Announcement
TE AM Agenda and Talks Reorganized

See Registration Desk
Review of LCLUC Observations and Data and Land Use

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LCLUC Program Objectives

• One of the long-standing objectives of the program is *to develop the capability to inventory and monitor land cover and land use change*

• As part of the thematic funding cycle we call for – observation, detection and monitoring, data products proposals (30% of the funding 97-2011)

• The program recognizes the importance of international cooperation on observations and participates actively in the GOFC/GOLD program
Observations for LCLUC

• **LANDSAT**
  – NASA Landsat Program Scientist (Garik Gutman)
  – 2003 SLC > Landsat Data Gap Study – investigated alternative sources (ASTER, CBERS, IRS, AWiFS)
  – LDCM will be critical – need for standard products (e.g. surface reflectance, continuous fields, land cover)

• **ASTER /EO1** – used for some local studies

• **MODIS**
  – Regional > global studies
  – VIIRS for MODIS continuity (NASA science products?)

• **Microwave Sensors** – ERS, JERS, ALOS

• **Fine resolution observations** – USG Data Initiative

• **Studies solicited on Data fusion/inter-use**

• **Assessment of Chinese Data and Availability**
Commercial Imagery Today

United States Commercial Satellite Imagery Footprints

Portion of Landsat 7 Scene: Washington D.C.
LANDSAT - Global Land Survey Data Sets
EPOCH Data Sets

Global cloud-free, orthorectified Landsat data sets centered on 1975, 1990, 2000, 2005, and 2010

- Partnership between USGS and NASA LCLUC, in support of USGCRP
- Support global assessments of land-cover, land-cover change, and ecosystem dynamics (disturbance, vegetation health, etc)
- Pilot project for routine global monitoring in LDCM era
Land Cover

• MODIS Global LC products (Science Team)
  – Driven by 90’s requirements DGVMs/GCMs – stratification
  – Land Cover
    • Global Land Cover products from Europe – inter-comparisons highlight differences
  – Validation and harmonization coordination (GOFC-GOLD)
  – Continuous fields
  – A surface type EDR to be generated from VIIRS (Friedl)

• Landsat-based Regional LC Products
  – Emphasis on Forest Cover (driven by Carbon Focus) – a mix of methods
  – LCLUC Program has not funded much generic regional land cover mapping

• Landsat Global in development (USGS / China?)
MODIS Global Land Cover

Friedl et al MODIS ST
CONUS 30m Vegetation Continuous Fields (%)

Generated from 2008 monthly, seasonal and annual WELD composites.
Automated Classification – Spectral Categories (SIAM) Applied to Landsat WELD Mosaic Product

Roy et al
LAND Cover Change

• Emphasis has been on mapping Forest Cover Change (Carbon)
  – MODIS Vegetation Cover Change (experimental)
  – Landsat Change Detection
    • Two epoch change (Manual > automated pre-archive release)
    • Bulk analysis every available scene (mining the archive)
    • Analysis of Data Stacks (Scene > Region)
    • How to validate change – higher resolution data?
    • Are standard practices emerging?
GLS Derived Forest Cover and Change

Skole et al MSU
Landsat Based Decadal Forest Change Mapping in the Congo Basin: 1990s – 2000s

Forest change and forest cover lost (in red) from circa 1990 to circa 2000 was mapped consistently at 57m across the Congo Basin via an automated procedure incorporating MODIS and Landsat. Forest loss, enhanced for visualization, is depicted in red.

Hansen et al. UMD
Percent forest cover loss, 2000 to 2005

Hansen et al
North American Forest Dynamics
Vegetation Change Tracker

Lake Anna, VA, 60 km NW of Richmond

Goward, Huang et al  North American Forest Dynamics (NAFD) - A NACP Core Project
Land Cover > Land Use

What we do with the land (rather than simply what is there) - for example:

- **Agriculture** (cropping system, type, yield)
  - Rainfed / Irrigated
  - Intensity (inputs)
  - Rotation
- **Rangelands and Pasture**
- **Forestry**
  - Plantation
  - Agroforestry
- **Urban / Suburban**
  - Residential (density) / Commercial
Fine Resn Data - a more nuanced view of land cover

Thailand

Skole et al
Land Use Change

• A not too distant future planet with 9 billion people and a changing climate will result in more land use change with local to global impacts and more pressure on society, natural resources, biodiversity

• Linkage between land use – food, water and energy

Land Use

• Looking at the present and recent past and understanding the processes and impacts of LUC

• Looking to the future and the challenges we will need to face
Soybean Expansion in Mato Grosso, Brazil

August 6 1992, TM

July 28, 2006, ASTER
Sugarcane Expansion (Ethanol), Brazil
Climate change impacts are visualized using a normalized difference index. It is calculated by dividing the difference in cereal production capacity between future and current production potential by their sum.
An Urbanizing Global Population

Urban population is increasing

50% of global urban population live in Asia

one-third will live in China or India by 2030

currently, 115 cities > 1 mil in China

Current and projected global urban population growth 1950-2030

Schneider et al
Coming to a town near you
Land Use Change

• Land Use Change is central to Adaptation Science
  – USGCRP is embracing Adaptation Science
  – Planet Under Pressure – vulnerability and resilience – next phase IGBP
  – Sustainability Science inc. Rio + 20

• New suite of land use models is needed and being developed with additional data needs

• NASA is supporting an NRC Study on Land Use Modeling - hopefully will help clarify the community
Purpose of the Meeting

• Opportunity for input on future directions for the LCLUC program (an evolving program)
  – Topics for future ROSES calls
  – Input on the Proposal Process

• Should we/ and how could we strengthen the LU in LCLUC

• Would the community be ready to respond

• Presentations from those working at the interface between LC and LU

• Breakout sessions to solicit community input
  – Chairs will be press-ganged into service for their country