Welcome

2017 KBS LTER All-Scientist Meeting

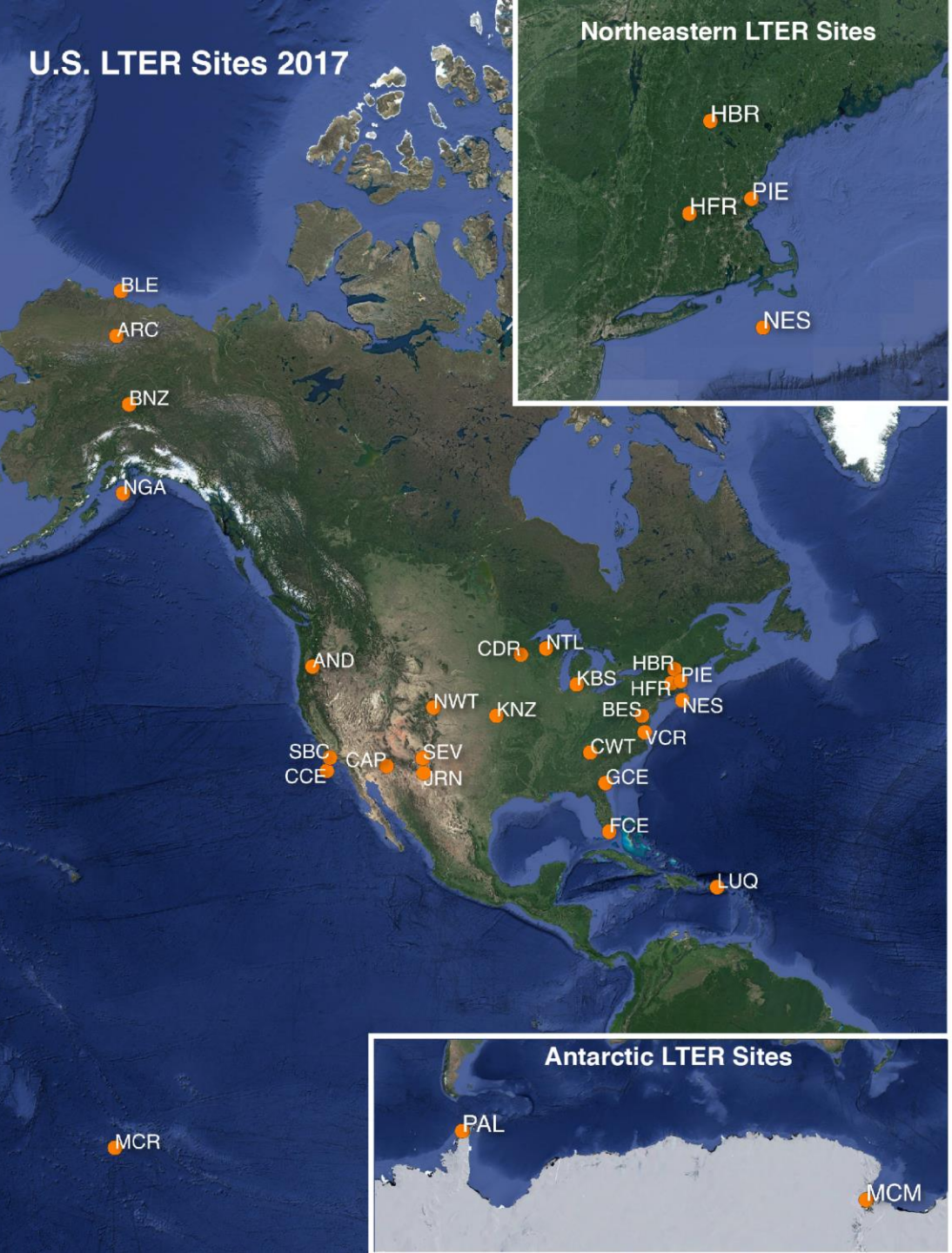
Charting New Directions for KBS LTER Science

