The NASA LCLUC Program –SCERIN Interactions: An Update

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LCLUC Program Manager

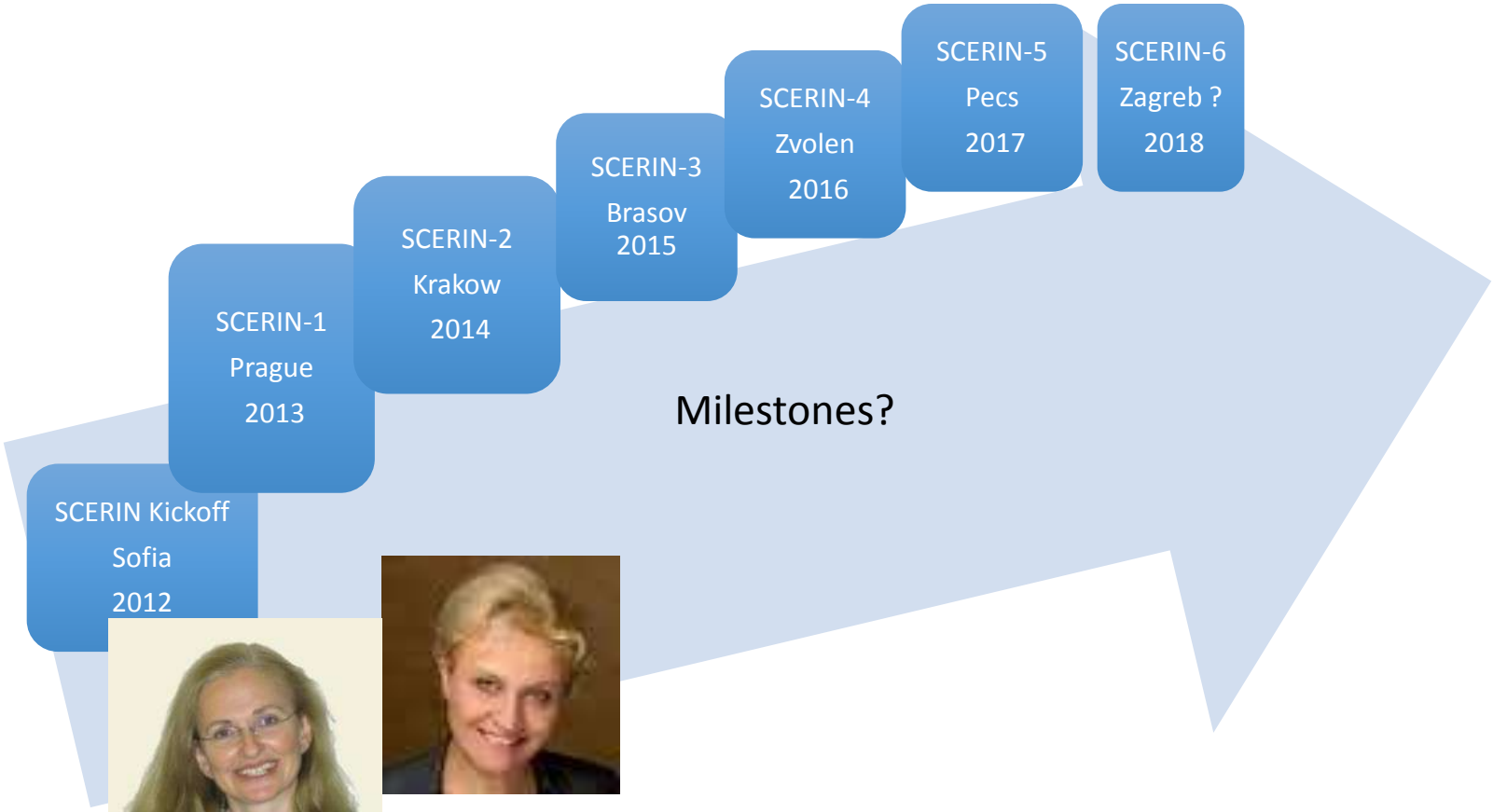
NASA Headquarters

Washington, DC

GOFC-GOLD Networks

- **South/Central America**
  - **Red LatinoAmericana de Teledetección e Incendios Forestales** (RedLaTIF)
- **Africa**
  - **Southern Africa Networks** (Miombo, SAFNet)
  - **West Africa Regional Network** (WARN)
  - **Central Africa** (OSFAC)
- **Asia**
  - **South East Asia** (SEARRIN)
  - **Central Asia Regional Information Network** (CARIN)
- **Europe**
  - **South Central and Eastern European Regional Information Network** (SCERIN)
  - *Balto-Arctic (BARIN)??*
  - Caucasus – to be formed in September
- NETWORKS SUMMIT to be held in Tbilisi, Georgia this September

South/Central Eastern Europe Regional Information Network (SCERIN)



Jana Albrechtova (Charles U.)

Petya Campbel (NASA)

SCERIN Victorious March

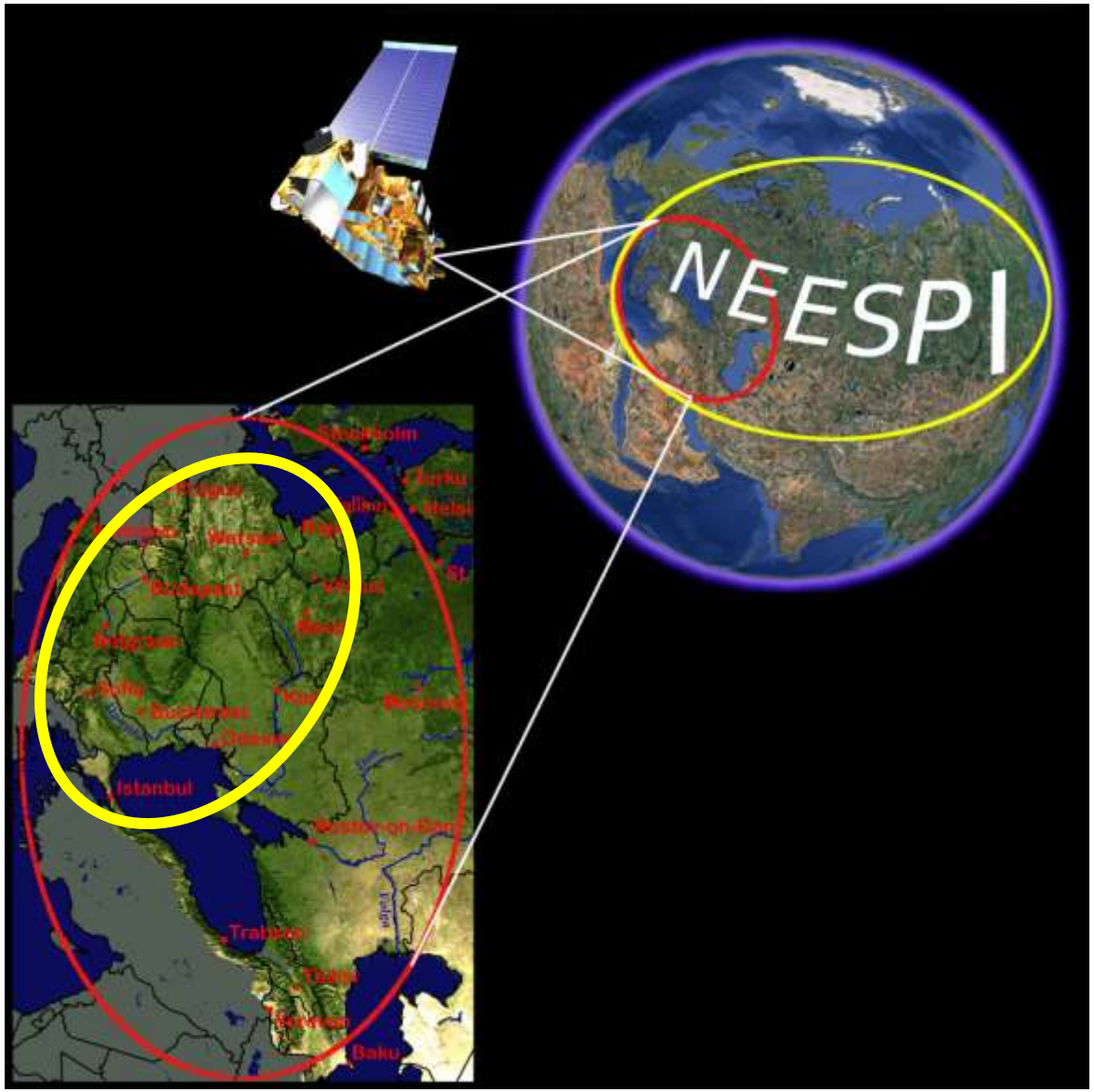
PECS ?

