



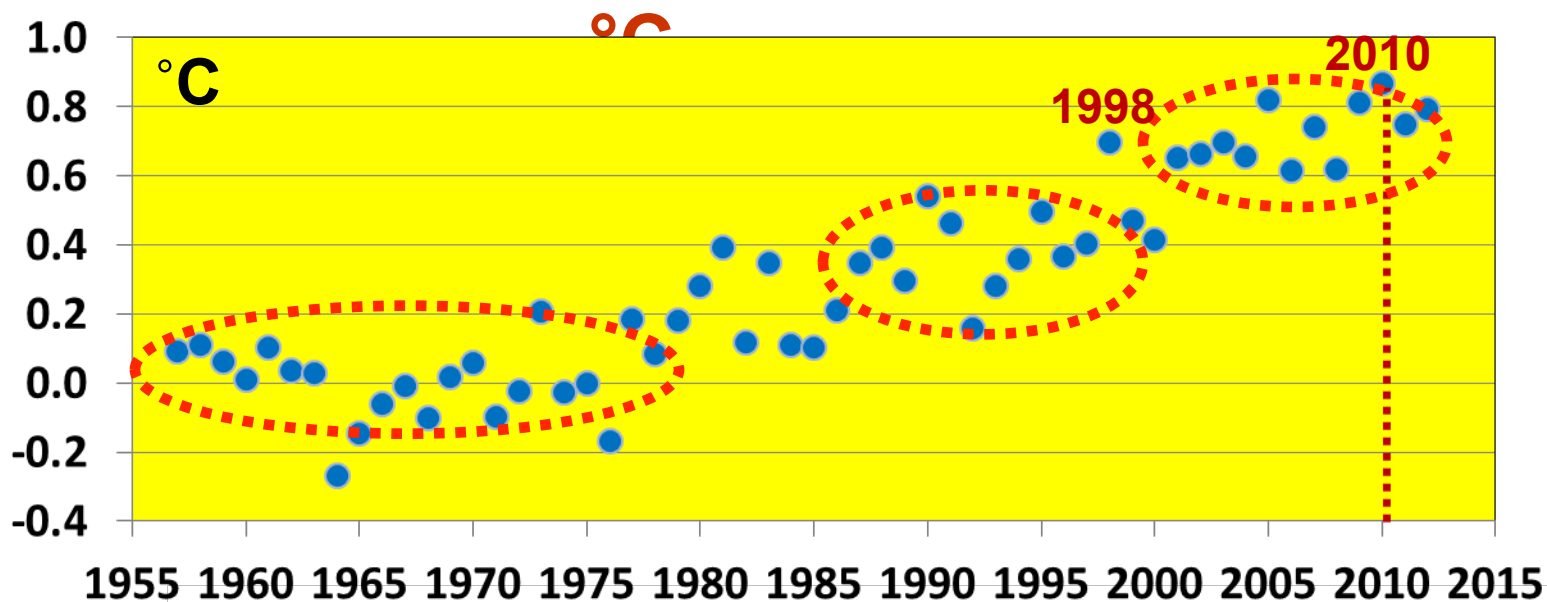
Northern Eurasia Earth Science Partnership Initiative (NEESPI) in the past two years

Pavel Groisman

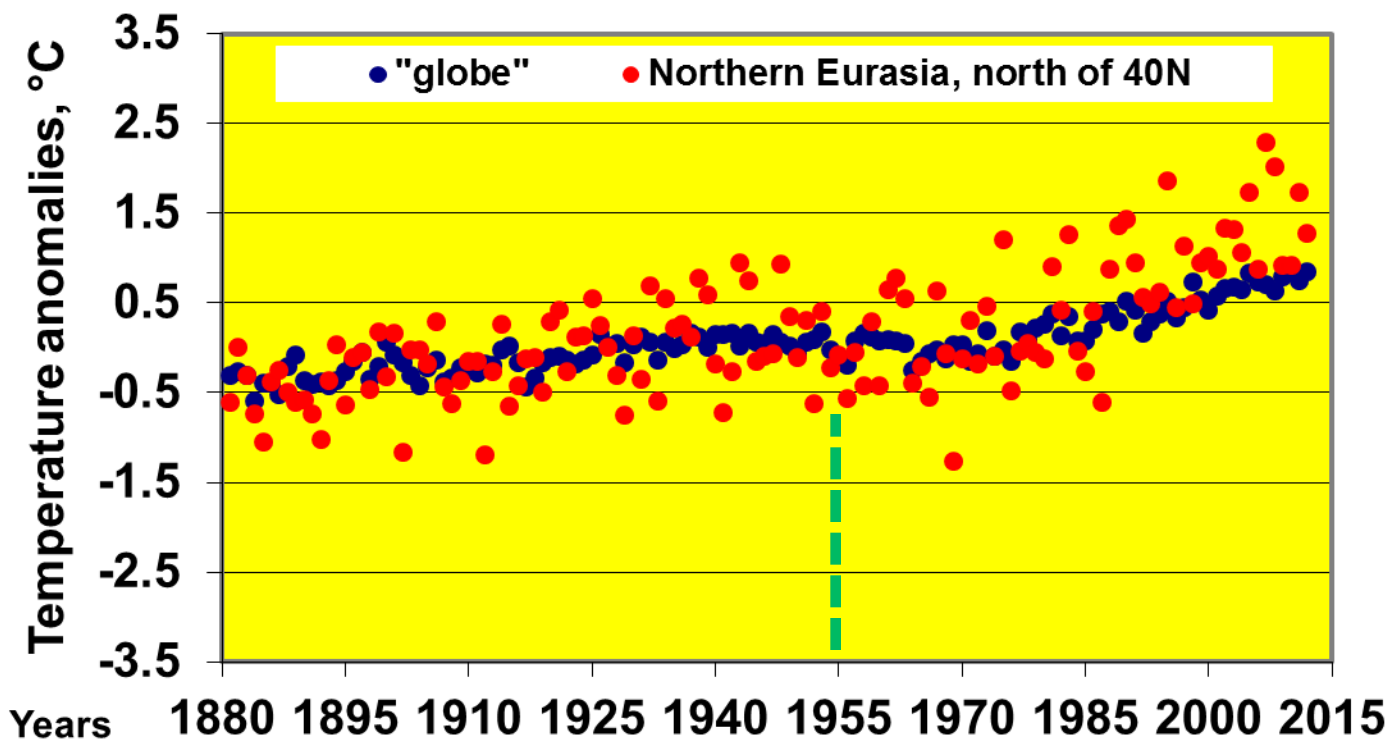
**UCAR Project Scientist at NOAA National Climatic
Data Center, Asheville, North Carolina, USA**

Global Annual Surface Air Temperature Anomalies,

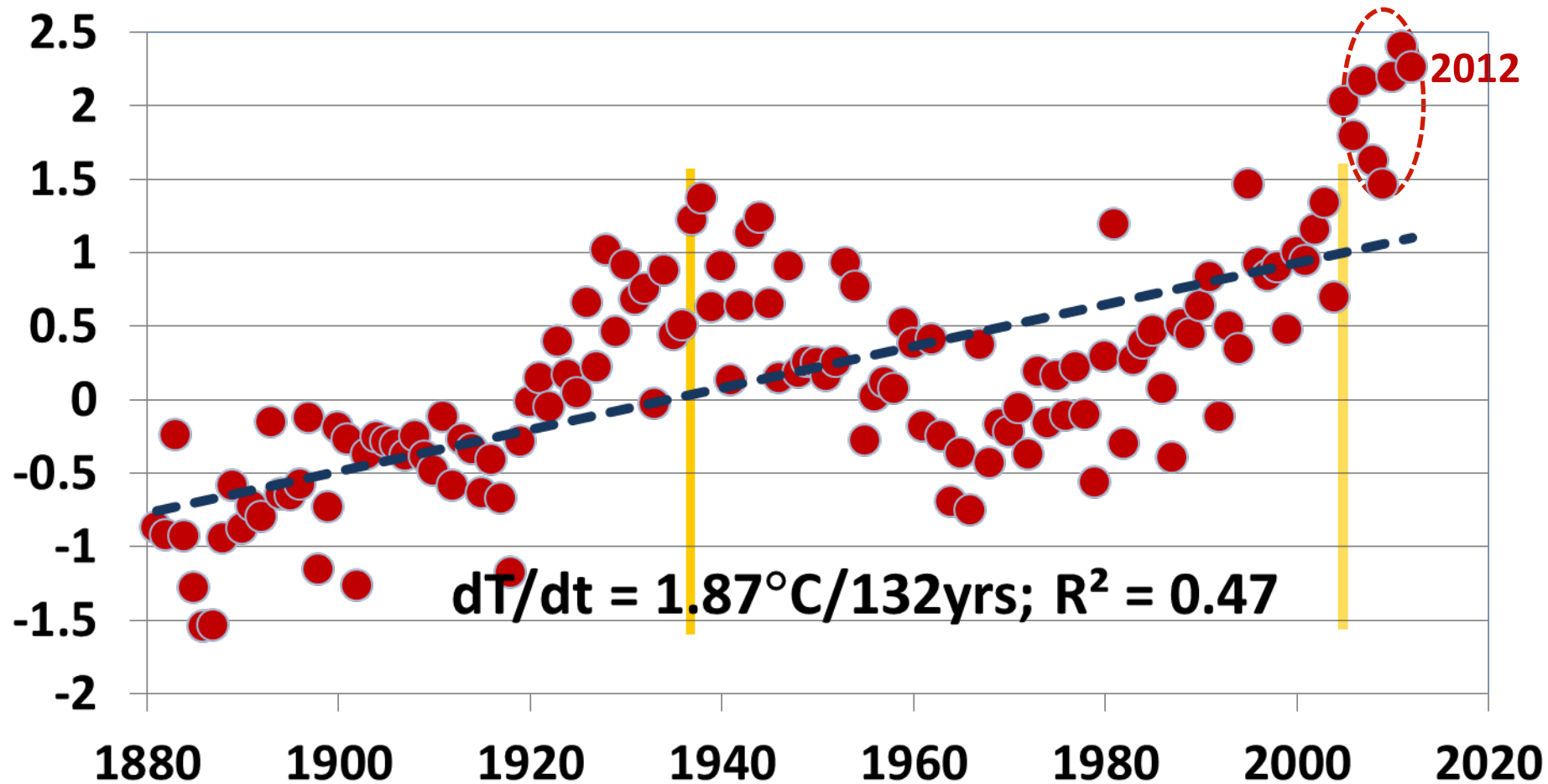
Global
temperature
anomalies



Rates of increase of
annual temperature
for the
“globe” (60°S to
90°N) and Northern
Eurasia are 0.91 °C/
130 yr and 1.5°C/
130yr respectively
(Lugina *et al.* 2007,
updated).

