Department of Geographical Sciences

Mission

To make a fundamental contribution to the advancement of Geographic Science by:

- Conducting disciplinary and integrative research in the physical and social sciences that span local to global scales with an emphasis on a geospatial perspective of our changing planet and its sustainability
- Equipping students to meet the challenges associated with the continuing evolution of geographic science while providing them with vibrant and fulfilling educational experiences
- Applying geographic science to societal and environmental issues in our state, nation and global community

Composition I

Faculty

- 22 Teaching Faculty
  - 14 Professors
  - 10 Lecturers
- 33 Research Professors
- 16 Adjunct Professors
- 10 Research Associates
- 27 Faculty Research Assistants

Composition II

Student Body

- 67 Ph.D. Students
- 92 Master of Professional Studies in Geospatial Information Sciences (MPS/GIS)
- c. 200 Bachelors (Majors)
  - Geography
  - Geographic Information Systems (GIS)
  - Environmental Science and Policy concentrations
    - Land Use, Global Environmental Change, Marine Coastal Management

GEOG ranked by NRC as #3 in the nation

for PhD granting Universities

Key Research Themes I

Human Dimensions of Global Change –

Coupled Human and Natural Systems

- Studies of linkage between socio-economic systems and climate change
  - Teleconnecting local consumption to global land use
  - Effects of Nature Tourism as a Development Strategy on Poverty and Inequality
  - Modeling and Visualizing Global Food Supply
  - Peak Oil

Land Cover – Land Use Change

- Studies key interface between human and natural systems
  - Global Forest Monitoring using Remote Sensing
  - Mapping of Global Urban Extent
  - Fire Monitoring and Modeling Remote using Sensing
  - Global Agricultural Production Monitoring

Key Research Themes II

Carbon, Vegetation Dynamics and Landscape-Scale Processes

- **Studies monitoring and modeling global vegetation dynamics and carbon**
  - Modeling the Impacts of major Disturbances on the Earth's Coupled Carbon-Climate System
  - Synthesis of Forest Growth, Response to Wildfires and Carbon Storage for Russian Forests
  - Carbon modelling of boreal peatland systems
  - A Framework for High-resolution Estimation of Terrestrial Carbon

Geospatial-Information Science and Remote Sensing

- **Studies utilizing big data, geospatial data mining, analysis and visualization**
  - Developing augmented reality environment through kinetic sensing technologies
  - Crowd modeling in urban environments
  - Lidar derived 3-D Vegetation Structure (GEDI Mission)
  - GLCF Data Archive and Distribution
  - GEO ODK Mobile Application for field data collection

Research Statistics (FY2013)

- Total Research Fund: $ 13.2 Million
- NASA Awarded Fund: $ 8.7 Million (69.8%)
- Total NASA projects: 58 projects
- FY 04 to FY 13 growth: +169%
- Education: Average, 6 Fellowships/year

- Leadership in NASA Programs:
  - Chris Justice: Program Scientist, Land Cover Land use Change, VIIRS Land Discipline Lead, Co-Chair LANCE UWG
  - Ralph Dubayah: GEDI PI., Chair Vegetation Structure WGG
  - George Hurtt: Science Team Leader, Carbon Monitoring System
  - Eric Kasischke: Co-Chair, ABOVE Science Definition Team

Research Highlights (2013)

- For the first time externally funded research volume passed $13 million
- 11 department researchers recognized as University Research Leaders (>$300,000/year)
- 10 Undergraduate Honors students participate in Joint UMD-BNU Joint Global Change Program
- 6 papers were published in top tier journals (e.g. Science, Nature, PNAS)
- UMD ranked #4 in the world in Remote Sensing
- New GSFC-UMD Joint Global Carbon Cycle Center enters year 2
- PhD Students Don Cheng and Ana Sanchez-Rivera win awards for student paper presentations at AGU and Applied Geography Conferences

Undergraduate Program

- **Concentrations**
  - Geography
  - Geographic Information Systems (GIS)
  - Environmental Science & Policy (ENSP) Land Use
  - ENSP Coastal & Marine Environments
  - ENSP Global Environmental Change
- **Tracks**
  - GIS
  - Geospatial Intelligence & Remote Sensing
  - Environment Systems & Natural Resources
  - Development & Sustainability
- **Internships available** (http://www.geog.umd.edu/landing/Undergraduate)
- **Study Abroad Programs**
  - China
  - Croatia
  - Southern Caribbean

Examples of Undergraduate Courses

Course #	Course Title	Credits
GEOG 100	Intro to Geography	3
GEOG 110	World Today: Perspectives	3
GEOG 130	Developing Countries	3
GEOG 140	Natural Disasters: Earthquakes, Fires and Floods	3
GEOG 201	Geography of Environmental Systems	3
GEOG 306	Intro to Quantitative Methods for Geographic Environmental Sciences	3
GEOG 332	Economic Geography	3
GEOG 345	Intro to Climatology	3
GEOG 415	Land Use, Climate Change and Sustainability	3
GEOG 437	Political Geography	3

Graduate Program

- **Programs Offered**
  - Master of Professional Studies in Geographic Information Sciences (MPS/GIS)
  - Doctoral Program
- B.A. or B.S. in Geography not required
- Applications accepted September 1 - January 15 for Fall entry
- Financial Aid
  - Teaching assistantships, research assistantships, various fellowships available.
  - Salary is for 9.5 months (20 hrs/wk) + full tuition remission
  - Annual renewal possible if 3.0+ GPA is maintained
- For more information, please visit:
  - www.gradschool.umd.edu/catalog

MPS GIS Program

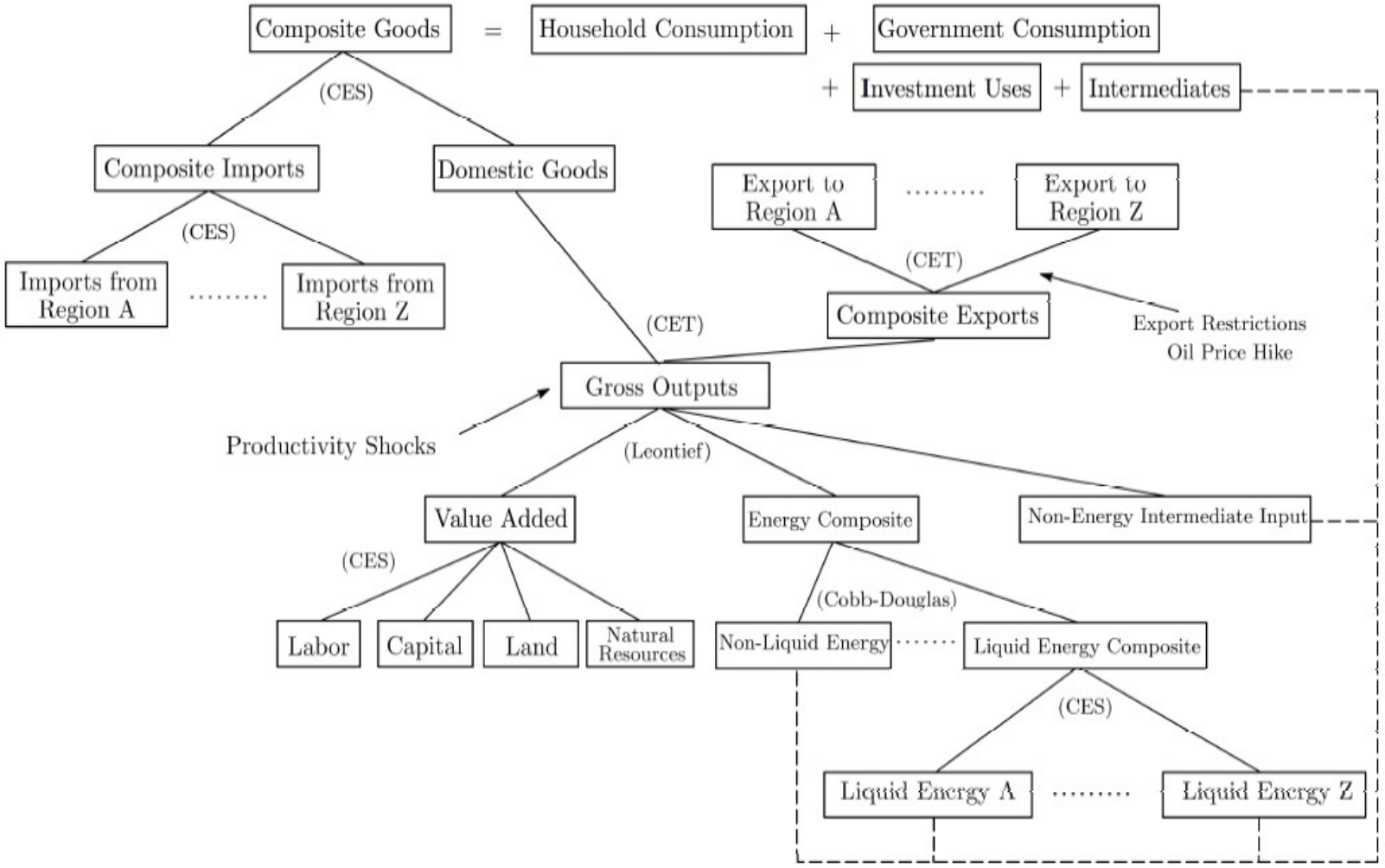
- More than just GIS:
  - Remote sensing, computer programming, statistics
- Offers both **MPS degree and Graduate Certificate**
  - MPS (31 credits)
  - Graduate Certificate (12 credits)
- Completely online (interactive and dynamic)
  - Lectures provided in real time
  - Optional on-campus study
- Based on 10-week long quarters
- Designated as an ESRI Development Center
- Currently enrollment: 110 students (as of Fall 2012; ~80% pursuing Master degree)

Human Dimensions of Global Change - Coupled Human & Natural Systems Research Areas

- Study of linkage between socio-economic systems and climate change
  - Population, socio-economic development, consumption and production, poverty, climate impacts and adaptation, policy alternatives, etc.

