

The NASA LCLUC Science: Focus on Central/Eastern Europe

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Land-Cover/Land-Use Change Program



LCLUC is an interdisciplinary scientific theme within NASA's Earth Science program. The ultimate vision of this program is ***to develop the capability for periodic global inventories of land use and land cover from space, to develop the scientific understanding and models necessary to simulate the processes taking place, and to evaluate the consequences of observed and predicted changes***

• Drivers of LCLUC

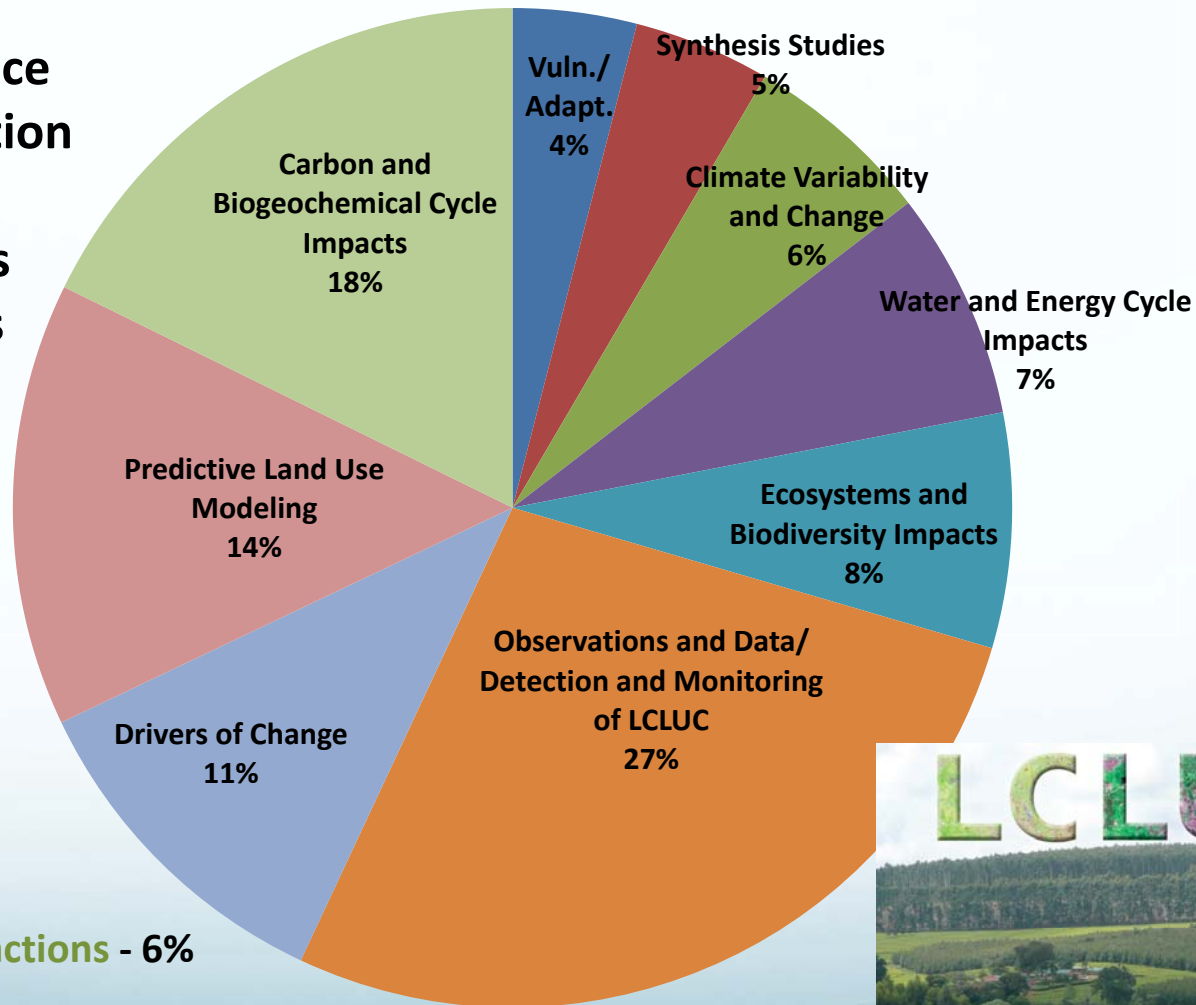
- Natural Drivers
- Anthropogenic Drivers
 - Socio-Economic Drivers
 - Landscape Modification

• Impacts of LCLUC

- Carbon Cycle
- Surface Hydrology
- Atmosphere

LCLUC Program Content

~280 projects since Program's inception
Each year:
~40 3-yr projects
>230 researchers



Impacts - 33%
(Carbon+Water+Eco)

Monitoring - 27%

LU Modeling - 14%

Drivers - 11%

LCLUC- Climate interactions - 6%

Synthesis - 5%

Vulnerability/Adaptation - 4%

<http://lcluc.hq.nasa.gov>



LCLUC Science Team Meetings

Washington: Spring Blossom

- 2007: Climate/Carbon
- 2008: Joint CC&E Focus Area meeting
- 2009: LCLUC impacts on climate
- 2010: GLS LCLUC products
- 2011: 15th Anniversary (review/update)
- 2011/9: Agriculture (Joint CC&E FA)
- 2012: Urban
- 2013: Wetlands
- 2014: Urban
- 2015: Early Career Scientists (Joint CC&E FA)
- 2016: 20th Anniversary (retrospective)