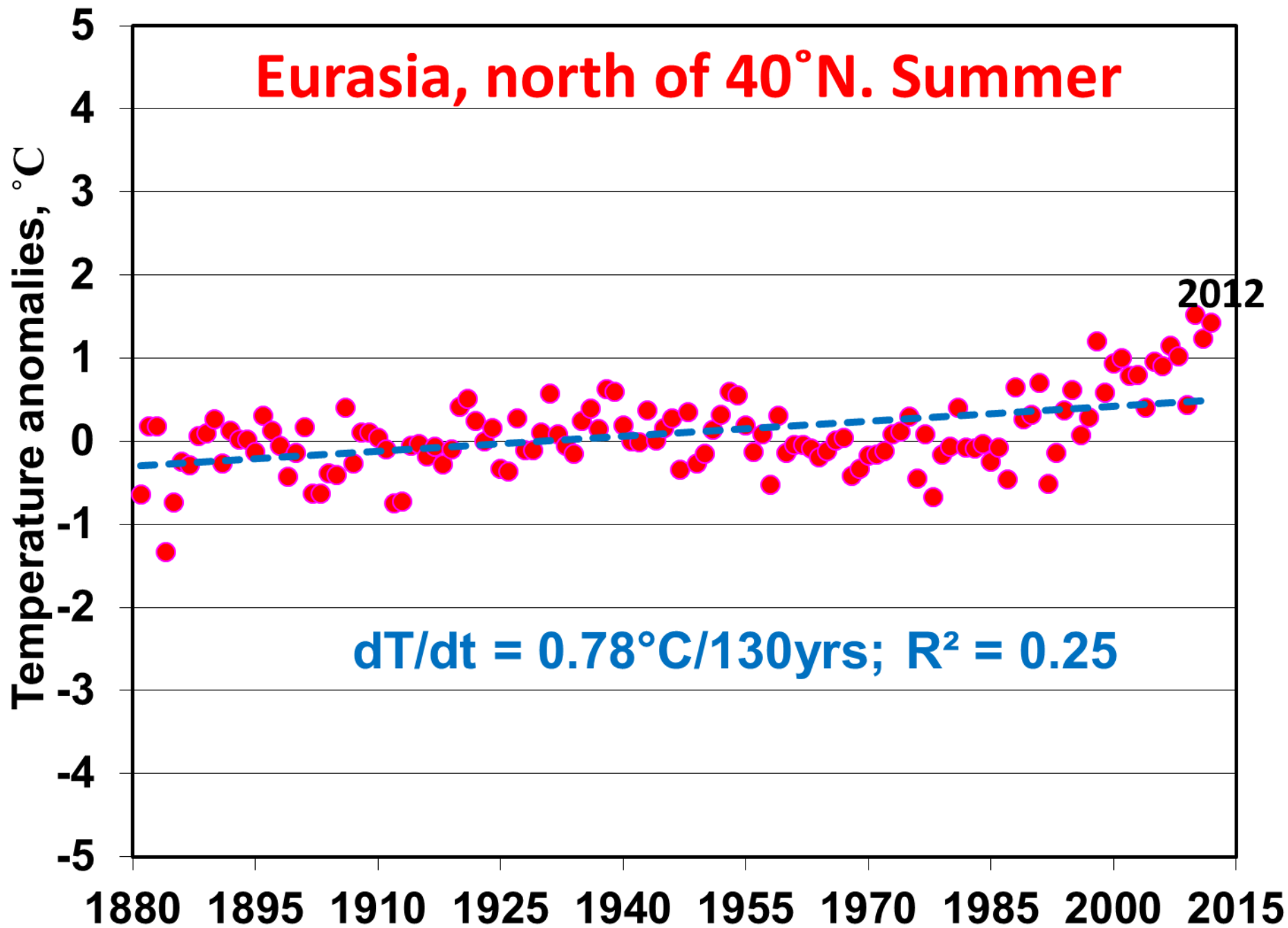


Annual surface air temperature anomalies (°C) area-averaged over the 60°N - 90°N latitudinal zone (Arctic)

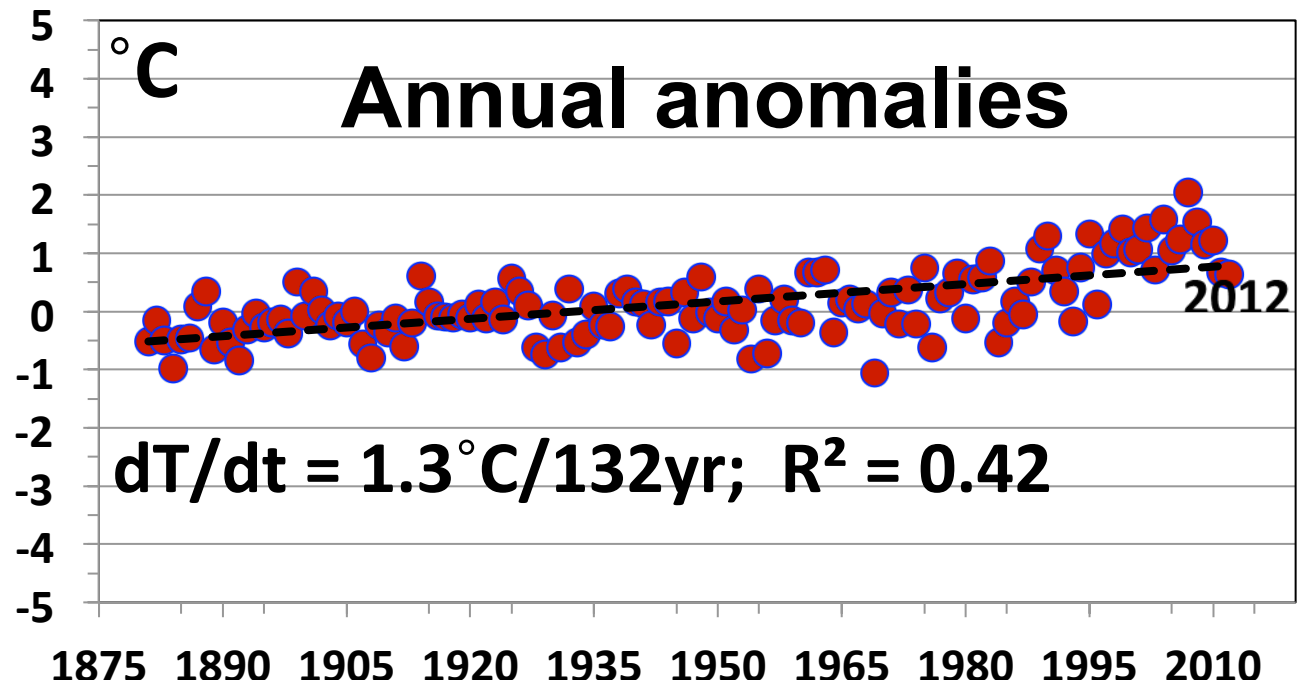
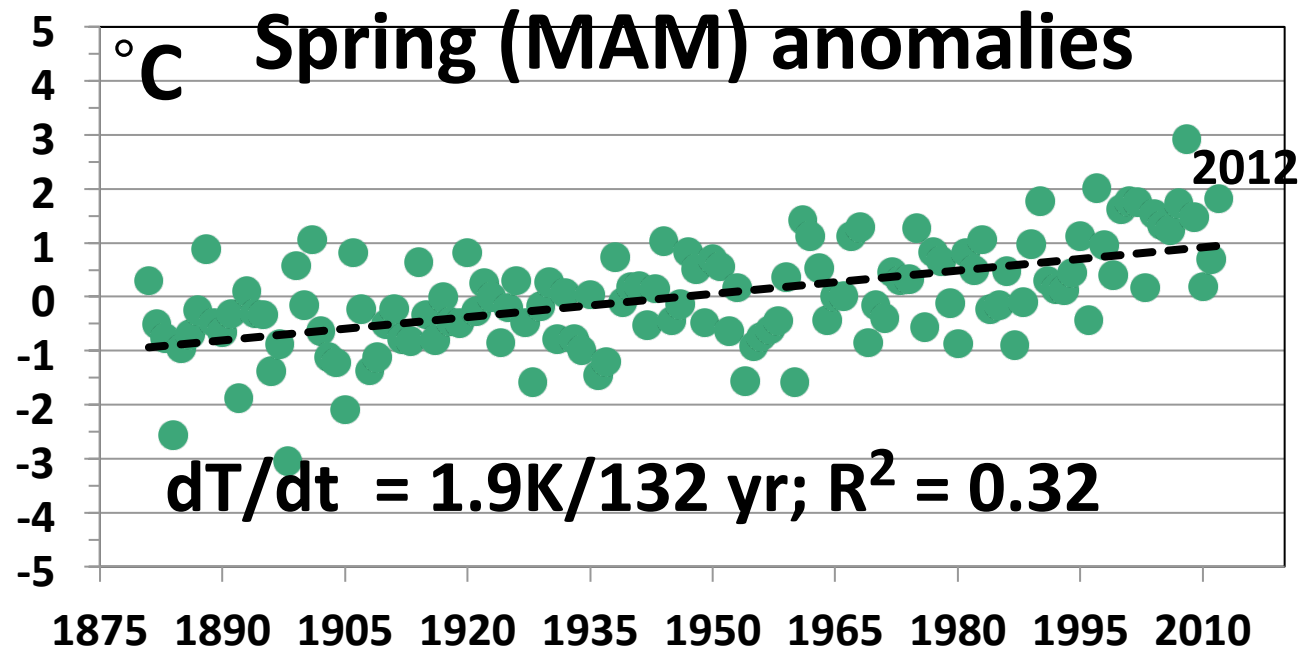
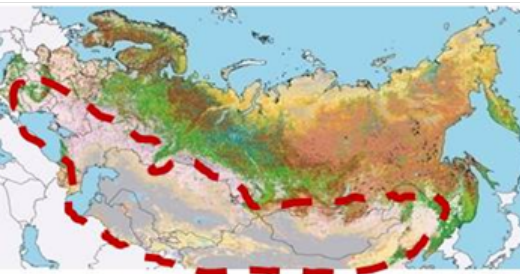


There were periods (e.g., 1936-2004) when there was no statistically significant linear trend ([SWIPA 2011; Ch.1, updated](#)).