- Current projects examples:
  - Teleconnecting local consumption to global land use
  - Effects of Nature Tourism as a Development Strategy on Poverty and Inequality: Namibia & Mozambique test cases
  - Modelling and Visualizing Global Food Supply
  - Peak Oil
  - China Food Supply Projections

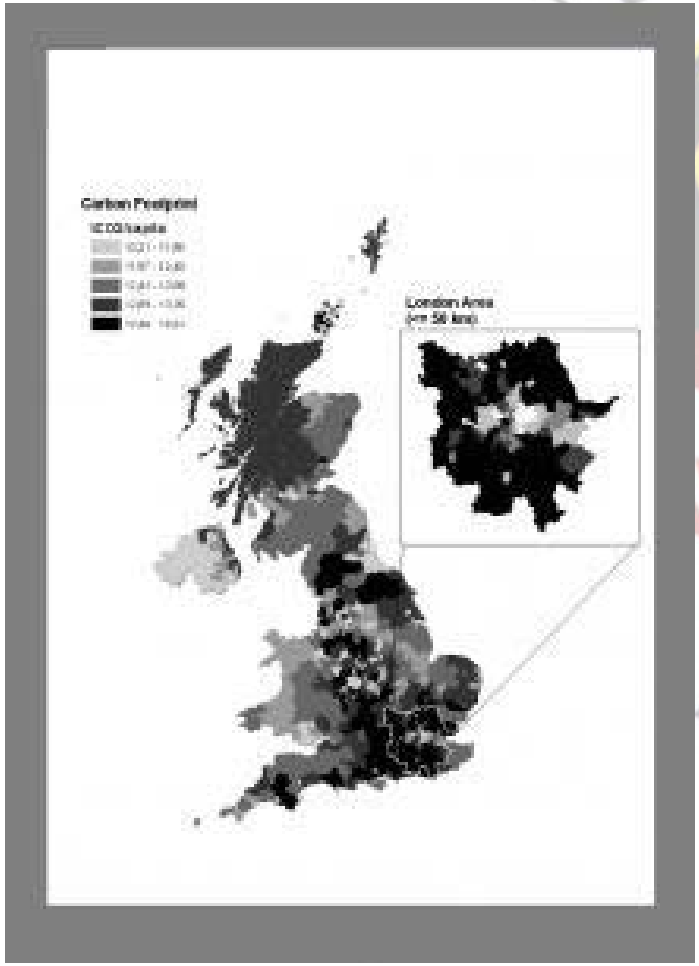
Modeling Global Trade



Commodity and price analysis with detailed national account and international trade data

Sun

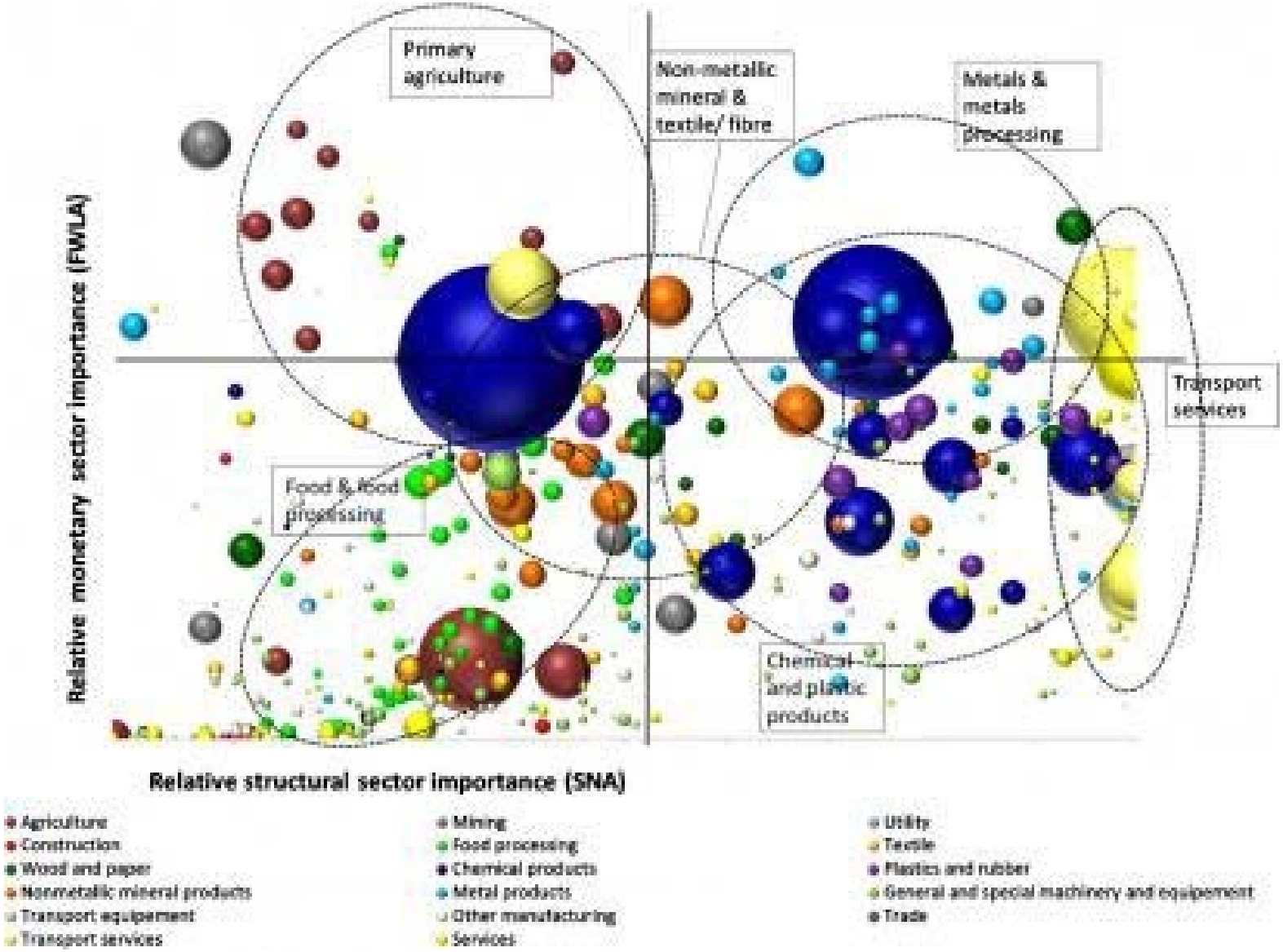
UK Urban Carbon Footprints



Study estimating the carbon footprints of cities and other human settlements in the United Kingdom explicitly linking global supply chains to local consumption activities and associated lifestyles.