The first university in Hungary, founded in 1367

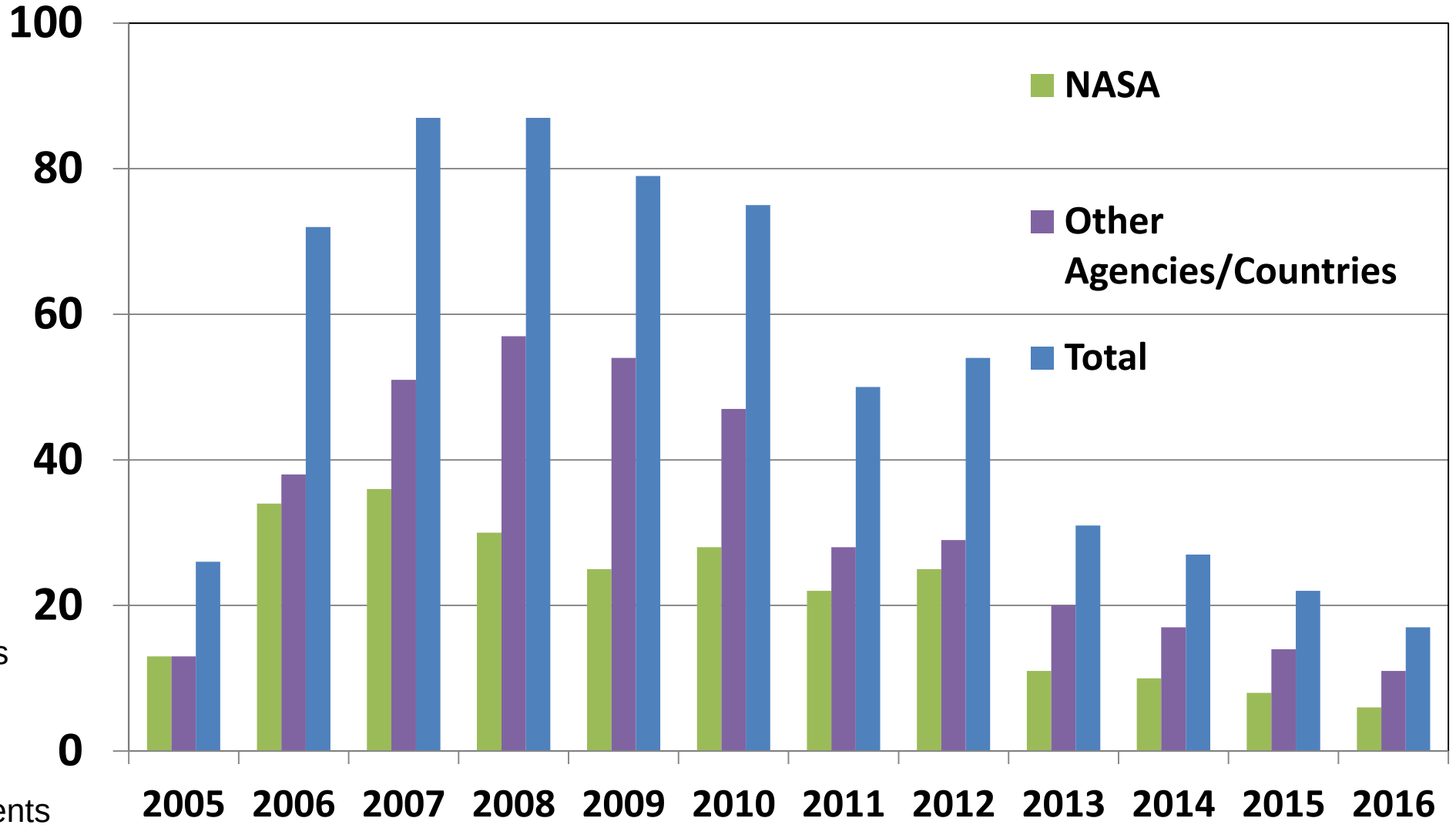
Programme on
Ecosystem Change and Society

UNESCO World Heritage Site in December 2000
In 1998 Pécs was given the UNESCO prize *Cities for peace*