Anomalies were calculated from the mean values for the 1951-1975 reference period.

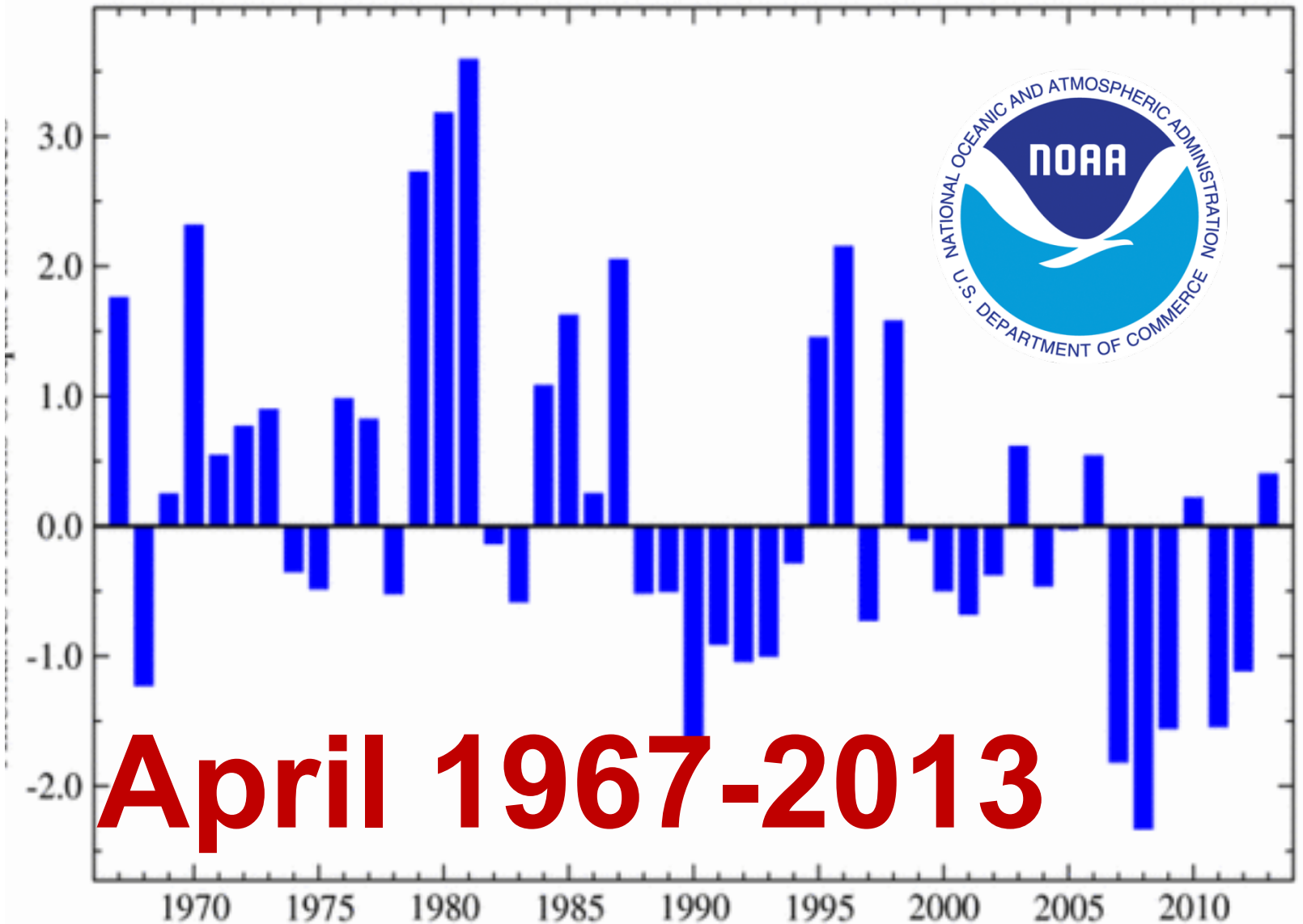


Dry Land Belt (DLB) of Northern Eurasia and its changes



Snow cover extent anomalies over Eurasia

Anomalies in $10^6 \times \text{km}^2$

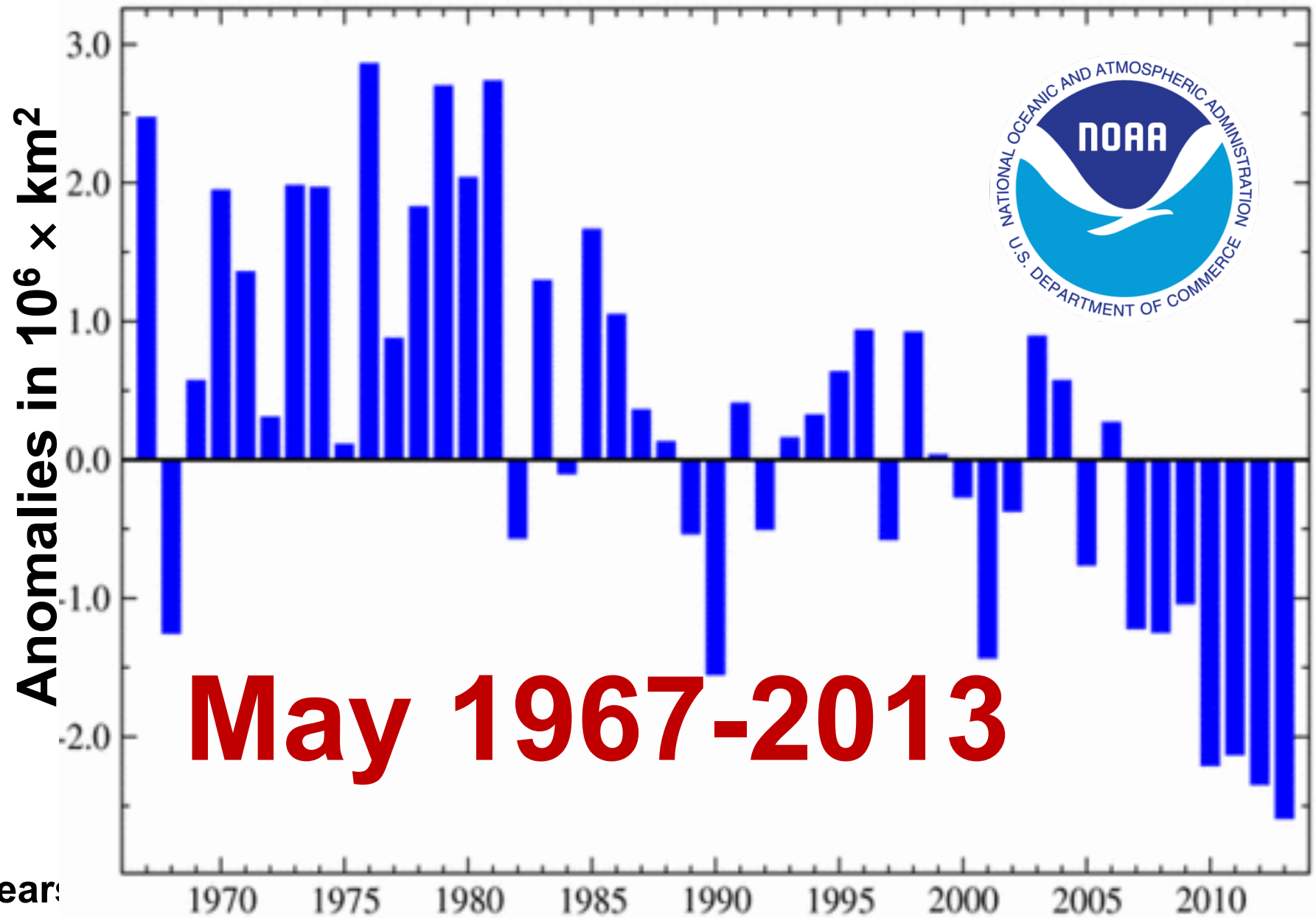


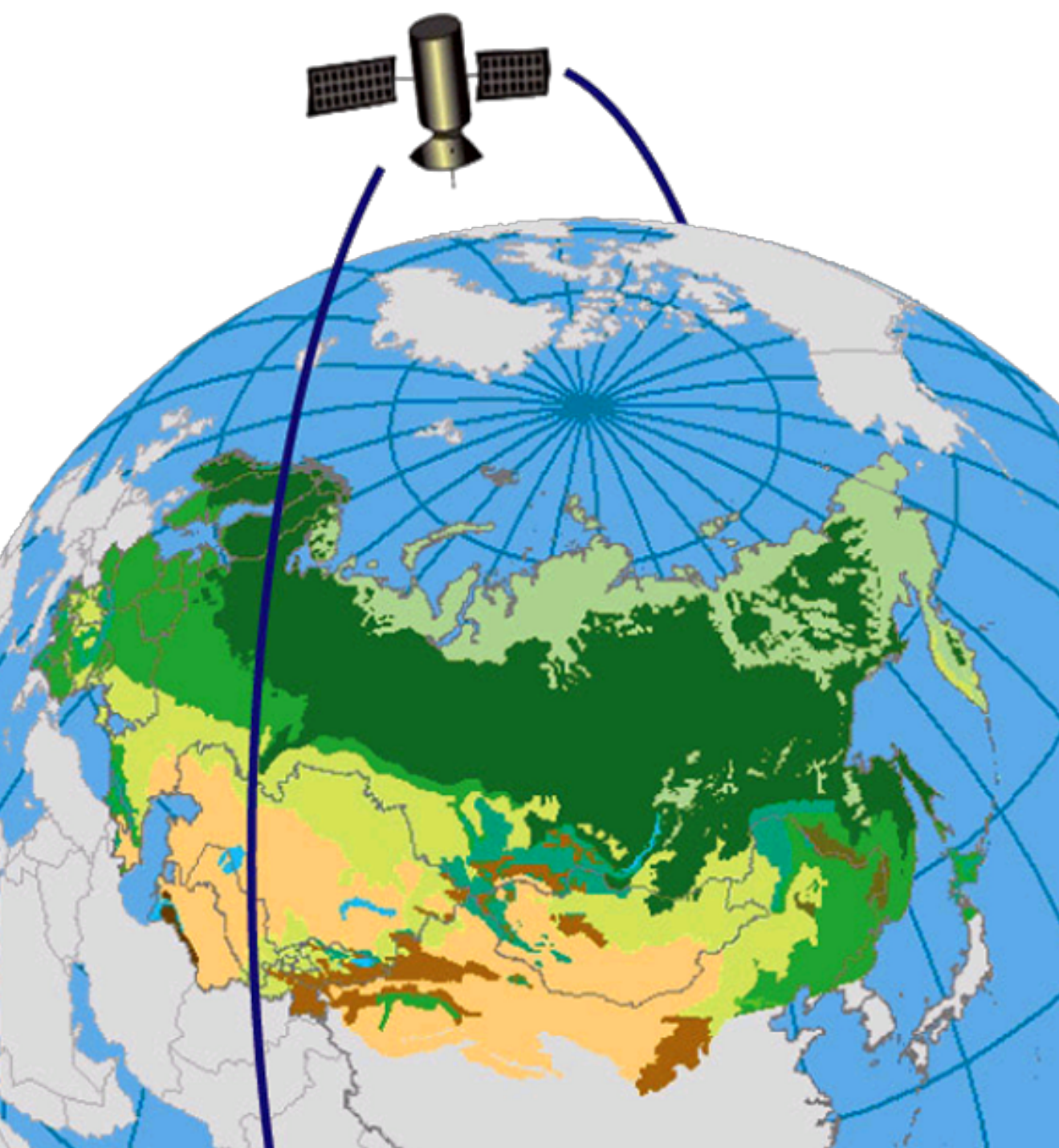
April 1967-2013

Years

<http://www.ncdc.noaa.gov/sotc/service/global/snowcover-eurasia/201304.gif>

Snow cover extent anomalies over Eurasia





The NEESPI Study Area

<http://neespi.org>

NEESPI is an interdisciplinary program of internationally-supported Earth systems and science research that addresses large-scale and long-term manifestations of climate and environmental change.

NEESPI Study Area includes: Former Soviet Union, Northern China, Mongolia, Fennoscandia, & Eastern Europe

NEESPI duration ~ 10-12 years (started in 2004)



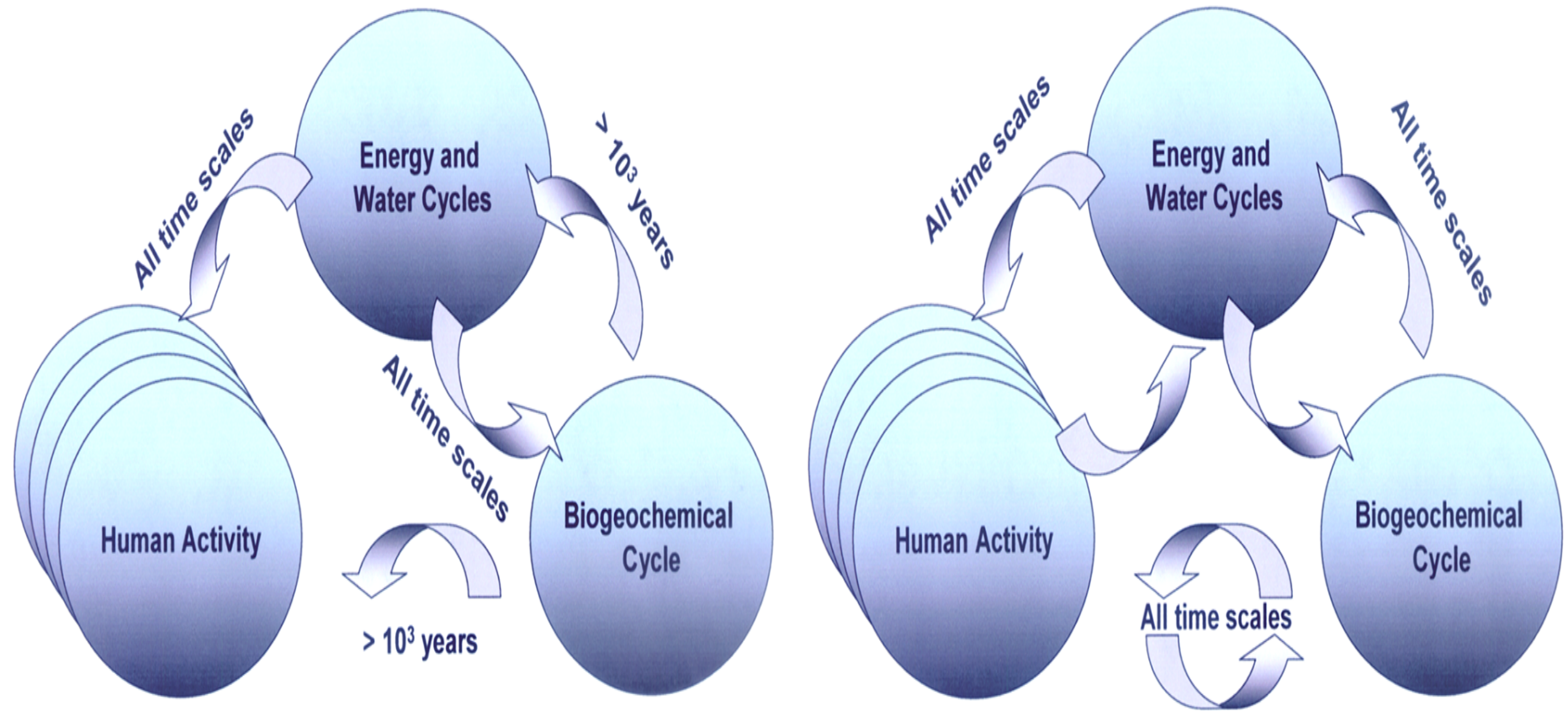
