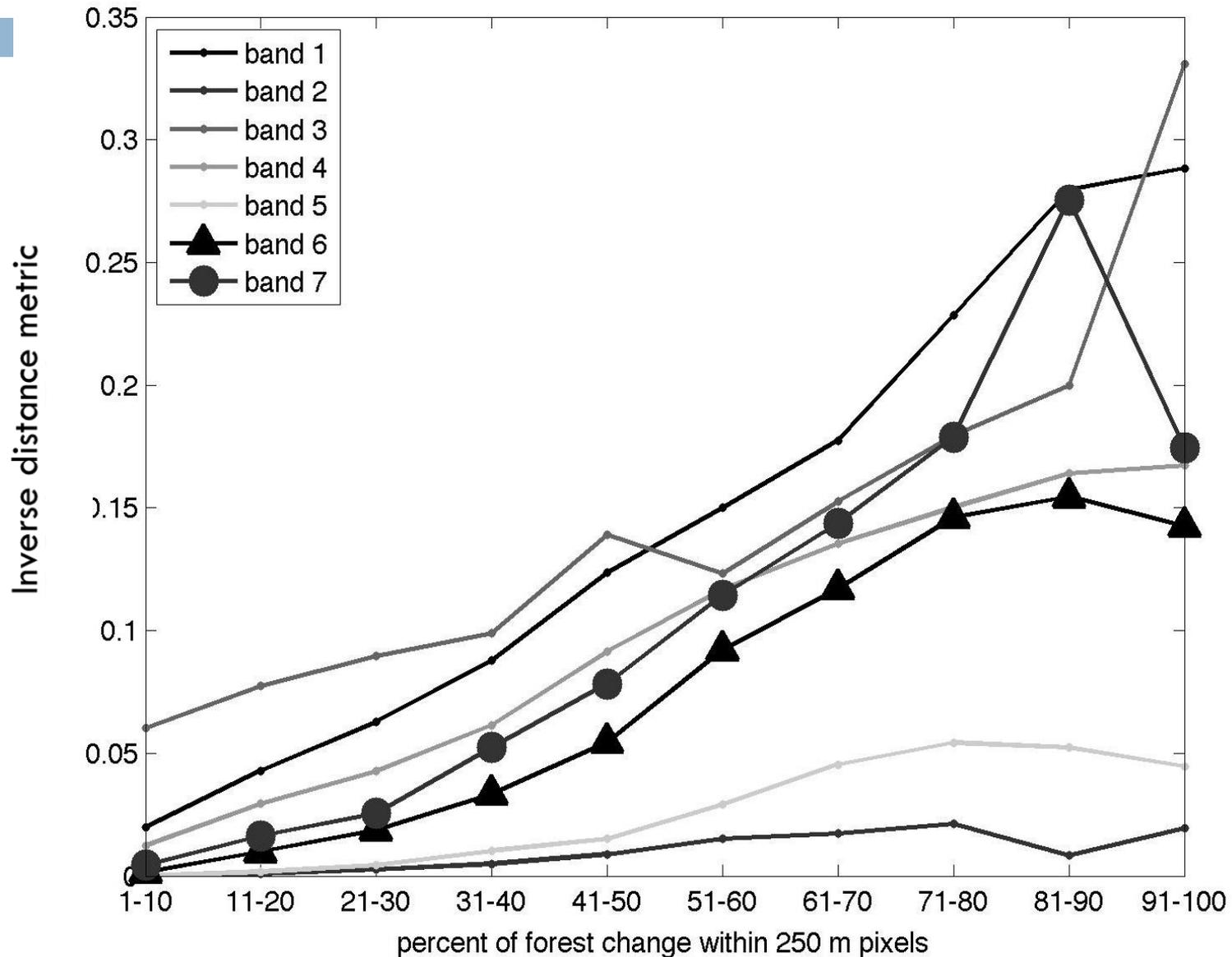
Forest change [2000-2005]