International: Fall-Winter

- 2007: NEESPI/MAIRS - Urumqi, China
- 2009/1: MAIRS - Kohn Kaen, Thailand
- 2009/9: MAIRS/NEESPI - Almaty, Kazakhstan
- 2010: NEESPI - Tartu, Estonia
- 2011: MAIRS - Hanoi, Vietnam
- 2013/1: MAIRS - Southern India
- 2013/11: NEESPI/MAIRS - Uzbekistan
- 2014: NEESPI – Sopron, Hungary
- 2015-16: MAIRS - Myanmar



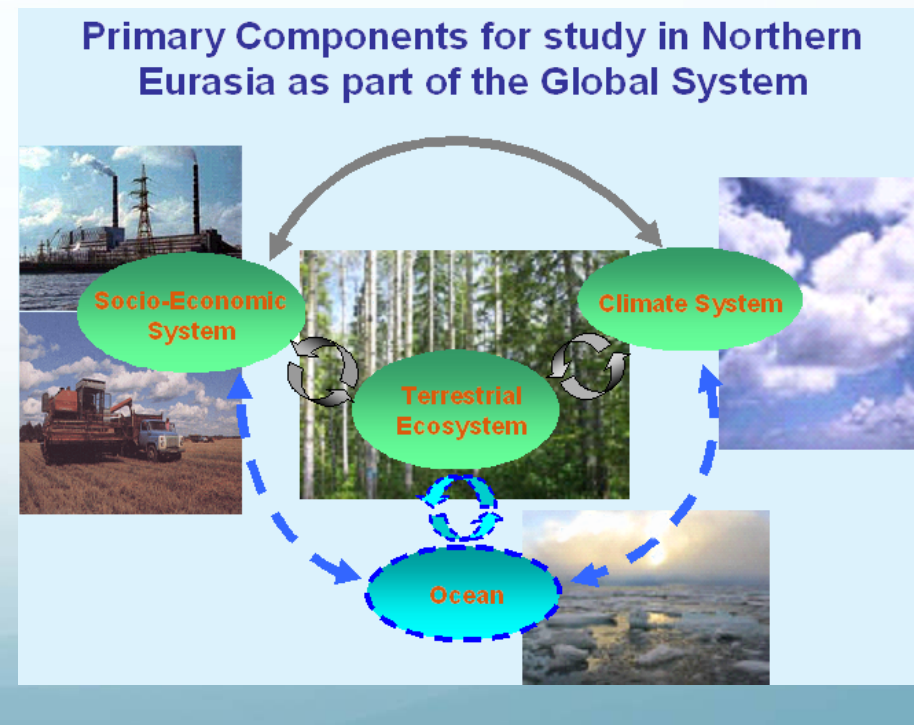
Northern Eurasia Earth Science Partnership Initiative (NEESPI)

NEESPI is one of the WCRP Hydrometeorology Projects

Focus on climate-ecosystem interactions and societal impacts in boreal and non-boreal zones of Northern Eurasia

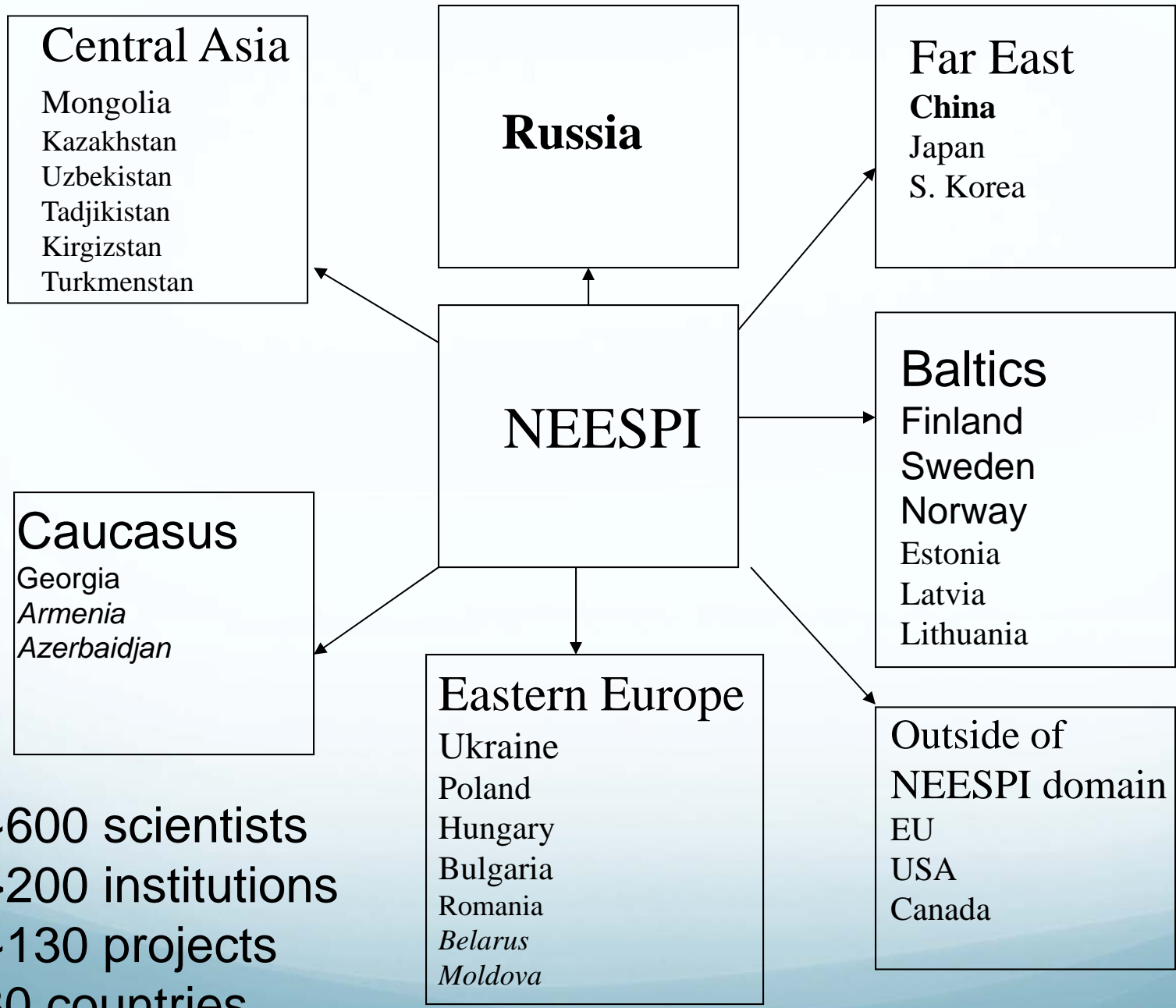
Goals:

- To evaluate the role of anthropogenic impacts on the regional ecosystems and climate and how it may affect the global climate
- To evaluate the consequences of global changes for regional environment, the economy and the quality of life in the region



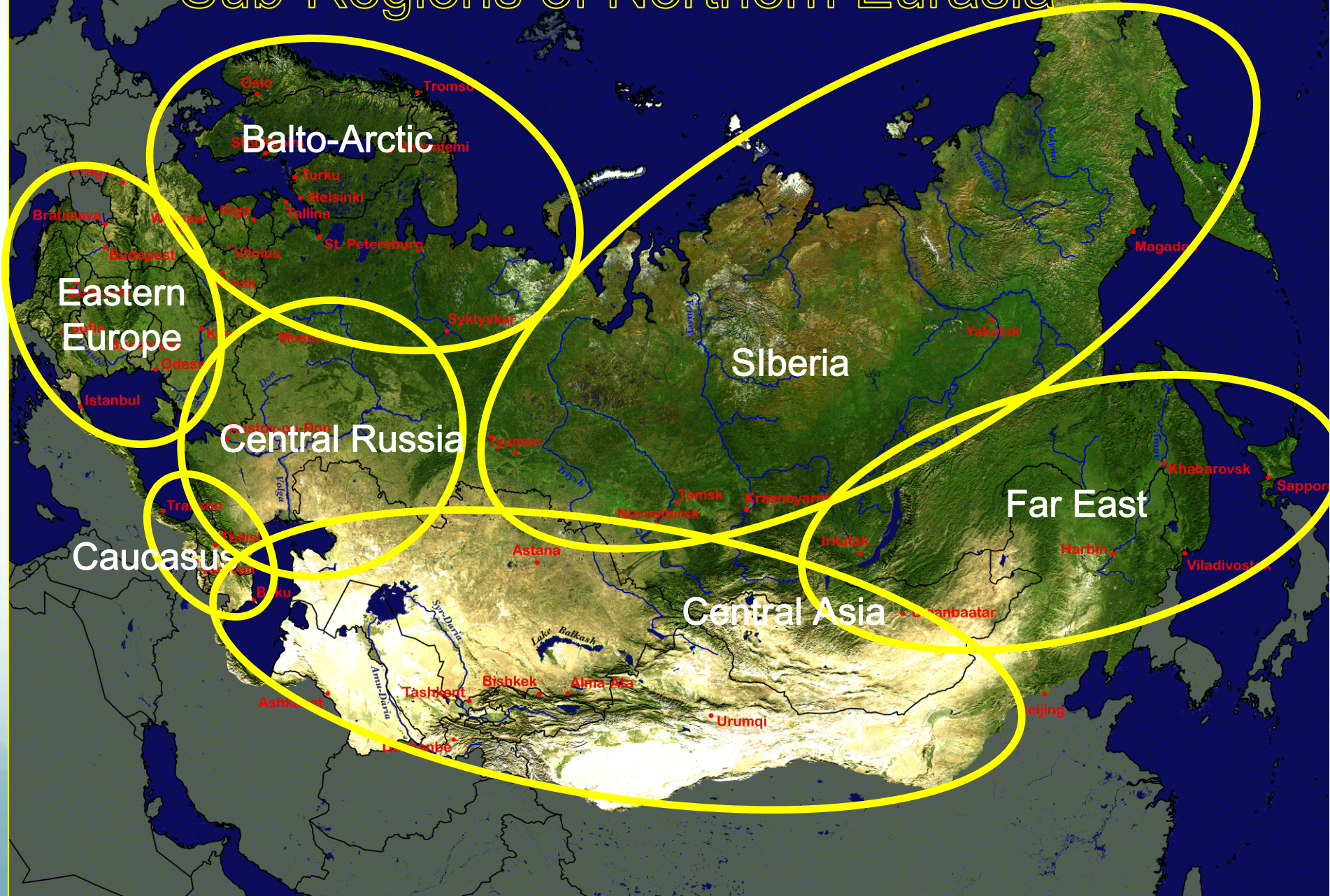


Pasha Groisman Csaba Mátyás

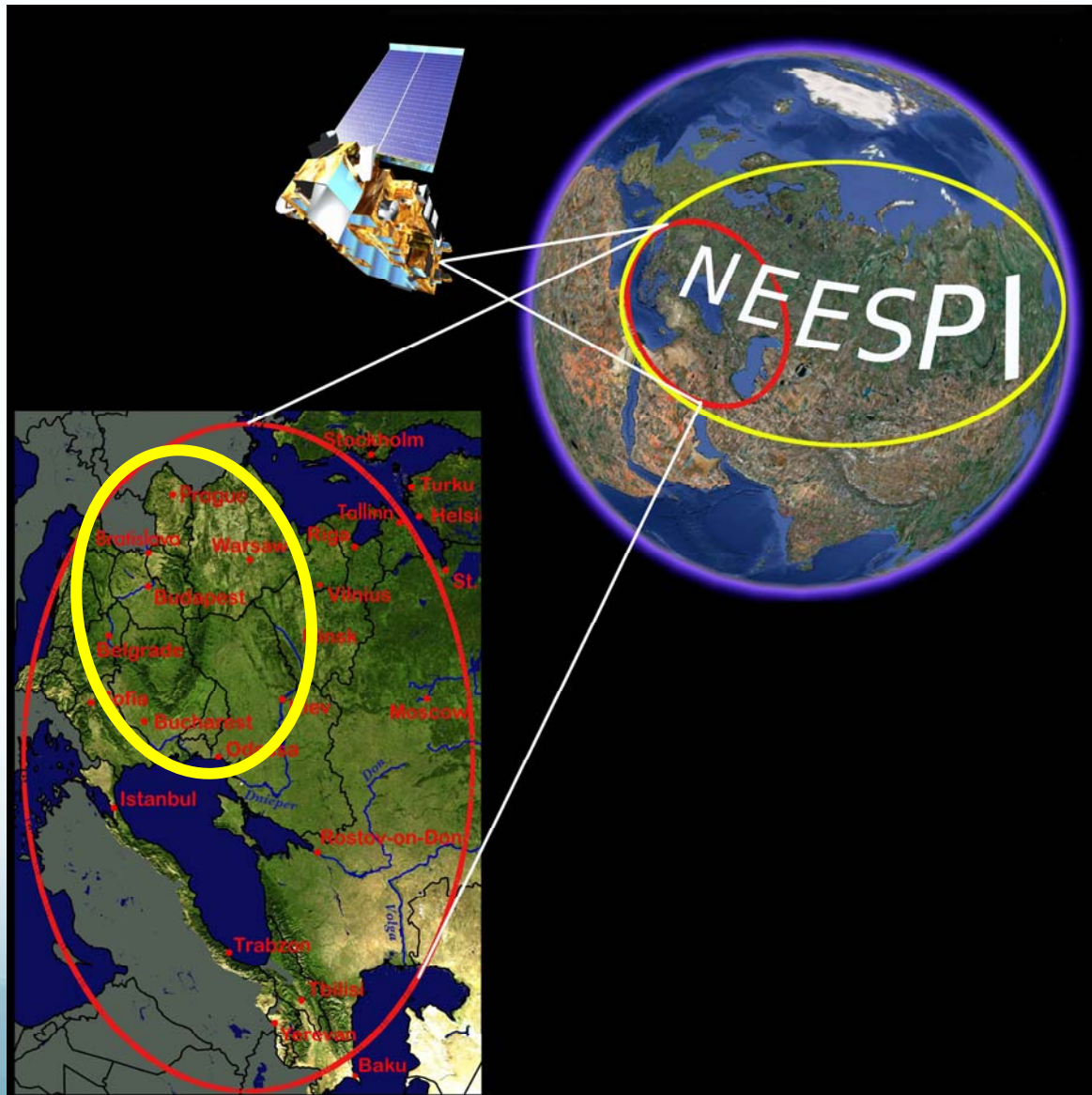


~600 scientists
>200 institutions
~130 projects
30 countries

Sub-Regions of Northern Eurasia



NEESPI-Europe



Proceedings of NEESPI Workshop on Eastern Europe

NATO Science for Peace and Security Series C:
Environmental Security, 2009

**Regional Aspects of Climate-Terrestrial-
Hydrologic Interactions in Non-boreal Eastern
Europe.** Editors: Pavel Ya. Groisman Sergiy V. Ivanov

- Observations Issues in the Non-boreal Eastern Europe
- Regional Climate Changes
- Air Pollution
- Regional Land Cover and Land Use Changes
- Changes in The Black Sea and Its Coastal Zone



<http://link.springer.com/book/10.1007/978-90-481-2283-7>

Ongoing LCLUC Projects on Eastern Europe

- ◆ PI: Jessica McCarty, Michigan Tech. U.
 - ◆ The role of environmental, socioeconomic, institutional, and land-cover/land-use change factors to explain the pattern and causal drivers of anthropogenic fires in post-Soviet Eastern Europe
- ◆ PI: Volker Radeloff, U. Wisconsin
 - ◆ Synthesis of studies on institutional change and LCLUC effects on carbon, biodiversity, and agriculture after the collapse of the Soviet Union
 - ◆ 200 years of land use and land cover changes and their driving forces in the Carpathian basin in Central Europe

Land-cover and land-use change in Eastern Europe 1990-2010: Impacts of the breakup of the Soviet Union