Baiocchi et al

Global Peak Oil and US Economic Sectors



Hubacek et al

Land Cover – Land Use Change (LCLUC) Research Areas

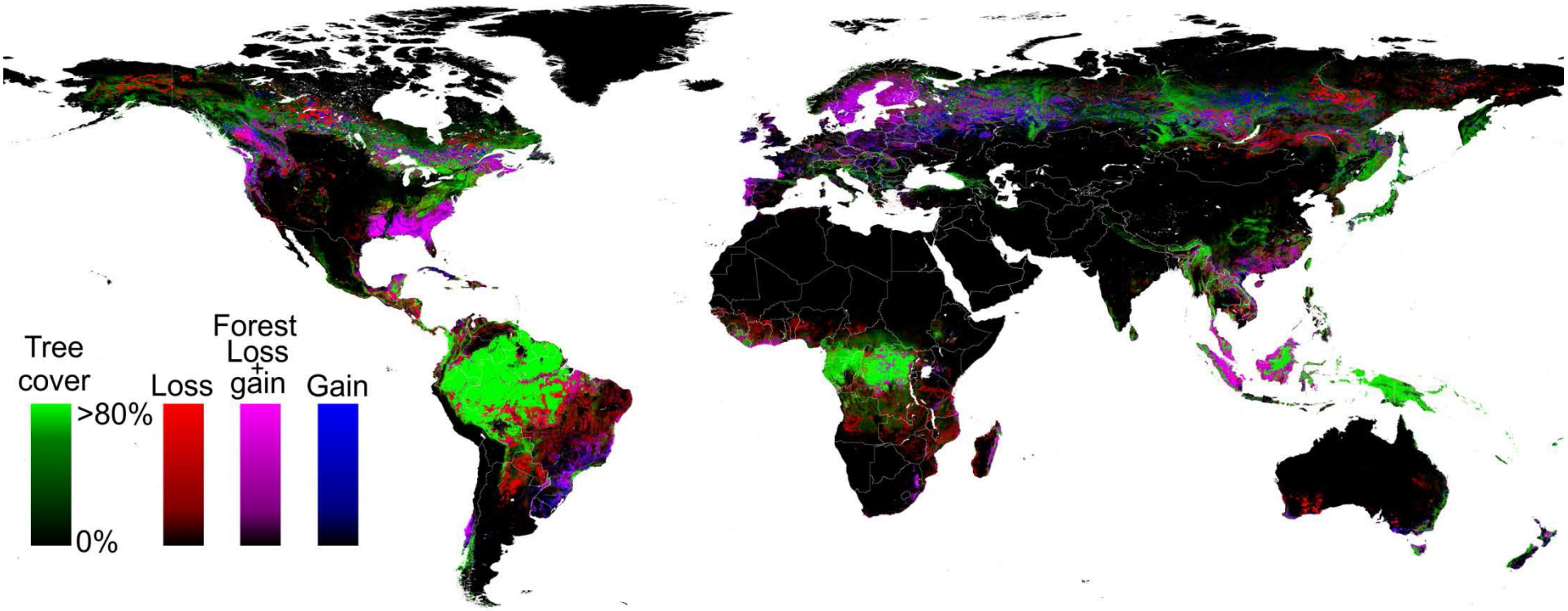
- LCLUC: key interface between human and natural systems
  - Land change Information is combined with human socio-economic data to study past land cover and land use change and to inform advanced modeling of spatially-explicit future scenarios
  - Data used to address social, economic, carbon, climate, biodiversity and other aspects of land-use changes to monitor societal impacts, adaptations and vulnerability to fire, droughts, floods, desertification, and other catastrophic events

- Current Project Examples:
  - Congo Basin Forest Monitoring using Satellites for CARPE
  - Mapping of Global Urban Extent
  - Eco-System Disturbance and Fire: Patterns, Trends, and Greenhouse Gas Consequences
  - Remote Sensing and Global Land Change Monitoring
  - Global Drought Monitoring

Land Cover/Land-use Change

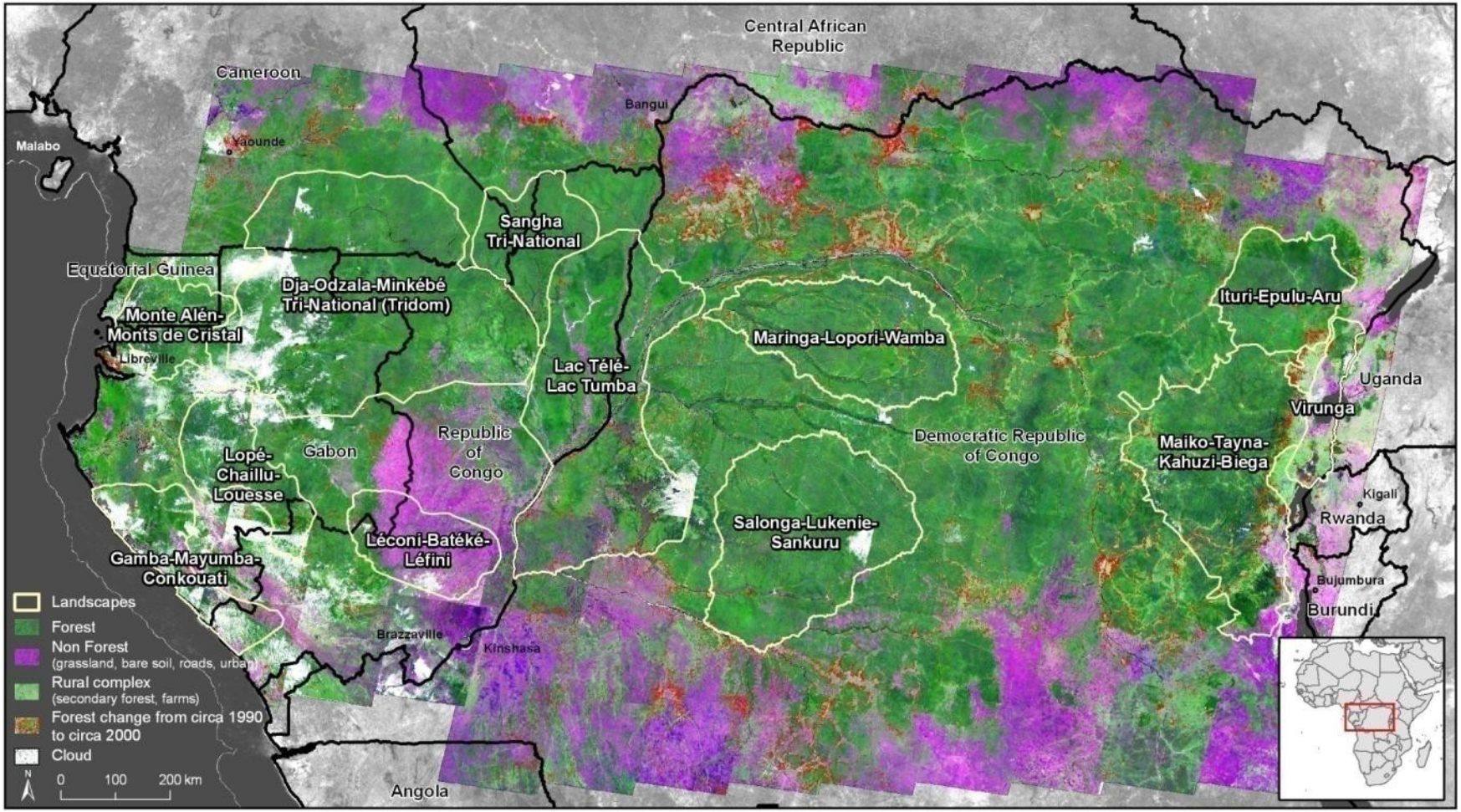
Global forest extent and change, 2000 to 2012

Landsat Enhanced Thematic Mapper Plus archive



Methods developed through NASA Land Use and Land Cover Change, Terrestrial Ecology, Applied Sciences and Measures programs

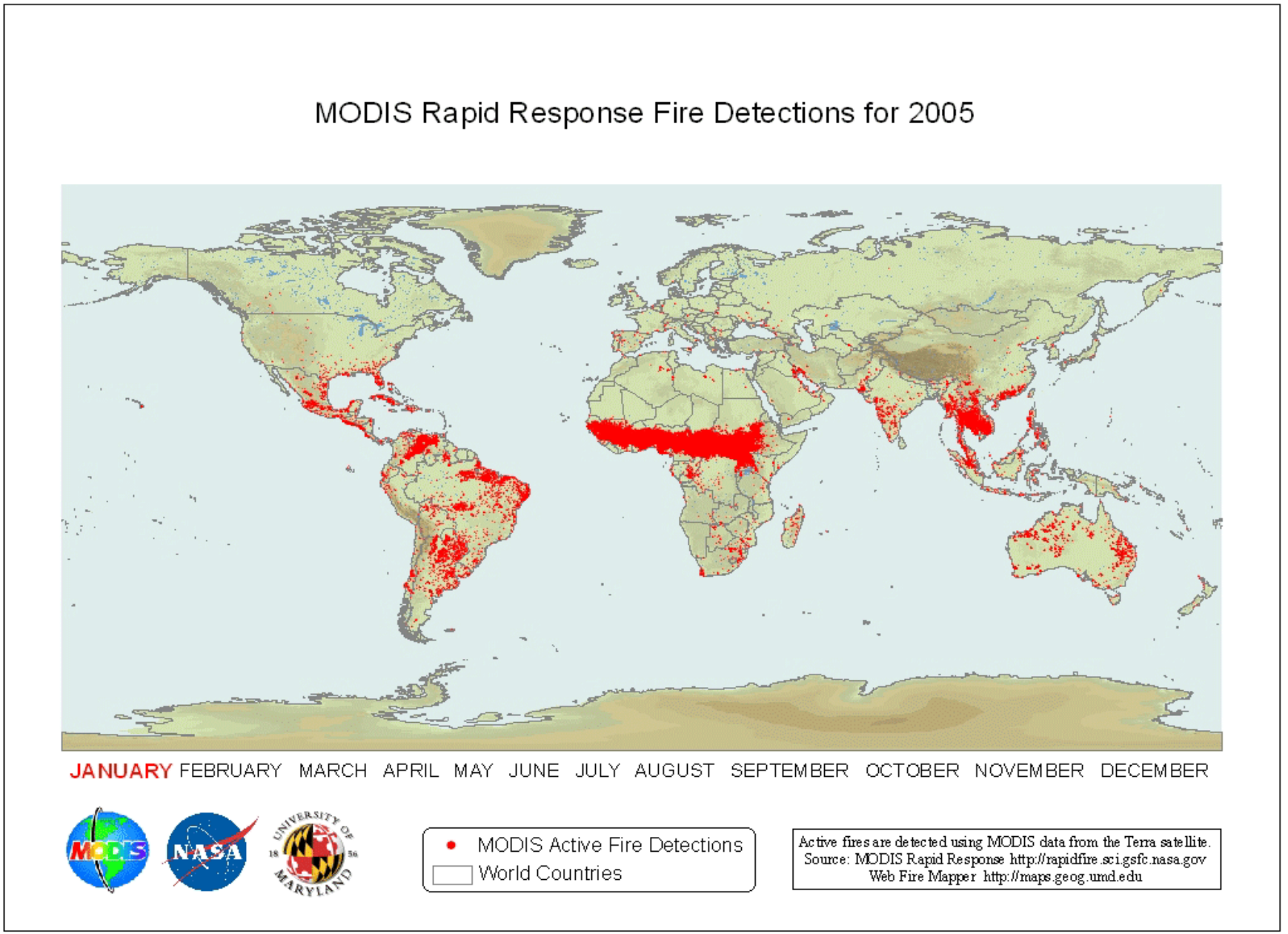
Landsat Based Decadal Forest Change Mapping in the Congo Basin:1990s – 2000s



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.

