Welcome to the LCLUC Cherry Blossom ST Meeting

Garik Gutman,
NASA Headquarters
Manager, LCLUC Program
Status of the LCLUC program

- Internal and external linkages
- Regional Initiatives
- Land Surface Imaging constellation
- Activities and reporting
- Data issues
- LCLUC-related projects
- NRA’s
- Future plans
External Linkages: National

• U.S. Global Climate Research Program (LULCC element)
  – Active participation in the LULC Interagency Working Group (LUIWG)
  – Support LUIWG Steering Group activities
  – NASA LCLUC projects results contribute to USGCRP’s annual issue of Our Changing Planet
  – NRC review of land use models - NASA LCLUC is major contributor

• USGS
  – Landsat program (ST meetings, telecons, LDCM, Education/Outreach)
  – Global Land Surveys (leading the project execution, funding of campaign stations, labor at USGS)
  – Contribution to SPOT data buy
External Linkages: International

• International
  – GTOS/Global Observations of Forest Cover and Land-cover Dynamics (GOFC-GOLD) – Inter. Project Office (IPO) in Canada
    • Fire Implementation Team office at UMD
    • Newly formed Central Asia Regional Information Network (CARIN) at Almaty ST meeting
    • The East European to be formed at the next ST meeting in Tartu, Estonia

  – IGBP/IHDP
    • Global Land Project (GLP) – IPO in Denmark
    • Integrated Land Ecosystem-Atmosphere Processes Study (ILEAPS) – IPO in Finland
    • Northern Eurasia Earth Science Partnership Initiative (NEESPI) – IPO in Finland
    • Monsoon Asia Integrated Regional Study (MAIRS) – IPO in China

  – CEOS
    • Calibration and validation (Land Product Validation WG – co-chair @ GSFC)
    • Land Surface Imaging (LSI) constellation
Support of IGBP-WCRP Regional Programs

• NEESPI
  – The founder of the program Don Deering passed away
  – The NEESPI session at EGU will be dedicated to him
  – The “Arctic LCLUC” book submitted!
  – 15 new LCLUC projects
  – A book on Siberia under preparation

• MAIRS
  – Asian Monsoon Years (2007–2012)
  – 6 new LCLUC projects
  – Drylands special issue is under preparation
Eurasian Arctic Land Cover and Land Use
In a Changing Climate

- NASA LCLUC Program contribution to IPY - a compilation of the studies focused on the Arctic region of Northern Eurasia
- The region of interest is land ecosystems north of 60° latitude, specifically transitional forest-tundra and tundra zones
- Twelve chapters written by international teams including US, Russian, and European scientists
- Submitted to Springer
- Expected this year
2-Programs Synergy

NEESPI

MAIRS
NEESPI Regions

Europe

Arctic

Siberia

Far East

Central Asia

Drylands

Black Sea/Caucasus

MODIS 1-km true color composite: August 20-28 2004.
Shaded relief adjustment using SRTM GTOPO30 elevation data.
Produced by Mutlu Ozdogan, NASA GSFC
LCLUC Global Expansion

• NEESPI Europe, Siberia, Central Asia, Arctic and MAIRS SE Asia – research well developed, expected to produce synthesis studies and tangible products (special issues, books)

• For NEESPI: Black Sea and Caspian regions, Caucasus, Far East are not sufficiently studied

• For MAIRS: South Asia needs more research

• South Asia, Mediterranean, Africa and South America – many proposals submitted
CEOS Land Surface Imaging (LSI) Constellation

- **LSI Constellation Portal**

**CEOS Agency Members**

- **USGS**: **Co-Chair**, Tom Holm
- **ISRO**: **Co-Chair**, V. Hegde
- **INPE**: **Co-Chair**, Julio Delga
- **INPE**: João Vianei Soares
- **EC**: Herve JeanJean
- **ESA**: Michael Berger
- **CSA**: Daniel DeLisle
- **CONAE**: Ana Medico
- **JAXA**: Takeo Tadono
- **NOAA**: Kevin Gallo
- **NASA**: Garik Gutman
- **NRSCC**: Yonghong Zhang
- **CRESDA**: Xiaohua Yi
- **GISTDA**: Phuriwaj Ruengnaowaroj
- **CNES**: Aurelie Sand
- **CDTI**: Mónica Lopez
### Overview

**CEOS Agency**

- Mid-Resolution Optical Satellite Systems

**Satellites**

- Satellites & Sensors
- Status & Launches
- Orbit Information

**Sensors**

- Band Information
- Visible & NIR Bands
- SWIR Bands
- Thermal Bands
- Panchromatic Bands
- Hyperspectral Bands
- Radiometric & Geometric Characteristics
- Geographic Characteristics

