The NASA LCLUC Program Support of Projects in Eastern Europe: An Update and Future Directions

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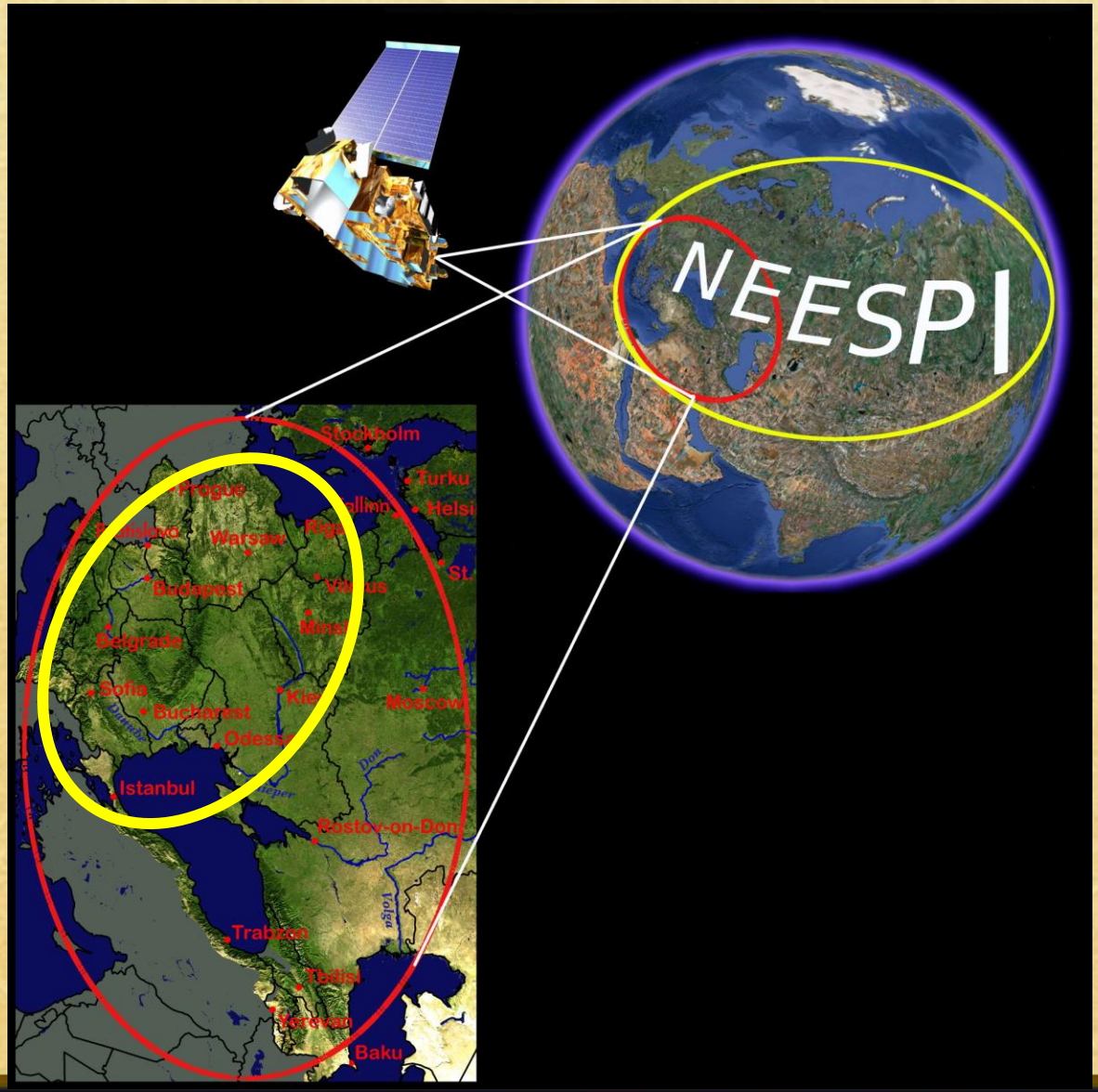
LCLUC Program Manager
NASA Headquarters
Washington, DC

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***
- http://lcluc.hq.nasa.gov/

