

The Northern Eurasia Earth Science Planning Initiative (NEESPI)

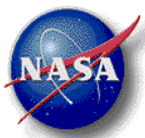
Developing a Framework and Plans for Future Large-Scale, Integrated U.S.-Russia Earth Science Research Projects

**LCLUC Science Team Meeting - Temperate and Boreal
University of Maryland, College Park
D.W. Deering, NASA/GSFC
31 October 2001**



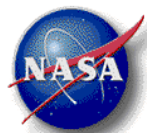
Goal of the NEESPI

To establish a large-scale, interdisciplinary program of funded research aimed at developing a better understanding of the interactions between the ecosystem, atmosphere, and human dynamics in northern Eurasia in support of international science programs with particular relevance to U.S. global Climate Change research interests and funding priorities (e.g., NASA).



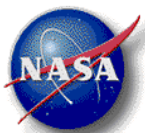
Rationale

- **Northern Eurasia is important to the global scientific community; e.g., Russia accounts for ~ 3/4 of the world's boreal forests.**
- **Boreal Forests are believed to play a key role in carbon cycling; but there are large uncertainties due to unreliable data.**
- **Evidence of Climate Change**
 - **Global Climate Models (GCM) predict temperature increases in Northern Hemisphere, high latitudes.**
 - **Ground station and Microwave Sounding data have recorded the largest temperature increases over central Siberia.**



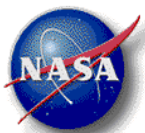
Rationale continued

- **Driving forces are in transition**
 - Social, economic and political forces that drive management and the ability to assess land use change, fire disturbance, climate change, biodiversity, nutrient regimes, and the impacts of pollutants and aerosols are dynamic in northern Eurasia.
- **Carbon storage capacity could be quickly altered by shifts in disturbance regimes (e.g. fire), forest management or land use practices** (ref. Kyoto Conf.: greenhouse gas emissions and proposed a carbon credit systems)