**Data**

- Data Access
- Documentation

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#### CEOS Agency Current and Future Satellites

<table>
<thead>
<tr>
<th>Satellite</th>
<th>Sensor</th>
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<tbody>
<tr>
<td>ADEOS-1</td>
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<td>JERS-1C</td>
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<tr>
<td>Landsat 1</td>
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<td>Landsat 7</td>
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<td>MS</td>
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<td>NASA</td>
<td>GISTDA</td>
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**Platform: LANDSAT-7**

- **Platform-based Instruments:**
  - Click to view more

**Orbit**

- Orbit Altitude: 705km
- Orbit Inclination: 98.2 degree
- Equator Crossing: nominally 10 AM
- Period: 99 minutes
- Repeat Cycle: 16 days

**Related Data Sets**

View all records related to this platform

**Description**

Landsat 7 systematically provides well-calibrated, multispectral, moderate resolution, substantially cloud-free, sun-lit digital images of the Earth's continental and coastal areas with global coverage on a seasonal basis. It covers the United States every 16 days. Operations were transferred to USGS on Fall 2000.

The Landsat Project is a joint initiative of the U.S. Geological Survey (USGS) and the NASA to gather Earth resource data using a series of satellites. NASA

**Online Resource:**


**Platform Logistics:**

- Design Life: 5 Years
- Launch Date: 1999-03-15
- Primary Sponsors:
  - US/USGS
  - US/NASA
Science Team

• LCLUC Program
• EOS Program
• IDS Program
• Carbon Cycle Program
• ACCESS/MEASURES
• Students Fellowship Program
• New Investigator Program
Program Components

Total ~40 projects

• LCLUC Monitoring/Modeling
• LCLUC impact on Carbon Cycle
• LCLUC impact on Water Cycle
• LCLUC impact on Climate, Environment, Biodiversity
• Climate impact on LCLUC and adaptation
LCLUC Science Team Meetings

Washington: Spring
2007: Climate/Carbon
2008: Joint CC&E Focus Area meeting
2009: LCLUC impacts on climate
2010: GLS LCLUC products

International: Fall-Winter
2007: Drylands (NEESPI/MAIRS)
    Urumqi, China
2008: Tropics (MAIRS)
    Kohn Kaen, Thailand
2009: Drylands (MAIRS/NEESPI)
    Almaty, Kazakhstan
2010: Boreal/Temperate (NEESPI)
    Tartu, Estonia
ST Meetings’ Objectives

- program status
- feedback from the PI’s
- identifying programmatic gaps, discussing new directions
- Format: less oral talks (mostly joint topical reviews), more discussions
- International: enhancing linkages with international programs and regional networks
Reporting and Communication

- The Web site: http://lcluc.hq.nasa.gov
  - Project Abstracts
    - Progress reports
    - Presentations
    - **Project update: 1 slide (bullets + visual)**
    - **Posters as ppt presentations!**
    - Lists of publications and references
    - Project metadata and data set links
- Sensitive info - to me by separate e-mail
- Submit these materials to LeeAnn on an ongoing basis to ensure accurate reflection of all the great work you are doing
- PI’s are encouraged to host their own websites to showcase their results in more detail and to make their data sets available - provide links.
- Announcements, events, job ops, news
- Forthcoming meetings
- Outreach (discoveries, journal covers, LCLUCers in the news, books)
Education and Outreach

• Each PI should provide
  – information on MS and Ph.D. students graduating during and after the project
  – Thesis title, dates

• Statistics on LCLUC educational “products” are being collected

• Students achievements (awards, discoveries)

• Link to the Landsat Project Office Education and Outreach Component
Data Issues

• NASA promotes the free and open sharing of data
• USGS - Landsat data for free distribution
• LCLUC expects its PI’s to make their data and products available to the broader community
• Data sharing is encouraged
• Metadata page on the LCLUC web site
• LCLUCers use established Land Cover data distribution centers (EROS, GLCF,TRFC)
• Landsat-based GLS (1975,1990, 2000, 2005) available
• GLS 2010 is being collected
• SPOT coverage for CONUS at USGS
• International cooperation on Landsat-like data
Landsat-5: The Cat in Space

– A 25+ yr old Landsat-5 is still alive and kicking!