NEESPI Background

Nine years ago
NEESPI was
established to address
large-scale and long-
term manifestations of
climate and
environmental change
in Northern Eurasia.

NEESPI Background, cont.

- <http://neespi.org> web site contains the NEESPI history, presentations at the NEESPI past conferences, the **NEESPI Science Plan** (260 pp.) and its **Executive Summary** (18 pp.; also dubbed in 2007 as a refereed publication in the Special NEESPI issue of “*Global and Planetary Change*”).
- The NEESPI domain is shown in the map.
- NEESPI Science Plan includes elements of WCRP, IGBP, IHDP и DIVERSITAS.

Pre-industrial and present interactions in the Earth Global System

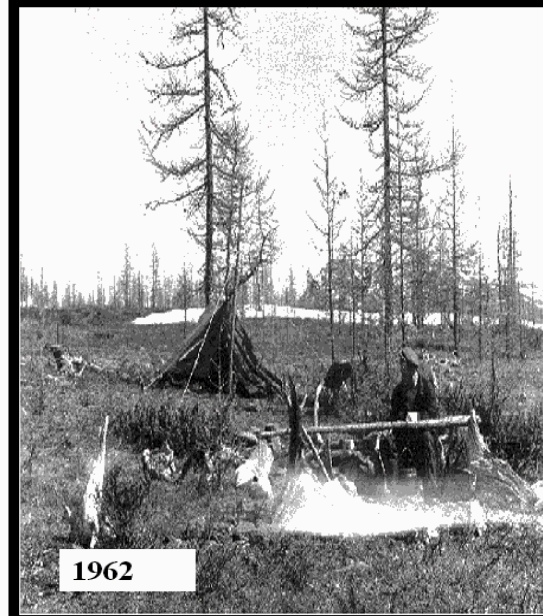


- **NEESPI ideological concept:** Studying any one of these cycles or activities often requires analyses of its interaction with the other two and of the transitional (non-equilibrium) character of these interactions.

