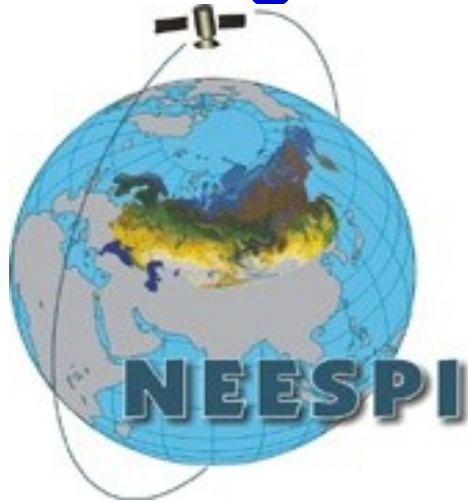


Northern Eurasia Earth Science Partnership Initiative and Monsoon Asia Integrated Regional Study in 2011-2012: An Update

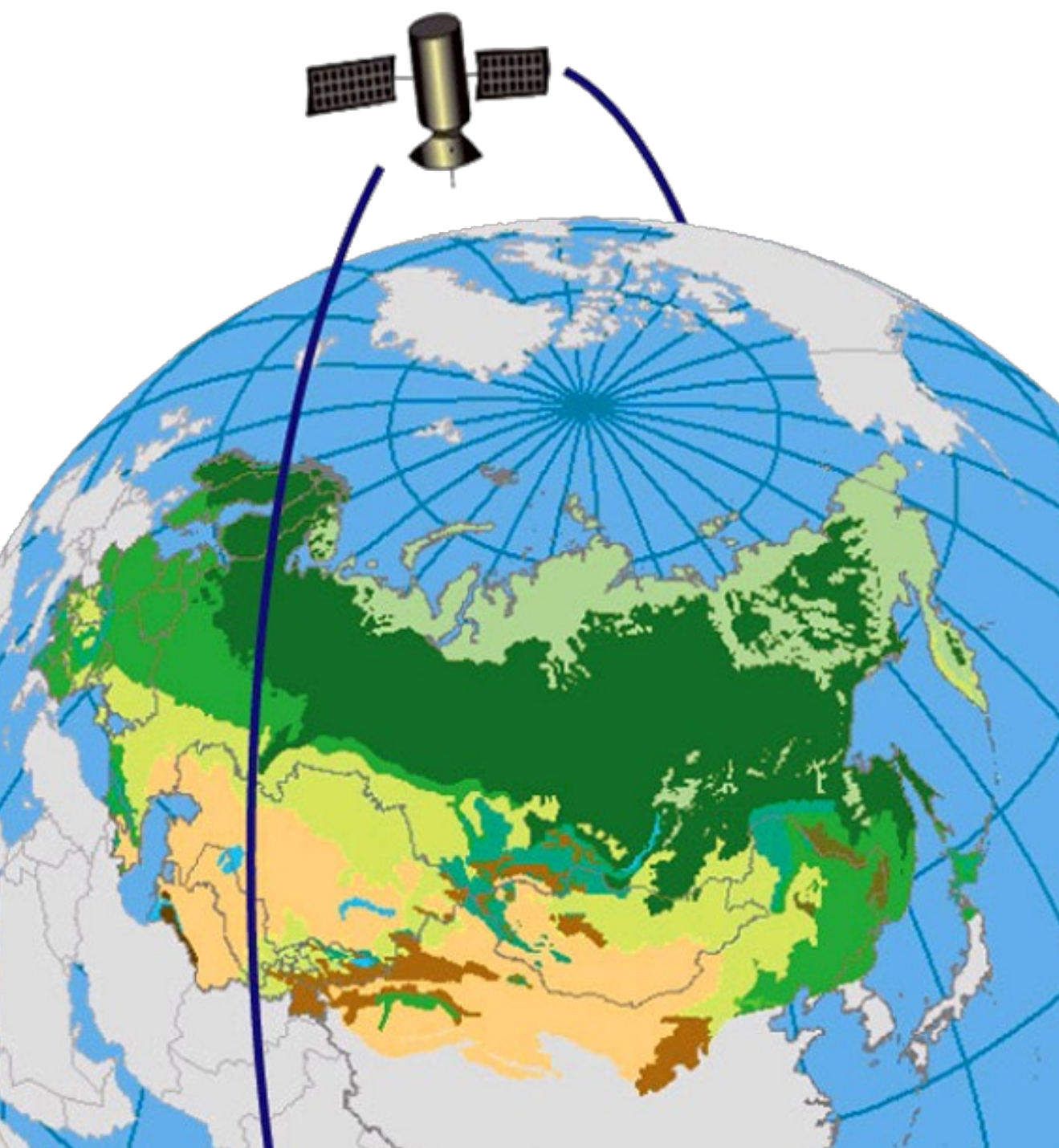


Pavel Groisman

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

Ailikun

Institute of Atmospheric Physics, CAS, China



The NEESPI Study Area

<http://neespi.org>

NEESPI Background

- Seven years ago NEESPI was established to address large-scale and long-term manifestations of climate and environmental change in Northern Eurasia (<http://neespi.org>). This 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.

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.