NEESPI-Europe



SCERIN ROADMAP

SCERIN Kickoff
Sofia 2012

SCERIN-1
Prague
2013

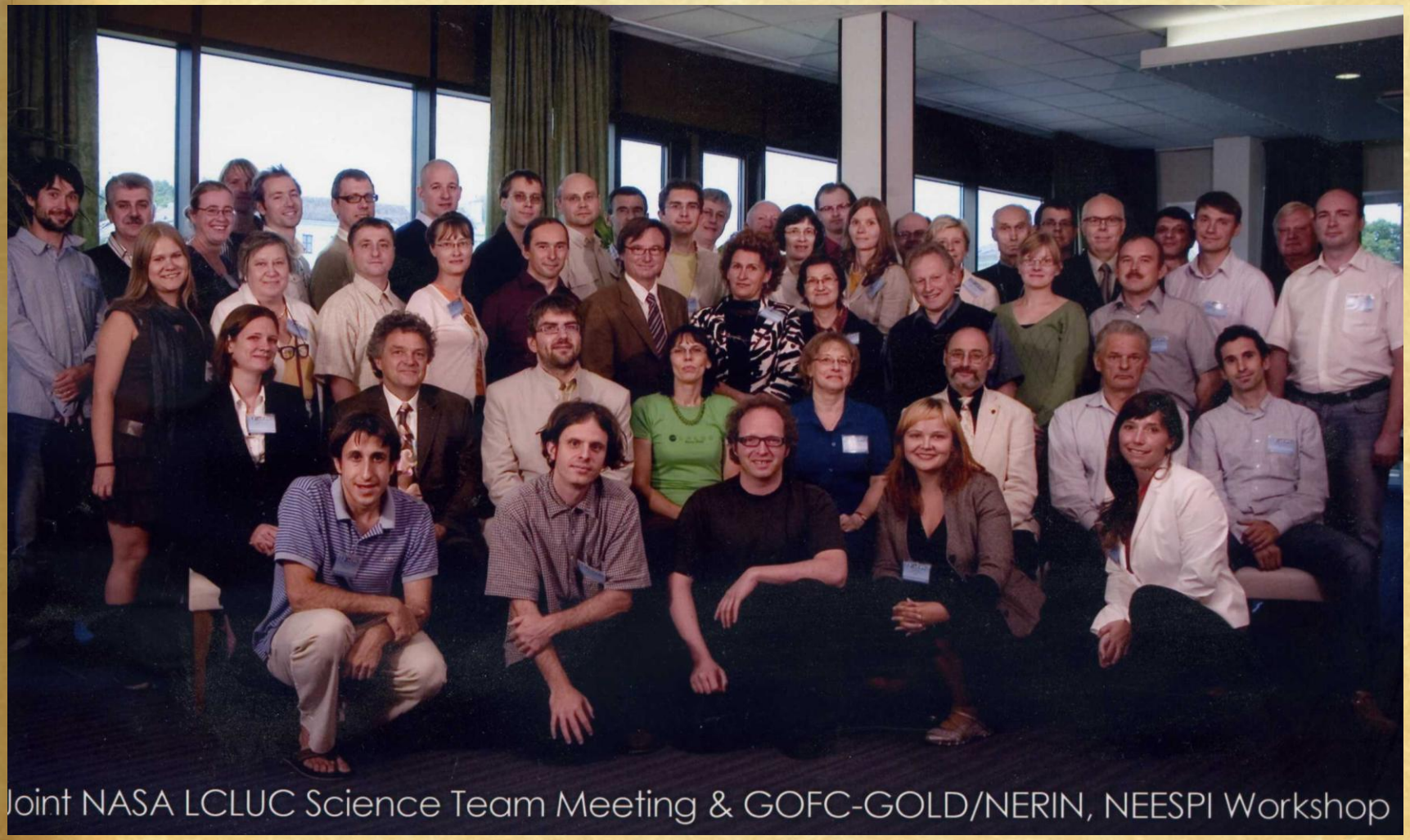
SCERIN-2
Krakow
2014

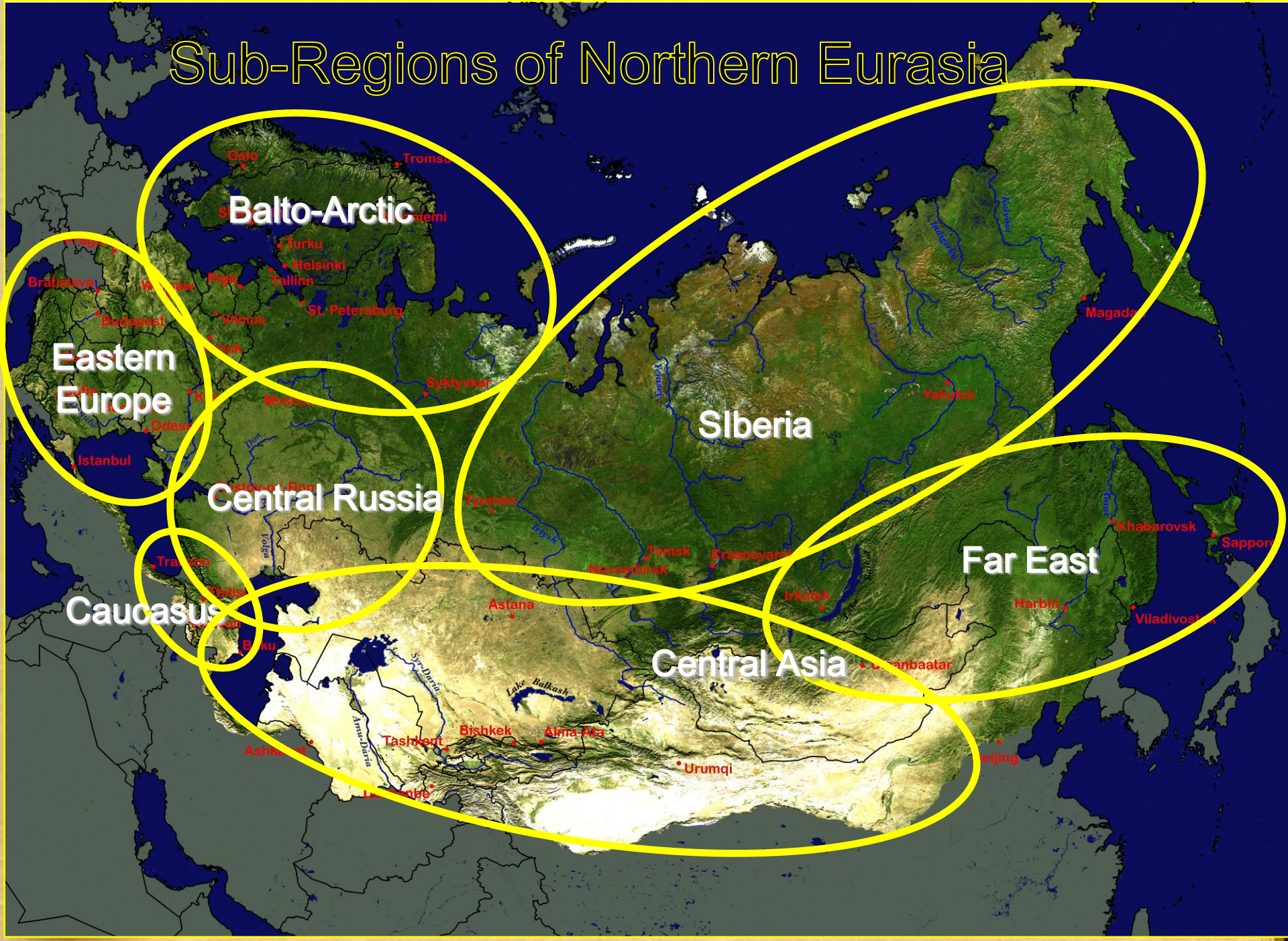
SCERIN-3
Brasov
2015

Petya Campbel (NASA)

Jana Albrechtova (Karlov U.)

Tartu, Estonia 2010




Sub-Regions of Northern Eurasia
Balto-Arctic
Eastern Europe
Central Russia
Caucasus
Siberia
Far East
Central Asia
Oslo
Tromsø
Turku
Helsinki
Tallinn
Riga
St. Petersburg
Vilnius
Budapest
Bratislava
Syktyvkar
Yakutsk
Magadan
Istanbul
Odessa
Tyumen
Tomsk
Krasnoyarsk
Novosibirsk
Irkutsk
Khabarovsk
Harbin
Astana
Bishkek
Alma-Ata
Tashkent
Urumqi
Lake Balkash
Syr-Daria
Amu-Daria
Volga
Don

Russia Issue

- *"all NASA contacts with Russian Government representatives are suspended, unless the activity has been specifically excepted."*
- *"Given Russia's ongoing violation of Ukraine's sovereignty and territorial integrity, until further notice, the U.S. Government has determined that all NASA contacts with Russian Government representatives are suspended, unless the activity has been specifically excepted. This suspension includes NASA travel to Russia and visits by Russian Government representatives to NASA facilities, bilateral meetings, email, and teleconferences or videoconferences. At the present time, only operational International Space Station activities have been excepted. In addition, multilateral meetings held outside of Russia that may include Russian participation are not precluded under the present guidance."*
  - Michael F. O'Brien, Associate Administrator for International and Interagency Relations, NASA Apr 1, 2014