Northern Eurasia Earth System Partnership: NEESPI-Europe



Active NEESPI Projects by Year

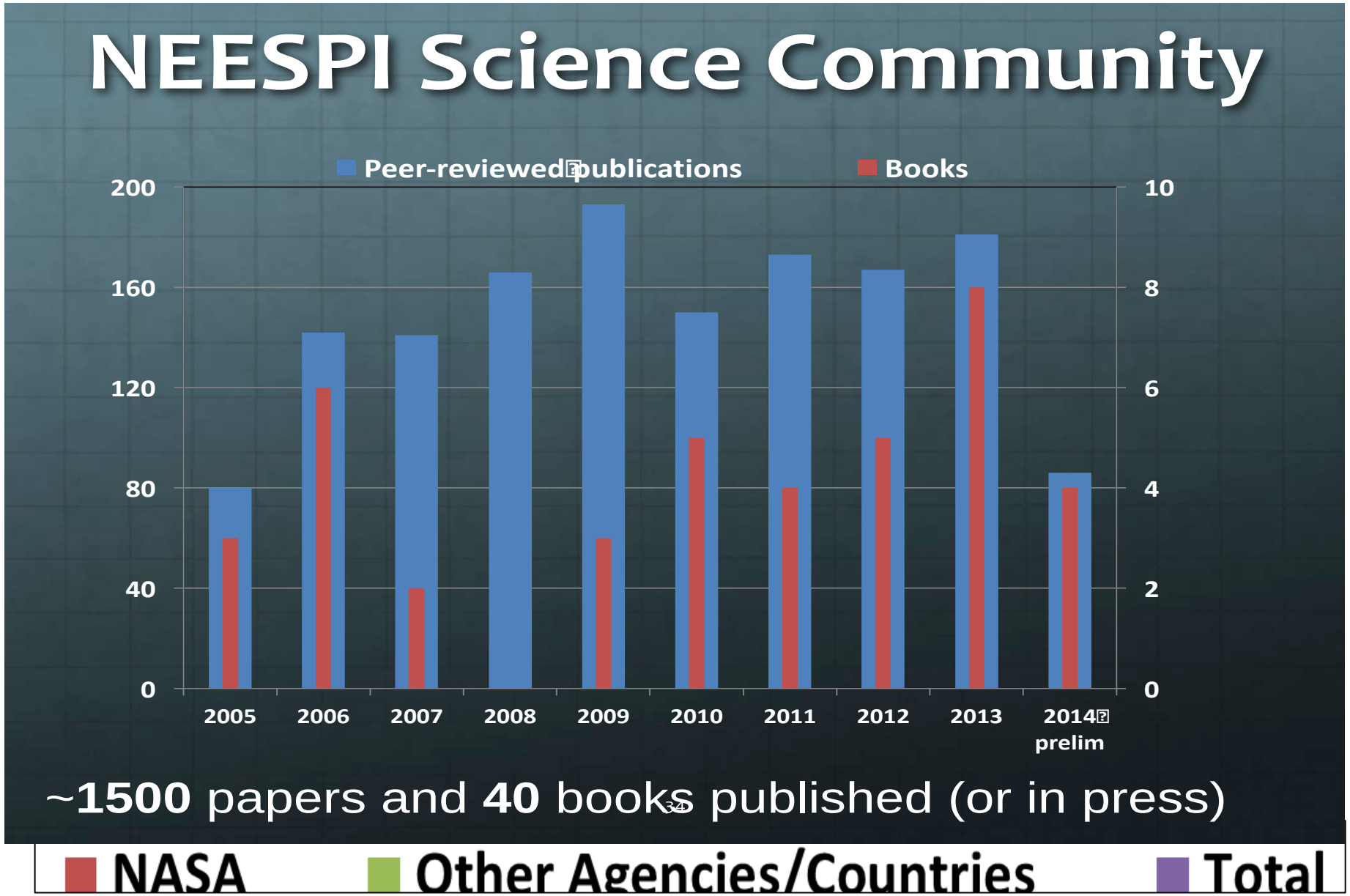


>750 scientists
>200 institutions
>170 projects
30 countries

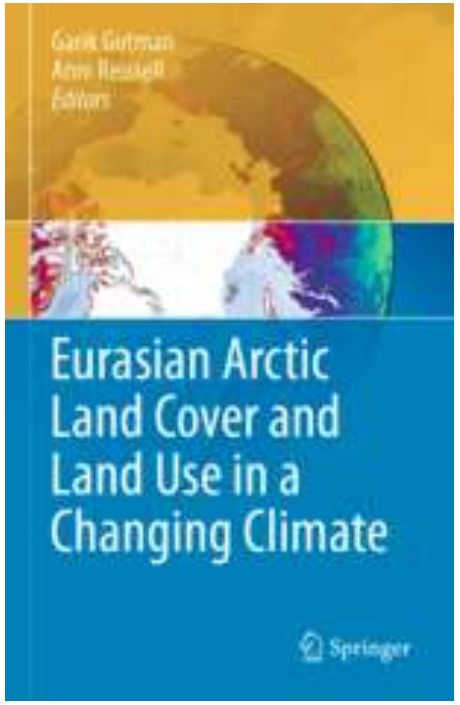
>80 Ph.D. students

Since The Prague Workshop in May 2015, we discontinued accepting the new projects to the NEESP Initiative redirecting them to NEFI.

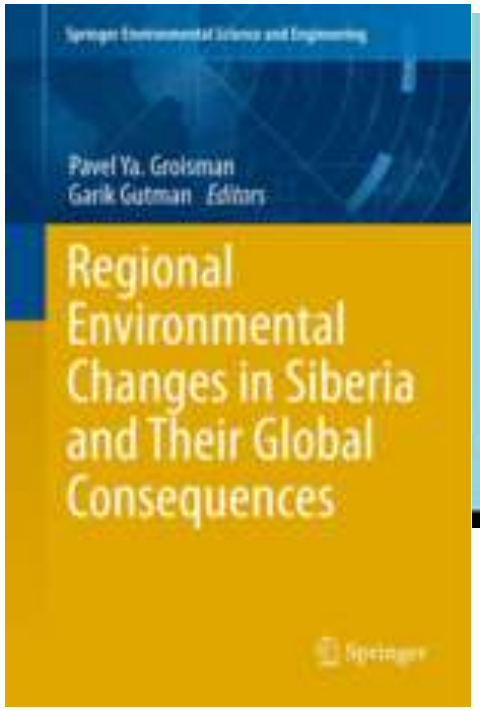
NEESPI Publications



NEESPI-LCLUC Books

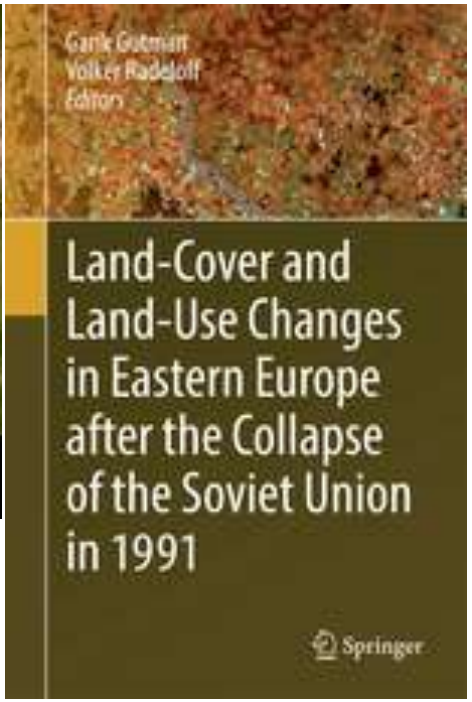


Springer 2010



Springer 2012

Springer 2013

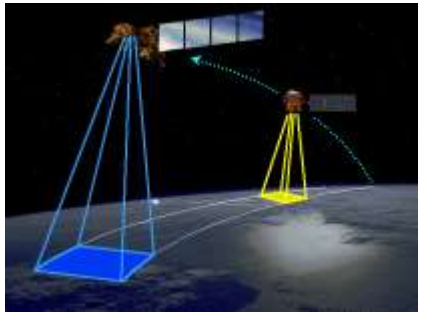


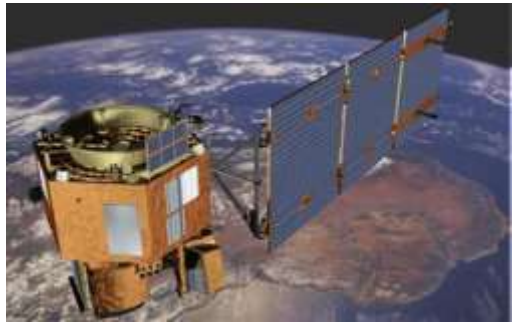
Springer 2017

LCLUC in Central Asia to be published in 2018

TRIBUTE TO EO-1

- **From:** NASA Executive News Briefing:
- **The Journey of NASA's Smartest Satellite Finally Comes to an End**
- NASA's highly experimental Earth Observing-1 satellite mission was supposed to last just a year. It did that, and then survived 16 more - all the while testing NASA's riskiest, oddball ideas.