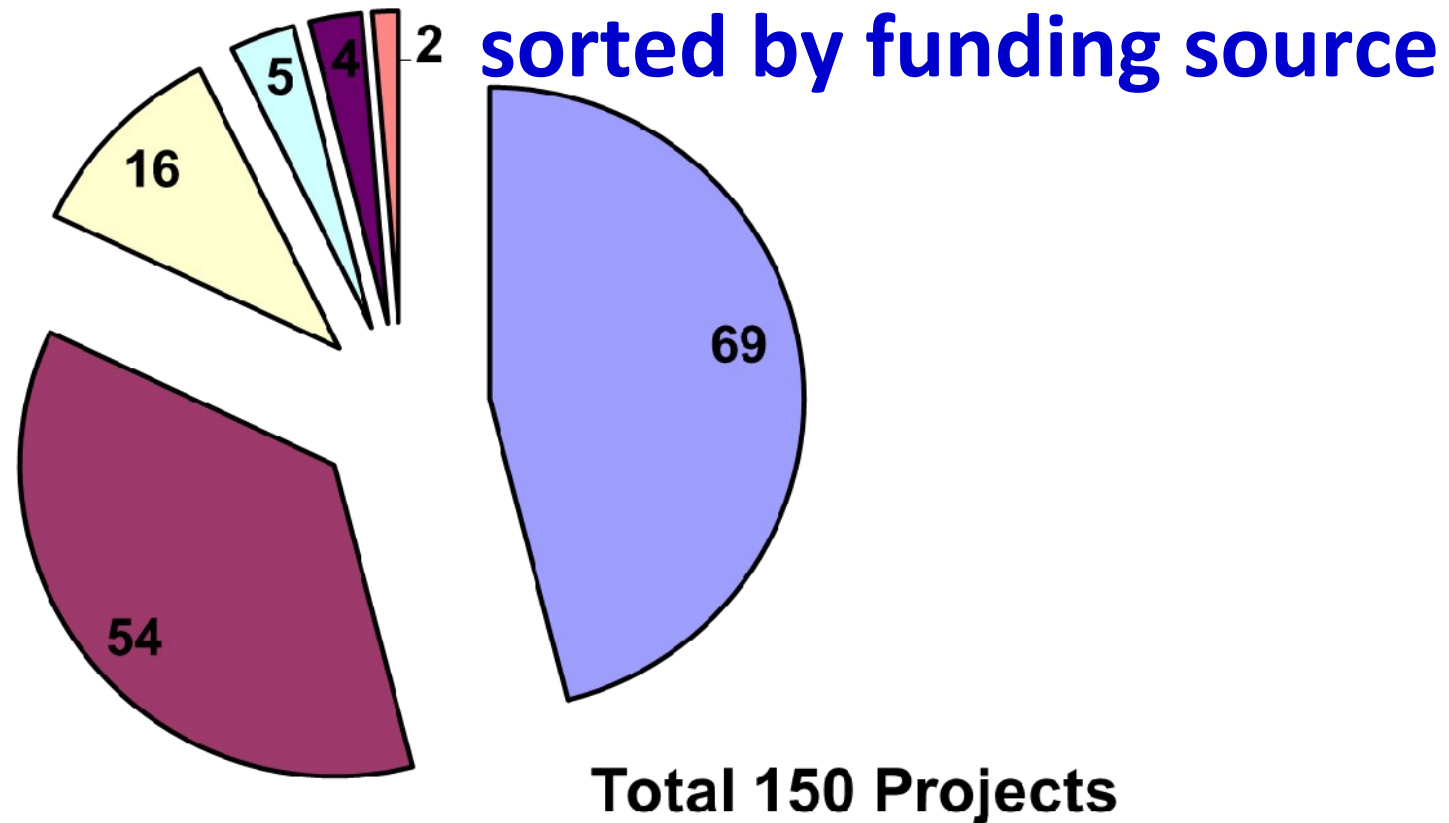
NEESPI Study Area includes: Former Soviet Union, Northern China, Mongolia, Fennoscandia, & Eastern Europe

NEESPI duration ~ 12 years (started in 2004)

NEESPI Statistics

- Throughout its duration, NEESPI served and is serving as an umbrella for about **150 individual research projects (always with an international participation)** with an annual budget close to 15 million US dollars (cf., Figure on the left, where international NEESPI projects are grouped by the major national funding source). More than **700 scientists from more than 200 institutions of 30 countries** worked or are working under the Initiative umbrella.
- **A new crop of NEESPI projects was launched in 2010/2011 to compensate for the projects that have been completed.**

Completed and ongoing NEESPI Projects by country (or group of countries), May 2012