LTER
Long Term Ecological Research

MICHIGAN STATE UNIVERSITY

AgBioResearch
MICHIGAN STATE UNIVERSITY

KBS LTER
Kellogg Biological Station
Long-term Ecological Research



Site Codes

AND	Andrews Forest LTER
ARC	Arctic LTER
BES	Baltimore Ecosystem Study
BLE	Beaufort Lagoon Ecosystems LTER
BNZ	Bonanza Creek LTER
CCE	California Current Ecosystem LTER
CDR	Cedar Creek Ecosystem Science Reserve
CAP	Central Arizona-Phoenix LTER
CWT	Coweeta LTER
FCE	Florida Coastal Everglades LTER
GCE	Georgia Coastal Ecosystems LTER
HFR	Harvard Forest LTER
HBR	Hubbard Brook LTER
JRN	Jornada Basin LTER
KBS	Kellogg Biological Station LTER
KNZ	Konza Prairie LTER
LUQ	Luquillo LTER
MCM	McMurdo Dry Valleys LTER
MCR	Moorea Coral Reef LTER
NWT	Niwot Ridge LTER
NTL	North Temperate Lakes LTER
NES	Northeast U.S. Shelf LTER
NGA	Northern Gulf of Alaska LTER
PAL	Palmer Antarctica LTER
PIE	Plum Island Ecosystems LTER
SBC	Santa Barbara Coastal LTER
SEV	Sevilleta LTER
VCR	Virginia Coast Reserve LTER