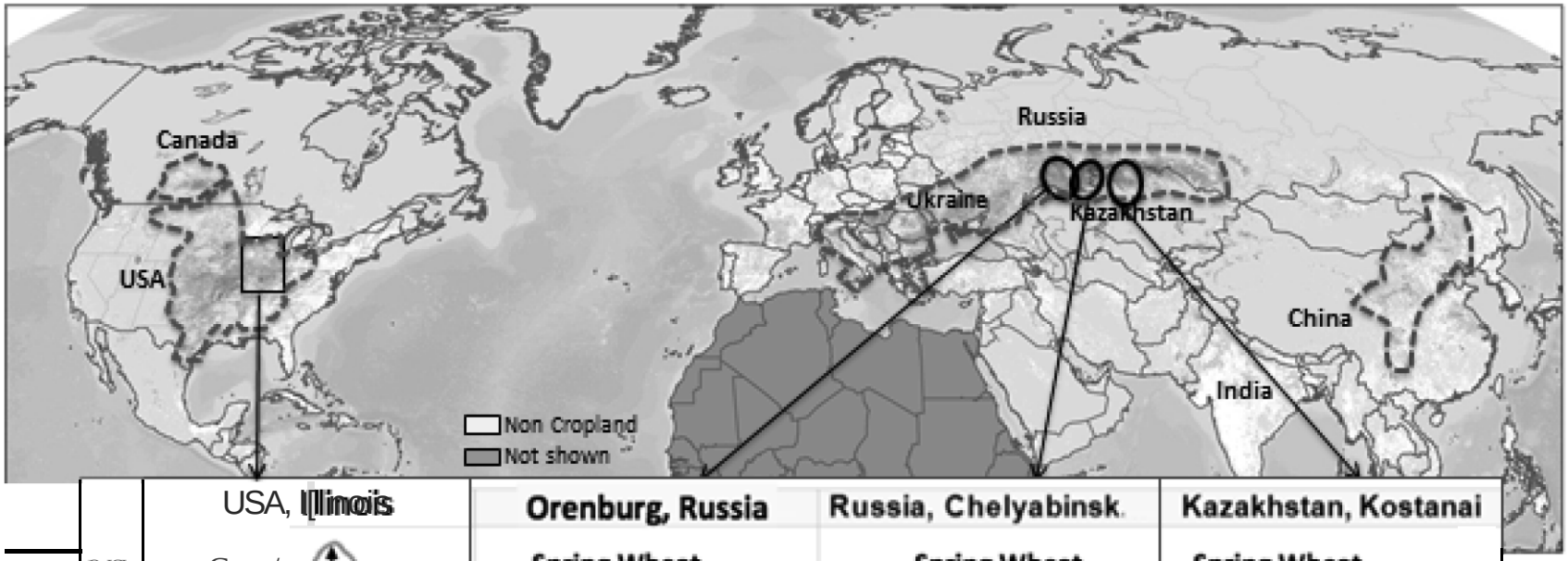
Alstatt, Wong UMD/Hansen SDSU

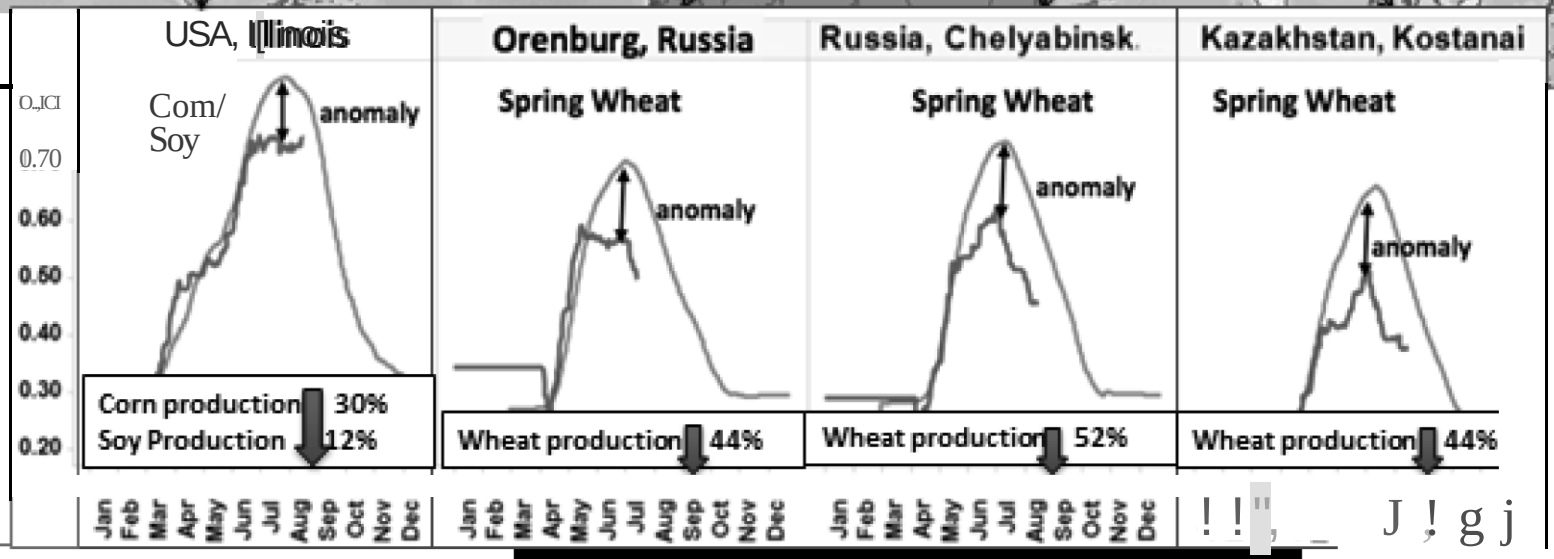
Active Fires Seasonal Variability (2005)



Justice, Giglio

Global Agricultural Drought Monitoring





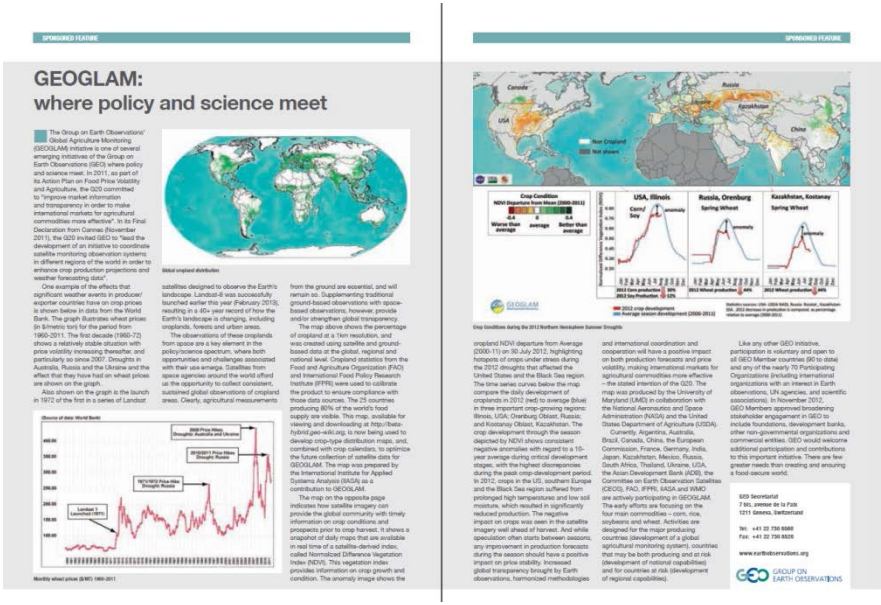
- Current season crop development *[2012*
- Average season development [2000-2011