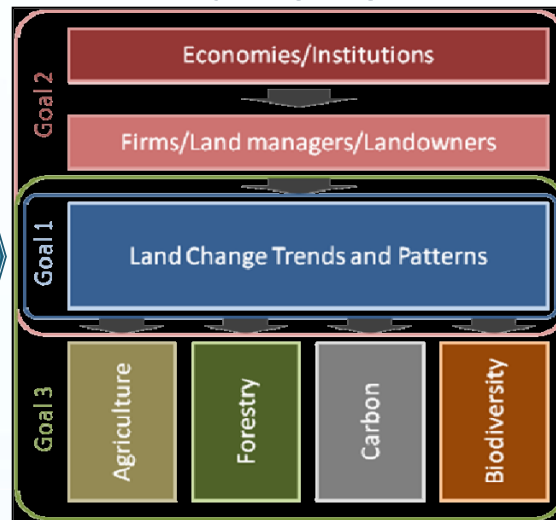
- Chapter 1: Introduction
- Chapter 2: Overview of changes in land cover and land use in Central Europe
- Chapter 3: Changes in carbon budgets associated with land-use changes in the Black Sea region
- Chapter 4: Changes in the Carpathians
- Chapter 5: Patterns and drivers of agricultural land-use changes in Eastern Europe
- Chapter 6: Agricultural land changes in European Russia
- Chapter 7: Urban changes from Night Lights data and Landsat
- Chapter 8: Contemporary hydrological changes associated with climate, political transformations and human activity
- Chapter 9: Land management changes and impact of extreme drought events on agricultural and ecological systems of European Russia
- Chapter 10 Wetlands

Synthesis of studies on institutional change and LCLUC effects on carbon, biodiversity, and agriculture after the collapse of the Soviet Union

Case Studies



Theoretical Framework



Comprehensive Assessments



A general theory of the effects of socioeconomic shocks on land use and land cover change



LCLUC-Fires: Patterns and Drivers

Study Area: Belarus, Lithuania, and European Russia

- Jessica McCarty,
Michigan Technological
University
- Investigation into the drivers
of anthropogenic fire and
wildland fire observed in
Eastern Europe and Russia
- Calculation of GHG, air
quality, and short-lived
climate forcers emissions

Legend

- Belarusian Voblasts,
Lithuanian Apskritys,
& Russian Administrative
Regions of Interest
- Belarus
- Lithuania
- European Russia
- Country Boundaries