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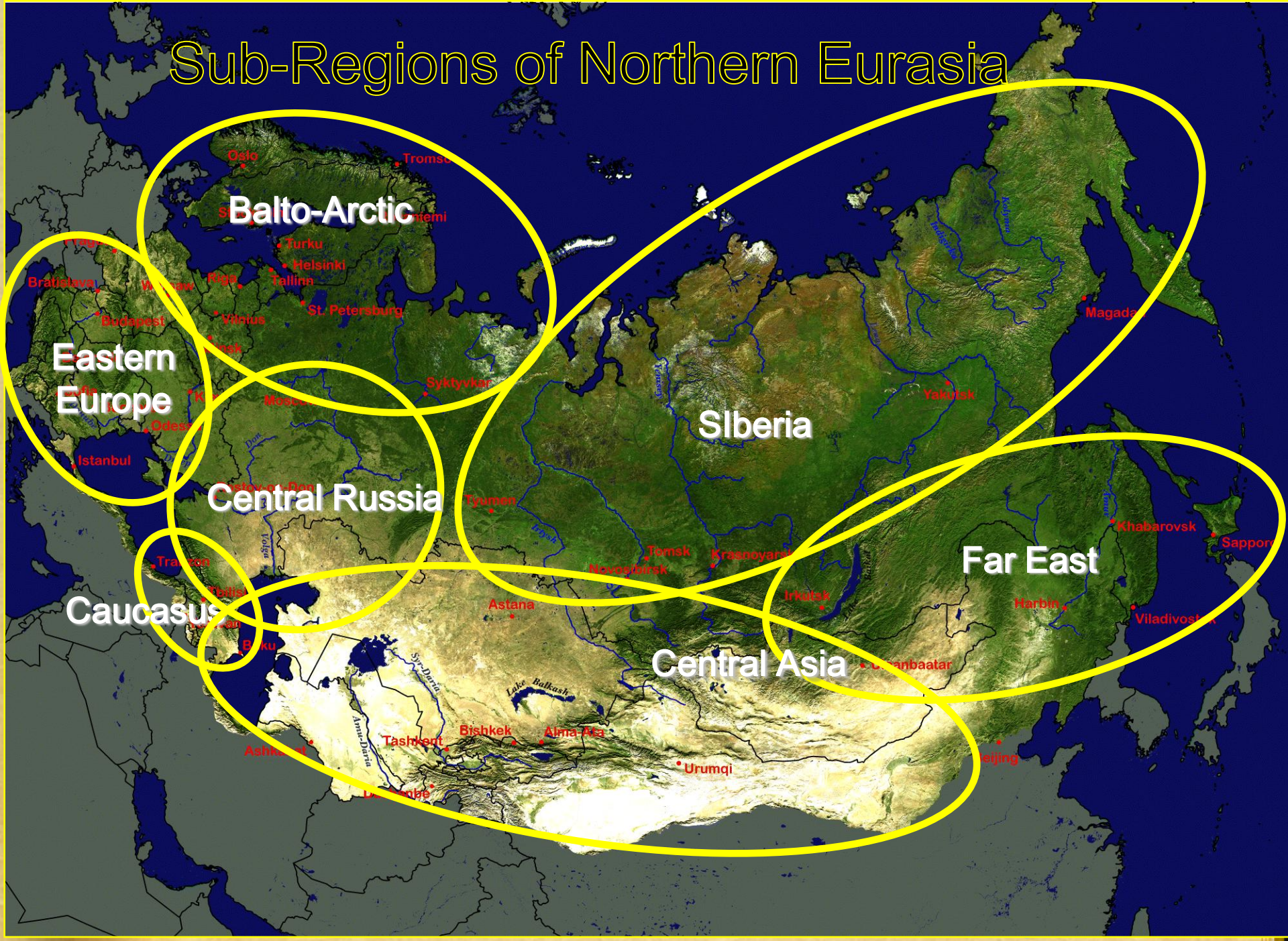
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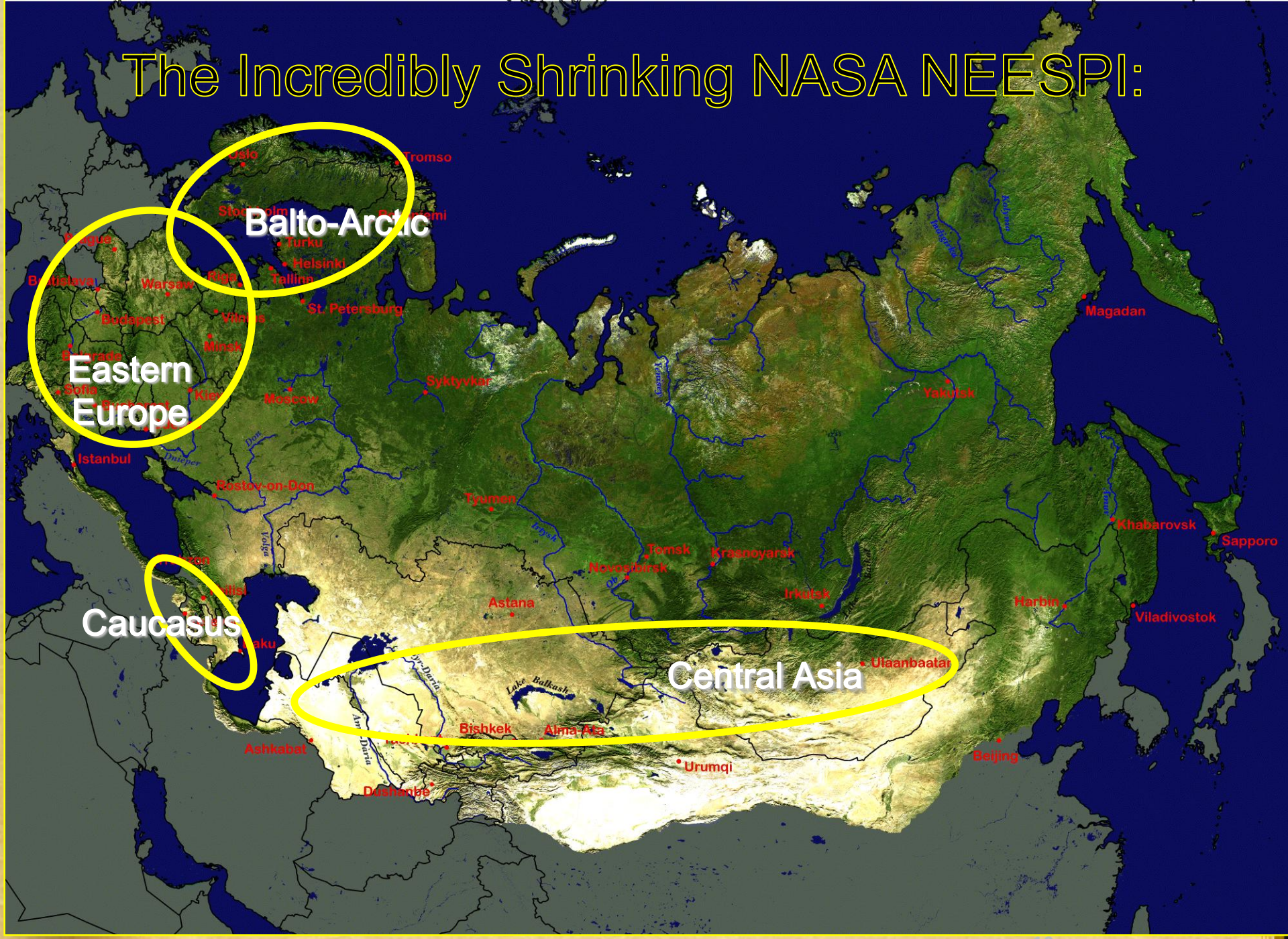
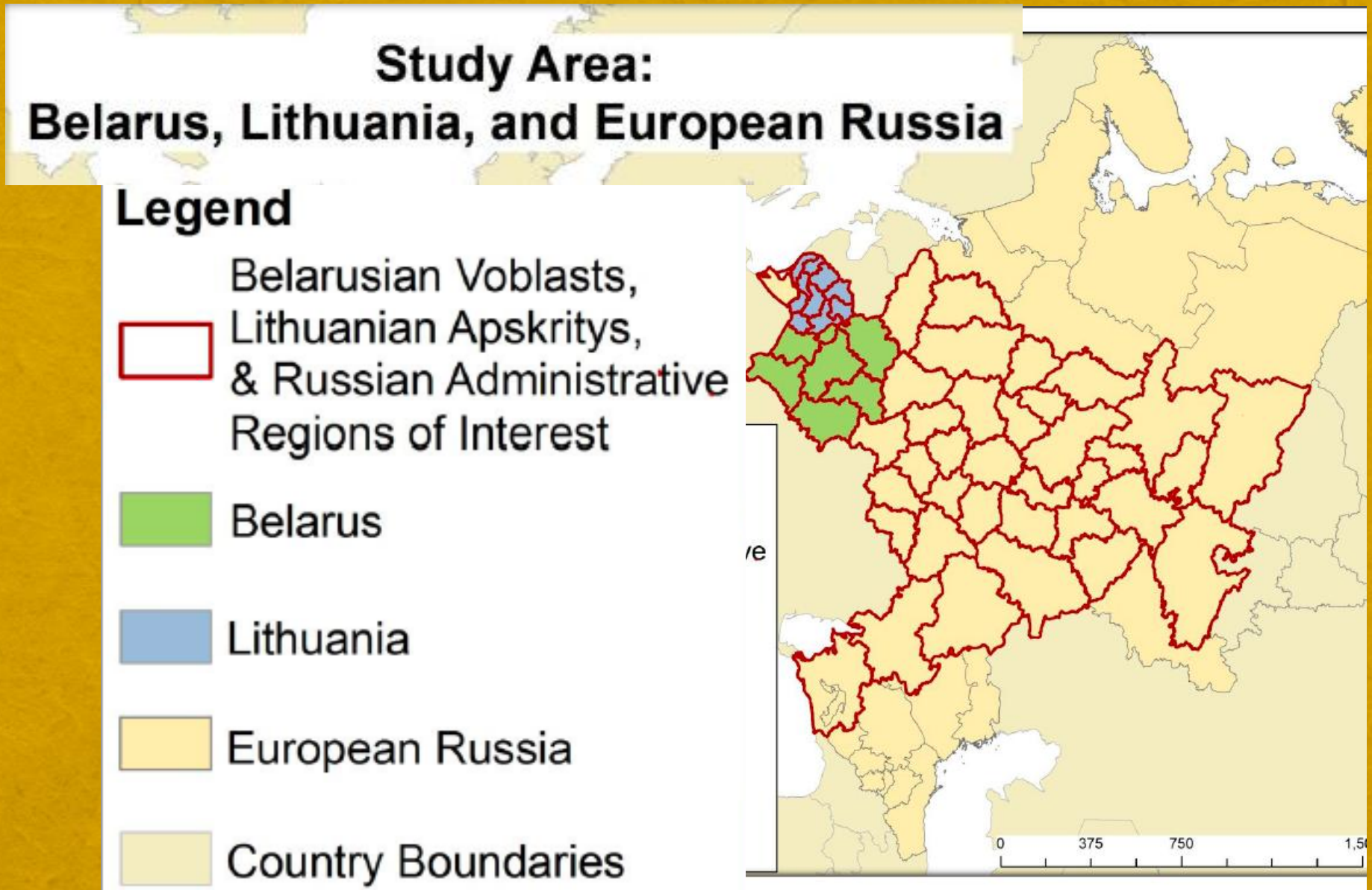
The Incredibly Shrinking NASA NEESPI:



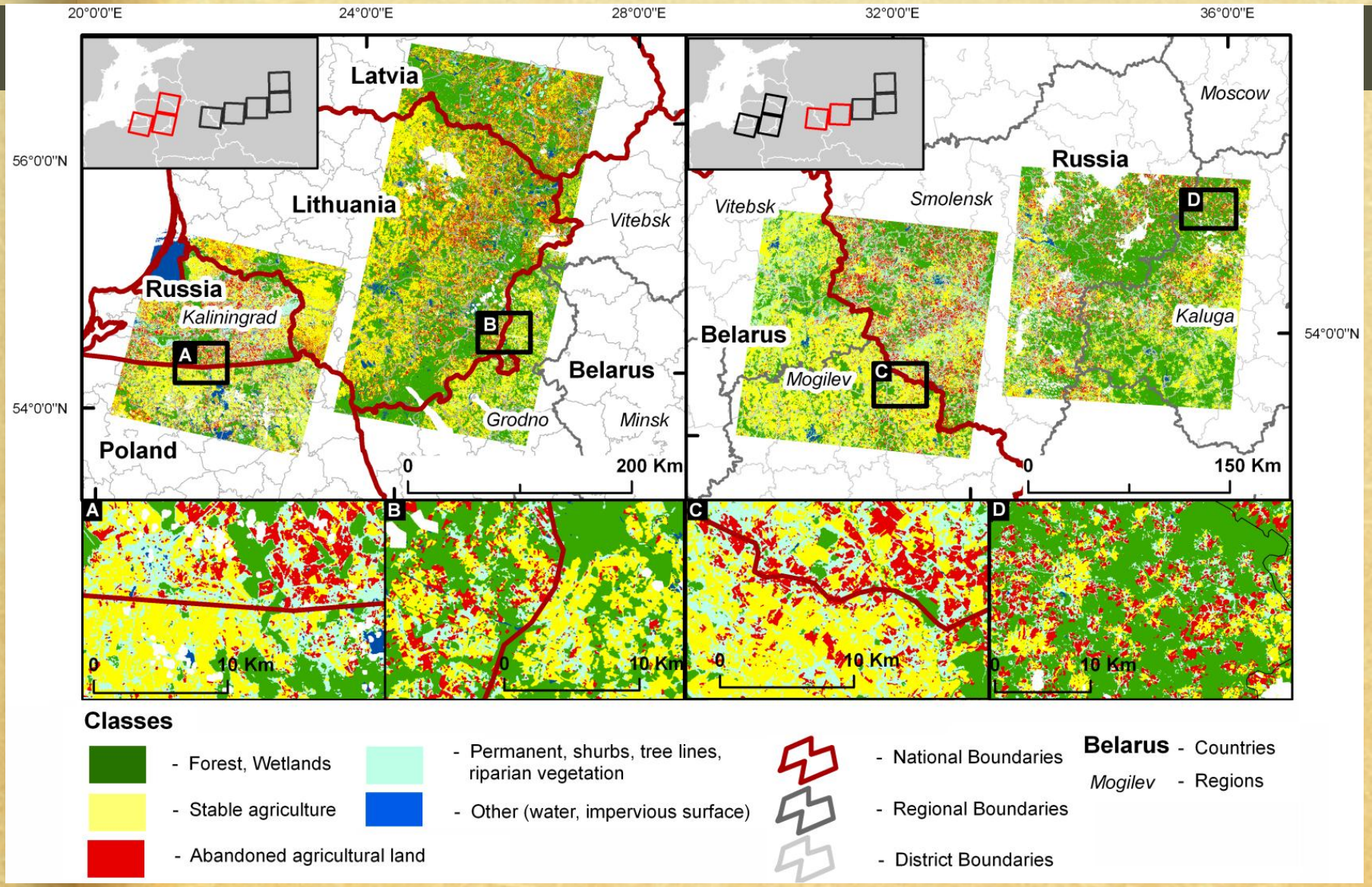
Ongoing LCLUC Projects on Eastern Europe

- 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

LCLUC-Fires: Patterns and Drivers



Field Abandonment

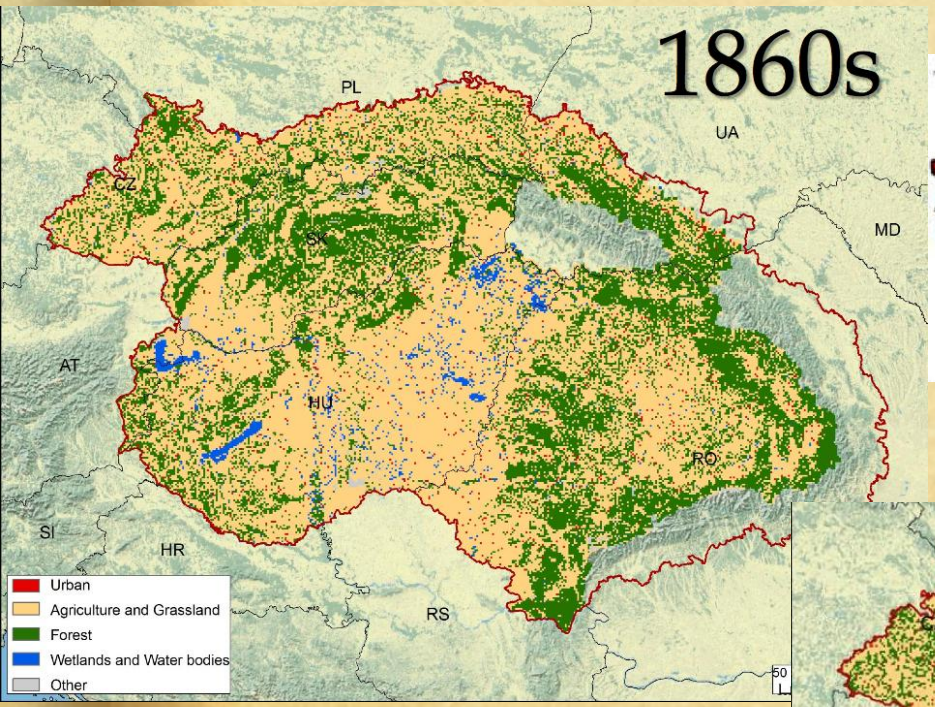


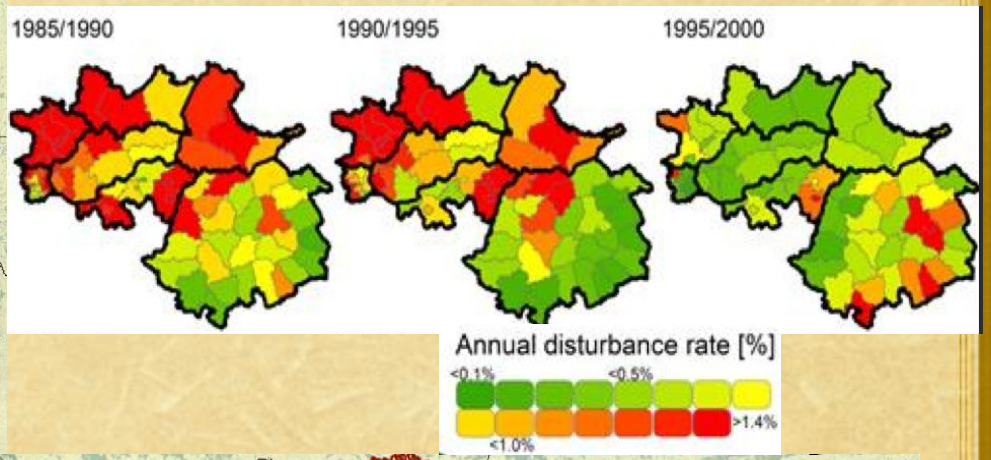
Prishchepov et al., Remote Sensing of Environment Journal, 2012