■ All US Agencies

■ All EU Agencies

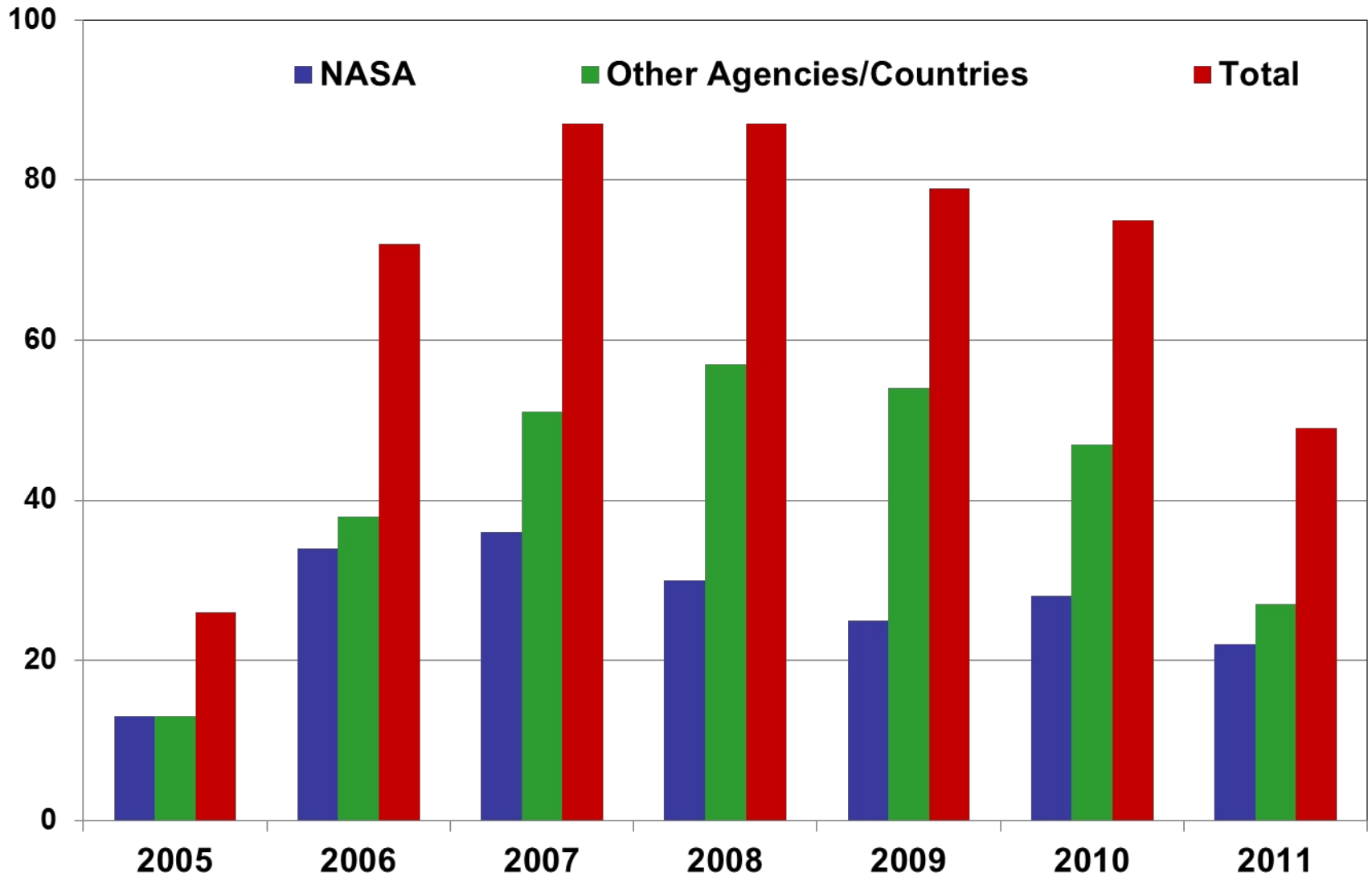
■ All Chinese Agencies

■ All Russian Agencies

■ All Japanese Agencies

■ Canada

Active Projects per year



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

During the past 5 years, ~30 dedicated NEESPI Workshops and 8 NEESPI Open Science Sessions at the International Meetings were convened and more than 700 papers and books were published. The past two years were extremely productive in the NEESPI outreach. Several PhD students defended their theses while working within the NEESPI framework. In 2010 and in 2011, *more than 300 peer-reviewed papers and/or book chapters were published or are in press* (this list is still incomplete and is anticipated to increase; cf., http://neespi.org/science/NEESPI_publications.pdf)

In particular:

A suite of 34 peer-reviewed NEESPI articles were published in the third Special NEESPI Issue in ***Environ. Res. Lett.* (2009, No. 4, and 2010, No.1).**

Several books and White Papers were published by Springer (**Balzter, ed., 2010; Gutman and Reissell, eds., 2011**), the National Academy of Science of Ukraine (**Lyalko, 2010**), and FAO (**Mátyás, 2010**).

Books and thematic journal Issues in 2012

Published:

- The 4th (the third ERL) *Environ. Res. Lett.* NEESPI focus issue has been publishing on line. This Special Issue has 24 accepted manuscripts, **twenty three** of them have been already **published** (cf., <http://iopscience.iop.org/1748-9326/focus/NEESPI3>)
- Groisman, P.Ya. and V.I. Lyalko (eds.) 2012: "*Earth System Change over Eastern Europe*" "Naukova Dumka" 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>)

In press:

- Groisman P.Ya. and G. Gutman (eds.), 2012: "*Environmental Changes in Siberia: Regional Changes and their Global Consequences*", Springer Publishing House, Amsterdam, The Netherlands (~August 2012).

In preparation:

- Chen et al. (eds.) "Dryland East Asia: Land Dynamics Amid Social and Climate Change") is scheduled to be submitted to the "Springer" Publishing House this summer.

Plans: NEESPI is going to use journal "***Geography, Environment, Sustainability***" (Russian Geographical Society) as a major outlet for its future publications (old Journal issues are available at <http://int.rgo.ru/>).

Ongoing and Future NEESPI activities in 2012:

Just completed:

- **April 22-27, 2012, Vienna Austria.** European Geosciences Union Annual Assembly. The special NEESPI Session (BG5.2)
- **May 20-25, 2012, Makuhari Messe, Japan** Japanese Geoscience Union Annual Meeting. Special NEESPI/MAIRS This Multidisciplinary Session
- **June 18-22, 2012, Yoshkar-Ola, Russia,** Regional Conference: “Impacts of extreme weather on natural, socio-economic, and land-use systems”
- **June 24 –July 2, 2012, Irkutsk, Russia.** Summer Scientific and Educational Event “*ENVIROMIS*” and the APN Workshop on extreme events in Eurasia (*this conference*)
- **December 3-7, 2012, San Francisco, USA,** Open NEESPI Session (GC-019) at the Annual Fall AGU Meeting

Session at the Global Change Focus Research Group at the Fall Annual AGU Meeting:

“Environmental, socio-economic and climatic change in Northern Eurasia and their feedbacks to the Global Earth System”

Abstract deadline: August 8, 2012

- **We invite presentations on climate and terrestrial ecosystems interactions in Northern Eurasia and regional impact studies of environmental changes and the feedback studies of societal and land use changes on regional and global environment and climate**
- ***Presentations by the early career scientists are particularly welcome***
- **The foci of this Session are:**
 - **advance in our ability to understand (monitor, model, project) processes specific to the Northern Eurasia dry land areas;**
 - **interactions between human and natural systems; and**
 - **regional integrative multi-disciplinary studies especially those with focus on extreme weather events dynamics and projections.**

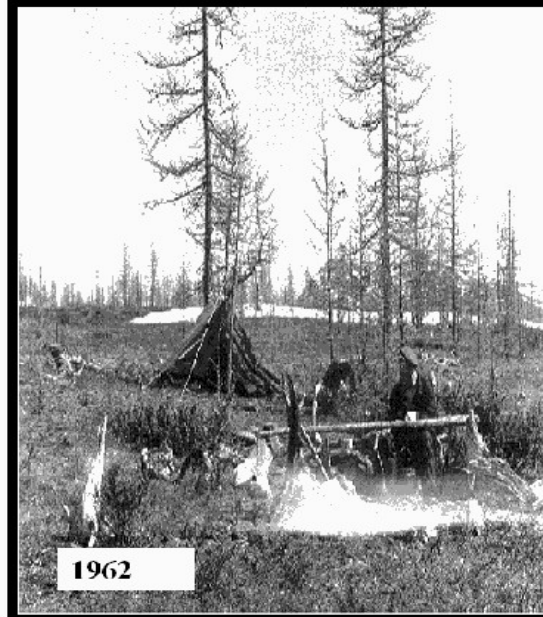
Future Plans

- Focus Modeling (i.e., on projections)
- Integrative studies (Siberia, Eastern Europe, *Central Asia, Dry East Asia*)
- Data and Research Results Dissemination
- Outreach
- Large NEESPI Conference in 2015 that will summarize the 12 years of NEESPI studies