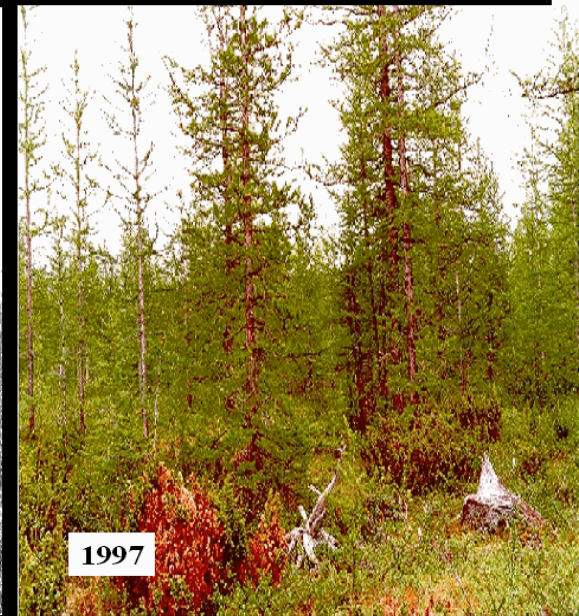
First phase foci of NEESPI were **monitoring and analyses** of climatic changes, biogeochemical cycles, land use, and land cover



**300-m tall
flux tower
in Siberia**



1962



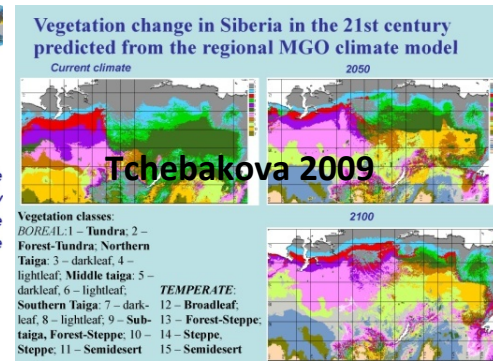
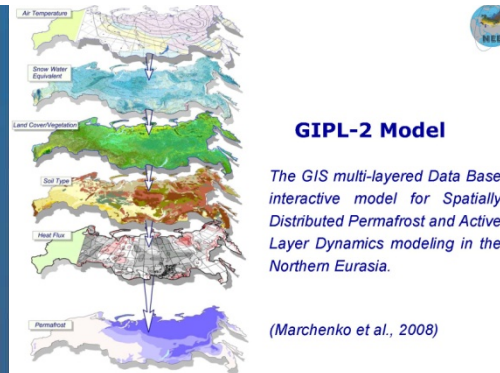
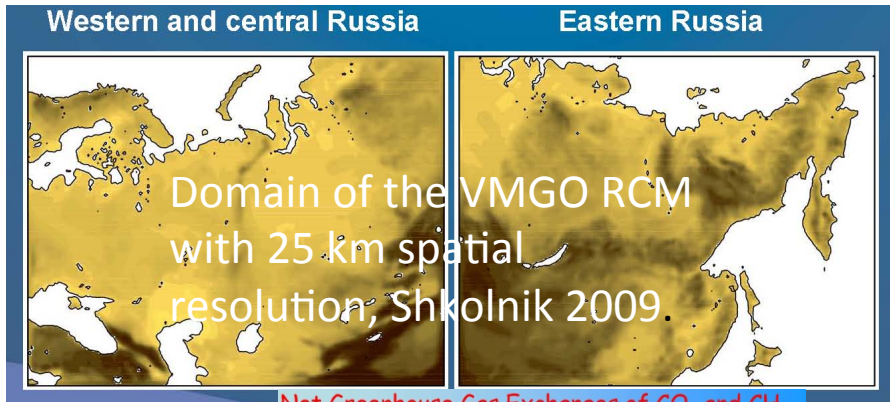
1997



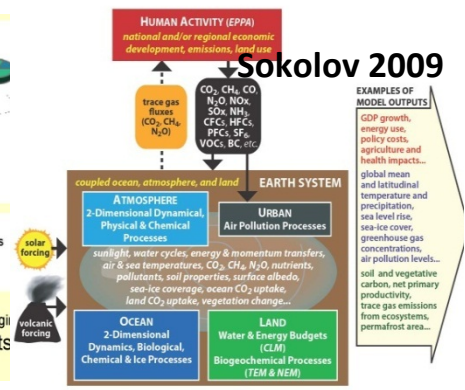
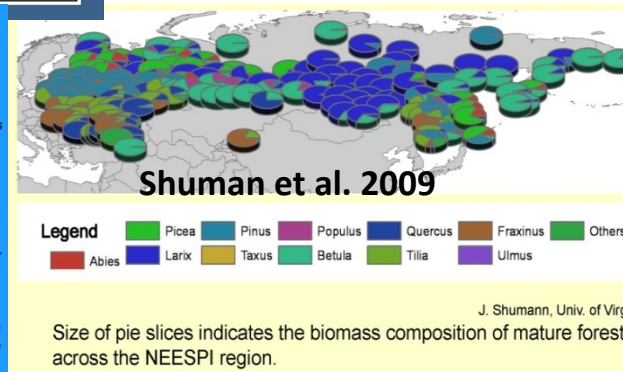
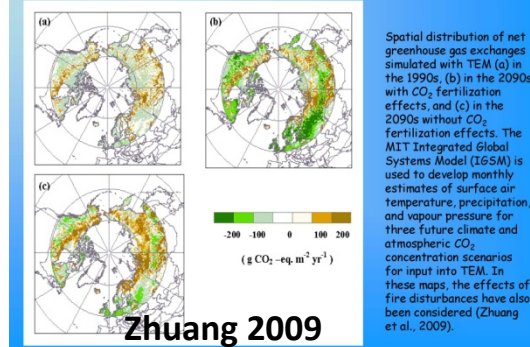
**Aral Sea
retreat**



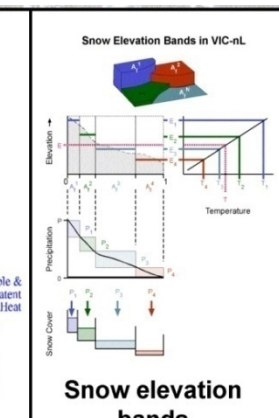
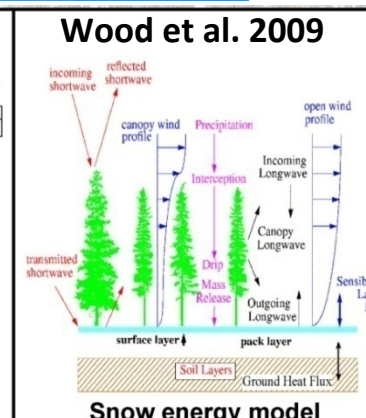
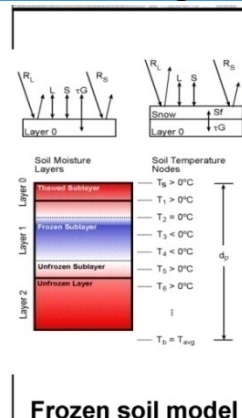
After the NEESPI Workshop in August 2007 at the Aspen Global Change Institute, a new course was accepted towards strengthening of the NEESPI research focus on **scenarios... i.e., focus on modeling...**



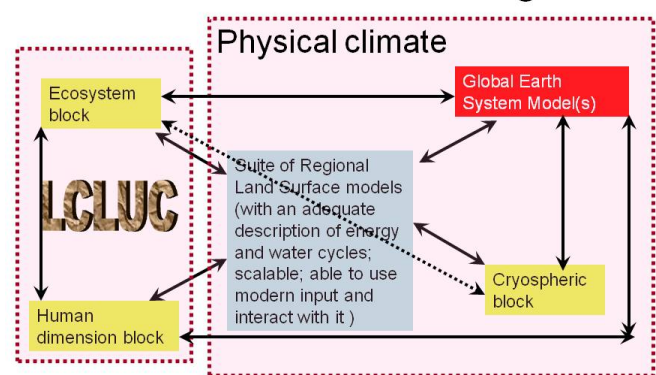
Net Greenhouse Gas Exchanges of CO₂ and CH₄



Efforts are made to blend modern RCMs with vegetation, carbon flux, permafrost, hydrological, and dust production models within a North Eurasia modeling suite and link it to the MIT Earth System model.



Northern Eurasia modeling suite



Latest NEESPI research foci on **integrated assessments and projections**

- Summation of all knowledge in books and overview papers
- Expanding and maintaining of the regional observational data base
- **“FUTURE Northern Eurasia”**. Developing regional **Earth System modeling capabilities** to provide the knowledge required for societies in the region and beyond to face risks posed by global environmental change and to seize opportunities in a transition to global sustainability. This means to respond to a **New initiative by ICSU/ISSC « Future Earth »**.

**Major NEESPI Science
question remains intact:**

- How do Northern Eurasia's
terrestrial ecosystems
dynamics interact with and alter
the biosphere, atmosphere, and
hydrosphere of the Earth?**