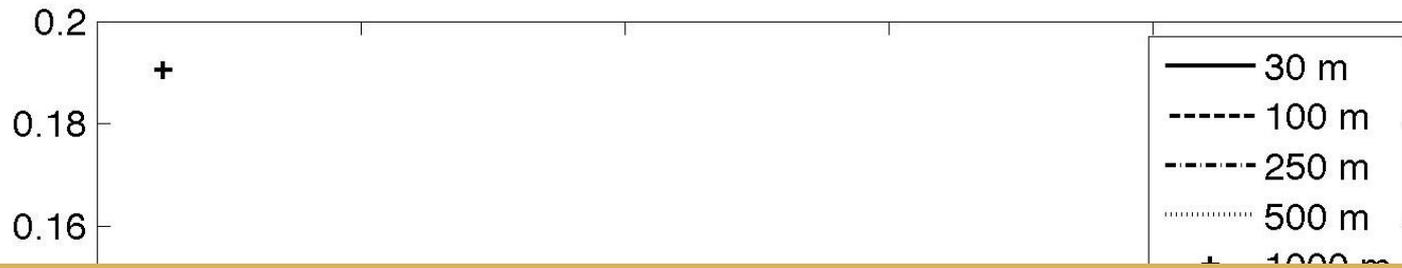
# Spatial resolution effects



# Spatial resolution effects

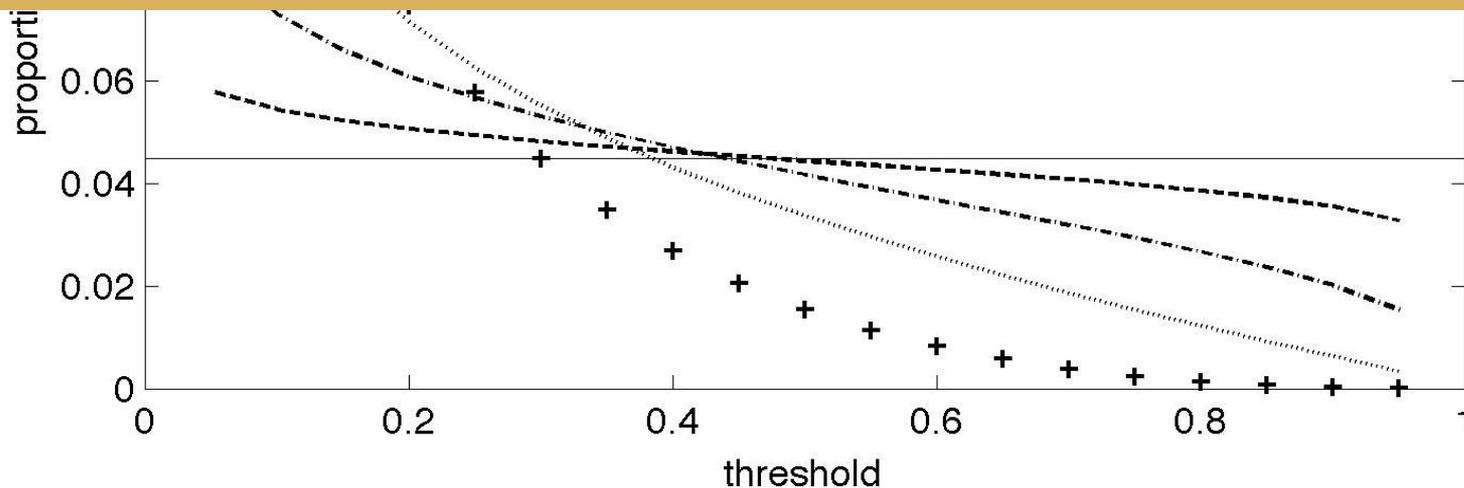


# Spatial resolution effects



If using coarse resolution data, we need to pay attention to weak signals and thresholds

There is continued need for Landsat style observations to monitor forests in the temperate zone



# Main findings

- Following a period of decline (the shock period), the forests of European Russia are expanding (recovery period) but there are major differences
- Classical economic theory explains both district and regional-level differences in harvest rates
- Governance has a non-linear effect on harvest rates – this nonmonotonic effect of governance on timber harvest differs from the governance effects on deforestation
- Spatial resolution matters more in regions with smaller harvest plots