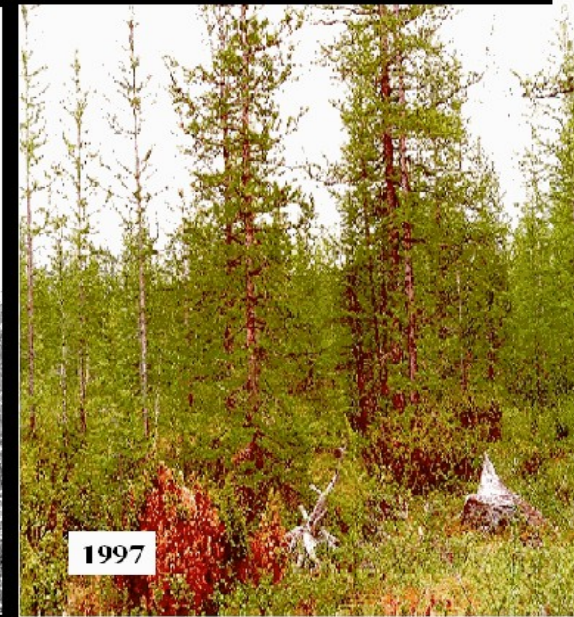
First phase foci of NEESPI were **monitoring and analyses** of climatic changes, biogeochemical cycles, land use, and land cover



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



1962



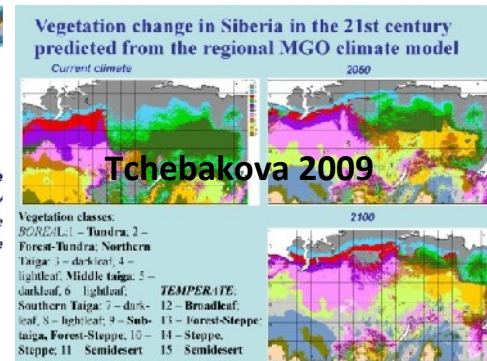
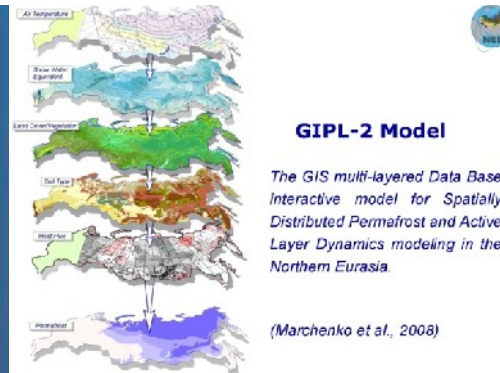
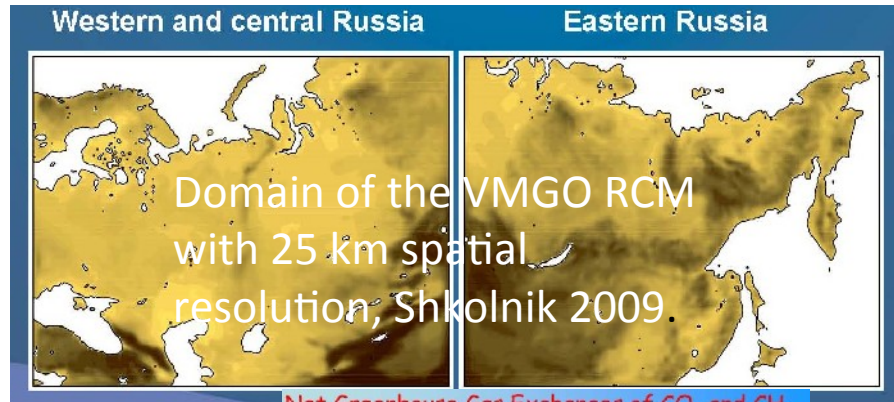
1997



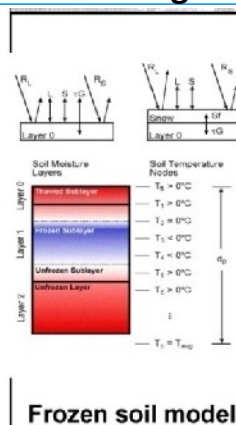
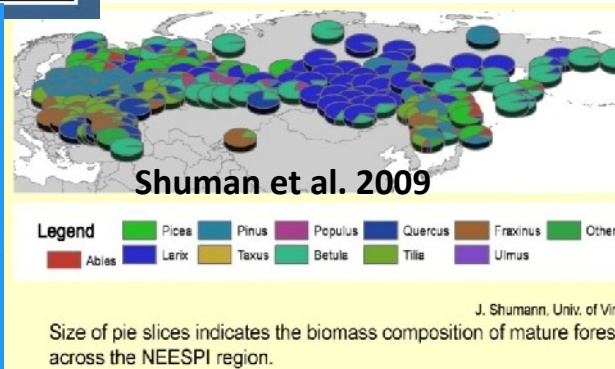
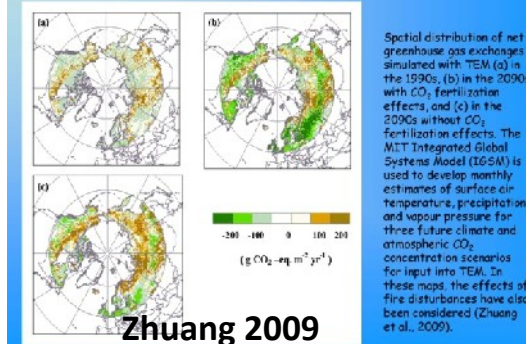
**Aral Sea
retreat**



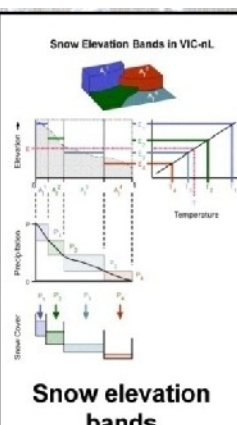
After the NEESPI Workshop in August 2007 at the Aspen Global Change Institute, a new course was accepted towards strengthening of the NEESPI research focus on **projections... i.e., focus on modeling...**