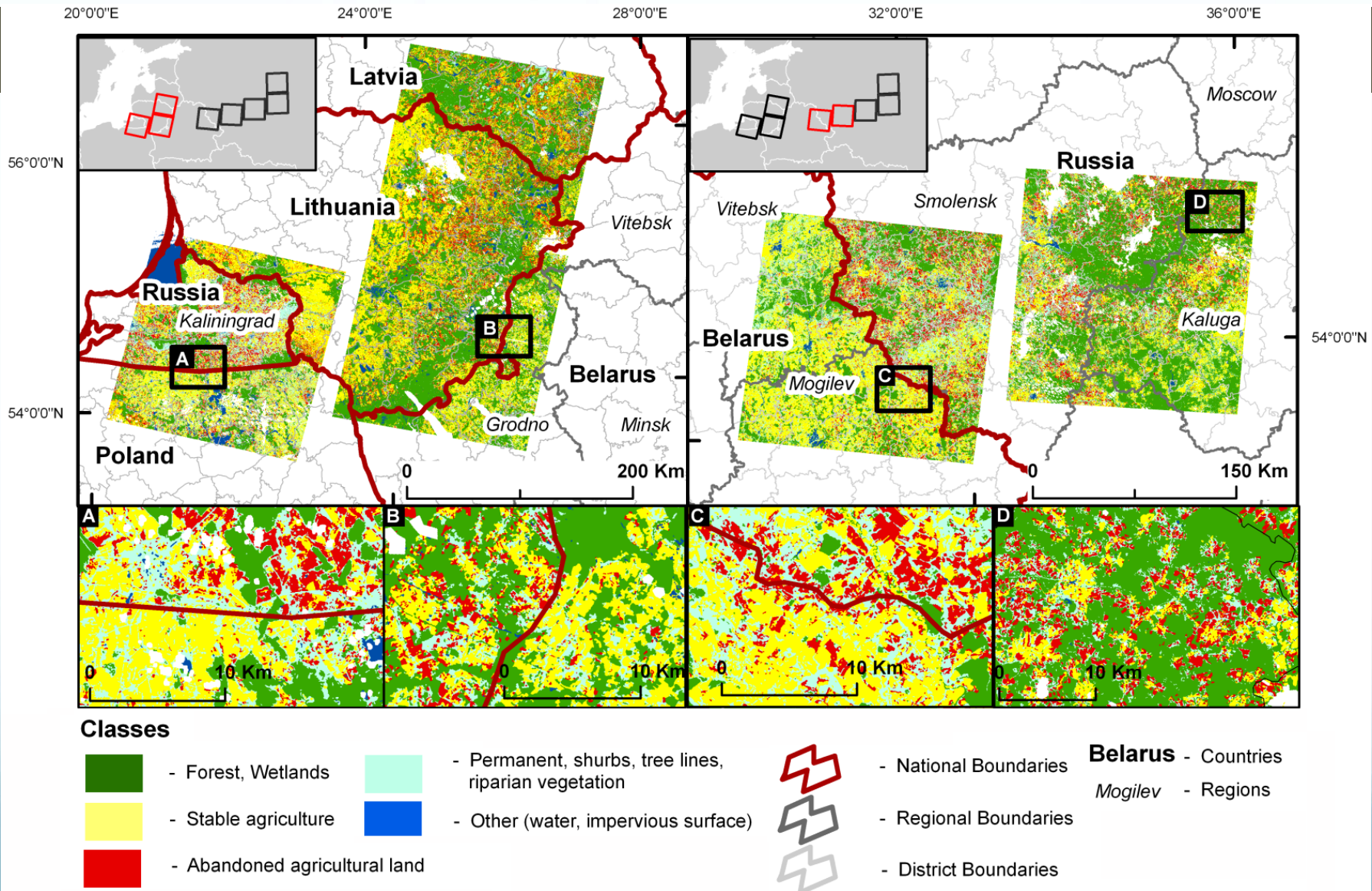


NORTHERN ESTONIA

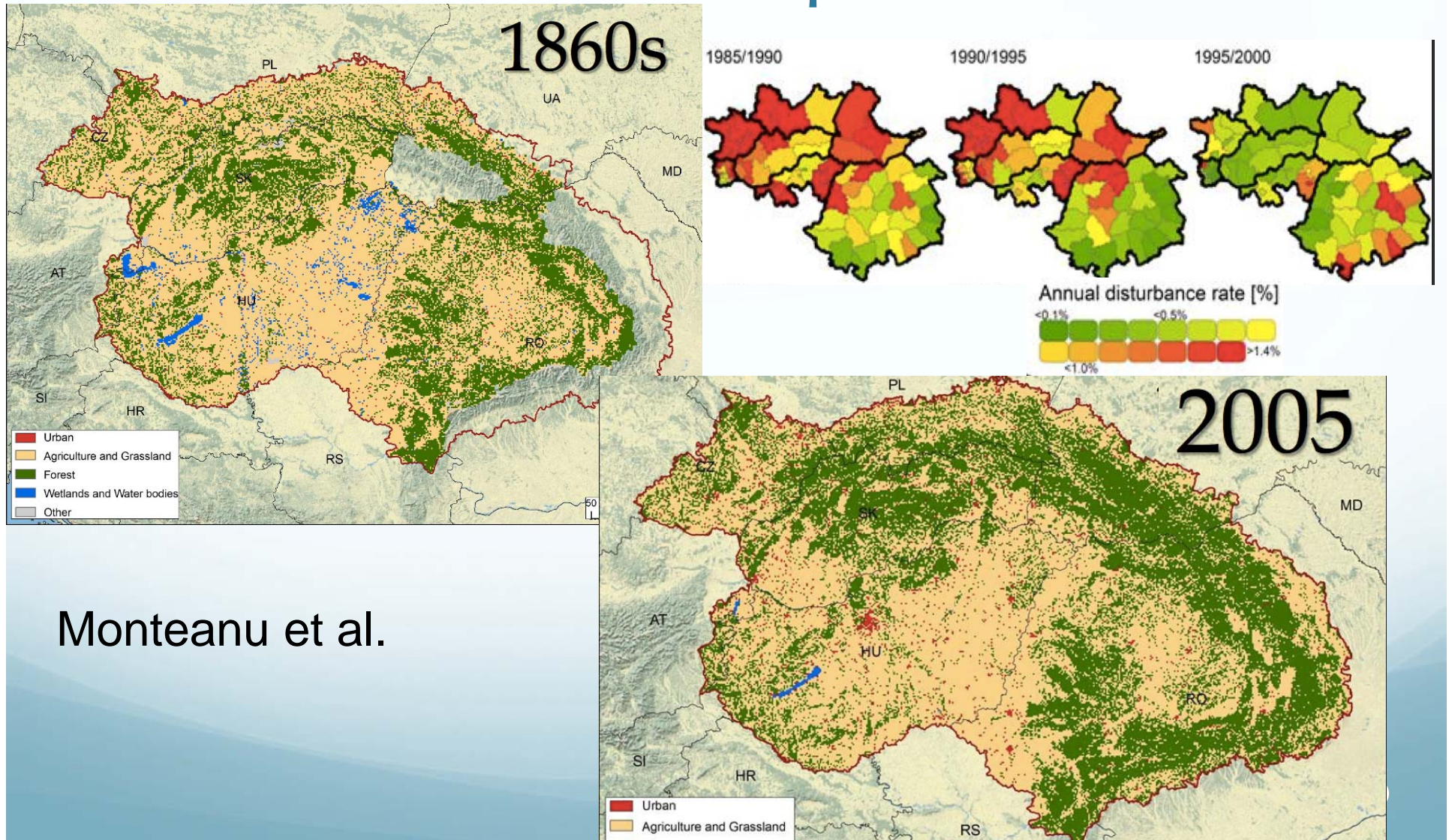


Fields abandonment in mid-latitudes affect surface processes
=>Carbon Cycle, Radiation Budget, Hydrology =>Climate