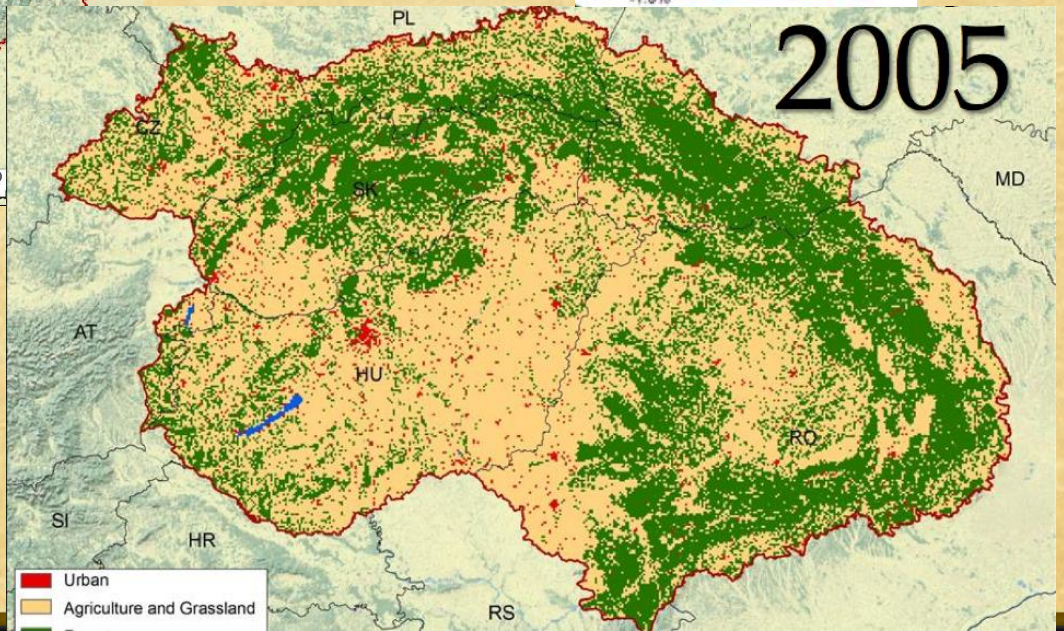
NORTHERN ESTONIA

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

200 Years of LCLUC Driving Forces in the Carpathian Basin



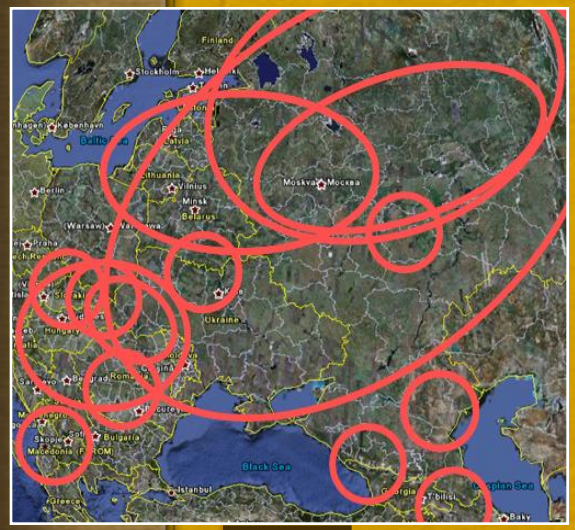




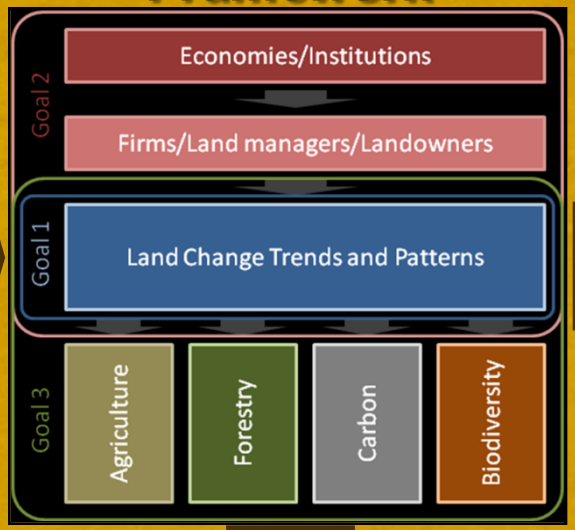
PI: V.C. Radeloff (U. Wisconsin)

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

NASA Land-Cover and Land-Use Change Program LCLUC

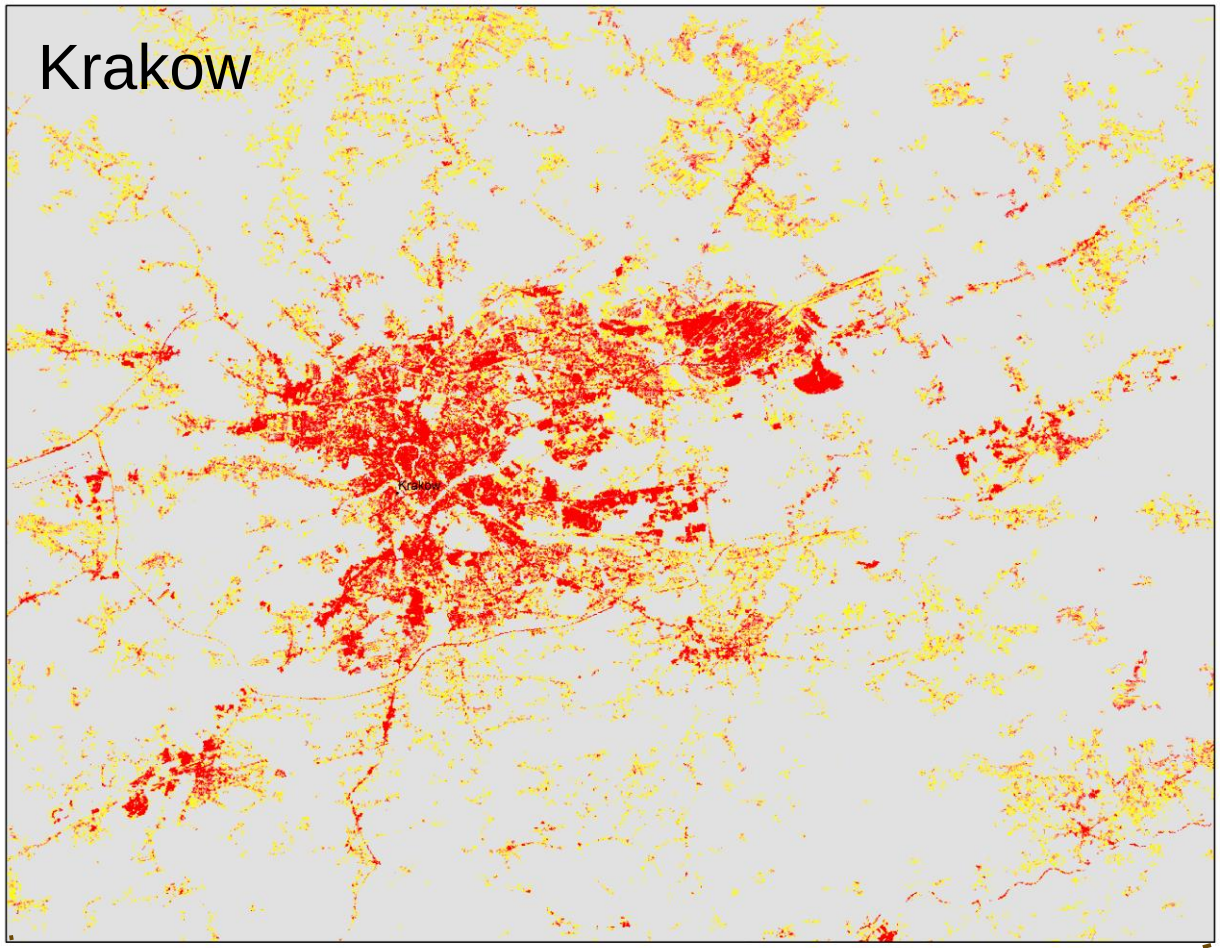
PI: V.C. Radeloff
radeloff@wisc.edu

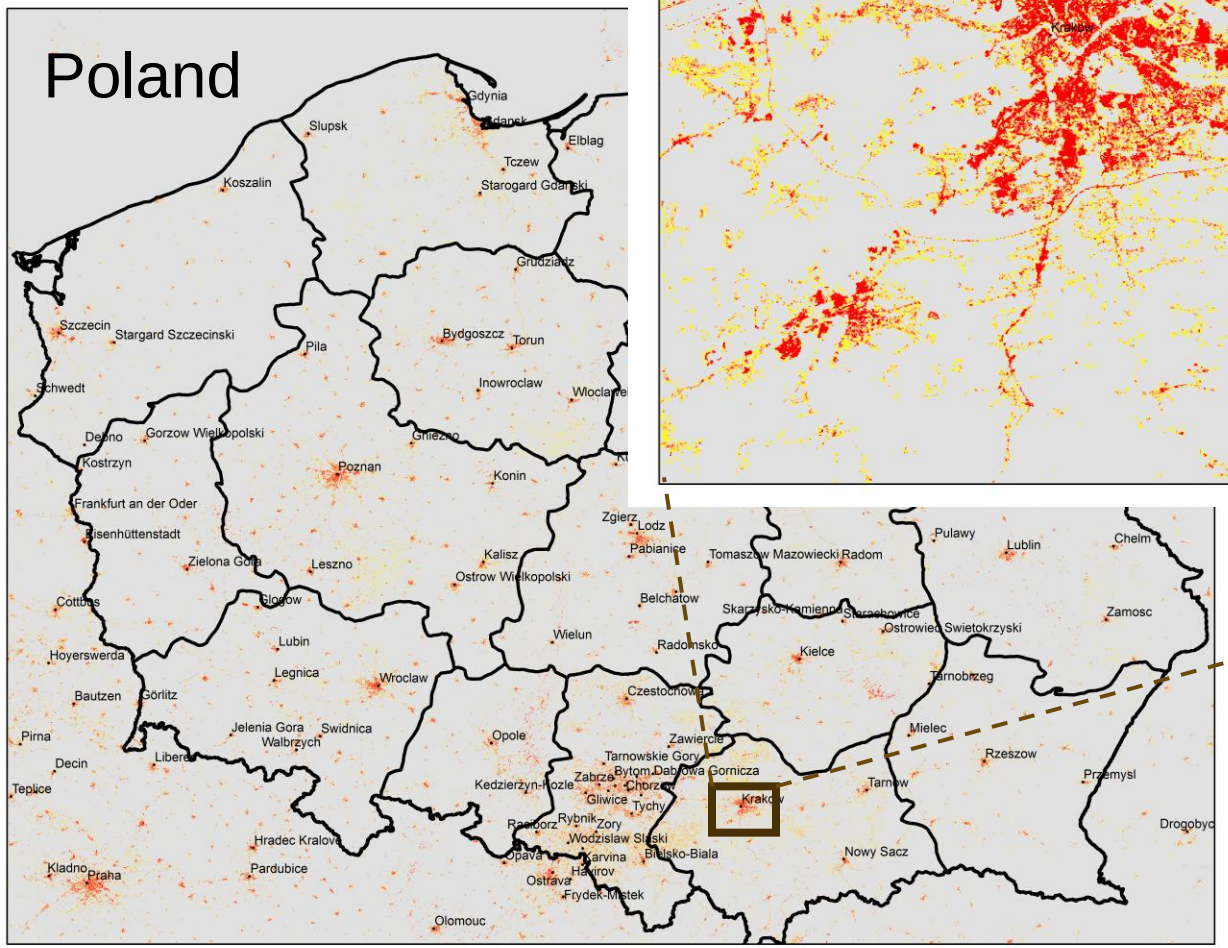
Global Urban Impervious Change Mapping Using Landsat Data