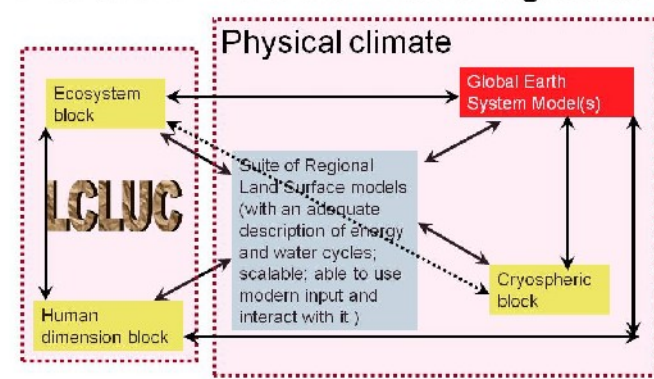
Net Greenhouse Gas Exchanges of CO₂ and CH₄



Wood et al. 2009



Northern Eurasia modeling suite



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.

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

MAIRS



MAIRS Background

- + MAIRS is an integrated regional study program focused on the integrated studies of environmental changes in monsoon Asian region.
- + MAIRS International Program office is located in the Institute of Atmospheric Physics, Chinese Academy of Sciences (CAS) and is financially supported by CAS



NEESPI: Northern Eurasian
Earth Science Partnership
Initiative

NEESPI-MAIRS Overlap

MAIRS: Monsoon Asia Integrated
Regional Study, focusing on the
integrated study of human-
climate system



MAIRS
Dryland
study

Characteristics of Dryland East Asia:

- Water scarcity with annual precipitation lower than 600mm
- Sensitive to climate variability and climate change
- Drought prone, vulnerable ecosystem and intensive agriculture activity
- Lack of ground observation and bad simulation in climate/land surface models



	Northern China	Southern China
Precipitation	50-800mm	800-2000mm
Cultivated land	65%	35%
Water resources	19%	81%
GDP	45%	55%

Since 65% agricultural land is in northern China, drought issue is more important for policy makers and scientific research than in the other areas.

MAIRS has three components in Northern China:

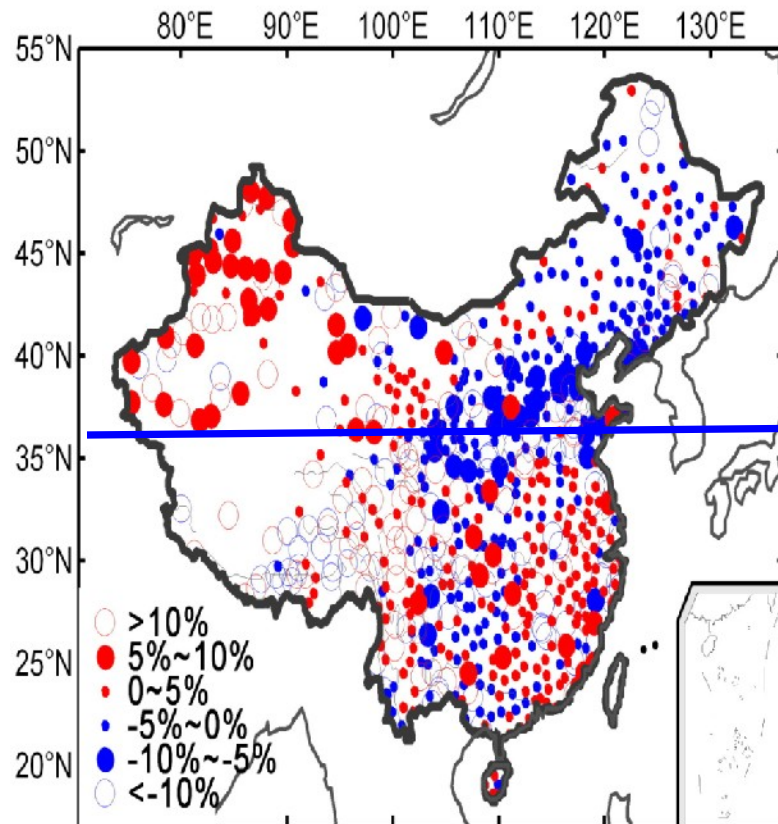
- In situ observations**
- In-depth observatory process studies, and**
- Climatic, ecosystem, and socio-economic modeling**

Main Research Agenda

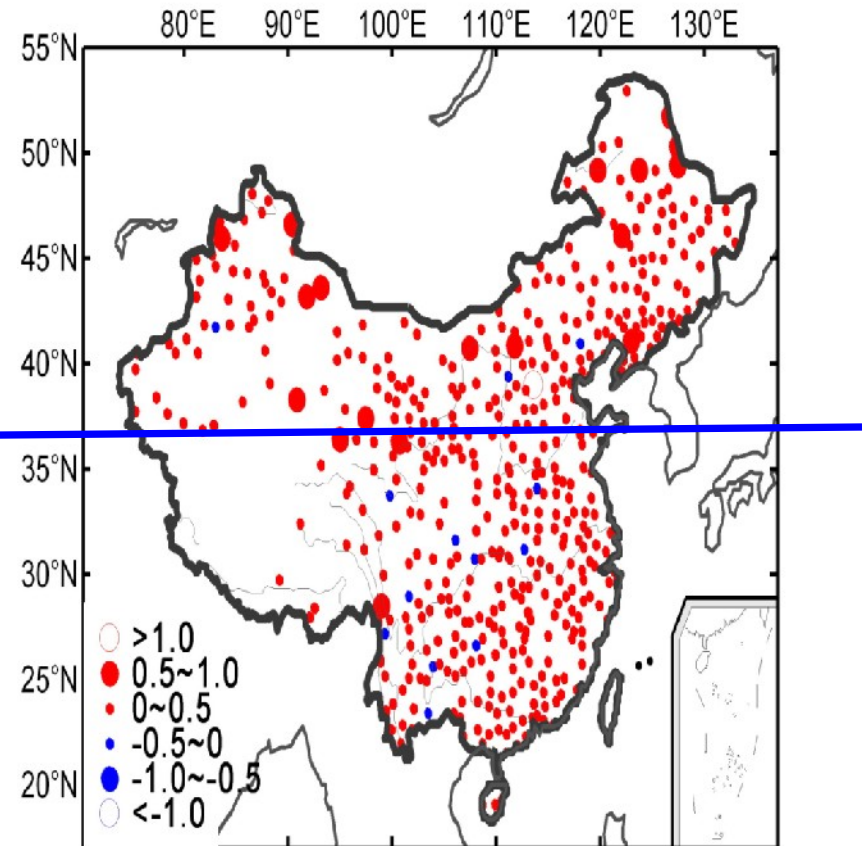
- ✚ global warming impacts to water resource, water cycle and ecosystem services in dryland Asia
- ✚ Assessment of vulnerability of human-environmental system to climate changes in the region
- ✚ Feasible resilient adaptation strategies to off-set risks of climate impacts