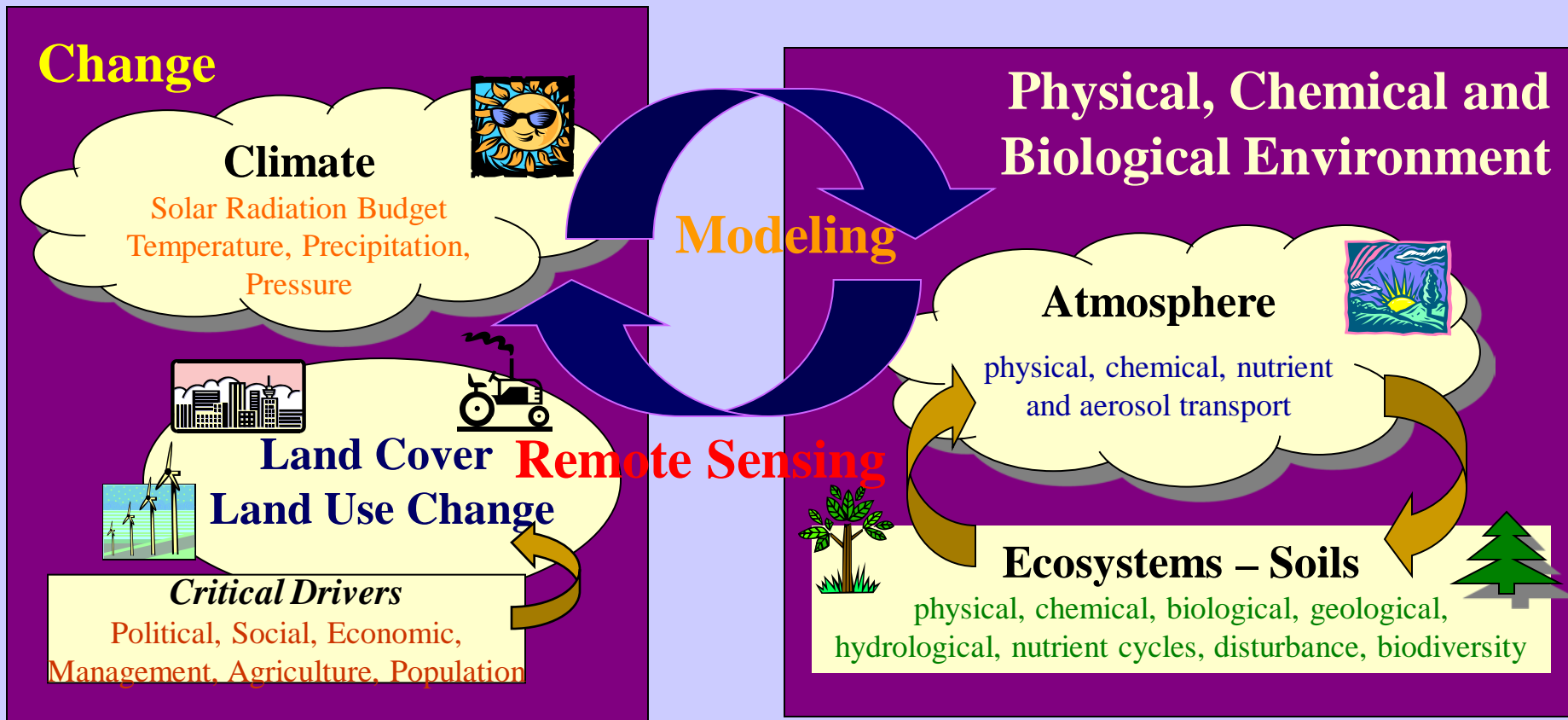
Rationale - Conclusions

- **International Panel of Climate Change (IPCC)**
 - Climate change is occurring and there is a need for concern
 - “humans are changing the natural rate of exchange of carbon between the atmosphere and the terrestrial biosphere through land use, land use change, and forest activities.”
- **No one nation or agency can be expected provide the framework (structure and funding) necessary to address the concerns that face national and international decision-makers today.**



Interaction between Land Use and Climate Change and the Environment

- Potential for NASA Contributions to Northern Eurasia Research -



International Science Program “Mandates”

International Geosphere-Biosphere Programme (IGBP)



Land-Use and Land-Cover Change (LUCC)



Global Change and Terrestrial Ecosystems (GCTE)



Biospheric Aspects of the Hydrological Cycle (BAHC)



International Global Atmospheric Chemistry (IGAC)



Global Change system for Analysis, Research (START)



Data and Information Services (IGBP-DIS)




Past Global Changes (PAGES)



Global Analysis, Integration and Modelling (GAIM)





**Some Large
International
Science
Projects**

FIFE

First ISLSCP Field Experiment

BOREAS

Boreal Ecosystem-Atmosphere Study

SIBERIA

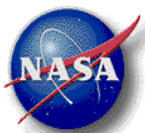
SAR Imaging for Boreal Ecology and Interferometry Applications

SAFARI 2000

Southern African Regional Science Initiative

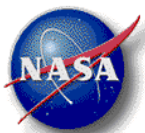
LBA

Large Scale Biosphere-Atmosphere Experiment in Amazonia



Why NEESPI, Why Russia?

- **The big northern Eurasia “hole” in global maps!**
- **Large areas under threat from global environmental change, unknown effects of social disruption, boreal forests are under pressure from global timber markets**
- **Internal funding for this work is not available, therefore globally-critical research will not be done otherwise.**
 - Other external funding generally focuses on local and national issues, global impacts are beyond their scope.
- **Data requirements of global change science and policy (IPCC, Millennium Assessment, etc.); Remote Sensing Is Essential!**
 - Limitations of alternative data sources are widely acknowledged.
 - Need for capacity building and establishing base-line for future monitoring



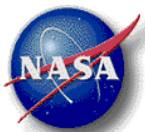
Why NEESPI?