– Still produces great imaged and contributes to GLS collections

– Campaign stations receive L-5 data

– The rumors of his last breath before slow death have been slightly exaggerated

– But there are some other issues (A-train)

“The TWTA current is starting to stabilize with a reduced duty cycle, and recent forecasts suggest data can be acquired for another 12+ months (maybe up to 2-3 years)”
The “cat in space” on collision course with the A-train
GLS Science: Data products and long-term land-cover analysis

· USGS EROS
  · Sensor cross-calibration (Chander)
  · Monitoring Tropical Mangrove Forests (Giri)
· South Dakota State U.
  · Forest Cover in Humid Tropics (Hansen)
· Stennis Space Center & UMD
  · Sensor intercomparisons (Pagnutti and Ryan)
  · Impact on land cover studies (Goward)
· Michigan State U.
  · Tropical Forest Cover Change (Skole)
· University of MD
  · Global Forest Cover Change Data Record (Townshend)
· U. Oklahoma
  · Land Cover Products for Monsoon Asia (Xiao)
· Boston U.
  · Validation and cross-product intercomparisons (Woodcock)
· More to come from the current LCLUC round
Geographic Coverage of LCLUC GLS Projects

- Hansen 1990-2005 (forest conversion)
- Skole 1990-2005 (forest conversion + logging)
- Townshend 1975-2005 (forest conversion)
- Xiao 2005 (non forest land cover)
- Goward/Masek 1990-2005 (forest disturbance)
GLS Quality Issues

• Where are data gaps in the GLS datasets?
• How stable is the GLS time series?
• How are we going to handle the 1990 calibration issue
• Are transitions between adjacent path/rows derived from L-5 and L7 data seamless?
• What is the proportion of data with poor gap-filled results? How is it controlled (QC)?
• What is proportion of path/rows with no L-5 available and no good L-7 for interpolation?
• How consistent (in terms of season) has been scene selection?
• What are we missing by having such infrequent time sampling with GLS in terms of disturbance history?
• Do we still have issues with geodetic correction? How is it in high latitudes? Ideas for future improvements?
• How we can benefit from collaborations with our international partners on processing Landsat-like data?
ESA-NASA Collaboration: Ground Segments and Data

• Full suite of collaborative opportunities for the agencies ground segments and data assets to enhance mission return and enable efficient development and generation of multi-mission/multi-agency data products.

• Collaborations
  – Harmonize ground system architecture, project status, approach and plans
  – Data systems interoperability strategy, planning, and implementation
  – Organized Data Exchange for each Agency's research use and feedback on data properties
  – Understanding of each agency approach to products and product availability, leading to projects and strategy for product harmonization and joint products (e.g., approach to ECVs and Earth system long-term data records)
  – Common strategy for long-term data stewardship
  – Creation of common data holdings for specific projects (e.g., supersites)
Solicitations and Projects

• EOS and MEASURES (final)
  – I am Program Scientist for UMD MEASURES Landsat project
• Carbon Cycle/LCLUC projects (final)
• GLS LCLUC Products projects (final)
  – I am co-lead on the USGS-NASA GLS initiative
• LCLUC projections projects (final)
• Climate impact on land use, adaptation (mid-term)
• Small contributions to non-NASA ongoing international projects programs (mid-term)
• ROSES-2009 to be selected in September
  – Will be submitted not more than 67 proposals; about 10 to be selected
• Selected IDS to be announced
  – Many LCLUC-relevant elements
Results Statistics

- **Regular**
  - Recommended for funding 9 out of 27 submitted:
    - 8 Universities (in 2 projects NASA is co-I) and one USFS
    - Funding ~ 2.4M/yr
  - Rejected 18
    - Among them 4 from NASA Centers