China climate change in last 50 years

Change of Ann. Precipitation in China, 1960-2005

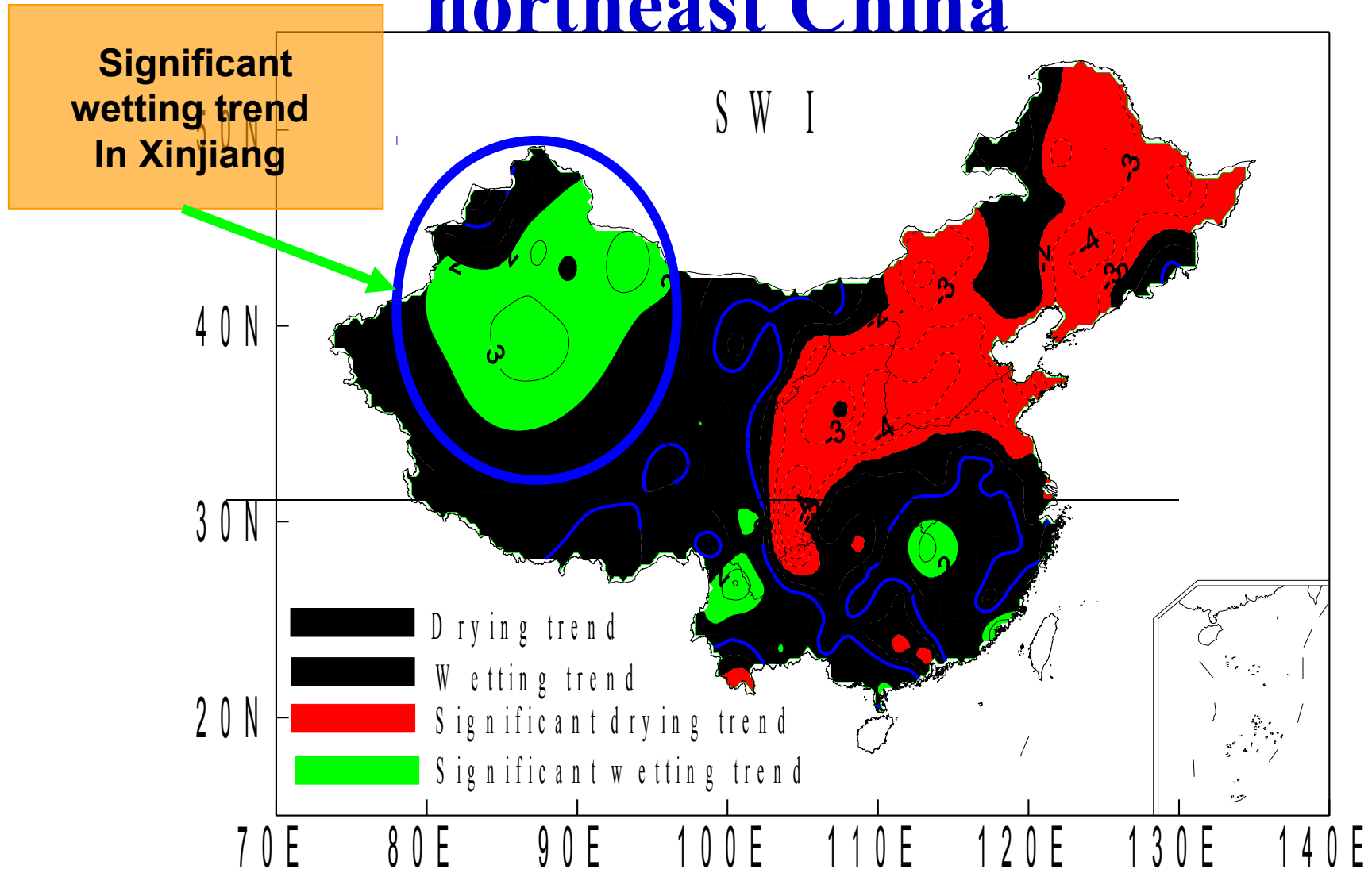


Change of Ann. Temperature in China, 1960-2005



By Tianbao ZHAO, 2010

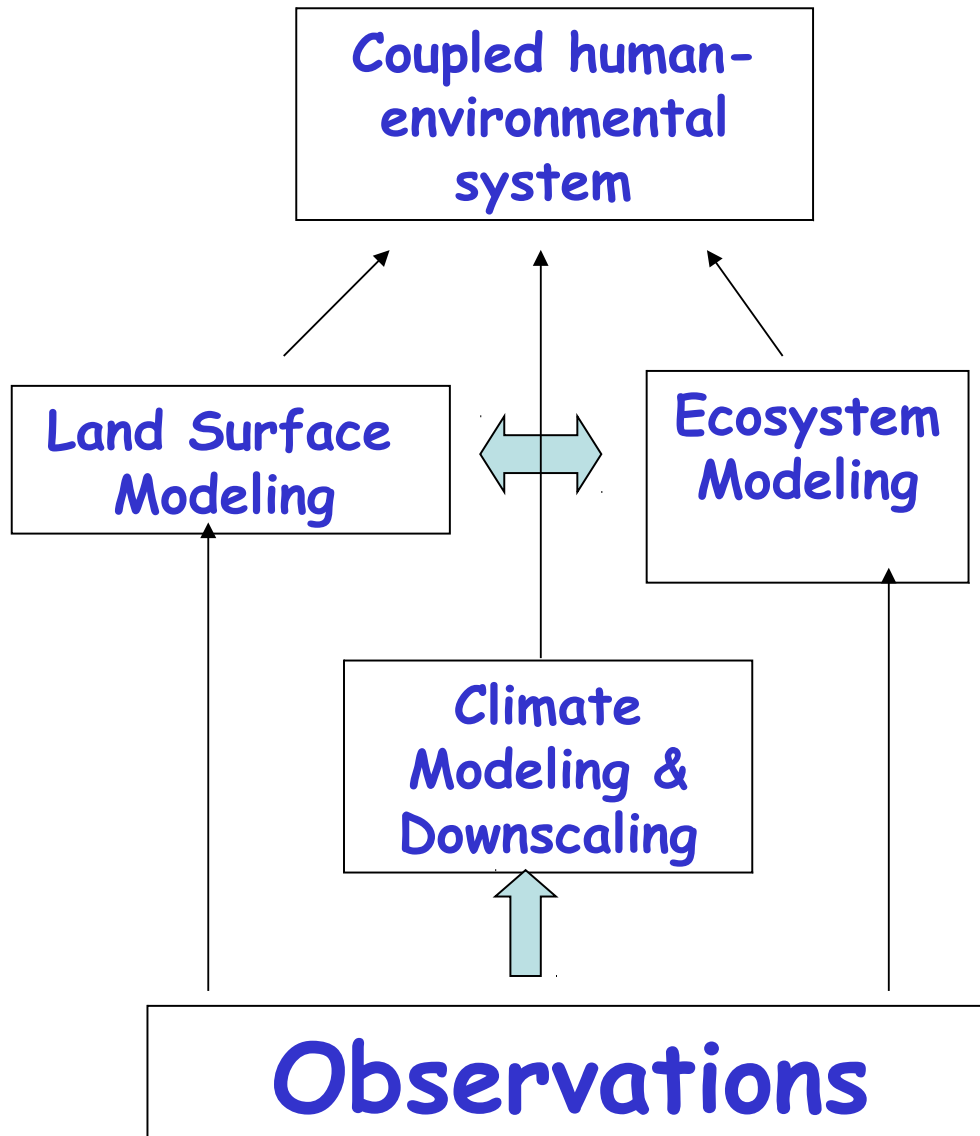