Stats: USA- USDA NASS, Russia- Rosstat, Kazakhstan- SSA

GEOGLAM

Becker - Reshef

GEOGLAM
Global Agricultural Monitoring



G20 Final Declaration – Cannes, November 2011

*44. We commit to **improve market information and transparency** in order to make international markets for agricultural commodities more effective. To that end, we launched:*

*The **"Agricultural Market Information System" (AMIS)** in Rome on September 15, 2011, to improve information on markets ...;*

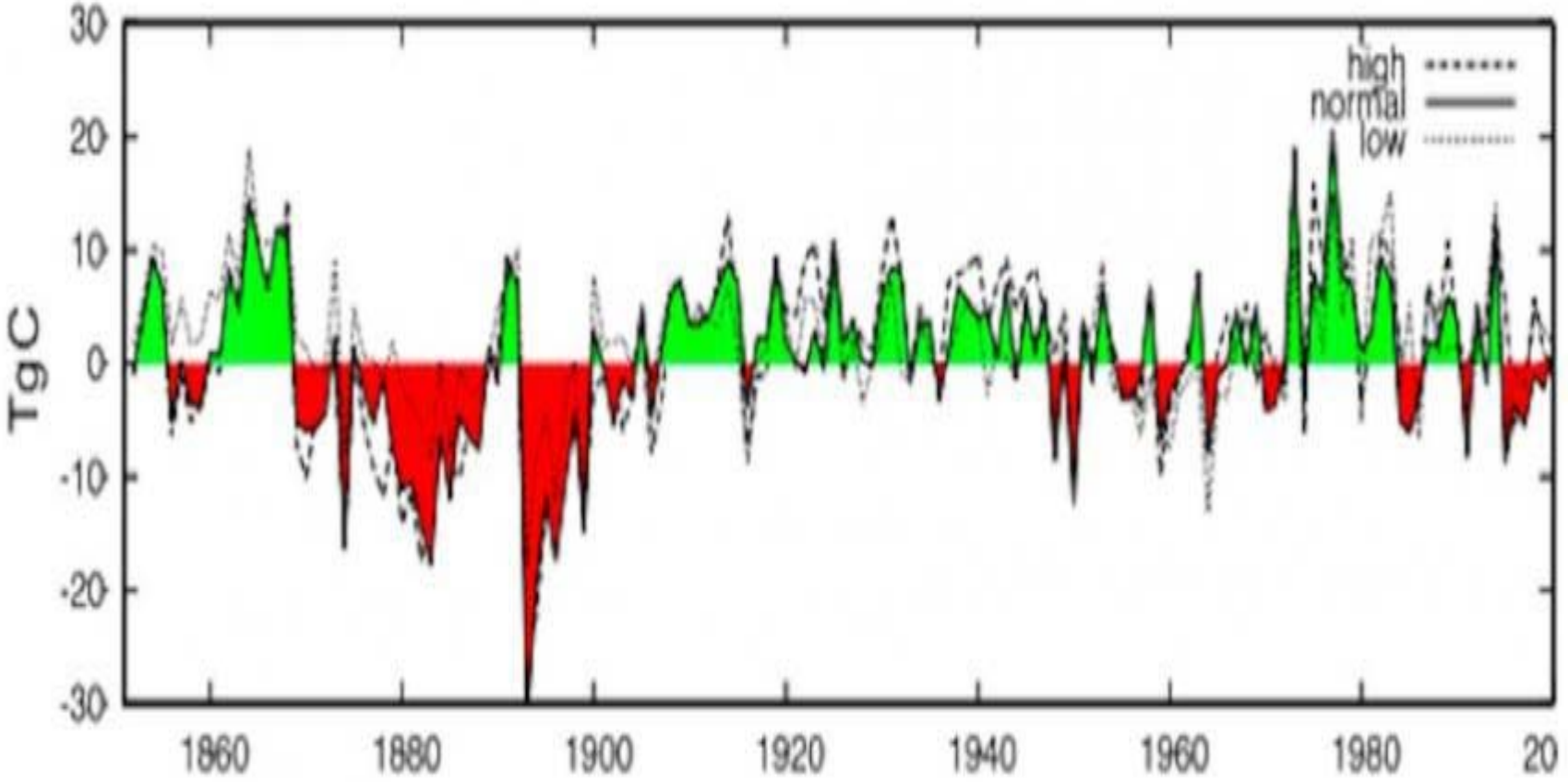
*The **"Global Agricultural Geo-monitoring Initiative" (GEOGLAM)** in Geneva on September 22-23, 2011. This initiative will coordinate satellite monitoring observation systems in different regions of the world in order to enhance crop production projections and weather forecasting data.*

Carbon, Vegetation Dynamics & Landscape – Scale Processes Research Areas

- Studies monitoring and modeling global vegetation
  - Mapping and studying human and natural disturbances and their landscape-scale impacts, as well as changes to the earth surface as a result of climate variability
  - Integration of field-based research with remotely-sensed observations to address key scientific uncertainties
  - Alterations to the global carbon cycle are changing atmospheric composition with implications for human well-being

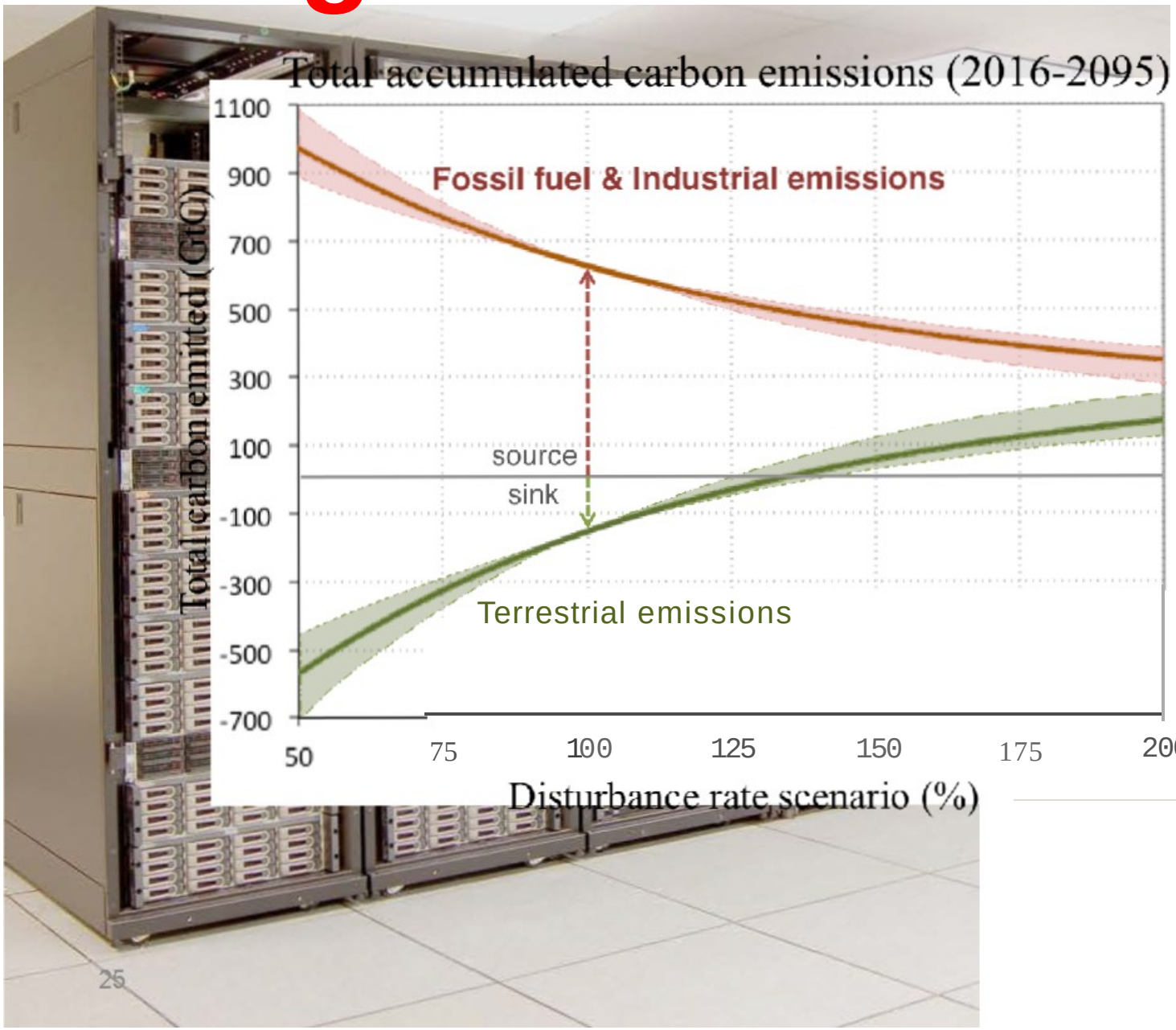
- Current Project Examples:
  - Synthesis of Forest Growth, Response to Wildfires and Carbon Storage for Russian Forests
  - Impacts and Implications of Increased Fire in Tundra Regions of North America
  - Carbon modelling of boreal peatland systems