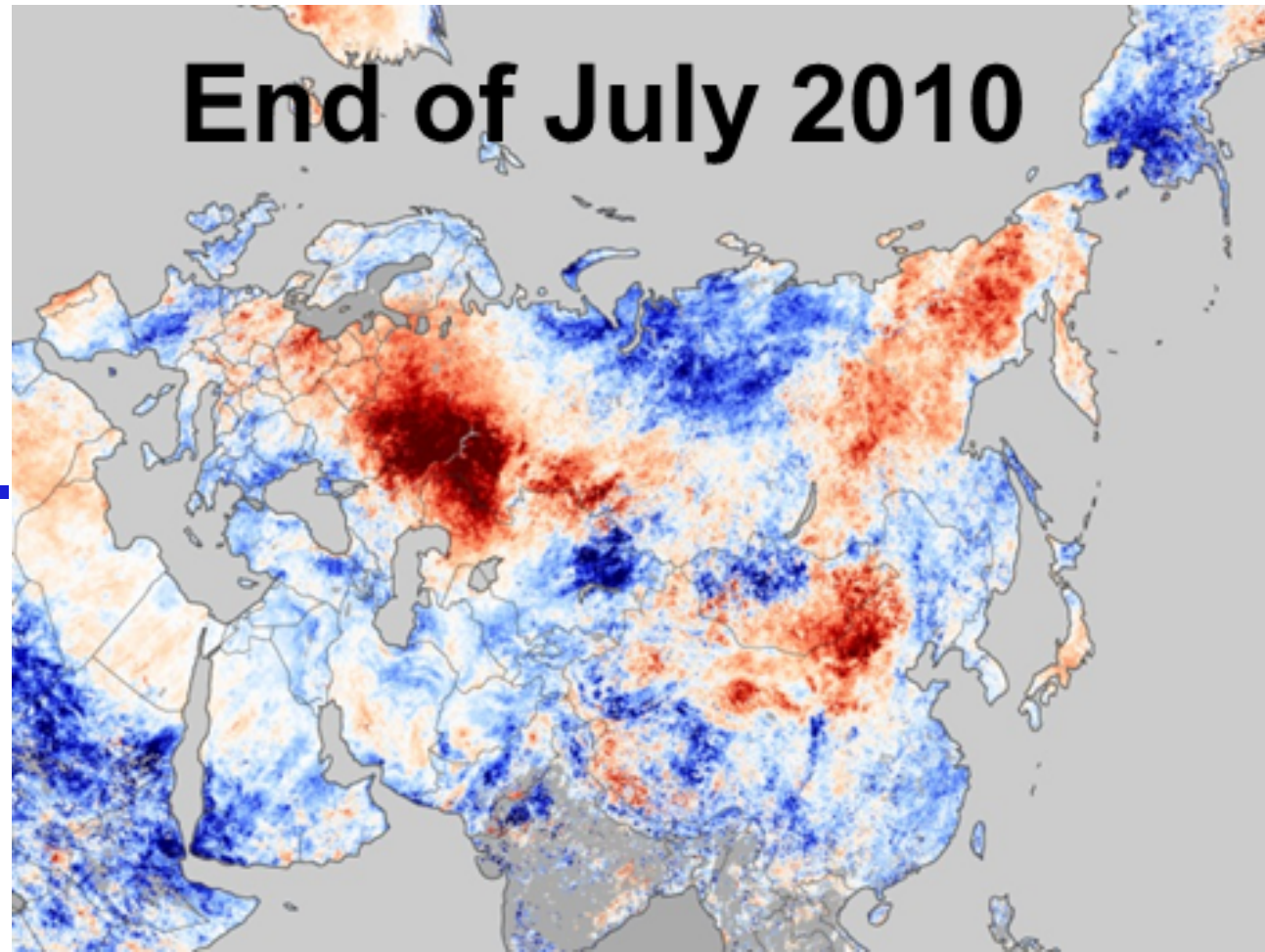
**But, the NEESPI researchers
have new challenges:**

Need to develop the new set of science questions for regional projects that succeed NEESPI (post-NEESPI)

a. Focus on extremes: Mechanisms

of extremes in changing climate and environment.

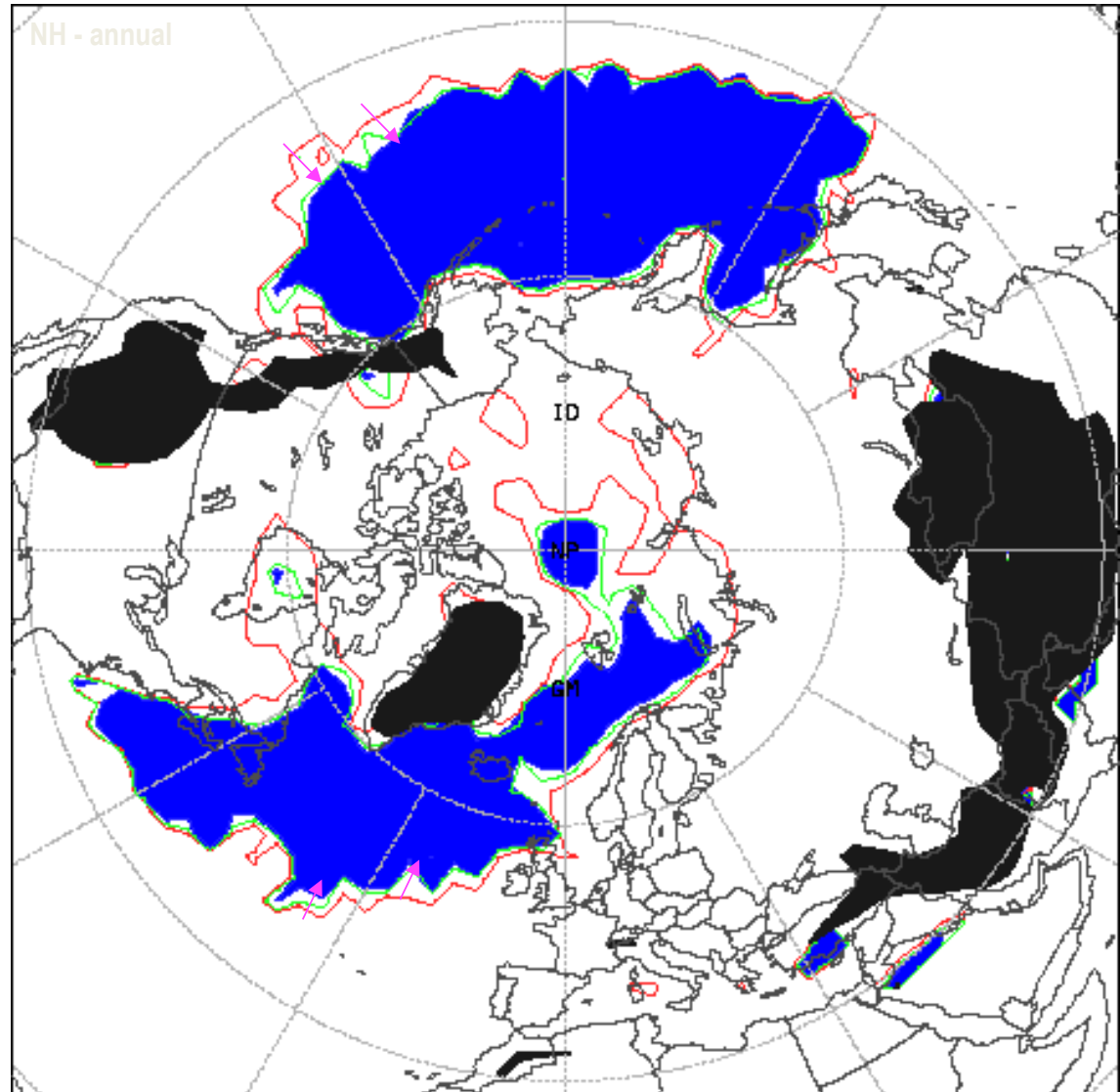
Temperature Anomalies:



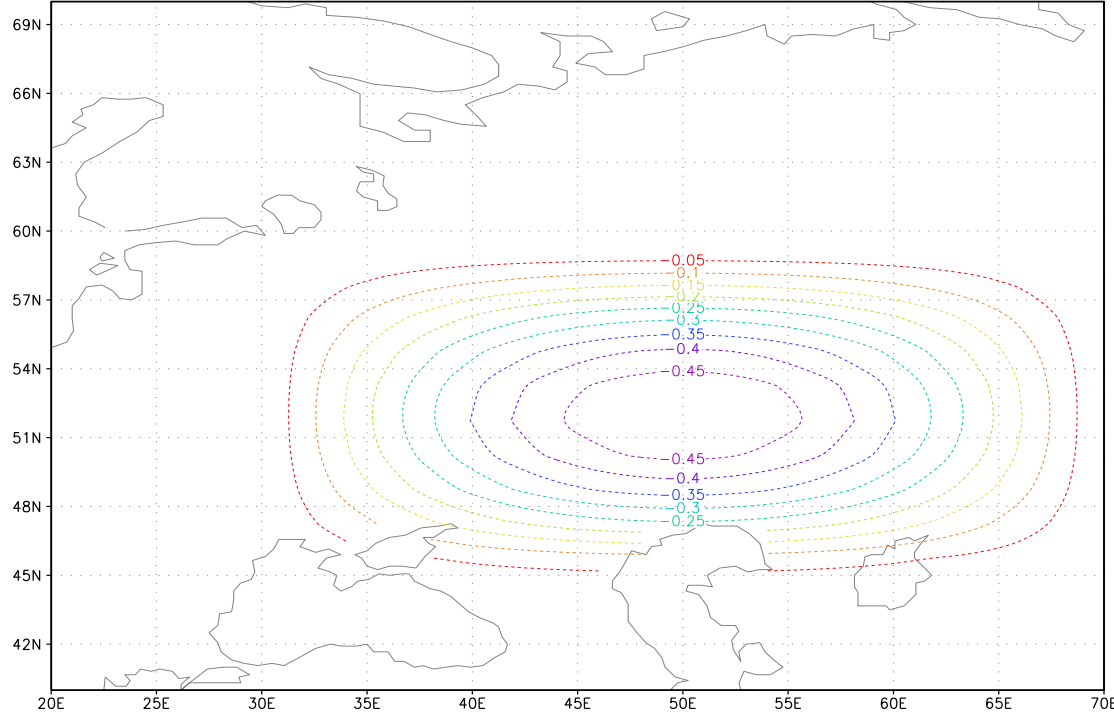
Major storm track regions in the 20th Century Reanalysis

defined by the 85th percentile contour of long-term mean strong cyclone counts

30-yr periods
Blue shading: 1979-2008
(current)
Green line: 1941-1970
(mid 20th century)
Red line: 1901-1930
(early 20th century)
Black shading: no data