NSF

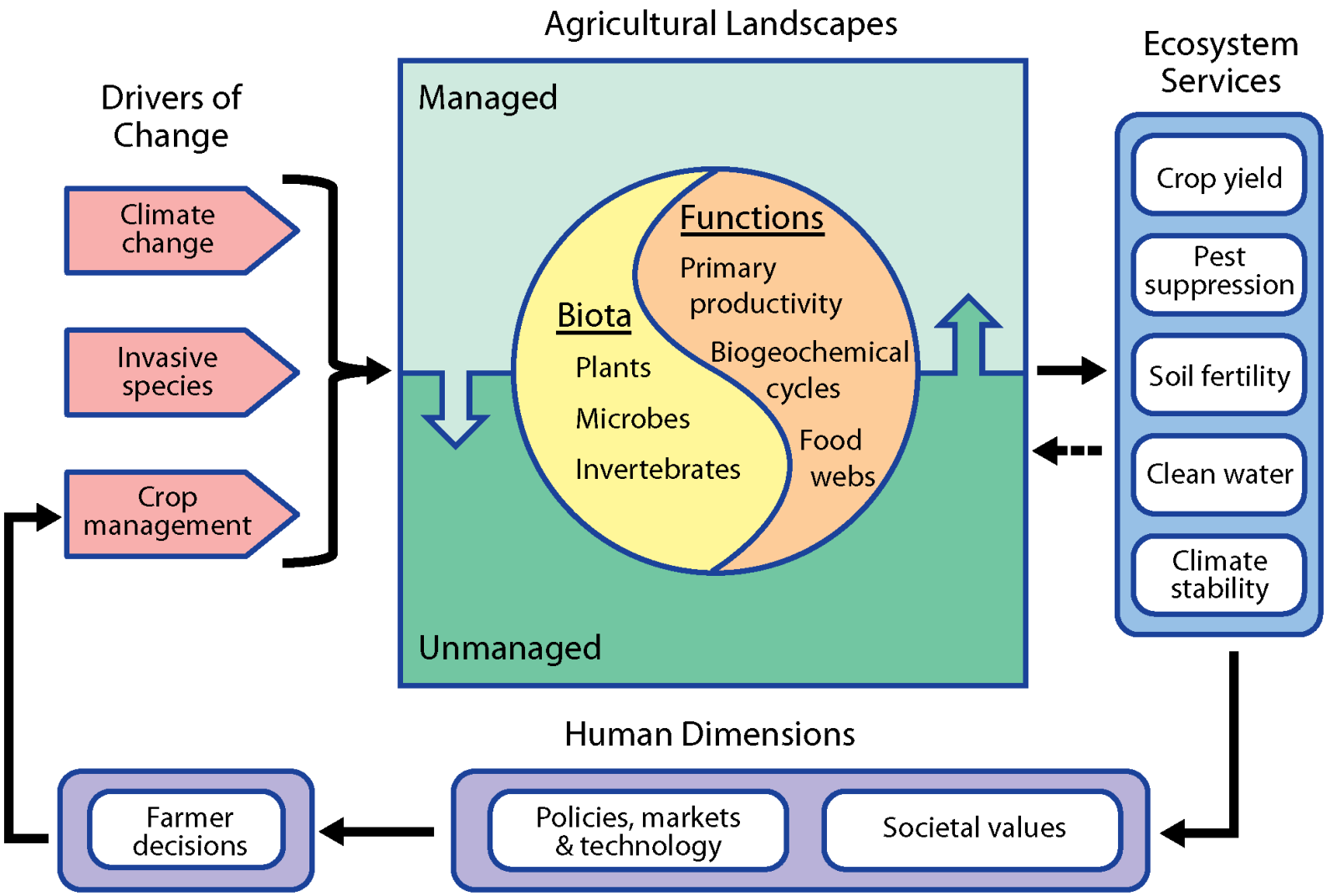
LTER

Long-term Ecological Research in Agricultural Landscapes

- KBS LTER has existed for nearly three decades (founded 1988)
  - PI group currently includes Steve Hamilton, Sarah Evans, Nick Haddad, Doug Landis, Jen Lau, Sandy Marquart-Pyatt, Phil Robertson, Scott Swinton
- Renewal grant funded, but only for 2017-18
- New 4-year renewal proposal in preparation
  - Jen Lau to be Lead PI, Nick Haddad co-leading
- We have been brainstorming about new directions for the project

  ...yet we need to maintain the core long-term experiments and measurements

Our current conceptual framework



KBS LTER's original overarching question

To what extent can we manage agricultural systems with biology rather than chemistry?

– *while maintaining / enhancing ecosystem services…*

- *High yields*
- *Environmental performance*

Major lines of KBS LTER research so far

The export of N and P to groundwater and surface waters

Microbe-soil-plant interactions that control nutrient availability

Soil N processes and gas exchange with the atmosphere

Plant community dynamics that influence biodiversity in grasslands

Arthropod predator-prey relationships that control pest populations

Ecosystem services provided by agriculture

Farmer perceptions and decision-making

KBS LTER Main Cropping System Experiment (MCSE)

Ecosystem Type	Management Intensity
Annual Grain Crops (Corn - Soybean - Wheat)	
Conventional tillage	High
No-till	
Low-input with legume cover	
Organic with legume cover	
Perennial Biomass Crops	
Alfalfa	
Hybrid poplars	
Unmanaged Communities	
Early successional old field	
Mid successional old field	
Late successional forest	Low

Main Cropping System Experiment (MCSE)

Treatment Key

- T1 Conventional **corn**/soybean/wheat
- T2 No-till **corn**/soybean/wheat
- T3 Reduced Input **corn**/soybean/wheat with cover crop
- T4 Biologically Based **corn**/soybean/wheat with cover crop
- T5 Poplar
- T6 Alfalfa
- T7 Early Successional community
- T8 Mown Grassland (never tilled) community

