An aerial photograph of a large agricultural field. In the foreground, a yellow tractor is pulling a blue stream of water through the field. The field is divided into several sections, some of which are planted with crops. The background shows a flat landscape under a clear sky.

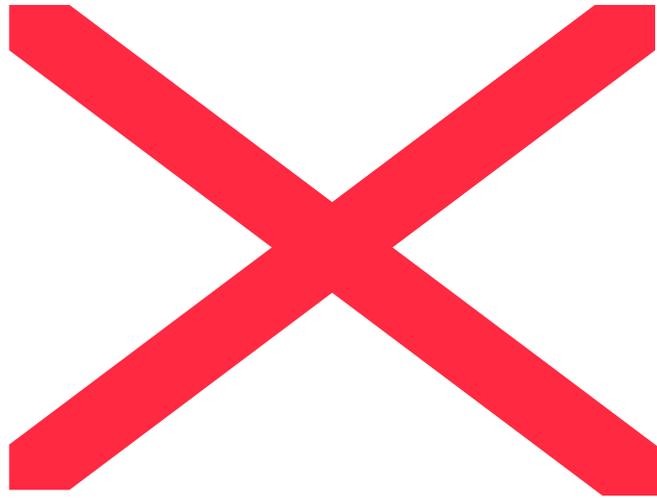
**CO₂ Fluxes between Agricultural Lands and the
Atmosphere: Towards more Complete
Accounting by Integrating Remote Sensing with
Simulation Modeling**

21 February 2006

Stephen Ogle (Principal Investigator)

**Chris Potter, Keith Paustian, Rich Conant, F. Jay
Breidt and Steven Klooster (Co-Investigators)**

Model: CASA-Century

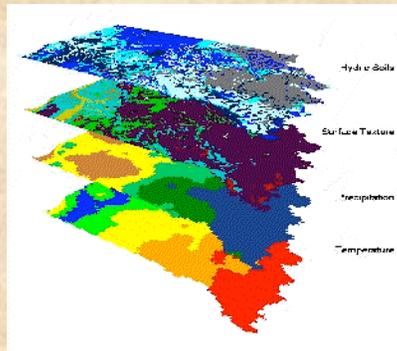
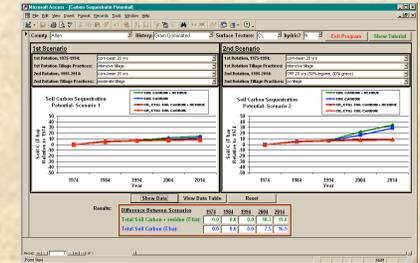
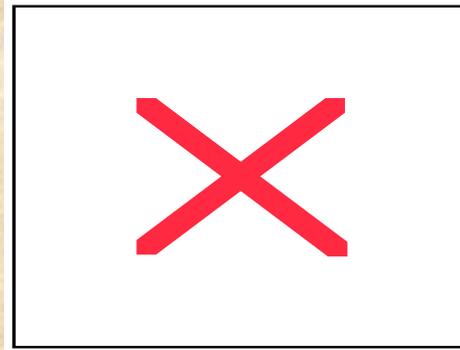
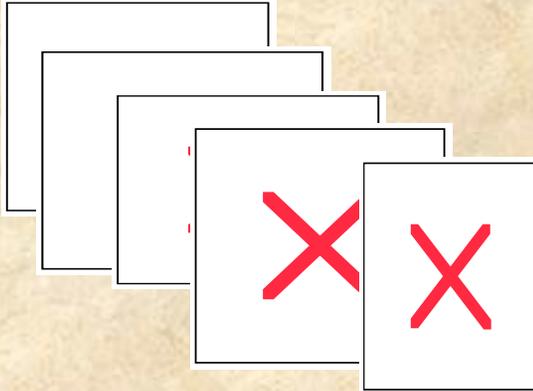


Model Testing and Verification

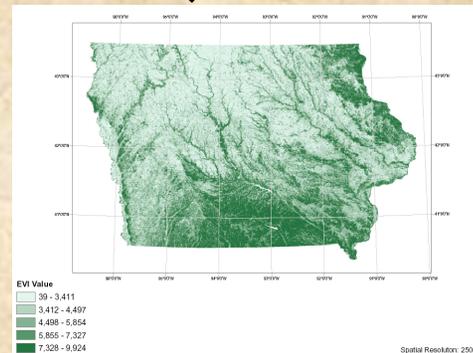
- **Compare results with measurements**
 - **Long Term Agricultural Experiments**
 - **Ameriflux Sites**
 - **ARS Flux Sites**
 - **Other Experiments**
- **Improve model structure and parameterization to the extent possible**