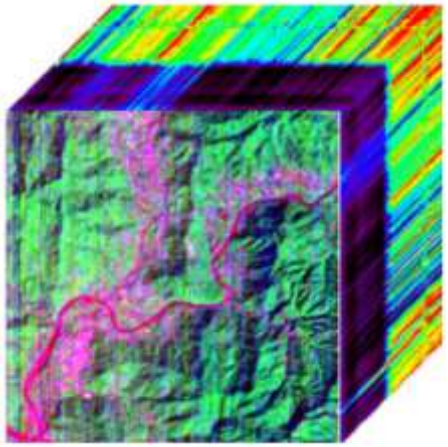
'The Little Engine That Could' (Betsy Middleton, NASA)

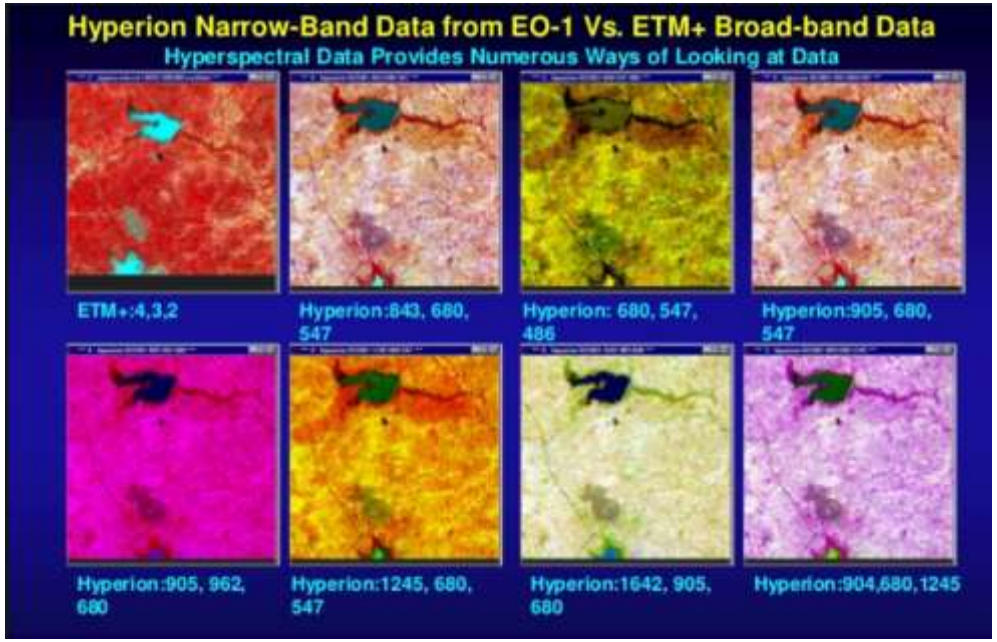
EO-1 Launch

11/21/2000

EO-1 Legacy

- Demonstrating the pushbroom technology for land imaging– as predecessor for Landsat 8 and 9
- Pointing ability – very useful feature for looking at the disaster event once it was identified
  - ability to increase collections (up to 5 in 16 days) for disaster





This image shows a fatal sludge spill (red-orange streak) running west from an aluminum oxide plant in western Hungary after a wall broke allowing the sludge to spill from the factory on Oct 4, 2010. This image was taken by EO-1's Advanced Land Imager on Oct 9, 2010.Credit: Earth Observatory