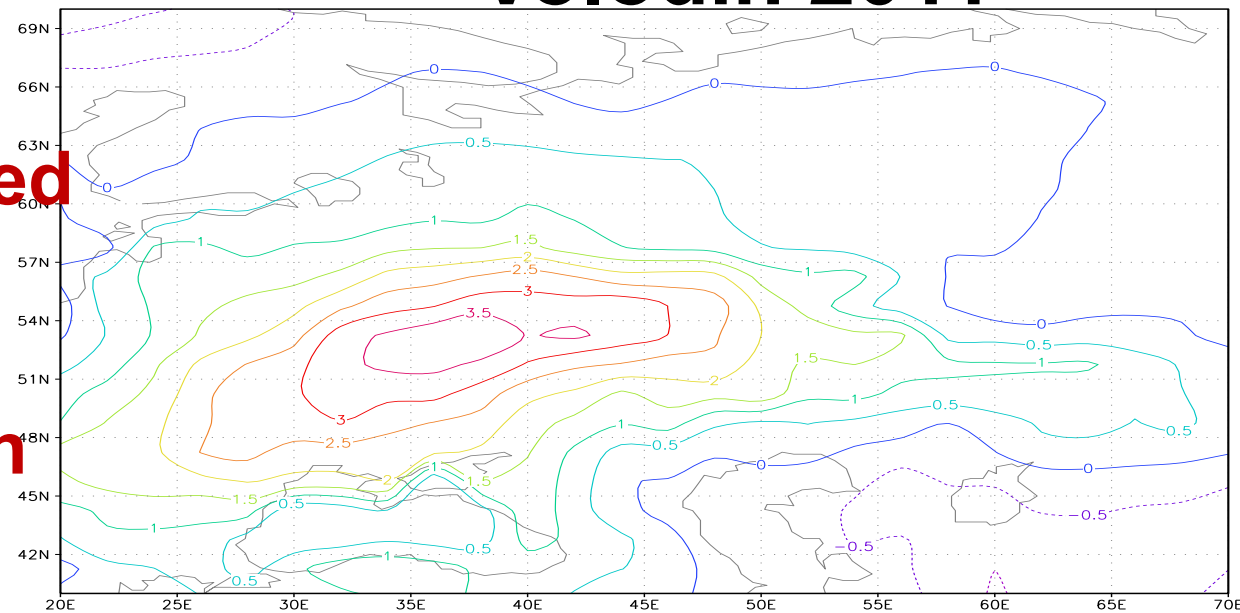


Wang et al. 2012



- **Soil moisture anomalies in the upper 50 cm over Russia in the end of June 2010**
GCM experiment, Volodin 2011

- **Temperature anomalies caused by soil moisture anomalies over central Russia in July 2010**



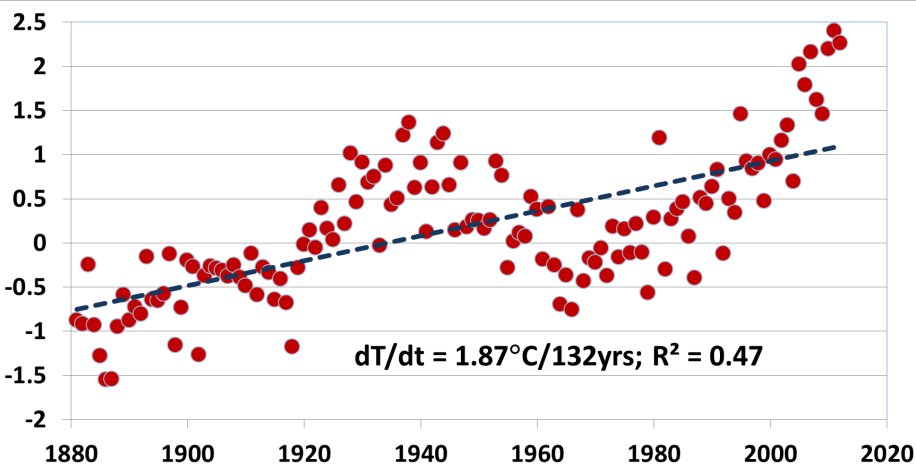
New challenges

a. Extremes.

b. Global impact of the

Arctic warming:

Annual surface air temperature anomalies area-averaged over the 60°N - 90°N latitudinal zone



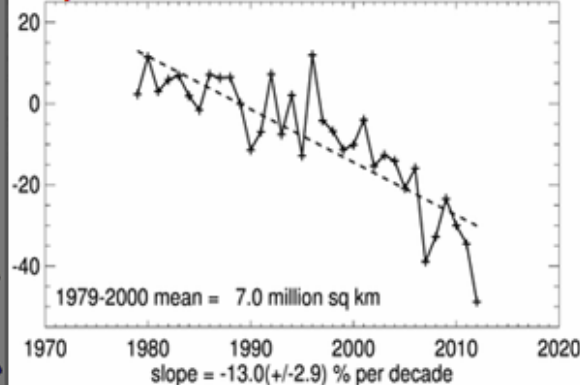
Northern Hemisphere sea ice extent as of mid-September 2012 and September sea ice extent anomalies, %



One of the first UCMO GCM sensitivity experiments with polar ice replaced by water at 0°C. Changes in January surface air temperature, °C (Newson 1973).



September 1979–2012 anomalies, %



Source: U.S. National Snow & Ice Data Center, Boulder, Colorado, USA

Need to develop the new set of science questions for regional projects that succeed NEESPI (post-NEESPI)

- a. Mechanisms of extremes in changing climate and environment**
- b. Global impact of the Arctic warming**
- c. Changing carbon cycle and land cover due to a. & b.**
- d. Global food & water security due to a, b, & c**
- e. Societal feedbacks to detrimental changes (adaptation & mitigation)**

New tools became available (GPM, ESMs)

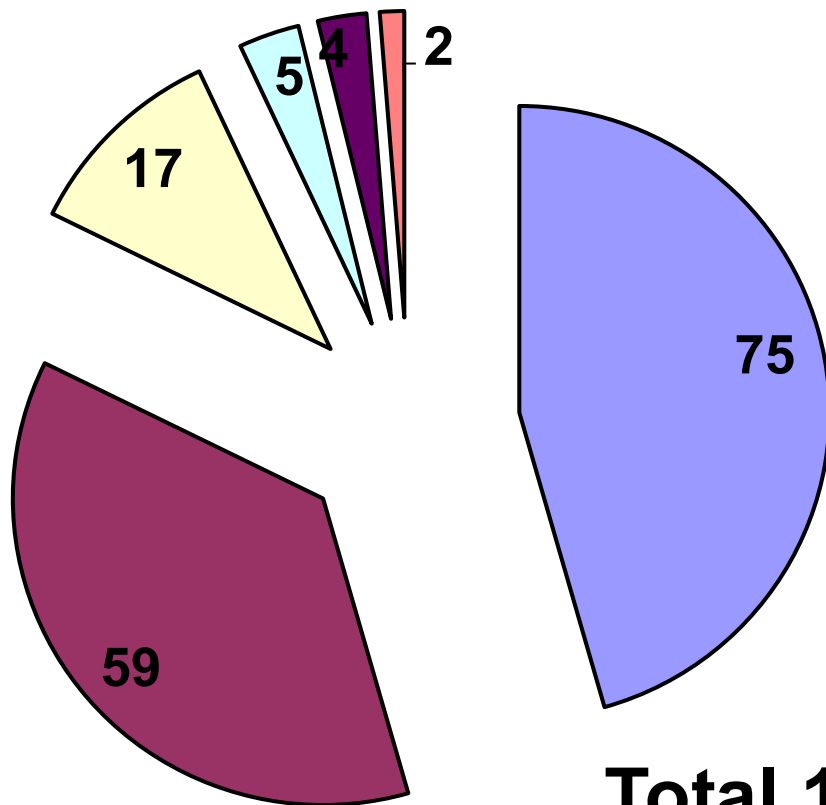
NEESPI Success Metrics

- NEESPI Project achievements are published and summarized in overview articles and books
- **Bridging, infilling the holes in the regional research activities**
- Preparation of a new breed of early career scientists who defended their PhD theses while working on North Eurasia and Arctic studies
- **Advances in building of the North Eurasian Modeling Suite**

NEESPI Statistics

- Throughout its duration, NEESPI served and is serving as an umbrella for **162 individual research projects (always with an international participation)** with an annual budget close to 15 million US dollars (cf., the next Figure, where international NEESPI projects are grouped by the major national funding source). More than **750 scientists from more than 200 institutions of 30 countries** worked or are working under the Initiative umbrella.
- In 2013, a new generation of projects funded in Russia (Ministry of Education and Science, RAS), the United States (NSF, NASA), China, and Europe was added (or is being in process of joining) to NEESPI.

Completed and ongoing NEESPI Projects by country (or group of countries), September 2013