Brown de Colstoun, NASA & Cheng Huang, UMD

- Goal:
  - Develop 30 m resolution global urban impervious change products
  - Provide subpixel estimate of imperviousness and impervious change
- Data:
  - Global Land Survey (GLS) 2000 and 2010
  - Globally distributed training data from ~2000 2 km x 2 km high resolution image)
- Methods
  - Object-based methods for deriving highly accurate training data using NGA high resolution images
  - Use surface reflectance consistent with MODIS data
  - Use a robust regression tree algorithm for estimating subpixel imperviousness
  - Object based methods for masking out non-urban areas

Urban Impervious Surface Product for Poland (2010)



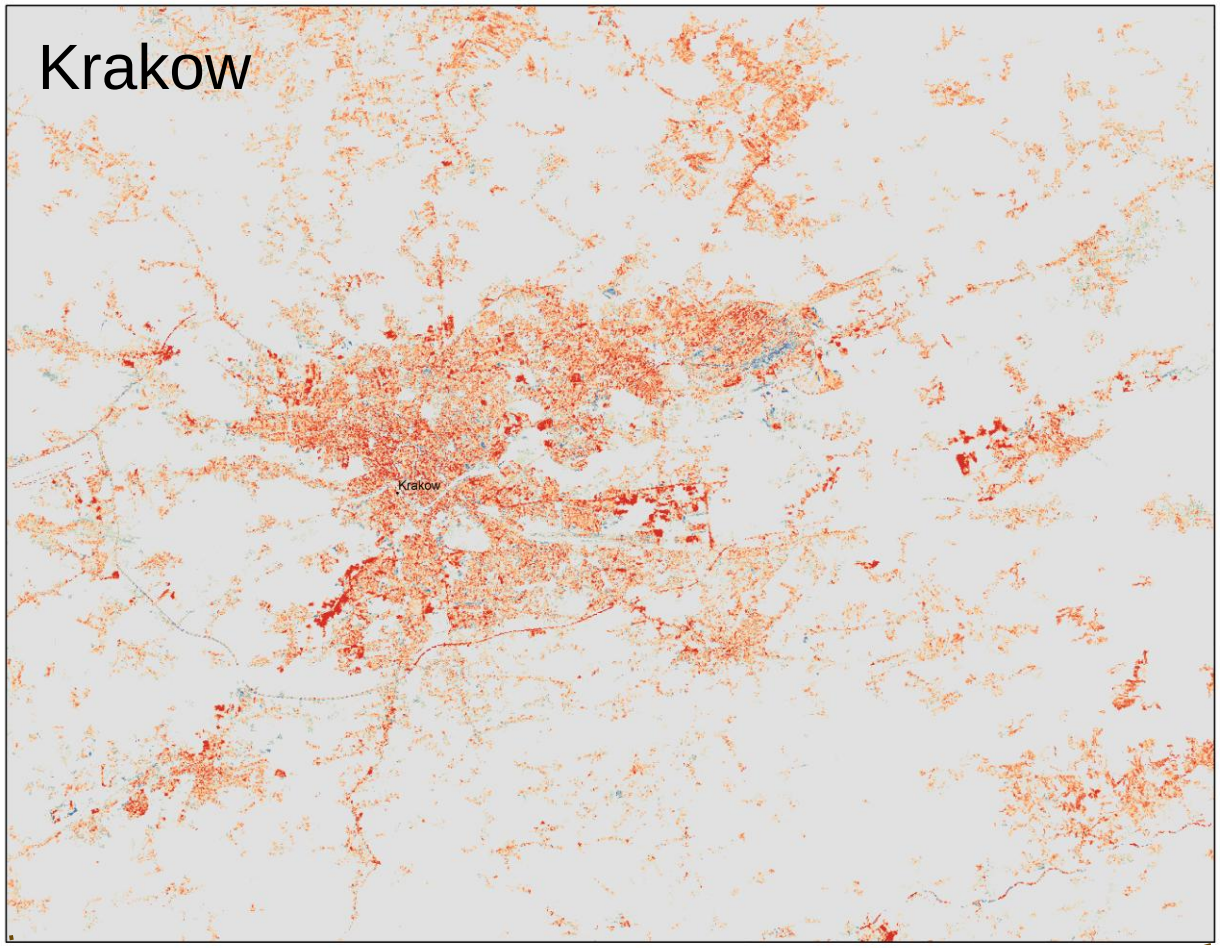


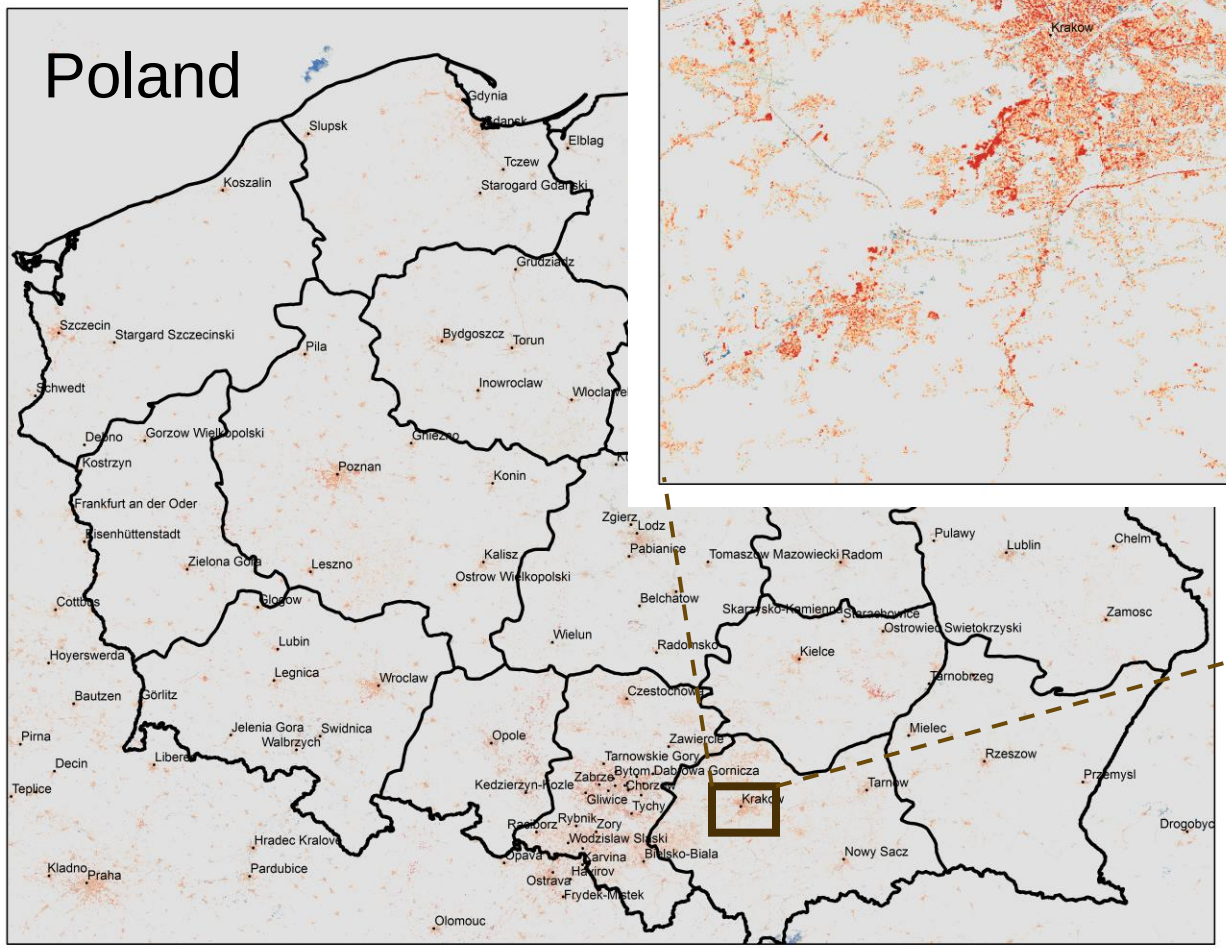
Imperviousness (%)