Net Carbon Impact of Tropical Cyclones



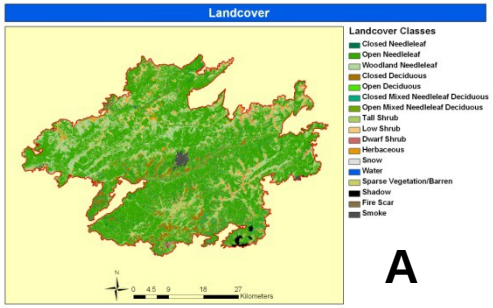
Fisk et al

Integrated Modeling

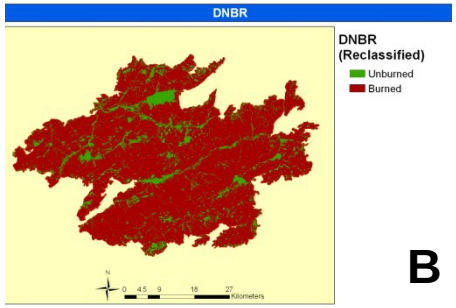


Field & Airborne Campaigns

By integrating multiple data sets derived from analysis of Landsat TM and DEM data, spatial patterns of burning of 6 vegetation types on two topographic positions (uplands/ lowlands) were examined for 41 fire events from the 2004 Alaska fire season (95% of all area burned)



A



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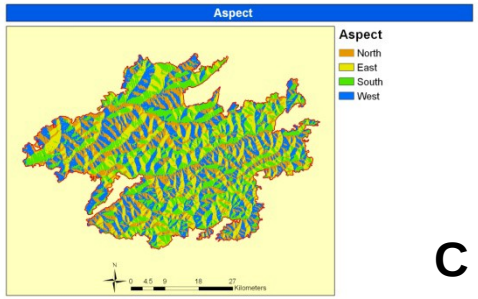

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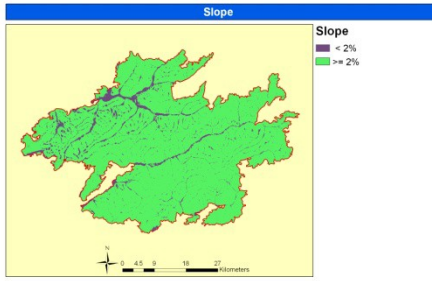
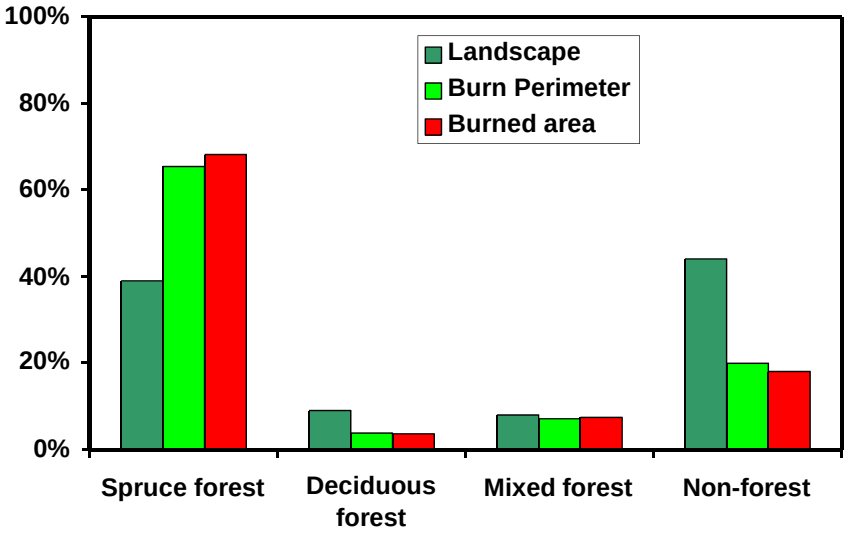
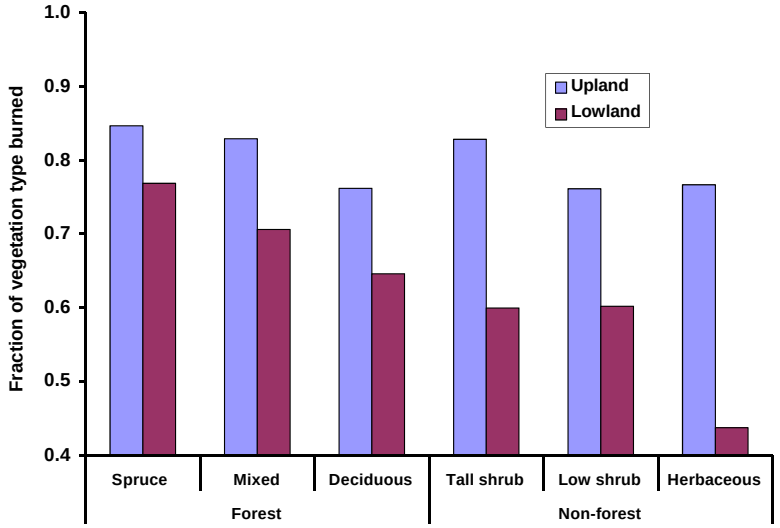






Across interior Alaska, mature spruce forests cover 40% of the landscape. However, withinthe 2004 fire perimeters, 65% of the vegetation was mature spruce. This demonstrates that fuel type controls distribution of fires at the landscape scale

For all 2004 fires, 20% of the area within fire perimeters did not burn. Fraction burned varied as a function of vegetation type and topography

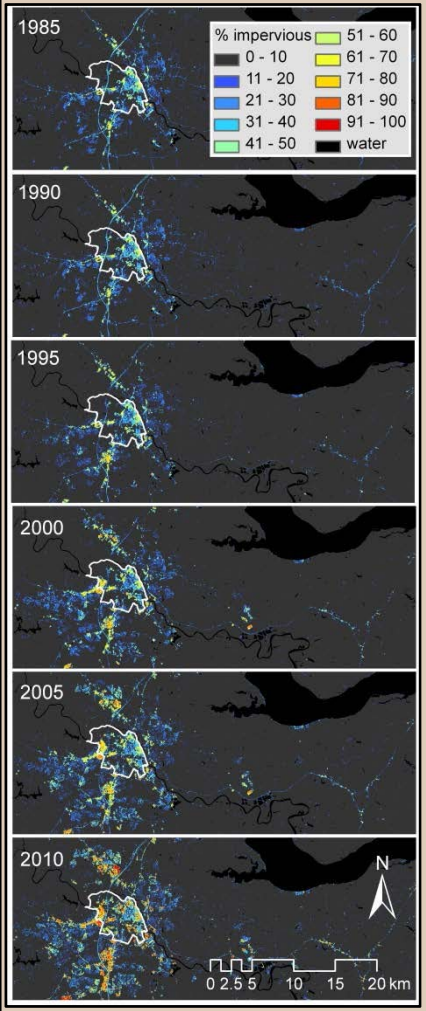
Kasischke

Geospatial-Information Science (GIS) Research Areas

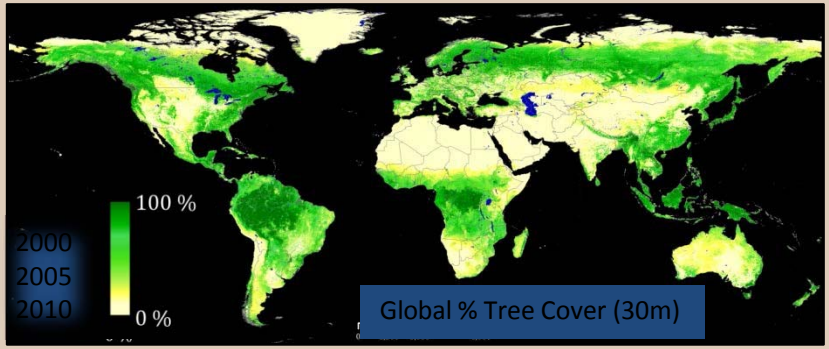
- Studies utilizing big data, geospatial data mining, analysis and visualization
  - Geovisual analytics; spatial modeling; and advanced data-access, data-fusion, and data-delivery
- Current Project Examples:
  - Developing augmented reality environment through kinetic sensing technologies
  - Crowd modelling in urban environments
  - ODK Field Data Collection tool development
  - GLCF Data Archive and Distribution