Land Use and Management Activity

Modeling Framework for Regional Simulations

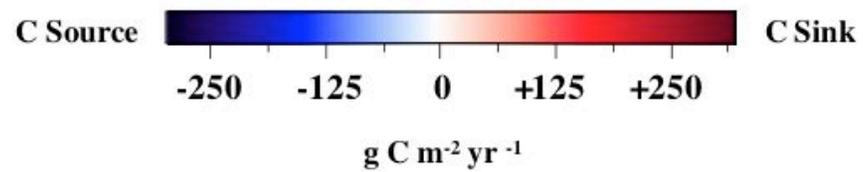
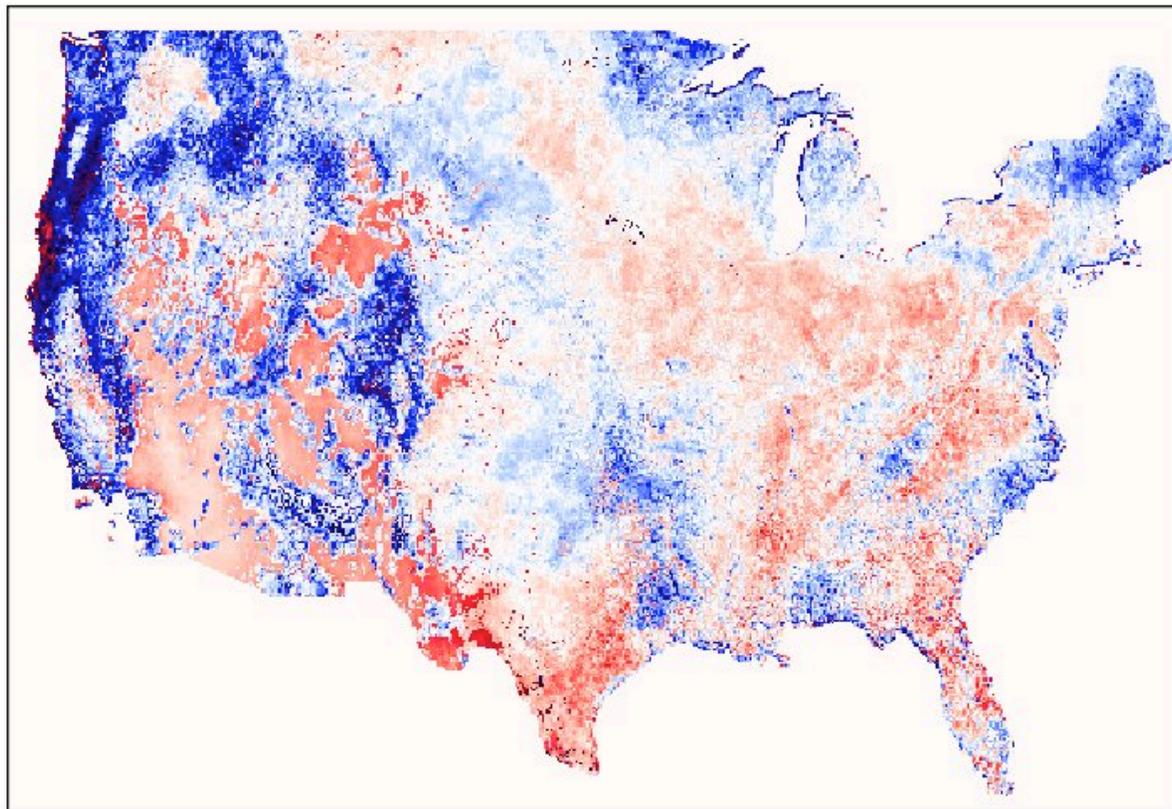