- **Russia today presents significant challenges for foreigners conducting research within its territory.**
 - Foreign scientists have been questioned and even arrested by the FSB and scientific equipment has been confiscated.
 - Internal Russian institution power struggles and their serious need for financial resources can be problematic.
 - There exists considerable resistance within U.S. agencies to support research in Russia.
 - **A plethora of bureaucratic problems need to be dealt with at the highest levels of the Russian government regarding institutional partnering, customs procedures and fees, importation of scientific equipment, fiscal responsibility, etc. for a large-scale, integrated research program to succeed.**



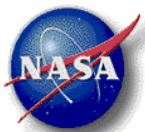
Objectives of the Northern Eurasia Earth Science Planning Initiative

- * **Develop a Framework for Conducting a Large-Scale U.S. – Russia Earth Science Research Program in Close Collaboration with the Russian Bureaucracy (i.e., learn from past experience; e.g., LBA)**
- **Develop a science plan based on U.S. and Russia Earth Science research funding priorities.**
- **Assess institutions, information and infrastructure resources in Russia to support the science plan and develop a joint project / mission plan.**
- **Identify funding vehicles for science elements from a variety of U.S., Russia, and other international sources**



Objectives of the Northern Eurasia Earth Science Planning Initiative - continued

- Prepare research proposals to secure project funding: “pilot” projects in the early stages; large-scale integrated project.
- Develop international agreements that facilitate joint research collaboration and mission implementation within Russia and provide some assurance of mission implementation success
- **Implement a high-speed information and data exchange network capability to support planning and project implementation.**
- Develop an exchange program for participants.



U.S. – Russia Network for Supporting International Research Collaboration: Leveraging MIRnet for Earth Science Research

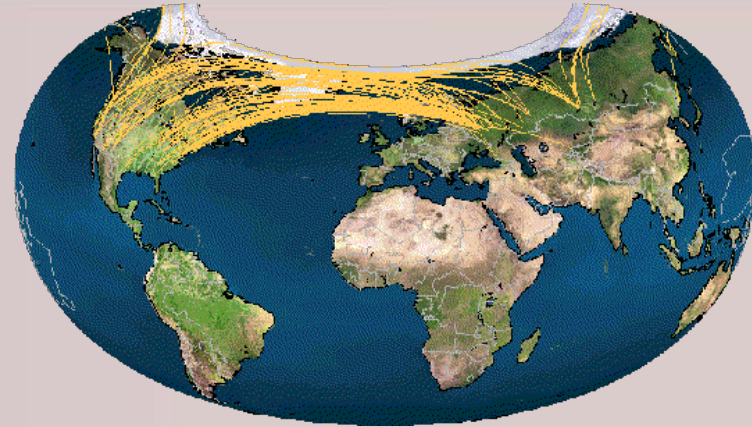


Donald Deering, NASA/GSFC
Marc Nadler, SSAI

MIRnet

A joint US-Russian project to provide next generation Internet services to collaborating US-Russian scientists

- NSF Cooperative Agreement (ANI-9730330) to the University of Tennessee with matching funds from Russian Ministry of Science and Technology to Russian partners
- A 6 Mbps IP/ATM service between STAR TAP in Chicago and the M9 switch in Moscow for purpose of linking high performance science and education networks in US and Russia
- A program to encourage applications of high performance networking for US-Russian scientific collaboration
- Network running reliably since July, 1999



Russian Partners

- RBnet (Russian Internet)
- Moscow State University
- CIVnet/Ford Foundation
- Russian Academy of Sciences

U.S. - Russia Research Networking for Supporting Collaborative Research in Russia

Objectives

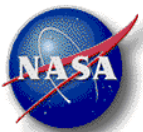
- Utilize modern day mechanisms for improving communications between US and Russia research communities
 - E-mail
 - Videoconferencing
- Provide Internet-based distributed data system for data sharing and exchange
- Establish communication, information discovery and tracking tools for efficiently facilitating collaborative research project planning and implementation

Challenge

- Current Russian telecommunications technology, especially in Siberian regions, is impractical for supporting research networking objectives
 - Connections between the U.S. and key Russian Earth Science institutes, as well as between the Russian institutes themselves offer unreliable and poor performance

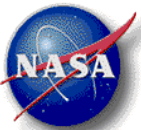
Potential Solution

- MIRnet offers promise in expanding high performance networks from the U.S. to Russia, and throughout Russian regions