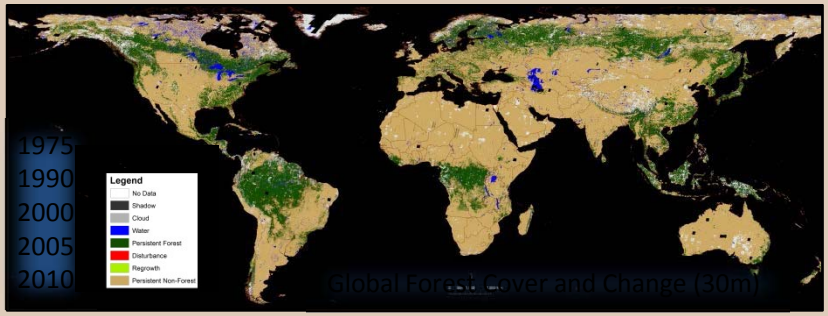
Products & Services

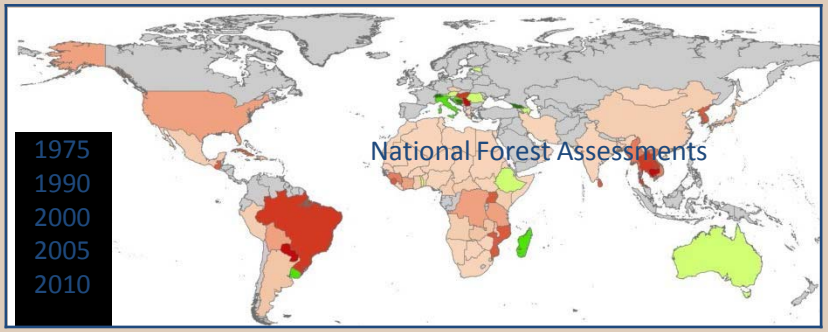
Urbanization



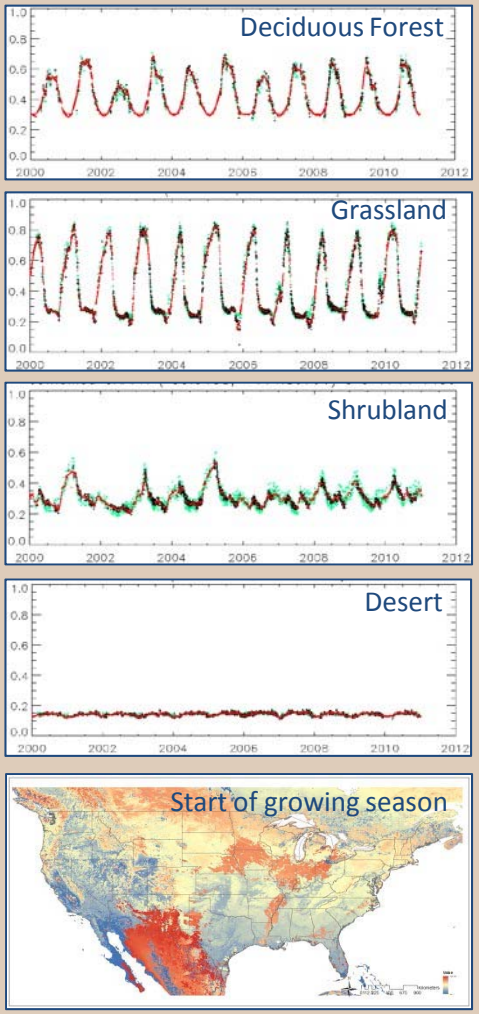
Tree and Forest-Cover Change







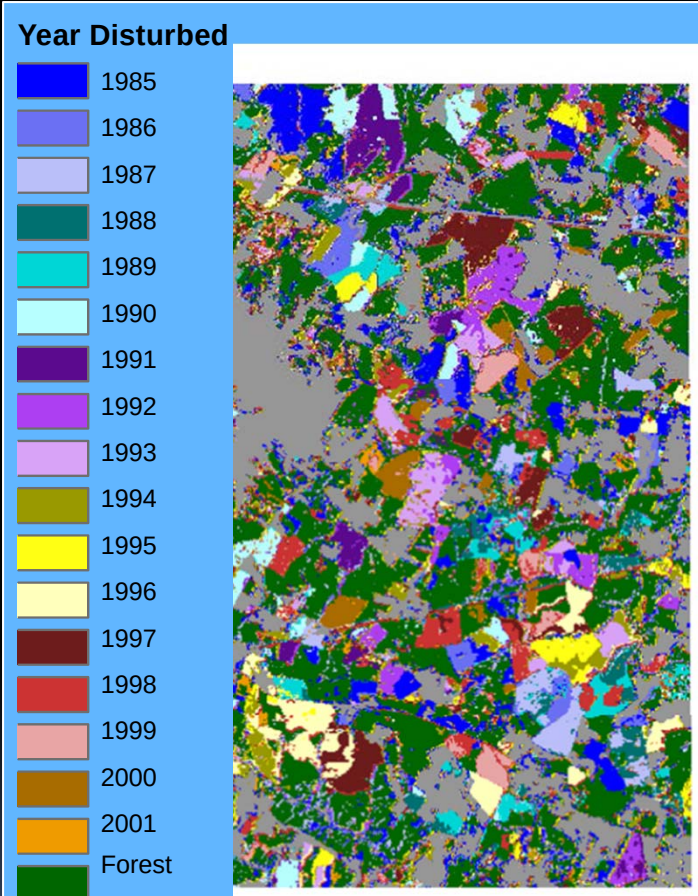
Vegetation Phenology

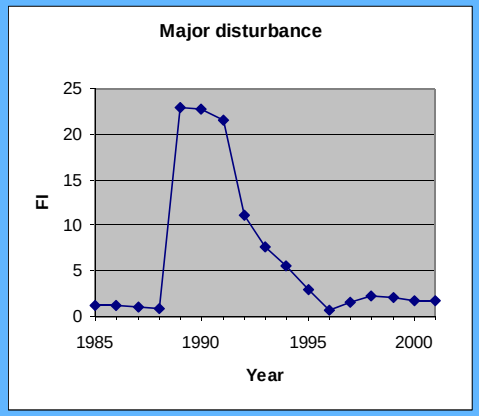


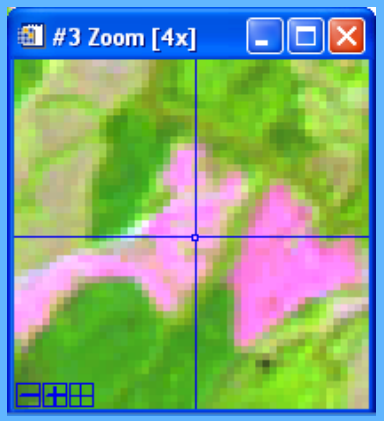
Remote Sensing Research Areas

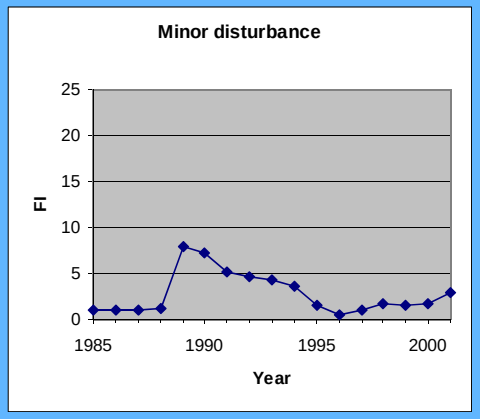
- **Remote Sensing Science**
  - Algorithm and product development
  - Collaboration on sensor specification and development (w. NASA GSFC)
  - Data and Information Delivery Systems
- **Global Observations and Data Products**.
  - AVHRR>MODIS>VIIRS (NASA Science Teams) w. NASA GSFC
  - Landsat TM> ETM> LDCM (USGS Science Team) w. NASA GSFC and NASA Ames.
  - LIDAR w. NASA GSFC and NASA JPL
  - Global Urban Extent w. NASA GSFC
  - Sentinel 2 and 3 merged processing (NASA US participation)
- **Remote Sensing Applications**
  - Agricultural Monitoring w. NASA and USDA
  - Global Forest Monitoring w. NASA, Google and the Moore Foundation
  - Range Management
  - Flood Monitoring and Management
  - Fire Monitoring and Management w. USFS
- **Integration of RS observations into Earth System models**
  - Carbon and Biogeochemical Cycling, Ecosystem Dynamics
  - Land/Atmosphere Exchanges of Energy/Water/GHG exchange
  - Emissions Estimation, Fire Regime Characterization
  - Agricultural production
  - Land Degradation

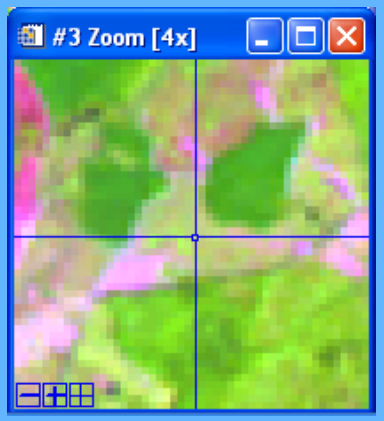
North American Forest Dynamics Vegetation Change Tracker