- 0 - 10
- 10 - 30
- 30 - 50
- 50 - 70
- 70 - 100

(Huang, Wang, de Colstoun, et al)

Urban Impervious Surface Change Product for Poland (2000-2010)





(Huang, Wang, de Colstoun, et al)

Impervious Change (2010-2000, %)

- < -70
- -70 to -50
- -50 to -30
- -30 to -10
- -10 to 10
- 10 to 30
- 30 to 50
- 50 to 70
- > 70

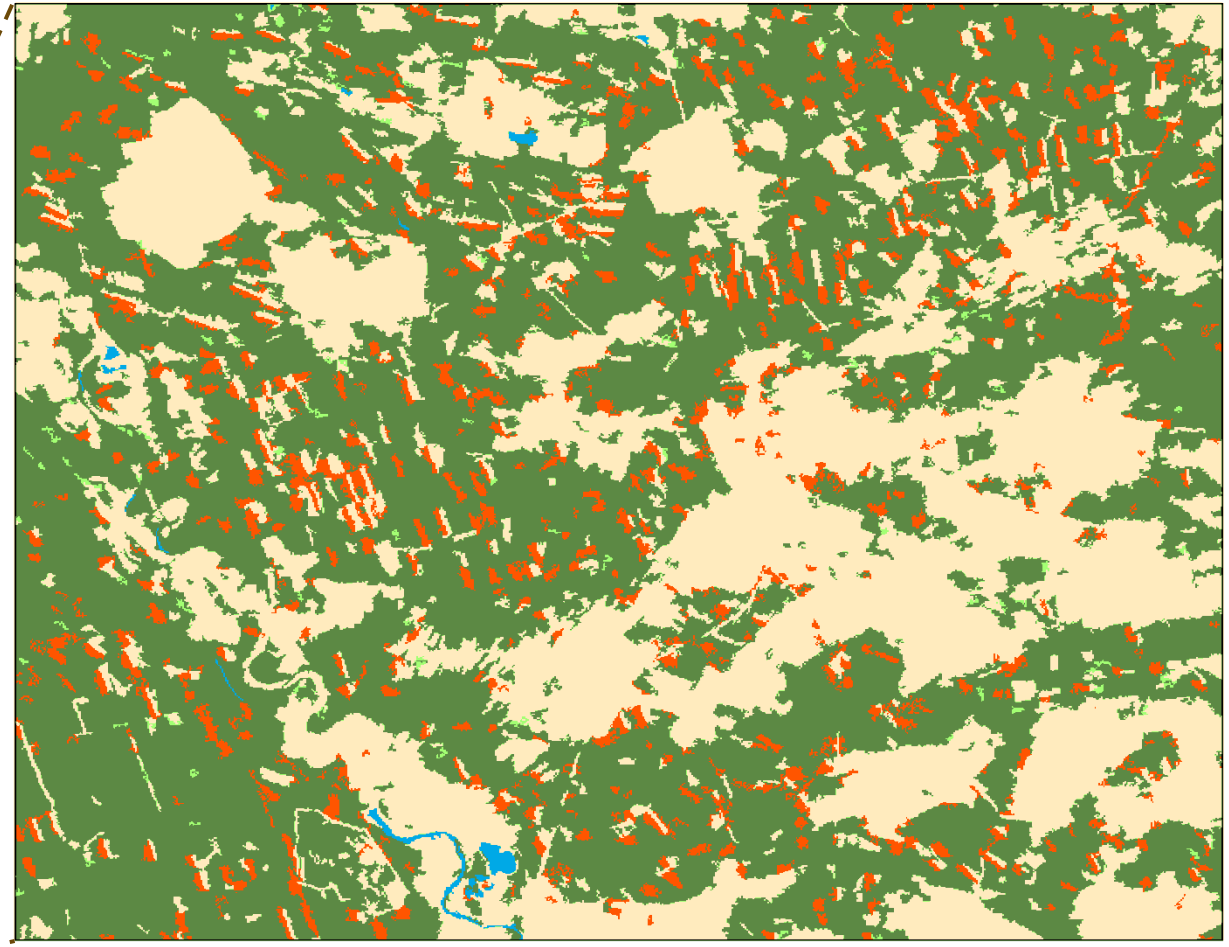
Global Forest Cover Change Mapping Using Landsat Data

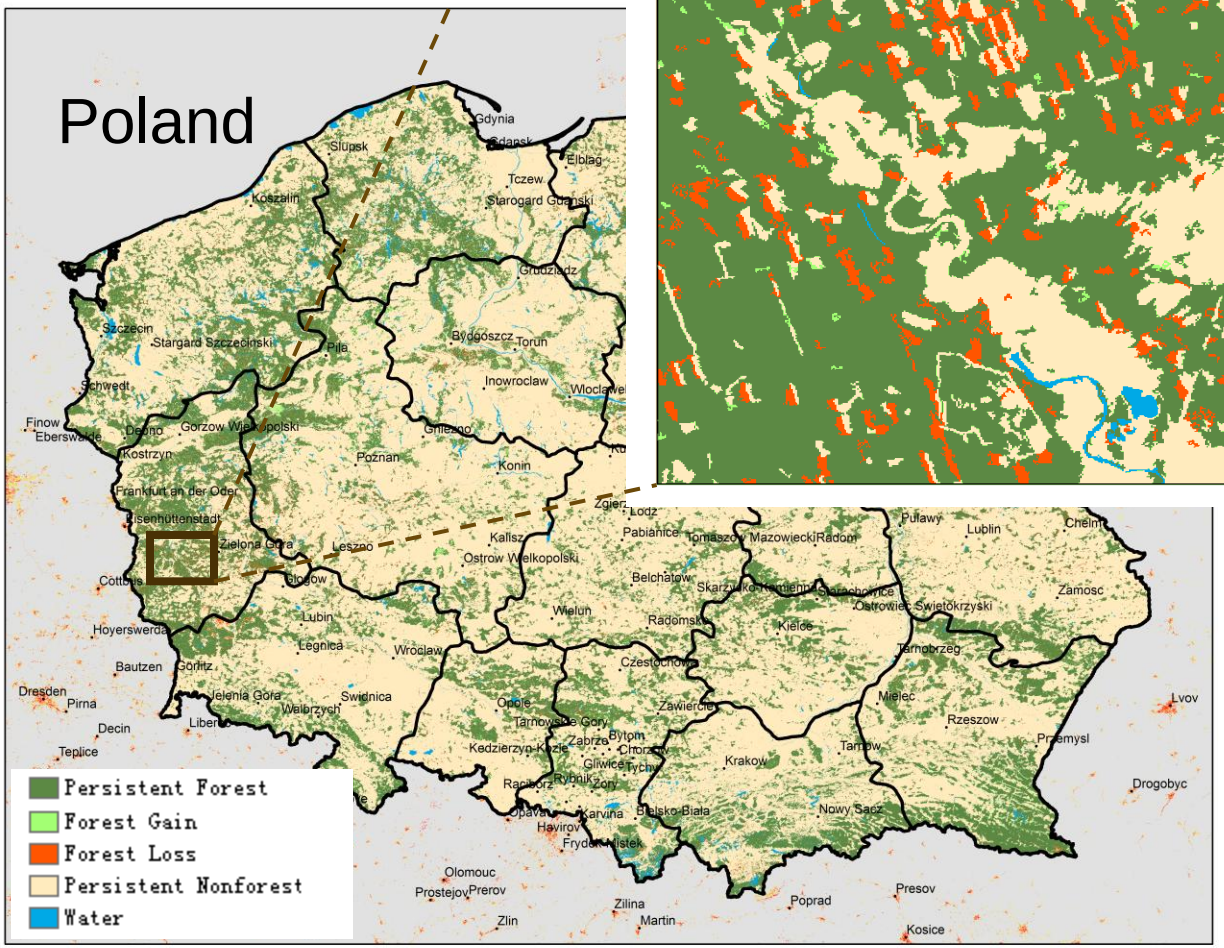
John Townshend & Cheng Huang, UMD

- Goal:
  - Develop 30 m resolution global forest cover change products
  - Subpixel estimate of percent forest cover and change
- Data:
  - Global Land Survey (GLS) 2005, 2000, 1990 and 1975
- Methods
  - Derive globally representative training data automatically using multiple data sources
  - Use a robust regression tree algorithm for estimating subpixel forest cover
  - Allow quantification of subpixel changes