Wetting in northwest; drying in northeast China



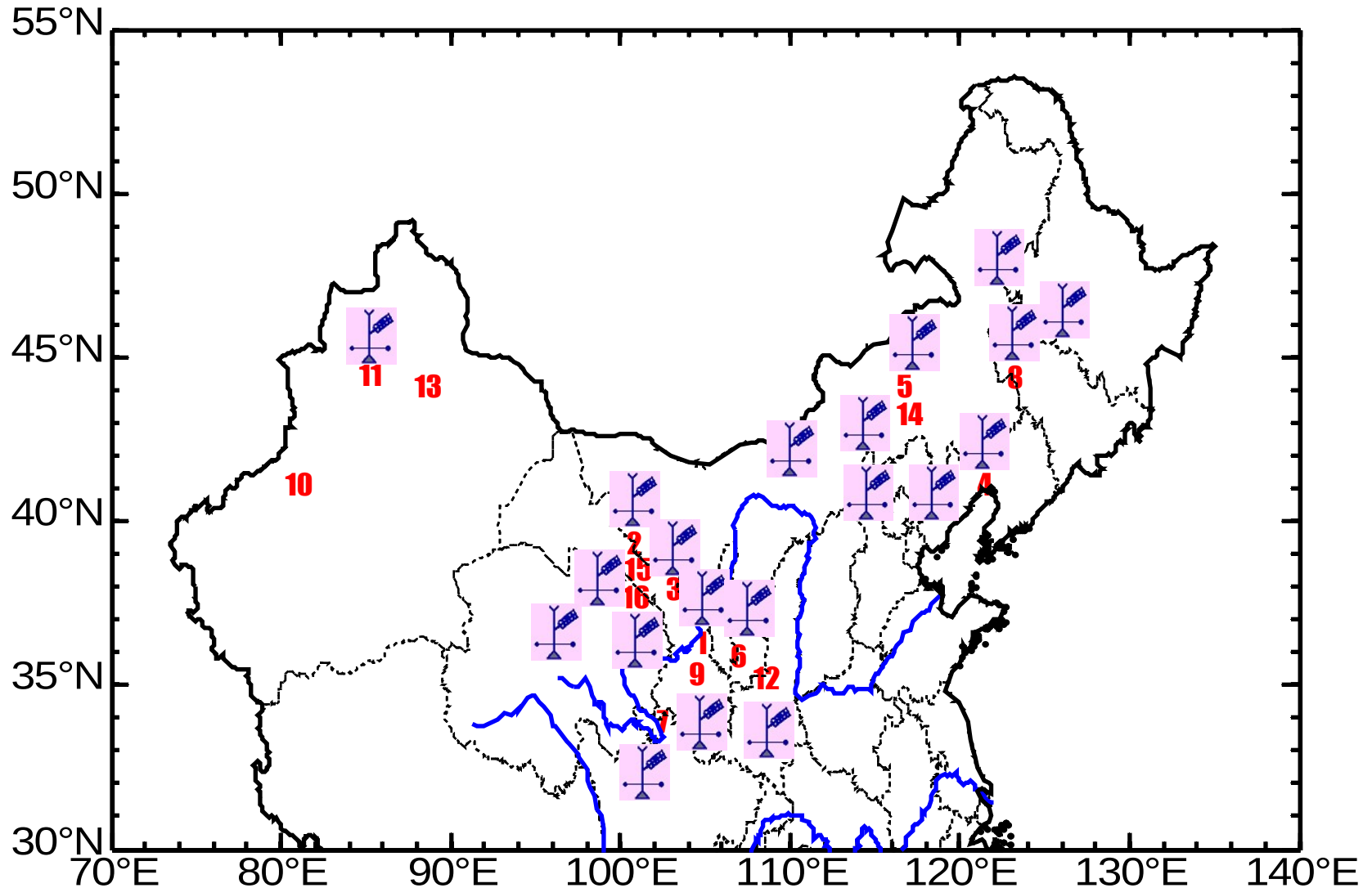
Dryland Task Teams

1. Dryland climate change dynamics
2. Dryland coordinated observation network for process studies
3. Dryland land-surface/ecosystem modeling
4. Coupled human-environment system