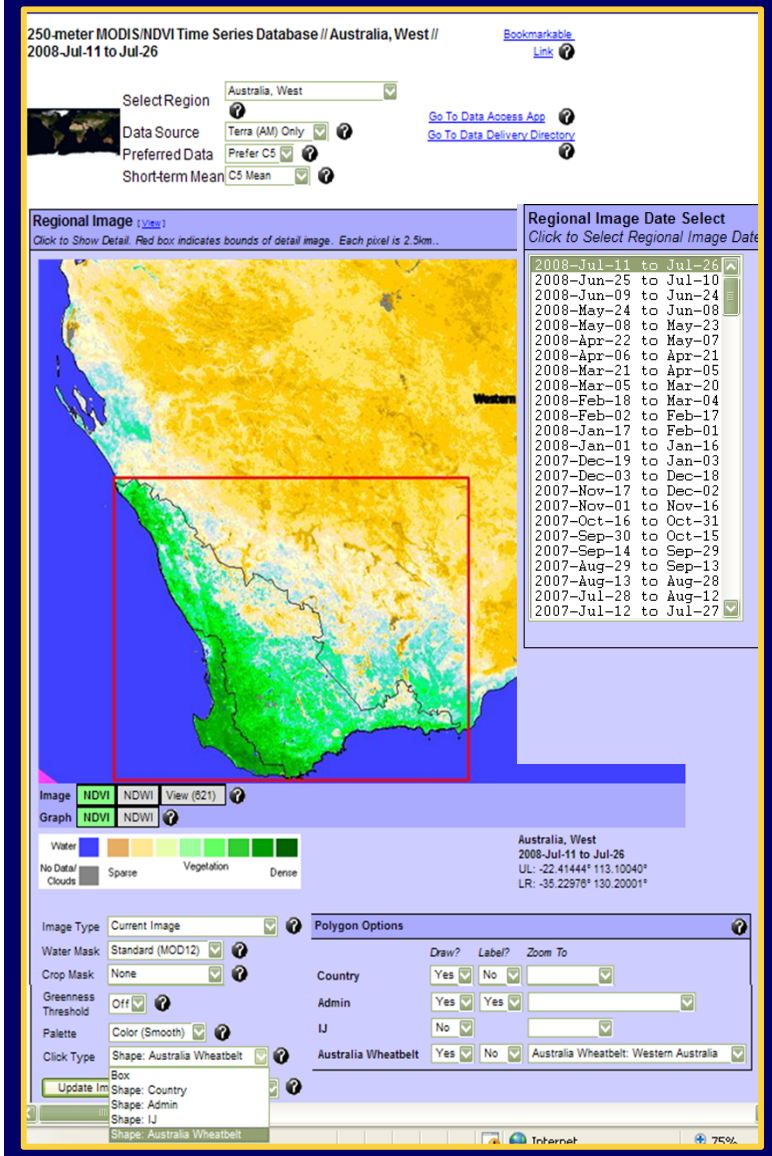


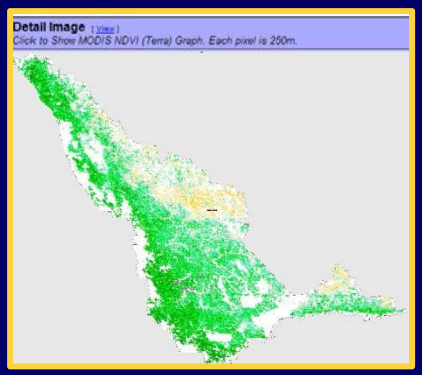


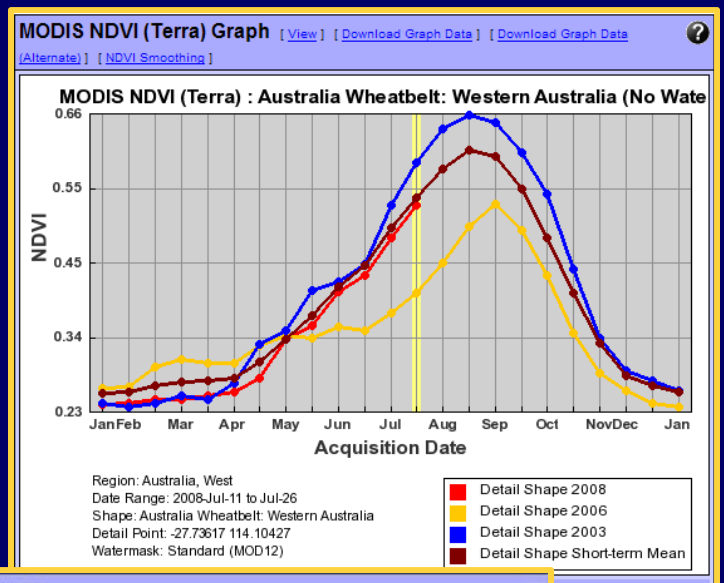
Lake Anna, VA, 60 km NW of Richmond

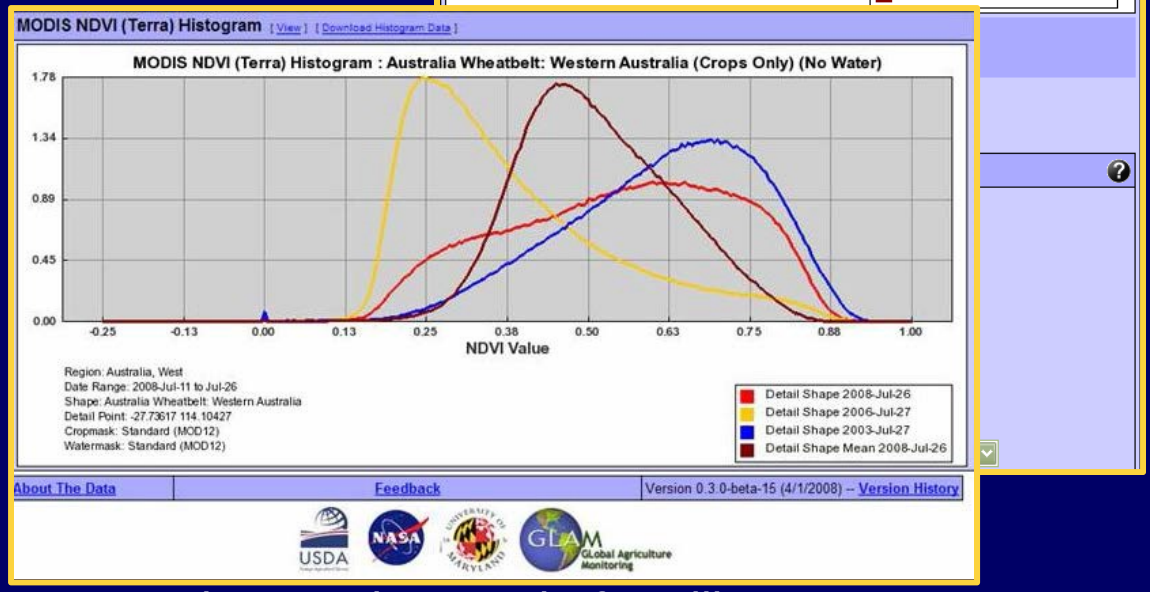
Huang et al *North American Forest Dynamics (NAFD) - A NACP Core Project*

GLAM System Web Interface for Querying and Analyzing MODIS VI Time Series









Justice, Becker-Reshef, Sullivan, Vermote

LATEST NEWS UMD Names New Associate Provost and Dean for Undergraduate Studies

About Academics Fearless Ideas

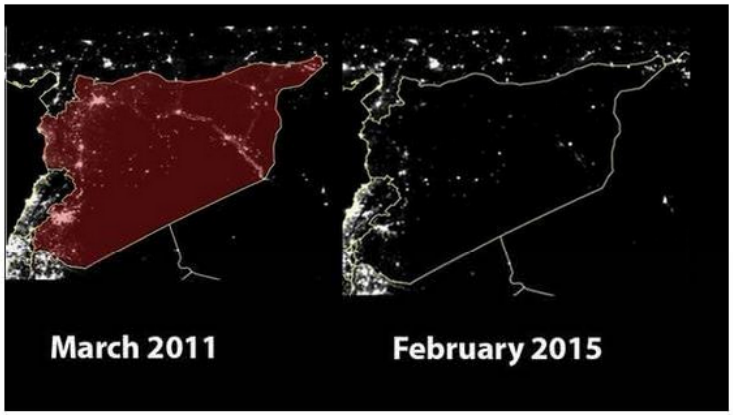
UNIVERSITY OF MARYLAND

DEPARTMENT OF

Geographical Sciences

BE GLOBAL

About Us | Undergraduate | Graduate | Research | GIS



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Visiting Scientist Xi Li Sheds Light on Syrians Living in the Dark

On March 11, 2015, Dr. Xi Li, a visiting scholar from Wuhan University in China, took part in a tele-briefing entitled, "WithSyria 4th Anniversary Campaign: Turn the Lights Back On." During this briefing - also attended by Madeleine Albright (former U.S. Secretary of State), David Miliband (former Secretary of State for Foreign and Commonwealth Affairs) and Dr. Majed Abu Ali (a medical doctor from Ghouta, Syria) - Dr.

Read More

News & Events

View Event Calendar

August Alumni of the Month: Rachel Berndtson

Name: Rachel BerndtsonMajor: GeographyMinor: GIS Current employment status:·Employer: University of Maryland·Position:... Read more

July Undergraduate Student of the Month: Chima Okpa

☆ Items of Interest

- Advances in GIS
- MPS in GIS
- GEOG Seminars
- Study Abroad
- Job Opportunities
- Current Newsletter

Publications