**Environmental Conditions:
Soils and Climate**



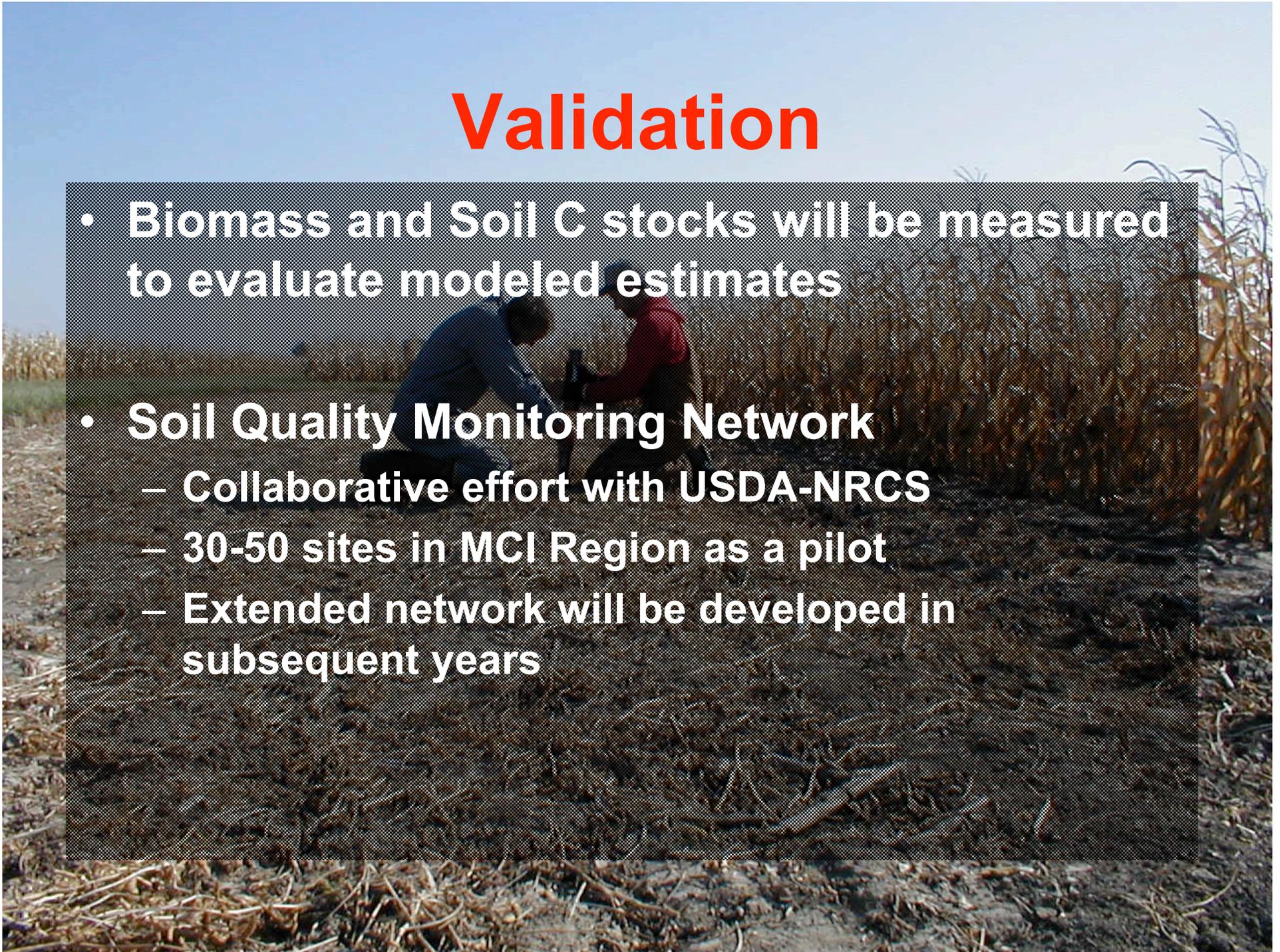
**Remote Sensing Data:
MODIS EVI**

Annual Net Ecosystem Flux of Carbon -- 2004 from MODIS inputs



Validation

- Biomass and Soil C stocks will be measured to evaluate modeled estimates
- Soil Quality Monitoring Network
 - Collaborative effort with USDA-NRCS
 - 30-50 sites in MCI Region as a pilot
 - Extended network will be developed in subsequent years