Structure of Dryland Task Teams



Dryland Task Team established comprehensive surface observation network: 20 stations in China (+ 2 in Mongolia)



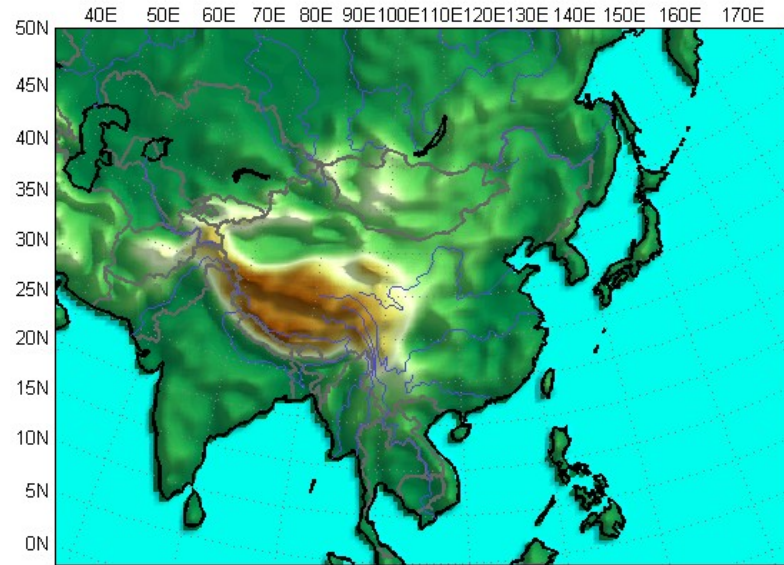
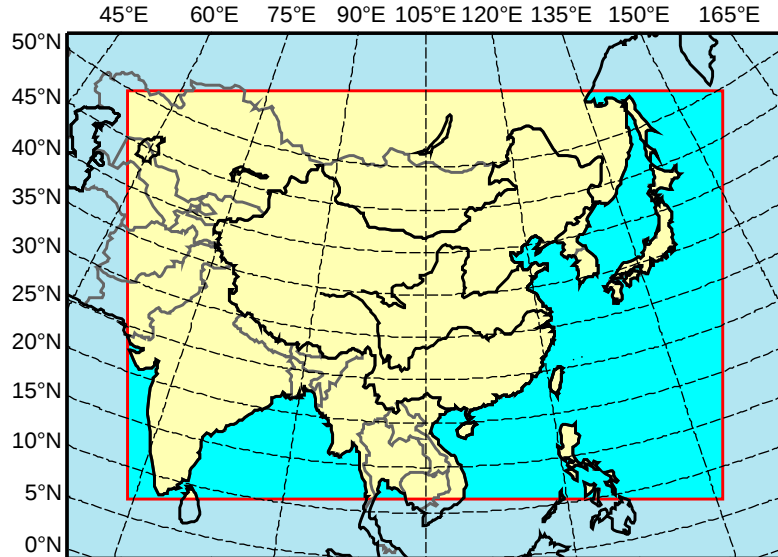
The Network Observing Agenda

- 1) Atmosphere boundary Layer
- 2) Land surface processes
(including the surface
water/energy/carbon flux,
soil T/M/heat flux)
- 3) Dust Aerosol (2 stations)
- 4) Ecosystem (4 stations)
- 5) Remote sensing products on
land cover details

RMIP Asia: Regional Modeling Inter-comparison Project

- Phase I, 18 months run (1997-), annual cycle and extreme, 2002-2004
- Phase II, 10 years run (1989-1998), statistical behaviors, 2004-2007
- Phase III, nesting with GCM, projection of regional climate in 21 Century, 2009-2012

RMIP Simulation Design



- ✦ **Integration Domain:** (45-165E, 0-45N)
- ✦ **Resolution:** 60KM (for whole area, downscaling to 30KM in some key areas)
- ✦ **Participating Countries:** China, Japan, Korea, Australia, US
- ✦ **Regional Models:** 6 models in RMIP II, and 9 models in RMIP III
- ✦ **Global models:** 1 GCM outputs as driving fields
- ✦ **Simulation Periods:** 1978-2000 for control, 2038-2070 for projection, A 2-year spin-up time is applied to both control and projection runs

Follow up activities of RMIP-III

- Transferring the RMIP products from modelers to users (contributing to CORDEX)

APN ARCP project: Development of an integrated climate change impact assessment tool for urban policy makers (UrbanCLIM)

- Developing high resolution RMIP-III scenarios (5-10KM) for specific regions

1. Dryland urbanized areas (China, Mongolia)

2. Coastal cyclones (Korea, Japan)

Dryland Task Team on “Coupled Human-Environment Systems (CHE)”

To assess the vulnerability of dryland Coupled Human-Environment (CHE) systems in the MAIRS region and to develop and evaluate various coping strategies to global changes in the MAIRS dryland region.

PIs: D Ojima and Jiaguo Qi

Supporting Projects in Dryland Research

1. CDKN project on "Climate Compatible Development in Dryland Systems of Mongolia and Surrounding Asian Systems", D Ojima, K. Gavin and Chuluun, 2012-2014
2. MOST international collaborative project "Disaster and risk management in Mongolian Plateau", Heqing HUANG, 2012-2015

Outline of “MAIRS Dryland Research Strategic Plan”

1. Introduction
2. System Framework for Research Agenda
3. Impacts and vulnerability of Asian dryland
4. Adaptive Capacity in Asian dryland
5. Mainstream Adaptation Strategy into Sustainable Development
6. Implementation Strategy

Lead Authors: Jiaguo Qi, D. Ojima, Chuluun, Y Yin, Xiaoyi Wang, Ailikun

To be Published in autumn of 2012

谢谢!

Thank you!

ADMIP: Asian Dryland land surface Modeling Inter-comparison

To evaluate and improve land surface models (LSMs, energy and water) & terrestrial ecosystem model (TEMs, carbon) through offline model inter-comparison using data obtained at Asian dryland, towards better reproduction and prediction of land surface state using improved models, and necessary capacity building.

**PI: Jun Asanuma from Tsukuba University
17 models from Japan, China, US, Korea**