- **“Small”**
  - Recommended for funding 9 out of 15 submitted:
    - 8 Universities
    - 1 NASA GSFC
    - Funding ~ 0.8M/yr
  - Rejected 6
    - 1 from NASA Center
<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Title</th>
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<tbody>
<tr>
<td>Chen</td>
<td>University of Toledo</td>
<td>Interactive Changes of Ecosystems and Societies on the Mongolian Plateau: From Coupled Regulations of Land Use and Changing Climate to Adaptation</td>
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<td>Southworth</td>
<td>University of Florida</td>
<td>Understanding and predicting the impact of climate variability and climate change on land use and land cover change via socio-economic institutions in Southern Africa</td>
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<td>Walker</td>
<td>University of Alaska (NASA GSFC co-I)</td>
<td>Adaptation to Rapid Land-Use and Climate Changes on the Yamal, Russia</td>
</tr>
<tr>
<td>Goetz</td>
<td>Woods Hole Research Center (NASA Ames co-I)</td>
<td>Modeling Strategies for Adaptation to Linked Climate and Land Use Change in the United States</td>
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<td>Zhuang</td>
<td>Purdue University</td>
<td>Changes of Land Cover and Land Use and Greenhouse Gas Emissions in Northern Eurasia</td>
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<td>Brown</td>
<td>University of Michigan</td>
<td>Grassland Ecosystems and Societal Adaptations Under Changing Grazing Intensity and Climate on the Mongolian Plateau</td>
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<td>Conard</td>
<td>USFS</td>
<td>The Influence of Changing Forestry Practices on the Effects of Wildfire;Interactions between Fire and Changing Climate in central Siberia</td>
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<td>de Beurs</td>
<td>Virginia Polytechnic Institute</td>
<td>Land Abandonment in Russia: Assessing Future Vulnerability and Adaptation to Changing Climate and Population Dynamics</td>
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<td>Fan</td>
<td>Michigan State University</td>
<td>China’s urbanization and its sustainability under future climate change</td>
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<tr>
<td>Name</td>
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<td>Project Description</td>
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<tr>
<td>Lettenmaier</td>
<td>U. Washington (Russia, Japan) NEESPI</td>
<td>Assimilation of tower and satellite-based methane observations for improved estimation of methane fluxes over northern Eurasia</td>
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<td>Knyazikhin</td>
<td>Boston University (Finland, Estonia) NEESPI</td>
<td>REMOTE SENSING OF FOREST STRUCTURE ACROSS MULTIPLE SCALES FROM LEAVES TO CANOPIES AND STANDS (Fennoscandia)</td>
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<td>Radeloff</td>
<td>U. Wisconsin (Russia) NEESPI</td>
<td>Land use change, protected areas, and biodiversity in the Caucasus and Ural Mountains (Russia)</td>
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<td>Ozdogan</td>
<td>U. Wisconsin (China, Kazakhstan) NEESPI and MAIRS</td>
<td>Investigating the Relationship Between Land Use/Land Cover Change, Hydrologic Cycle, and Climate in Semi-Arid Central Asia</td>
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<td>Krankina</td>
<td>Oregon State U. (Russia) NEESPI</td>
<td>Contribution to studies of LCLUC in Northern Eurasia</td>
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<td>Hughes</td>
<td>U. Arizona (Russia) NEESPI</td>
<td>Response of forest growth to climate variability and change: remotely-sensed and in situ data for European Russia</td>
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<td>Leptoukh</td>
<td>NASA (China) MAIRS</td>
<td>NASA Data and Services Supporting Monsoon Asia Integrated Regional Study in Eastern Asia</td>
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<td>O'Neal</td>
<td>U. Delaware (Russia) NEESPI</td>
<td>Field and Remotely Sensed Data for Improved Characterization of Permafrost Landscapes in the Russian Arctic</td>
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<td>Saatchi</td>
<td>U. California, LA</td>
<td>Impacts of Land Cover and Land Use Change on Water and Energy Cycle in Caspian Sea Drainage Basin</td>
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Future Steps

• Enhance social science component in LCLUC projects
• Balance the program thematically and geographically
• Develop synthesis of global forest from GLS projects
• More emphasis on non-forest land-cover types
• Develop LCLUC calls on a regular, annual basis
  – Step-1 Dec 1, Step-2 June 1
• Revise the solicitation procedure
  – Two-step or one-step process?
  – Narrowing the calls?
• New, improved LCLUC website
• Continue the twice-a-year ST meetings structure
• Next year – the 15th Anniversary meeting for all alumni!
ROSES-2010 LCLUC

- Synthesis of Previous Studies for LCLUC “hot spots” over the globe
- Vulnerability, Impacts, and Adaption of Land Use to Climate Change
- $2M to be distributed; proposals vary from 100K/yr to 500K/yr
- Needs narrowing down the scope: new ideas are welcome
- Amendment will follow – this is the time and place to influence me
- With 130+ proposals we need 2 steps and still the success rate is 1/7
- I prefer receiving 30-40 proposals to select 10
- In this case we don’t need 2 steps
- If we to continue with two steps 70-80 proposals could be expected but not 135!
- Food for thoughts and the subject of one breakout session
Global Land Project (GLP) Open Science Meeting 2010

- Land Systems, Global Change and Sustainability
  - Including joint day with UGEC Science Conference on: Sustainable land systems in the era of urbanization and climate change

- 17-19th October 2010, Arizona State University, Tempe

- Registration and abstract submission is open on [www.glp2010.org](http://www.glp2010.org)
  - Extended Deadline for Abstract submission: 15th May 2010!
  - Reduced “Combi-Ticket” to attend both the UGEC and GLP Conferences (http://www.glp2010.org/Registration.shtml)
  - Support for early career and developing country
Thank you, Enjoy the Spring time

Apr 2009