LEES Landscape Ecology & Ecosystem Science Lab

The LEES Lab of Michigan State University, directed by Dr. Jiquan Chen, is interested in scientific investigations and education in fundamental ecosystem and landscape processes.

Research Objectives and Projects

Our studies focus on the carbon and water cycles of different ecosystems—grassland, desert, forest, cropland, wetlands, freshwater—and investigate multiple spatial and temporal scales, bioenergy systems and resource uses, human-nature coupled interactions, sustainable management, and conservation. Across North America and Asian landscapes, we employ state-of-the-art equipment and technology, monitoring stations, methods and modeling, and remote sensing technology. Our work is strengthened through collaboration with many institutions, including Mongolian Academy of Sciences, University of Bari, United States Forest Service, Auburn University, and AgroTech, along with many members of the USCCC.

Socioecological Carbon Production in Managed Agricultural-Forest Landscapes (NASA iSEC): Human activities, including land use and land cover changes, are paired with CO_2-equivalent amounts of energy (i.e., "social C flux"). A life cycle assessment (LCA) will explain sequestration strength at different spatial and temporal scales.

Productions of Bioenergy Systems (GLBRC/DOE Albedo): This project uses continuous and instantaneous measurements of solar and infrared radiation, soil moisture, drone and satellite observations, and plant phenology to derive variations in albedo and global warming potentials for seven biofuel cropping ecosystems at BCSE, which include corn, switchgrass, sorghum and miscanthus, as well as the GLBRC Scale-up and Marginal land sites.

Coupled Human and Natural Systems on the Mongolian Plateau (NSF/CNH & NASA/LCLUC): We examine current and historic land-use change, carbon, water and energy balances, and socioeconomic shifts on the Mongolia Plateau. These are analyzed for their importance to ecosystem functions and possible conservation strategies.

Flood Mapping for Kazakhstan's Changing Climate: Using a hydrological process model paired with geospatial statistics of population, agriculture, and economics, we will map historical flood zones to assess the impact of flooding and identify high-risk areas in Astana and Almaty, Kazakhstan.

MICHIGAN STATE UNIVERSITY

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Dr. Jiquan Chen: jqchen@msu.edu
www.lees.geo.msu.edu

Center for Global Change and Earth Observations
Department of Geography, Environment, and Spatial Sciences