Danube flooding from MODIS

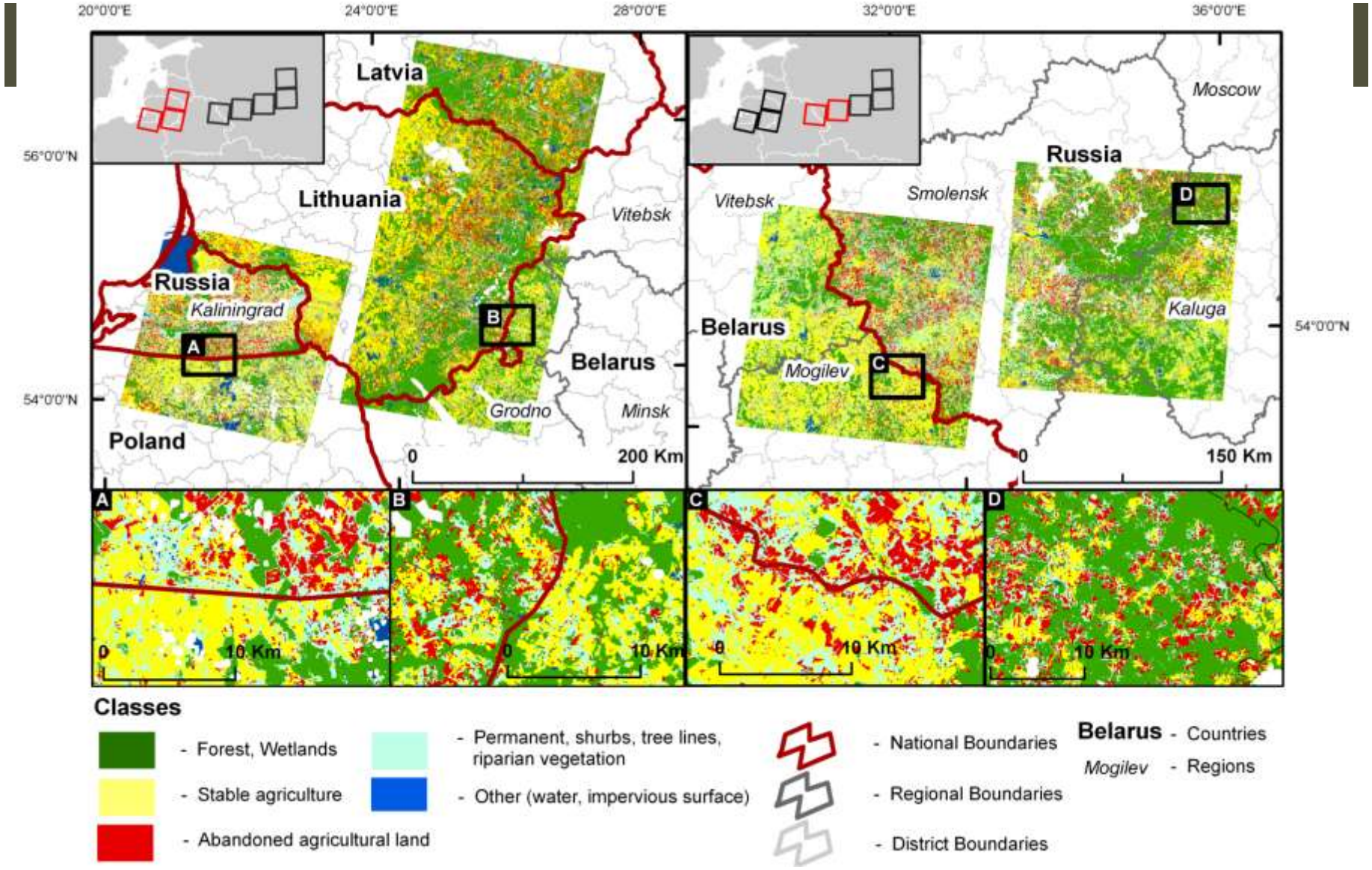
March 17, 2002

April 2, 2002

Tree-Canopy Cover and Loss 2010-2015

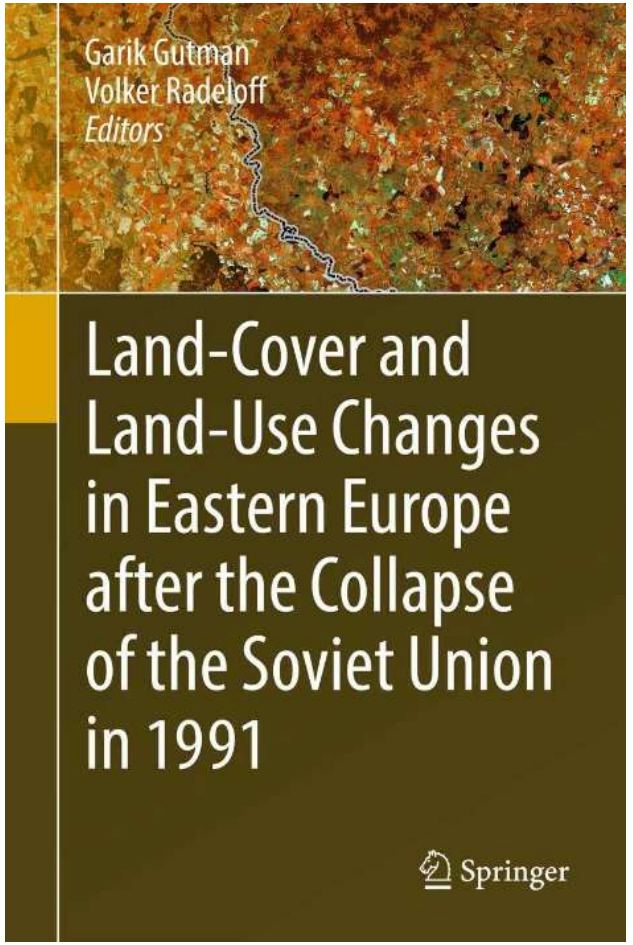
Courtesy: Joe Sexton et al. (PI: John Townshend, U.Maryland)

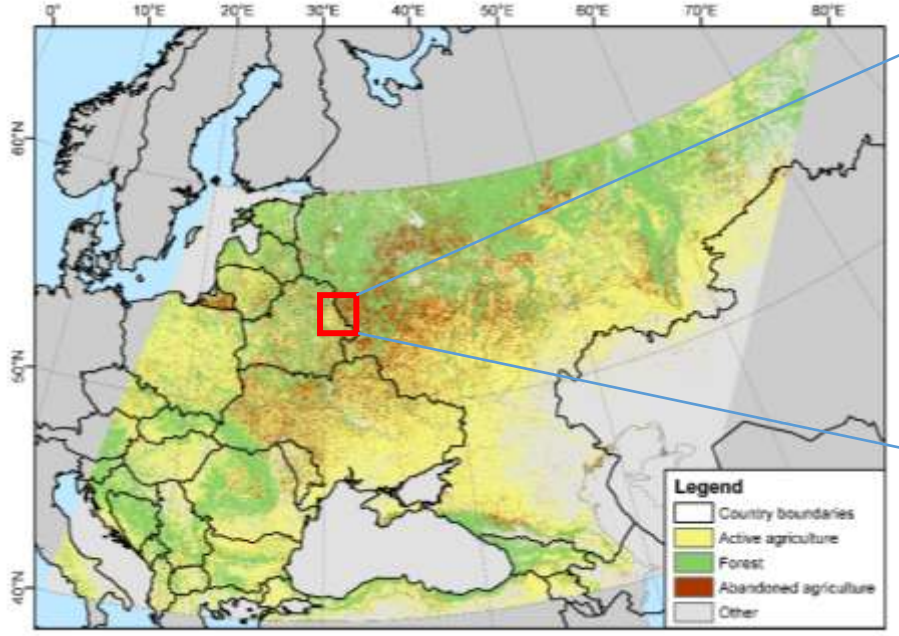
Field Abandonment



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

Land-Use Change After the Collapse of the USSR: Agricultural Abandonment





MODIS-derived abandoned agricultural areas in 2005

35 to 50 million hectares of croplands and grasslands managed in 1990 were abandoned by 2010

- Widespread agricultural land abandonment after the collapse caused by the socioeconomic shock that the collapse of the USSR represented
- Strong differences in abandonment rates among neighboring countries were caused by differences in policies and institutions

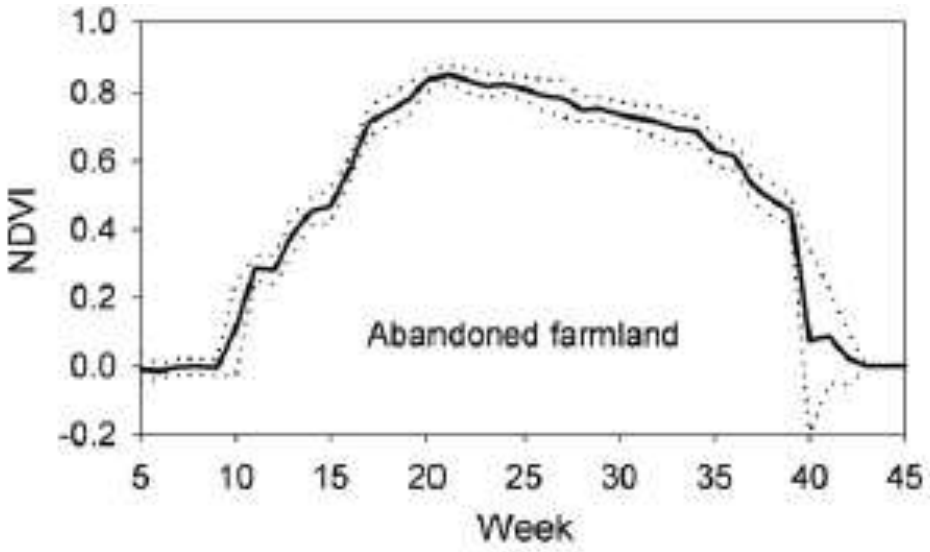
Notice the contrast on the two sides of the border between Russia (abandoned fields) and Belorus (managed fields)