Field Abandonment

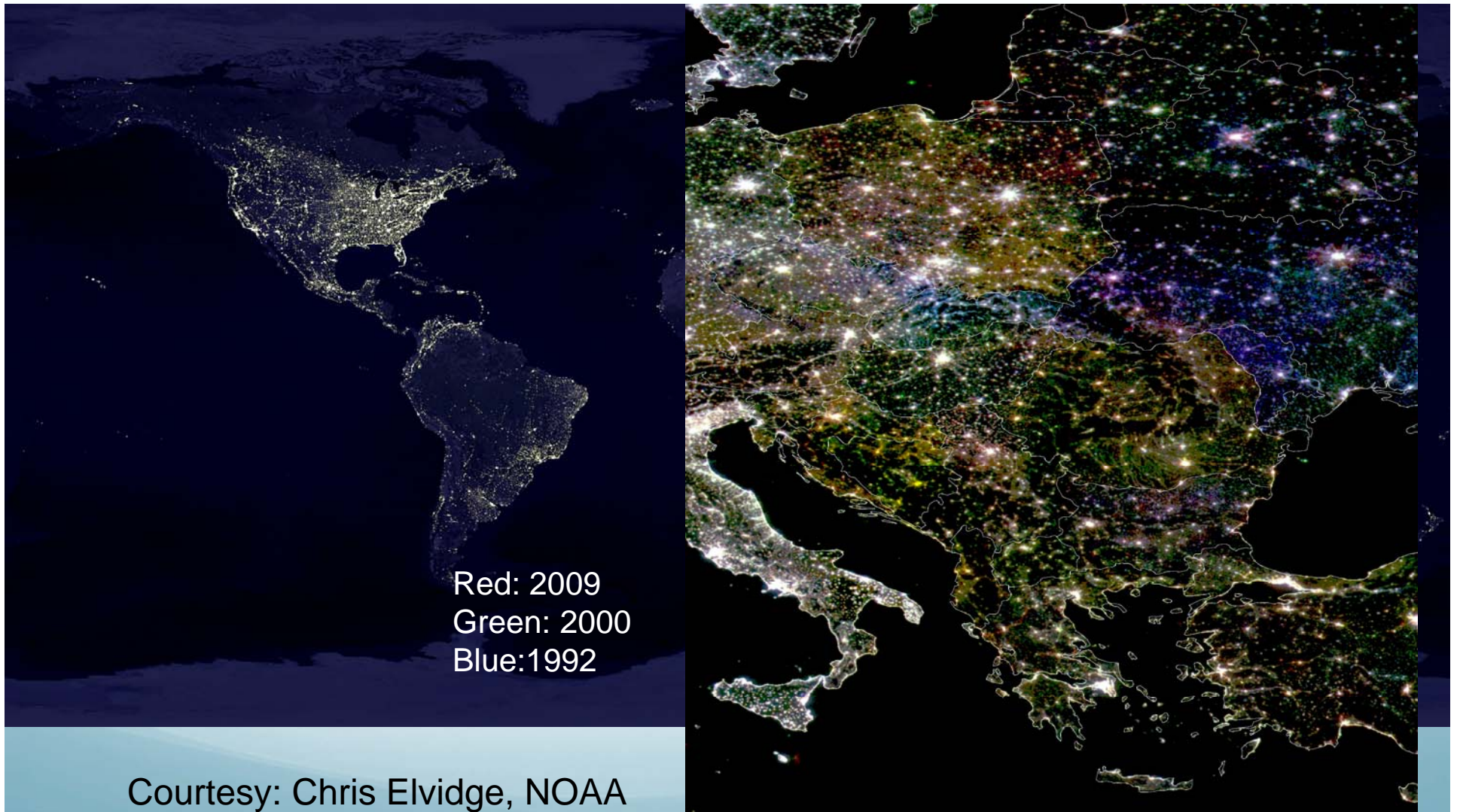


200 Years of LCLUC Driving Forces in the Carpathian Basin



Monteanu et al.

Earth Night Lights Observed by DMSP/OLI



Courtesy: Chris Elvidge, NOAA

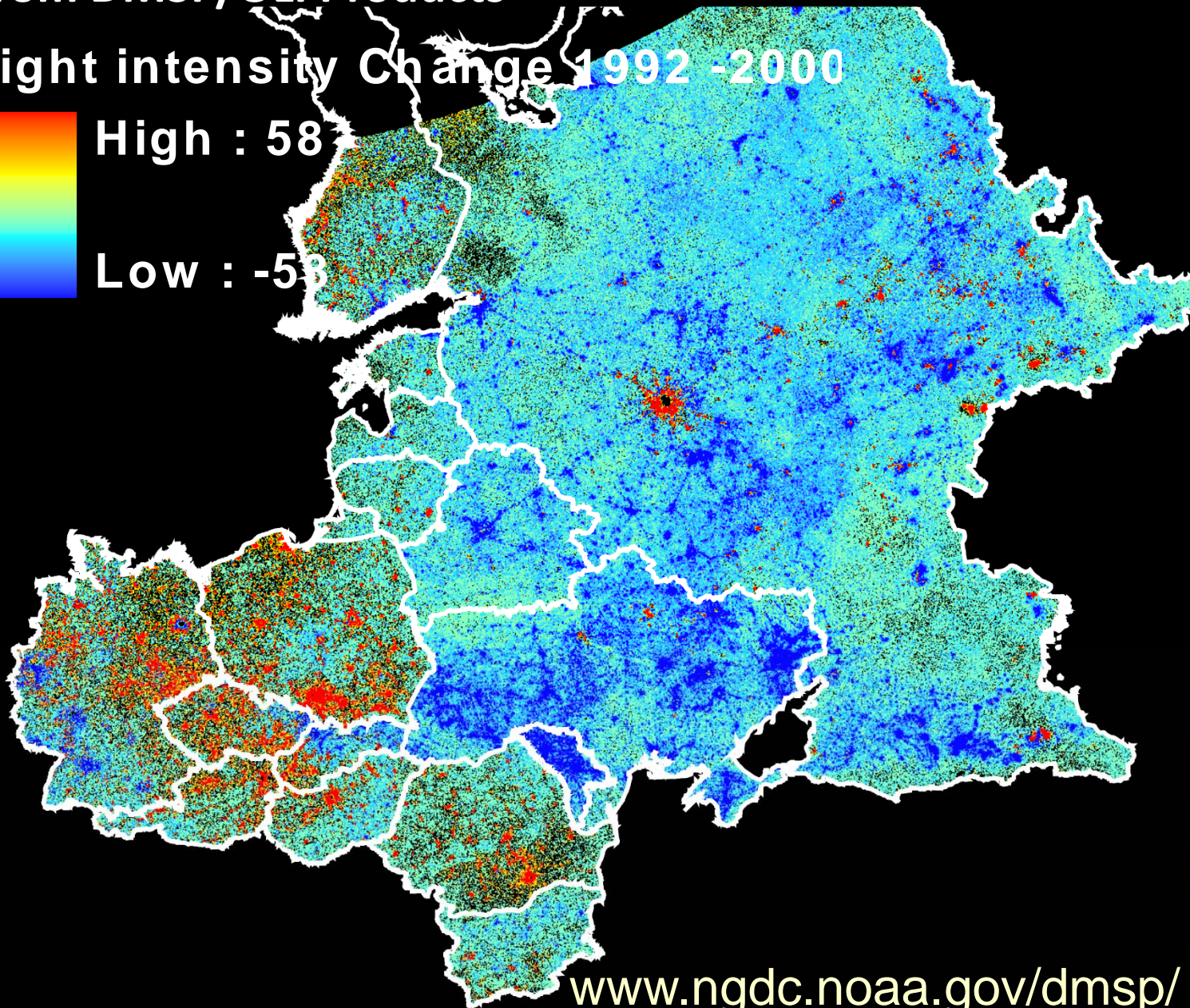
Change in Nighttime Lights 1992 to 2000 From DMSP/OLI Products