NEESPI / MIRnet Status and Plans

- **September – November 2000**
 - Assessment of networking challenges in Siberia with case studies considered for Novosibirisk and Krasnoyarsk
 - Initial discussions with MIRnet sponsors (Greg Cole, NSF)
 - MIRnet enabled as 6Mbs link between US and Moscow since July 1999
 - **April 2001**
 - MIRnet strategic alliance with Academician Evgeny Velikhov, President of Kurchatov Institute, offers viability for moving forward with MIRnet expansion to Siberian regions
 - **June 2001**
 - NEESPI/MIRnet presentation at GOFC Workshop in St. Petersburg
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NEESPI / MIRnet Status and Plans

- **October 2001**

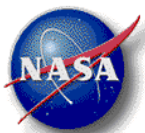
- MIRnet meeting to discuss NASA's Space and Earth science networking interests in Russia
- **Nauka-Grid** (Science-Grid in Russia) meeting to discuss video conferencing and high volume data transfer applications that will leverage MIRnet capabilities in Russia
- RBnet (Russian Internet) access points extend to St. Petersburg at 155Mbps and Novosibirisk at 35Mbps for MIRnet prototyping efforts

- **December 2001**

- **Major MIRnet upgrade from 6Mbps to 90Mbps**
- **Rapid expansion of 90Mbps access points within Russia, including Siberia become feasible** (strategic alliance between MIRnet, Kurchatov Institute and RBnet constituents)

- **February 2002**

- NEESPI WS in Moscow - potential MIRnet videoconference demo



MIRnet Regions of Interest include Locations of Some of the Key Earth Sciences Institutions in Russia



New US-Russia Network Tools for Collaborative Research Planning and Implementation



Personnel

Publications

Institution

Research

Activities

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Phone Page Schedule Conference

Affiliations
Projects
Publications

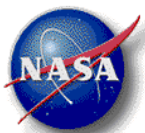
Dynamic Web Sites,
On-demand High Quality
Video Conferencing,
International Seminars



Information Discovery And Tracking,
High Volume Data Transfer,
Computer-based Visualizations,
Distributed High-performance
Computing,
Remote Instrumentation

Additional Considerations Regarding the NEESPI

- The U.S.-Russia Earth Science Joint Working Group has given its support to the general NEESPI concept.
- NEESPI Long-range planning is considered to be synergistic with and supportive of current and future NASA research projects and international research program initiatives (LBA, Carbon Initiative, etc., rather than competitive; goal is to support all such activities.
- Support from other national and international partners will be solicited for a future large-scale science project.



Initial Planning Tasks

- **Develop a strategy for proceeding with NEESPI planning by engaging key Russian government leaders who can address foreign investigation implementation issues (e.g., international agreements, shipping, customs, expedition regulations etc.) and Russian Earth science priorities.**
- **Identify key science leaders, form a U.S.-Russia science steering committee, elucidate the compelling science questions and conceptualize the scientific mission.**
- **Engage ~~key~~ institutions and establish physical network capabilities (i.e., data and information sharing)**



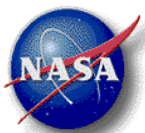
Rough Schedule of Events

- February 19-22, 2002 – Russian Leadership Strategy Workshop, Moscow
- March - May 2002 – Formation of U.S.- Russia NEESPI Science Steering Committee, develop science workshop schedules, planning proposal writing, solicitation of formal planning support.
- Summer 2002 – Workshops and Preliminary Science Plan Conceptualization
- TBD
- 2004 - 2007 – Pilot Projects and Launch Northern Eurasian Regional Science Project (funding and agreements in place)



The First Russian-American Workshop on The Northern Eurasia Earth Science Planning Initiative (NEESPI)

- **Purpose:** To engage Russian government leaders in defining a strategy for proceeding with the development of an international program of research in the Earth sciences through involving appropriate agencies capable of potentially impacting (+ or -) implementation of research within Russia involving foreigners.
- **Time:** February 19-22, 2002
- **Place:** Holiday Hotel of Russian Academy of Sciences, Zvenigorod, Moscow administrative region.



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<http://neespi.gsfc.nasa.gov/>