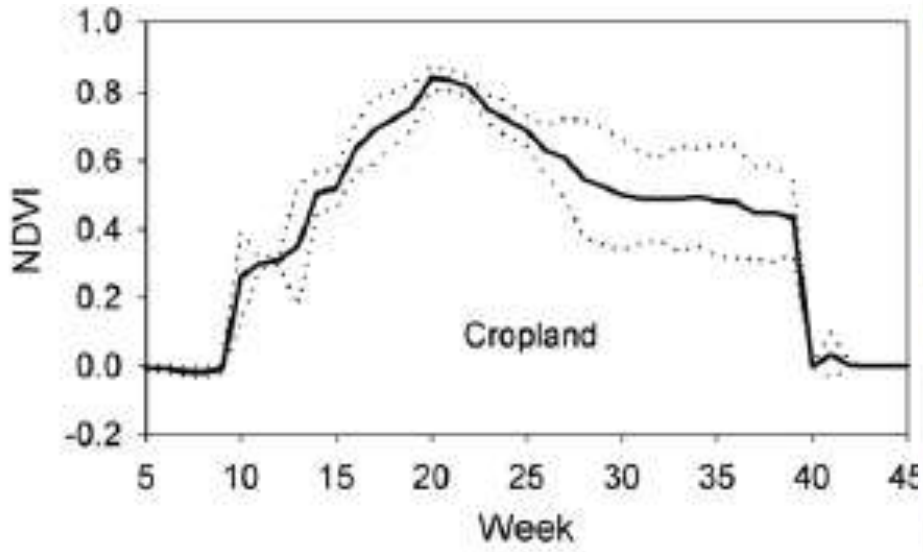
Land-Cover and Land-Use Change Program L C L U C

NORTHERN ESTONIA

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

MODIS-Derived NDVI Profiles for Managed and Abandoned Fields





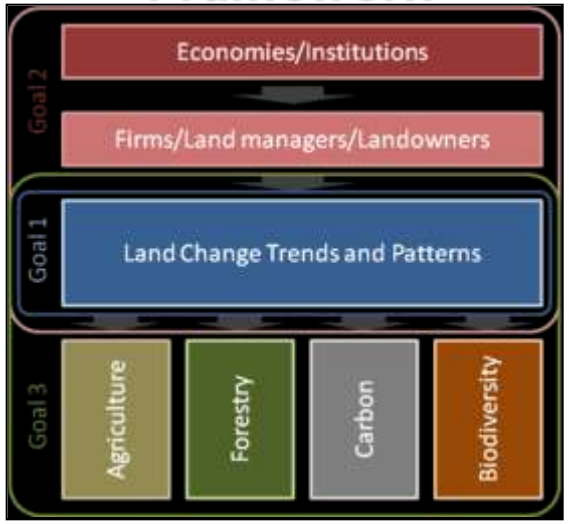
Phenology (time-series) metrics help to accurately distinguish managed and abandoned fields. Different integrals (areas under the curves) indicate the difference between the managed and abandoned fields. Variability in the reflectances on abandoned fields is much lower compared to actively cultivated fields (see Min & Max indicated by dotted curves).