Light intensity Change 1992 - 2000



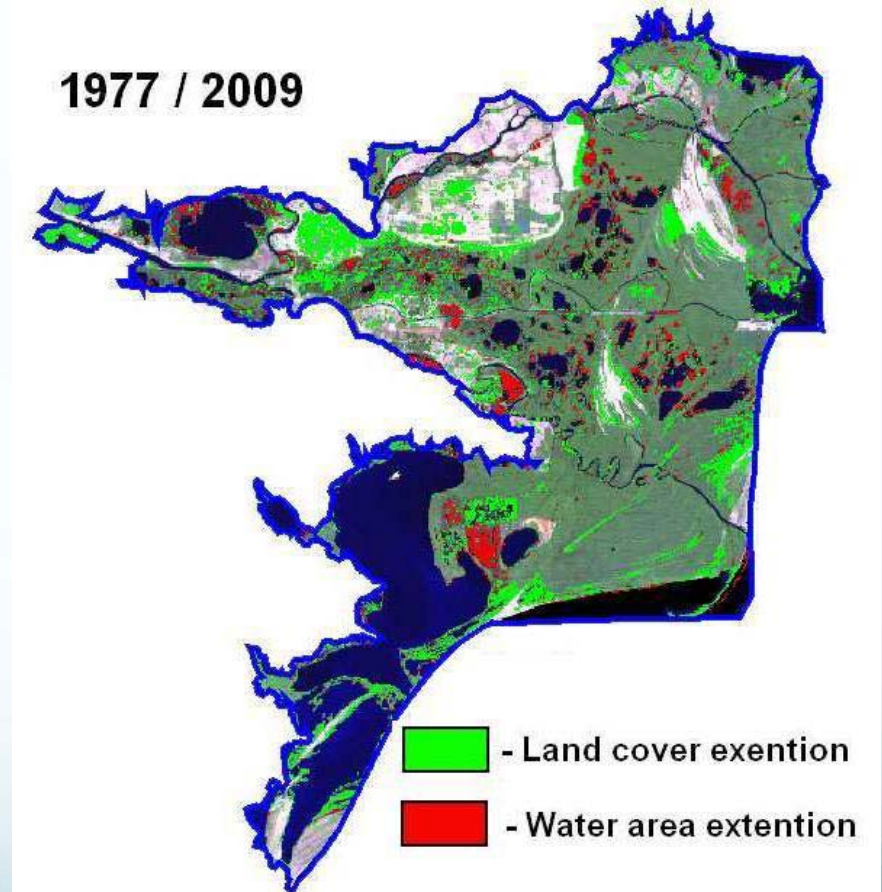
High : 58

Low : -58



Wetlands

- GLOBAL SCALE ASSESSMENT OF THREATENED RIVER DELTA SYSTEMS: EVALUATION OF CONNECTIONS BETWEEN THE CONTINENTAL LAND MASS AND OCEAN THROUGH INTEGRATED REMOTE SENSING AND PROCESS MODELING
 - PI: Charles J. Vörösmarty, City University of New York
 - Collaborator: Vladimir Starodubtsev, *National University of Life and Environ. Sciences, Ukraine, Kiev*
- Deltas play an important economic and social role, especially in connection with water use intensification for power, irrigation, water supply and other purposes. However, excessive use of water resources since the last century has led to a decrease in water and sediment inflow into the deltas and a change in their landscapes.
- Danube River delta: as a result of flow regulation and economic activity, the inflow of water and sediment decreased



Land cover change detection in the Danube delta
Courtesy: Vlad. Starodubtsev

- Sopron 2012



Köszönöm!