Total 162 Projects

■ All US Agencies

■ All EU Agencies

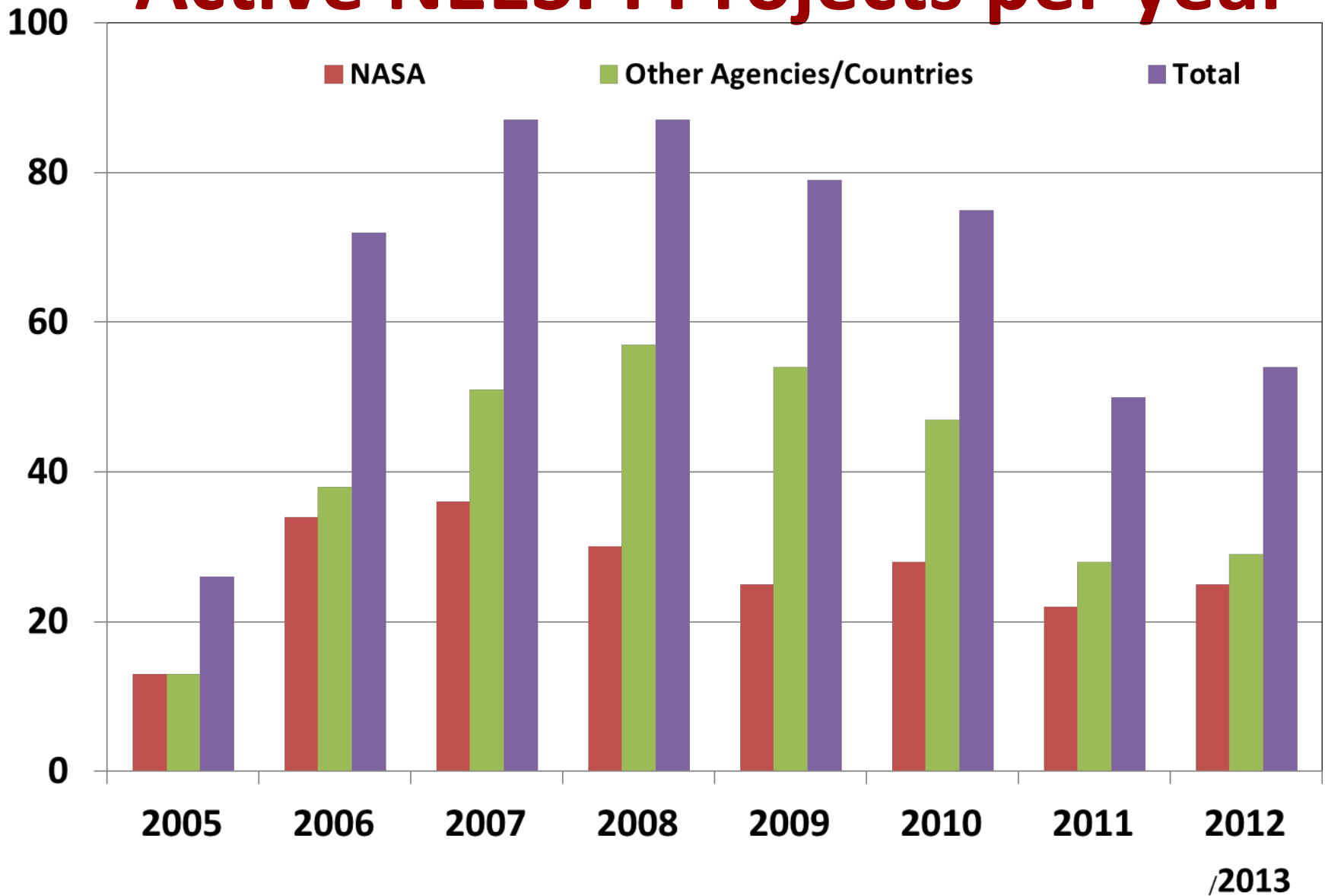
■ All Chinese Agencies

■ All Russian Agencies

■ All Japanese Agencies

■ Canada

Active NEESPI Projects per year



Books and thematic journal Issues in 2012/13

Published:

- The 4th (the third ERL) *Environ. Res. Lett.* NEESPI focus issue was **published** and is available on line. This Special Issue has 25 manuscripts (<http://iopscience.iop.org/1748-9326/focus/NEESPI3>)
- Groisman, P.Ya. and V.I. Lyalko (eds.) 2012: "**Earth System Change over Eastern Europe**" "Akademperiodyka" Publ. House, Kiev, Ukraine, 487 pp. (in English; May 2012).
- Groisman, P.Ya., A. Reissell, and M. Kaukolehto (eds.) 2012: **Proc. of the NEESPI Regional Science Team Meeting devoted to the High Latitudes**, Univ. Helsinki Press, Helsinki, Finland ~ 153 pp. **REPORT SERIES IN AEROSOL SCIENCE No. 130** (<http://www.atm.helsinki.fi/FAAR/reportseries/rs-130.pdf>)
- Groisman P.Ya. and G. Gutman (eds.), 2013: "**Environmental Changes in Siberia: Regional Changes and their Global Consequences**", Springer Publishing House, Amsterdam, The Netherlands (Published on September 2, 2012).

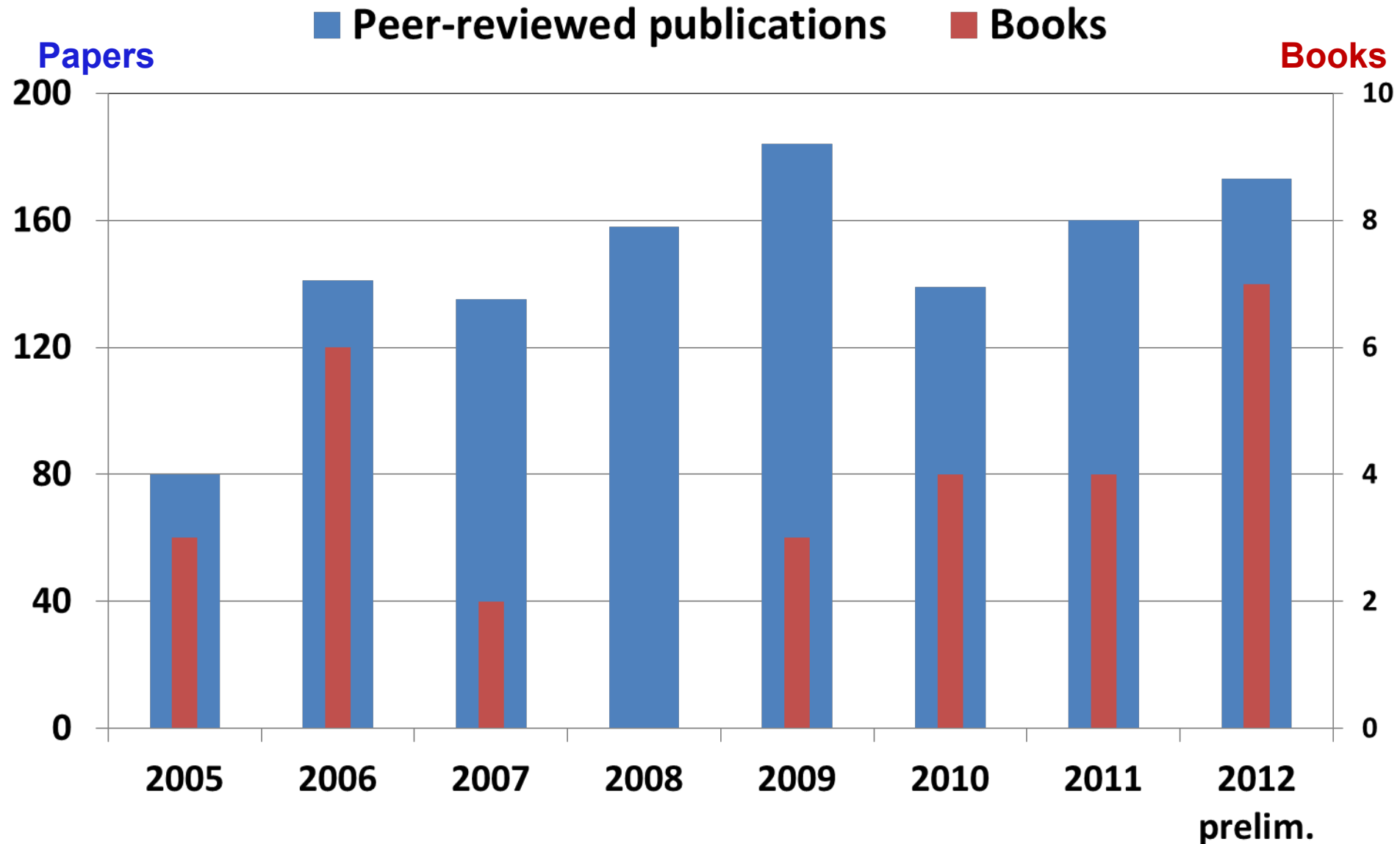
Just out of press:

- Chen, J., S. Wan, J. Qi, G. Henebry, M Kappas, and G. Sun (eds.), 2013: "**Dryland East Asia: Land Dynamics Amid Social and Climate Change**" Beijing: Higher Education Press & Berlin: De Gruyter.

NEESPI Outreach, <http://neespi.org>

- After the First NEESPII Science Team Meeting (IIASA, Laxenburg, Austria, February 2006), ~**30** dedicated NEESPI Workshops and **19** NEESPI Open Science Sessions at the International Meetings were convened.
- **Two or more** Early Career Scientists Summer Schools per year were organized in the past three years (since 2009).
- During the Mega-Project life, more than **1165** papers and **31** books were published or are in press; their list is regularly updated at http://neespi.org/science/NEESPI_publications.pdf. In particular, since 2010, about **465** peer-reviewed papers and/or book chapters were published or are in press.
- More than **75 PhD students** defended their theses while working within the NEESPI framework.

NEESPI publications by year



Further NEESPI activities in 2013-14:

- **Ongoing next *Environ. Res. Lett.* Special NEESPI Issue**; 58 confirmed present and *future* contributors
- **December 9-13, 2013, San Francisco, USA**, Open NEESPI Session at the Annual Fall **AGU** Meeting
- **March 19-21, 2014, Berlin, Germany**. Session “Northern Eurasia in transition: implications for food security and ecosystem tradeoffs” at the **Global Land Project** 2nd Open Science Meeting
- **April 7-10, 2014. Beijing, China**. “Future Earth in Northern Asia” Session at the MAIRS Open Science Meeting
- **April 27- May 2, 2014, Vienna, Austria**. Open NEESPI Session at the Annual **EGU** Assembly
- **July dates TBD, 2014, Tomsk, Russia**. ENVIROMIS Educational scientific event and Science Conference.
- **December 15-19, 2014, San Francisco, USA**, Open NEESPI Session at the Annual Fall **AGU** Meeting

Future Plans

- Integrative studies (Siberia, Eastern Europe, *Central Asia*, Dry East Asia)
- Data and Research Results Dissemination
- Outreach focused on early career scientists
- **Strengthen links with BALTEX and MAIRS**
- **Large NEESPI Conference in 2015 that will summarize the 12 years of NEESPI studies and launch the preparation of the following-up NEESPI overview book**
- **Development of the new set of scientific ideas for regional projects that succeed NEESPI under a tentative title “FUTURE Northern Eurasia”**

FOR MORE INFORMATION SEE THE NEESPI WEB SITE:

<http://neespi.org>



(COURTESY PHC)



Side Note:
“NEESPI” is pronounced
approximately like the
Russian phrase for
“Don’t sleep”

Northern Eurasia Earth Science Partnership Initiative

谢谢!

Thank you!

Спасибо!