Source of pictures: Prishchepov

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



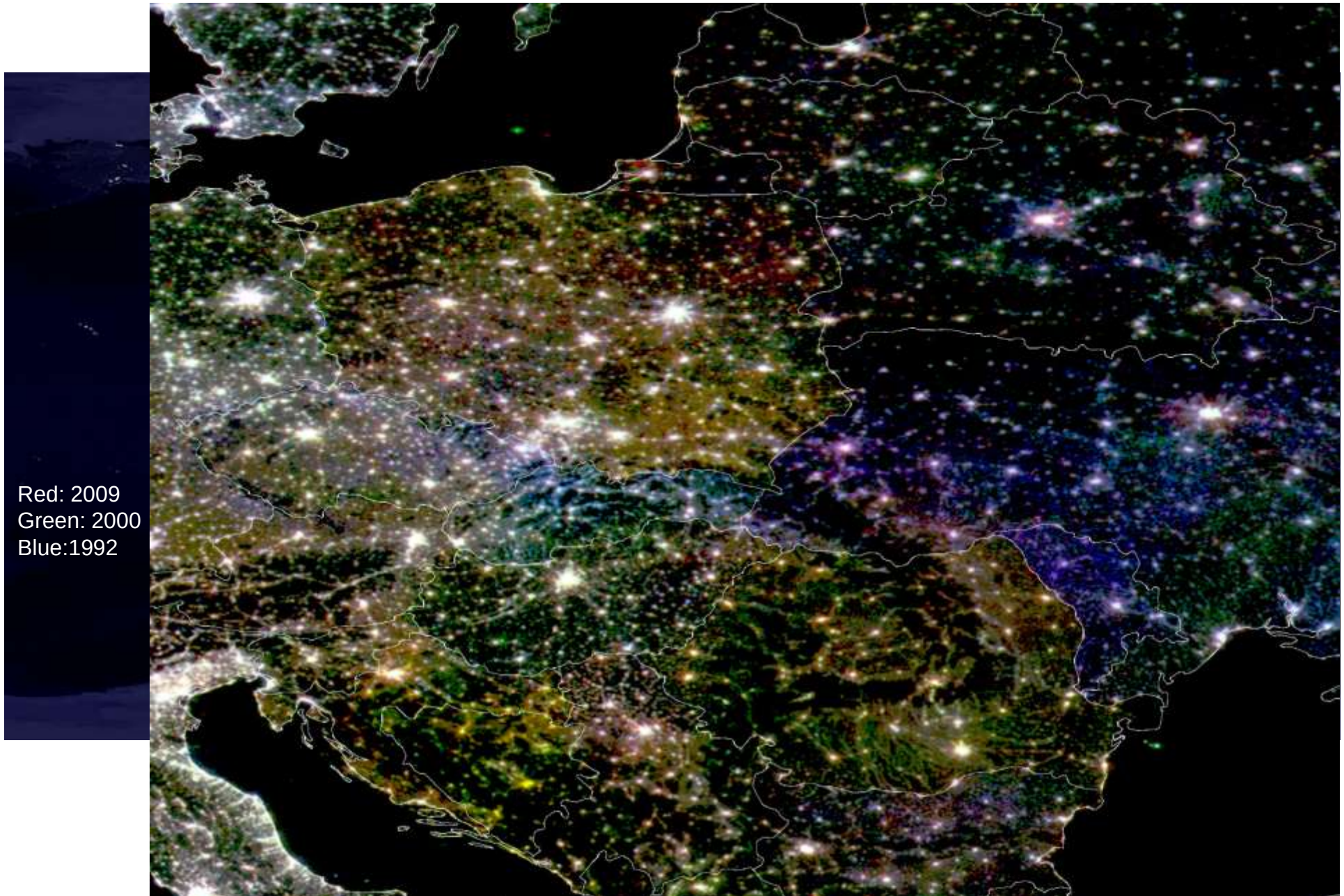
Comprehensive Assessments

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

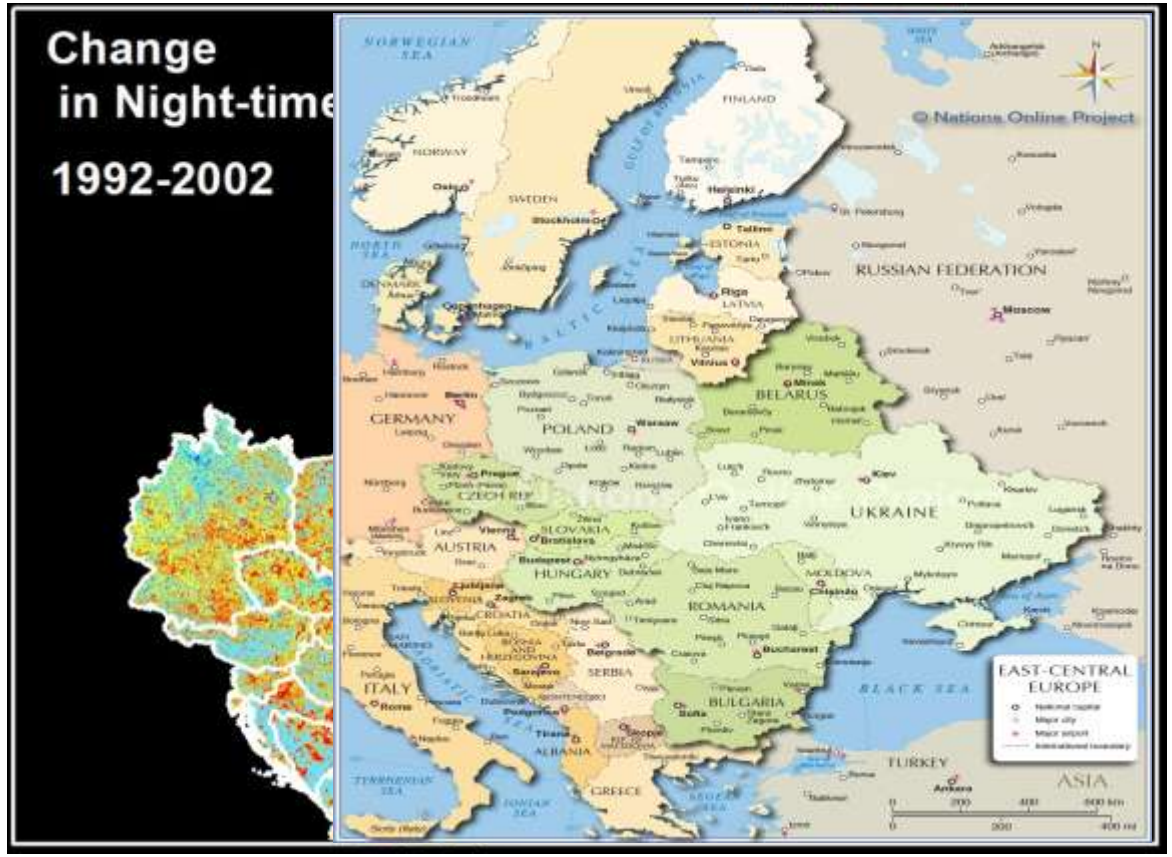
PI: V.C. Radeloff
radeloff@wisc.edu

Earth Night Lights Observed by DMSP/OLI



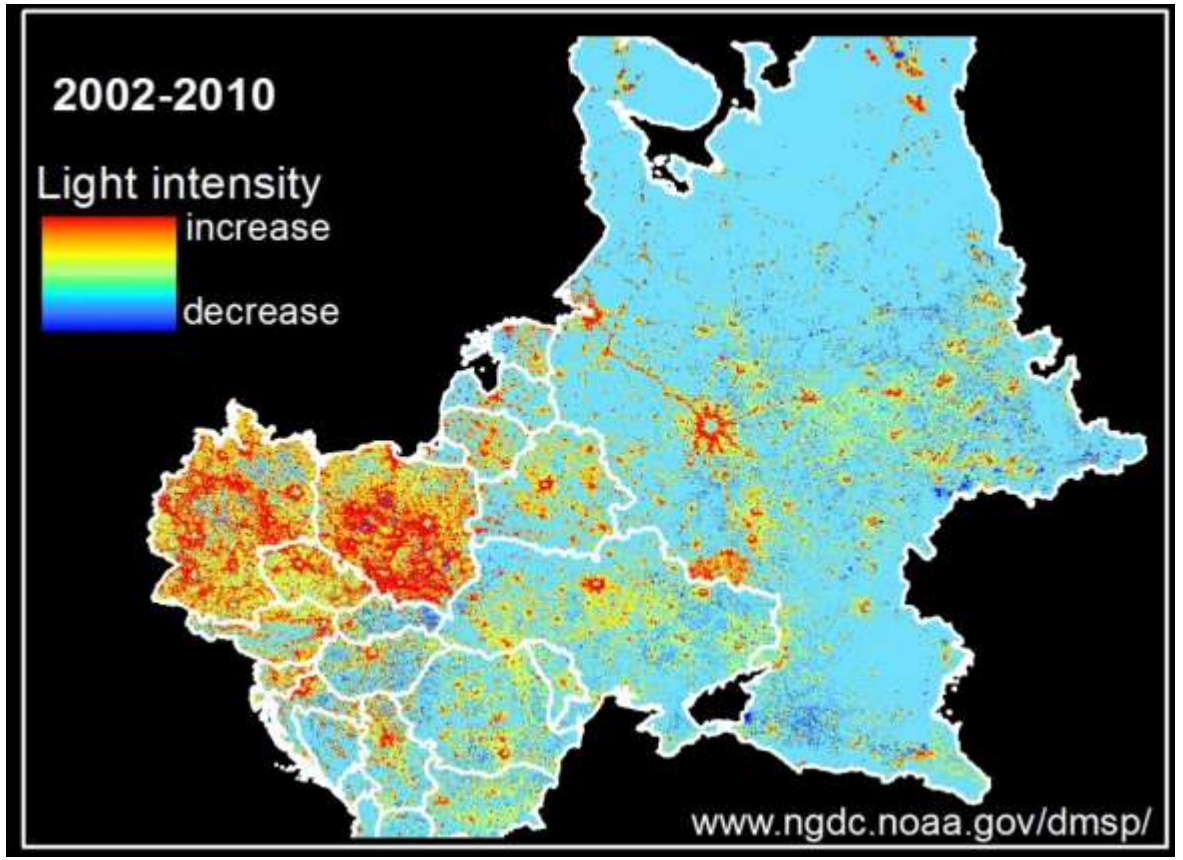
DMSP Night Lights Reflecting Changes in Economy

The Decade of Collapse



Deep Blue: Depressed Economies of Ukraine & Moldova
Red: Positive Economy Development