Global Forest Cover Change Mapping

- Subpixel percent forest cover estimate at 30 m
  - Global products
  - 2000 and 2005

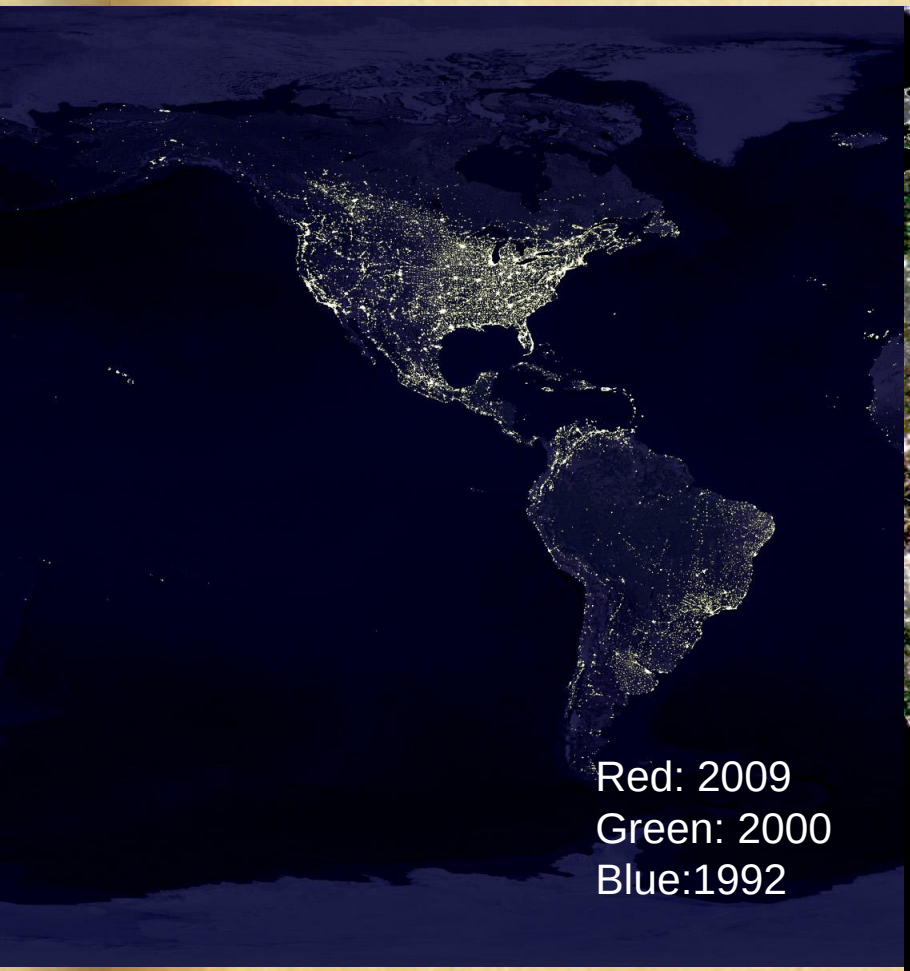




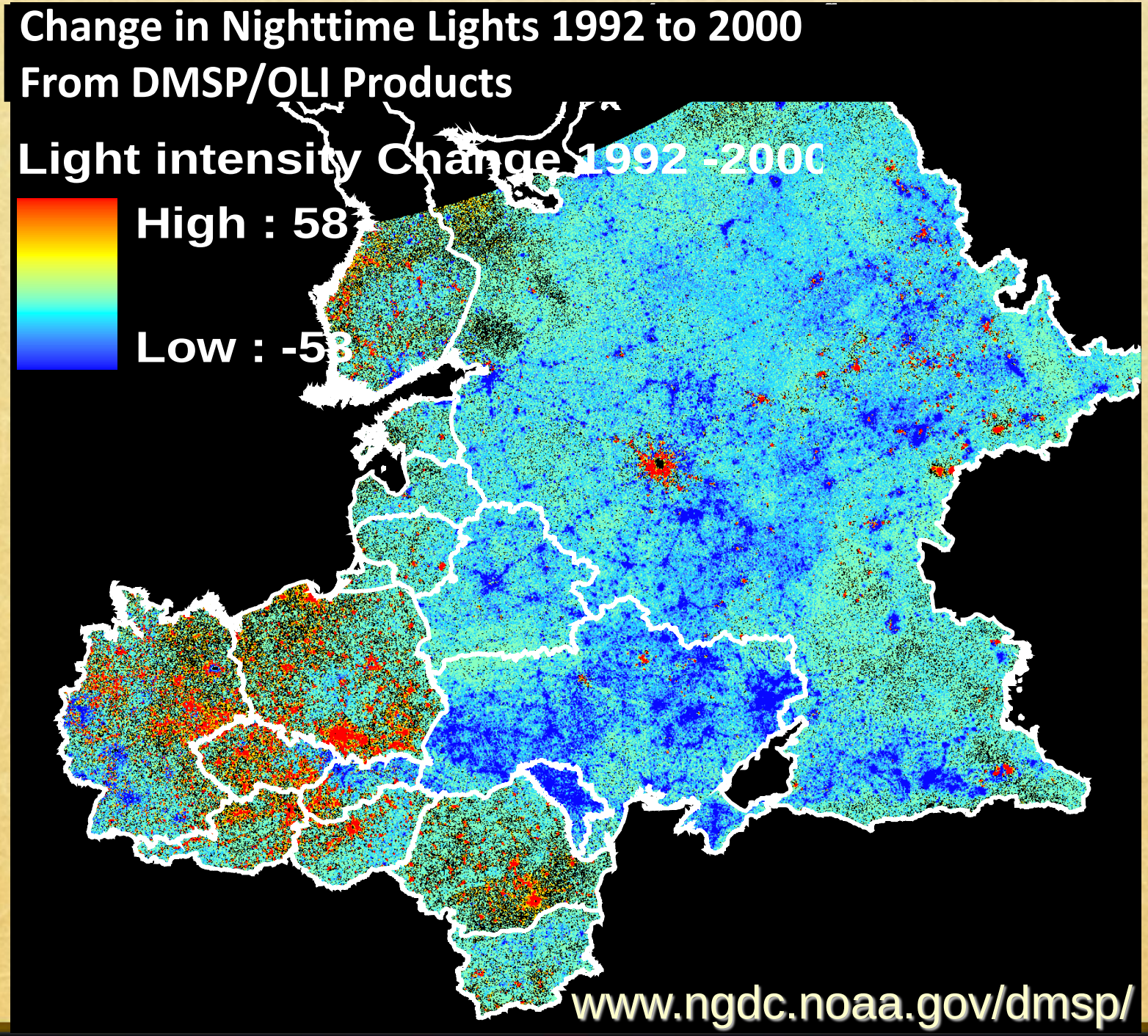
- Subpixel percent forest change at 30 m
  - Global
  - 2005 – 2000

(Feng, Sexton, Huang, et al, GLCF)

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
www.ngdc.noaa.gov/dmsp/

Educational Component for E.Europe: NASA-ESA Trans-Atlantic Training Initiative

- Origin – after the training session for the LCLUC ST meeting, Valmiera, 2010

  Concept: while visiting Karlov U.,2012

  NASA-ESA agreement

  Implementation: TAT-1 Prague, 2013

  Under careful supervision

Next Year Plans

- NEESPI conference: 10th Anniversary and Future N. Eurasia, Prague, May 2015
- TAT-3 session: Brasov, Romania June (?) 2015
- SCERIN-3: Brasov, Romania, June (?) 2015

Prague 2013 => Krakow 2014

Dziękuję!