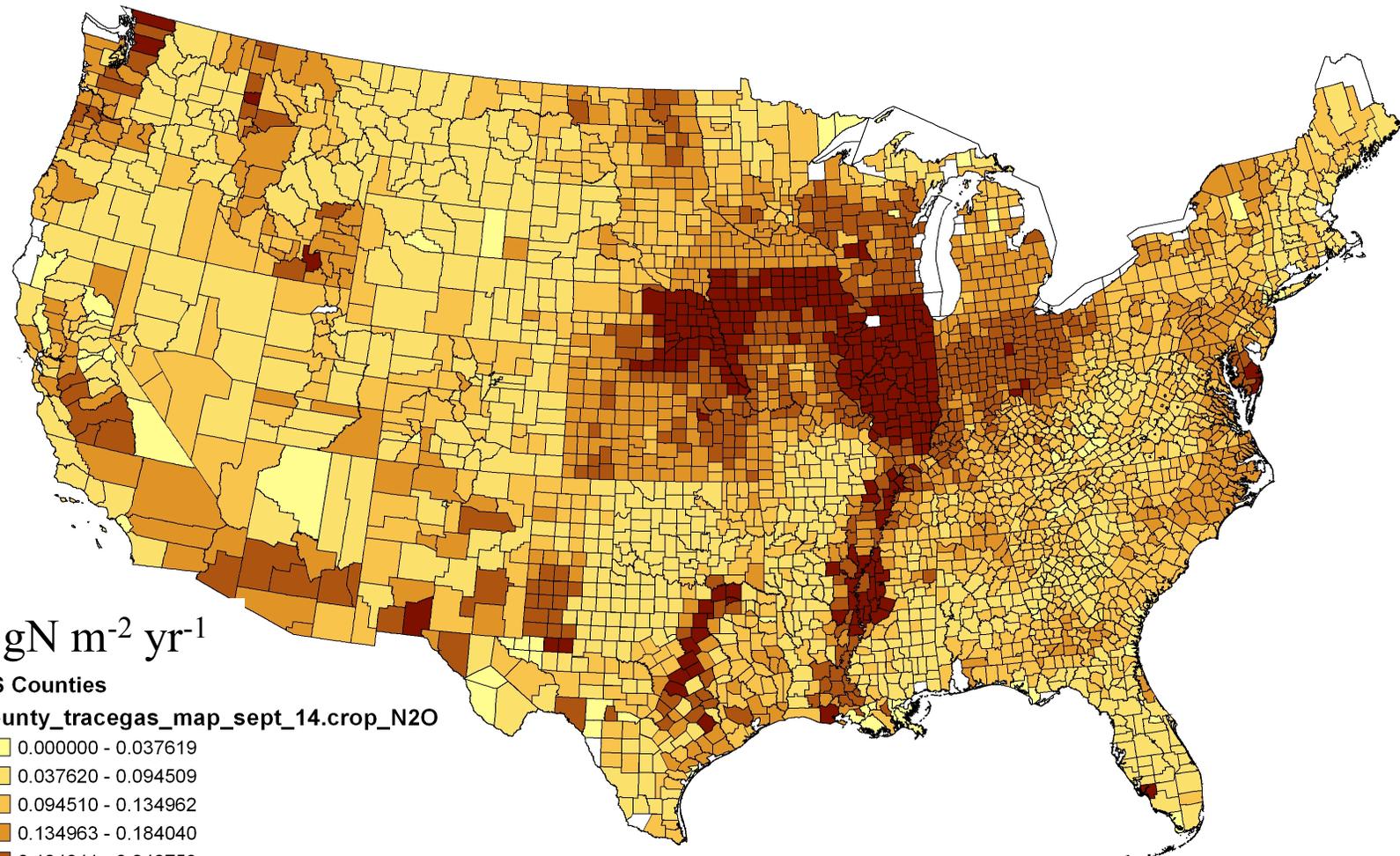


Contribution to MCI

1. Validated carbon stock change estimates for agricultural lands
2. Mechanistic explanation of stock changes based on land use, management and climatic patterns
3. Collaborate on compilation of “bottom-up” inventory
4. Collaborate on comparison of “top-down” and “bottom-up” approaches

Other Modeling Research: Ojima, Del Grosso, and Parton (N₂O and CH₄)

N₂O Emissions -- Cropped System



$\text{gN m}^{-2} \text{yr}^{-1}$

US Counties

county_tracegas_map_sept_14.crop_N2O

- 0.000000 - 0.037619
- 0.037620 - 0.094509
- 0.094510 - 0.134962
- 0.134963 - 0.184040
- 0.184041 - 0.248753
- 0.248754 - 0.392035

Ojima, Parton and Schimel: Couple DAYCENT modeling with aircraft campaign to compare “top-down” and “bottom-up” estimates