The Decade of Recovery



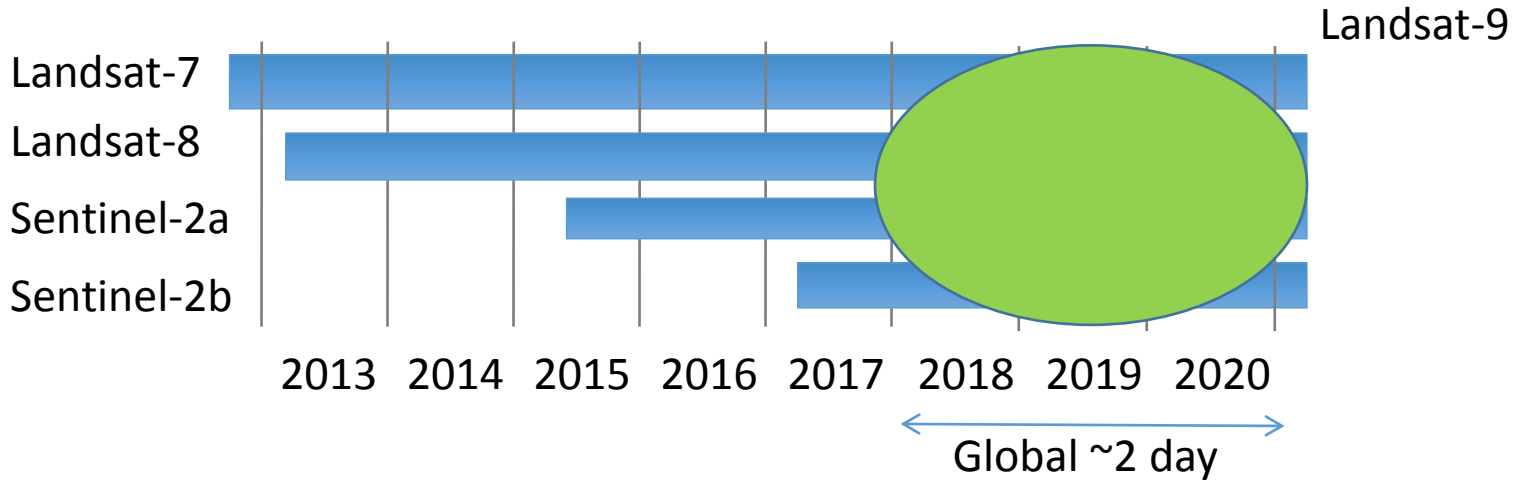
Light Blue: neutral (not much change)
Red: Economy and urban expansion (e.g. Moscow)

Current Prospects:
Sentinel-2 - Landsat Fusion

Agriculture monitoring needs ~ 5-day coverage

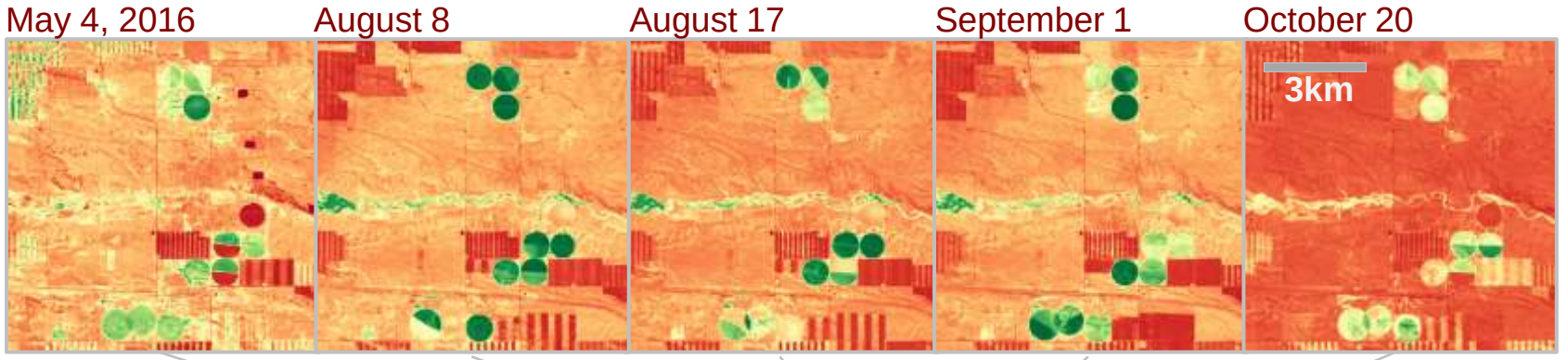
Both sensors have 10-30m coverage in VNIR-SWIR

- Satellite orbits are complementary
  - Landsat-7 & -8 8 days out of phase
  - Sentinel-2a & 2b 5 days out of phase
  - Landsat and Sentinel sun synch orbits precess relative to each other

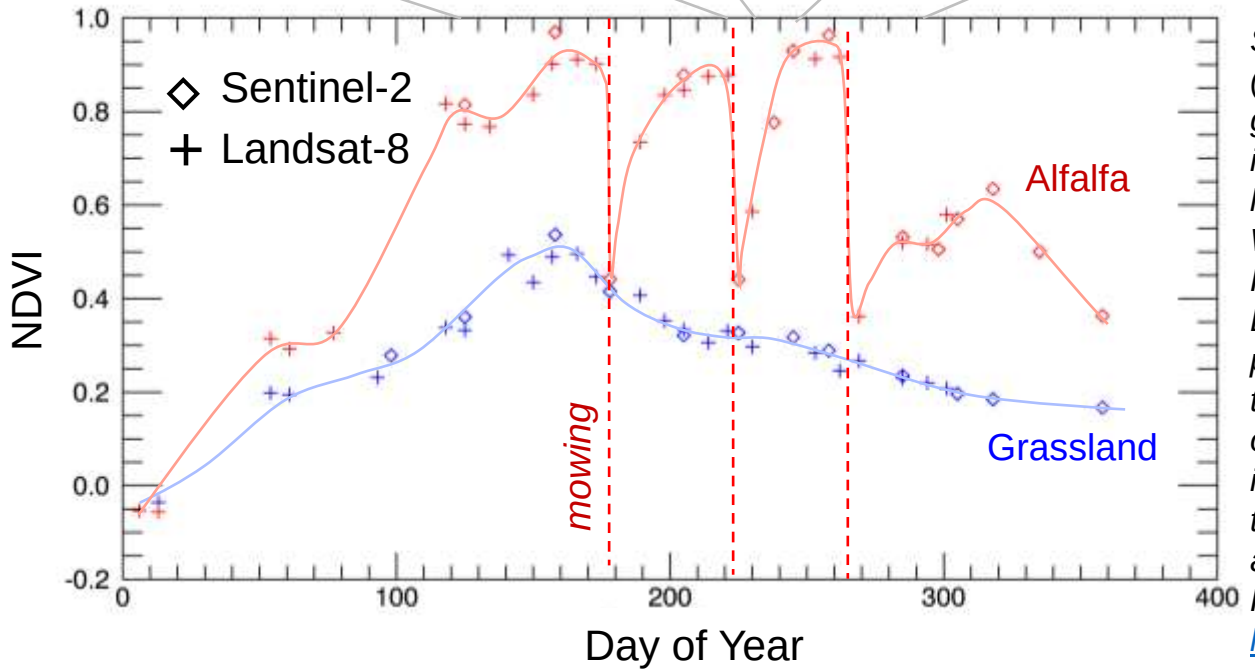


Harmonized Landsat-8/Sentinel-2 Products

Laramie County, WY



Courtesy: Jeff Masek
NASA GSFC



Seasonal phenology (greening) for natural grassland (blue line) and irrigated alfalfa fields (red line) near Cheyenne Wyoming observed from Harmonized Landsat/Sentinel-2 data products. The high temporal density of observations allows individual mowing events to be detected within alfalfa fields. HLS Products available from https://hls.gsfc.nasa.gov

Capacity Building Component:
Trans-Atlantic Training (TAT) in Conjunction with SCERIN

LCLUC Training in Latvia - 2010:
Czech trainees

Agreeing on the TAT: Prague, Dec 2011

NASA-ESA regular training sessions in Eastern Europe for students +3 years
June 2013 in Prague, Czech Rep.
June 2014 in Krakow, Poland
April 2015 in Prague, Czech Rep.
July 2016 in Zvolen, Slovakia
June 2017 in Pecs, Hungary
June 2018 in Zagreb, Croatia?

Hands-on Training

Köszönöm!