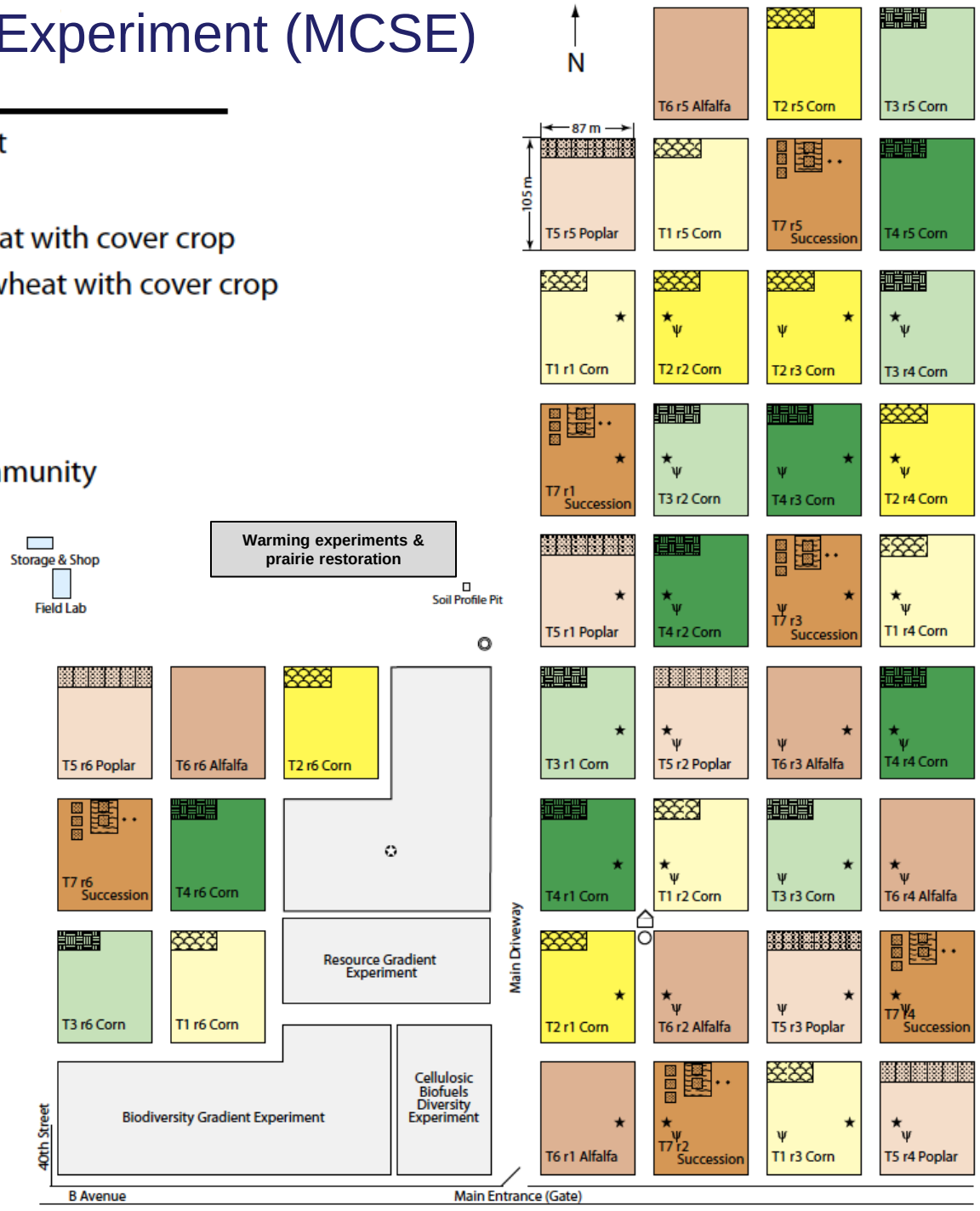
r = replicate number

Microplot Treatment Key

- Nitrogen fertilized
- Tillage (T7)
- Herbicide-free
- Nitrogen fertilized and weed-free

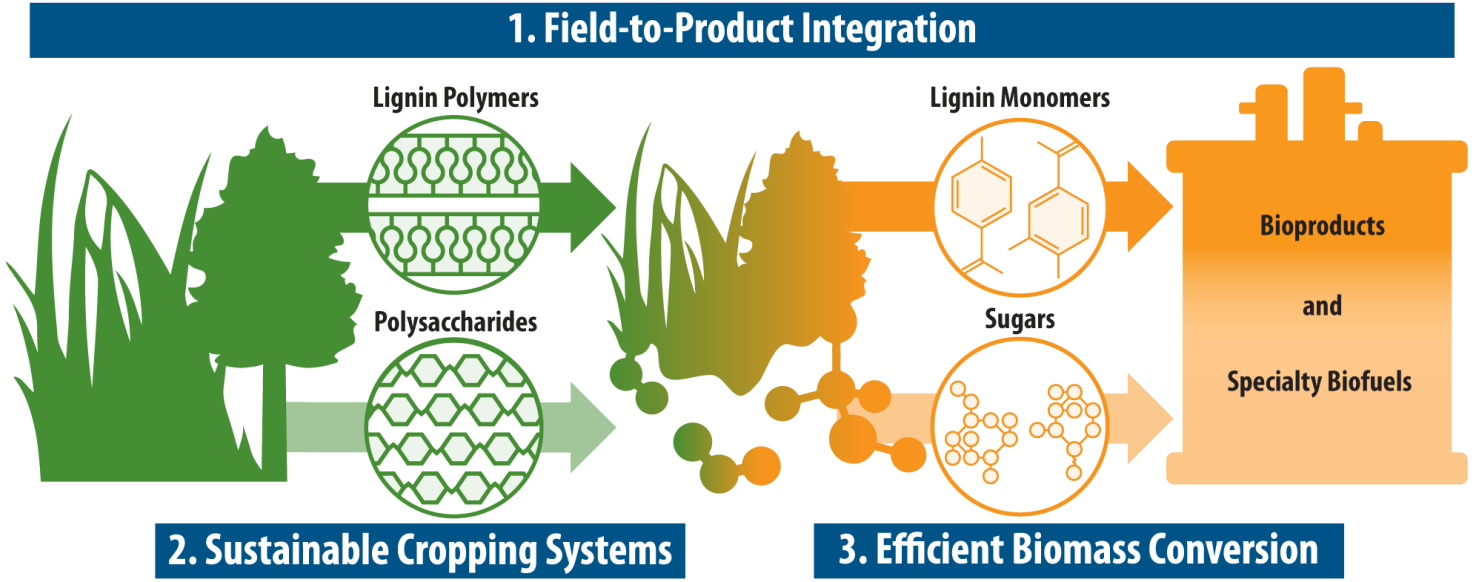
Instrumentation Key

- Minirhizotrons
- ★ Trace gas flux chambers
- Ψ Low tension suction lysimeters
- Weather station & weighing lysimeter
- Trace gas shed
- Wireless tower & sun photometer
- Aphid tower



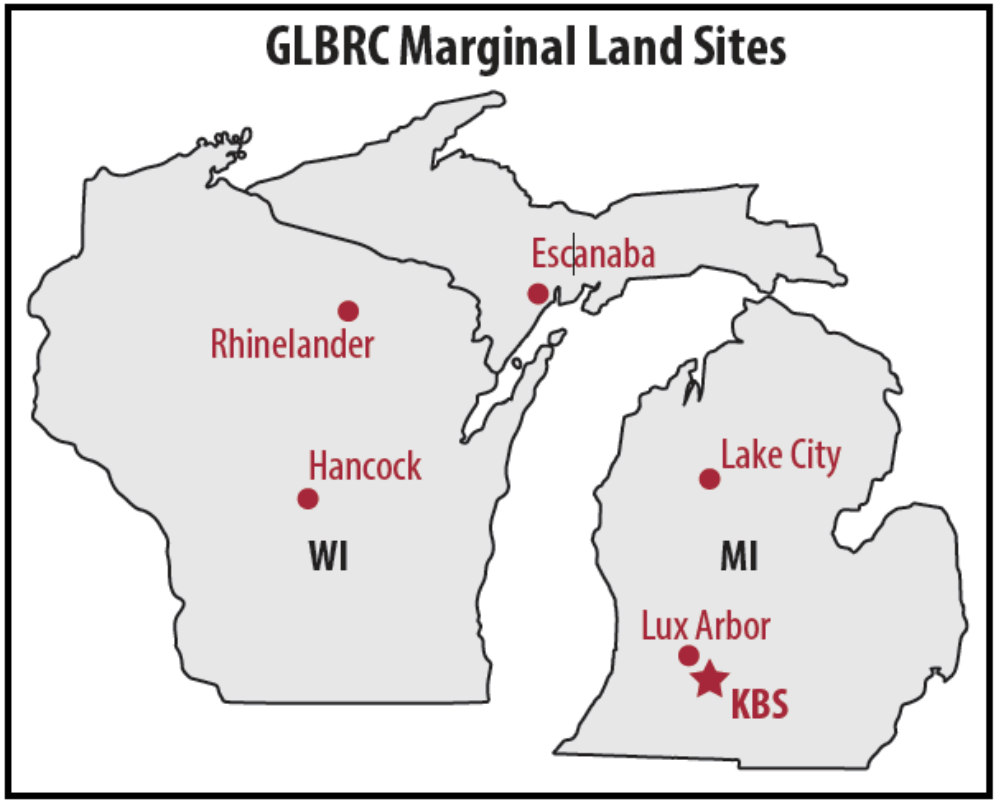
Great Lakes Bioenergy Research Center (GLBRC II)

Generating the knowledge needed to sustainably produce specialty biofuels and bioproducts from lignocellulosic bioenergy crops



Research activities across four BRC-defined focus areas:

GLBRC II:
Sustainability of biomass crop production on marginal lands



Focal cropping systems:

- Switchgrass
- Mixed grasses
- Poplar
- Energy sorghum

Current experiments at KBS to continue

New research areas include:

- Soil C accrual
- Biodiversity
- N fixation
- Nitrous oxide sources
- Albedo
- Water use

Key LTER staff you should know

- Neville Millar: LTER Science Coordinator
- Julie Doll: LTER Outreach and Education Coordinator
- Sarah Hanks: LTER Outreach and Education
- Stacey VanderWulp: LTER Project Manager
- Sven Bohm: LTER Information Manager
- Joe Simmons: LTER Agronomic Manager
- Kevin Kahmark: LTER/GLBRC greenhouse gas analyses
- Cathy McMinn: LTER sampling and analytical work
- And many seasonal and student research assistants!

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Welcome to our international visitors

- 5 scientists from the Xinjiang Institute of Ecology and Geography of the Chinese Academy of Sciences
- Dr. Leticia Mesa, visiting Fulbright Scholar from the National Institute of Limnology in Argentina

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