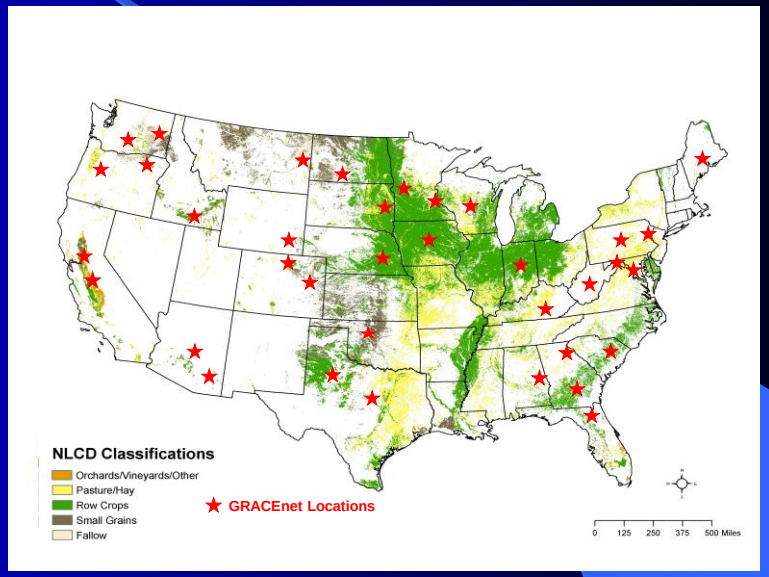
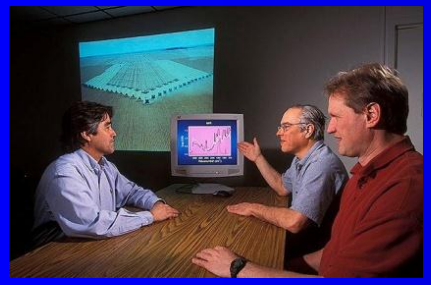
# Greenhouse gas Reduction through Agricultural Carbon Enhancement network: ***GRACEnet***

- Evaluate soil C status & change in existing typical and alternative agricultural systems
- Determine net GHG emission ($CO_2$, $CH_4$ and $N_2O$) of existing and alternative agricultural systems
- Determine environmental effects (water, air and soil quality) of new agricultural systems developed to reduce GHG emission and increase soil C storage



Multi-location-coordinated ARS effort

- Core project plan
- Individual scientist project plans
- Peer reviews

# GRACEnet

- Experiment Scenarios
  - Business as usual (current management practices)
  - Maximizing C sequestration rate
  - Minimizing net GHG emission including $N_2O$ and $CH_4$ emissions
  - Maximizing environmental benefits

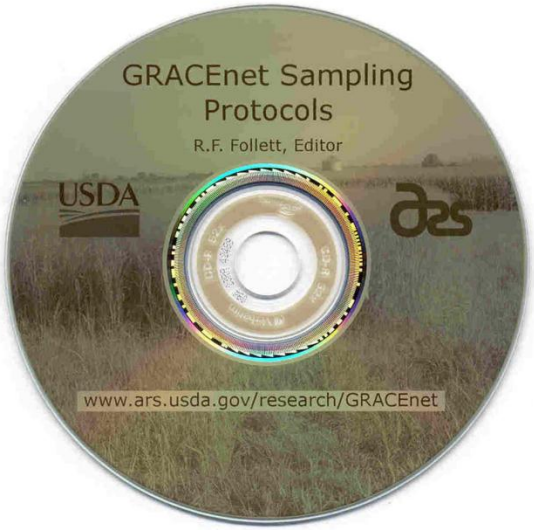
- Common sampling guidelines
- Instrumentation development
- Model development






# GRACEnet Sampling

**Cheyenne, WY**
**Prairie Heating And $CO_2$ Enrichment (PHACE) plot**

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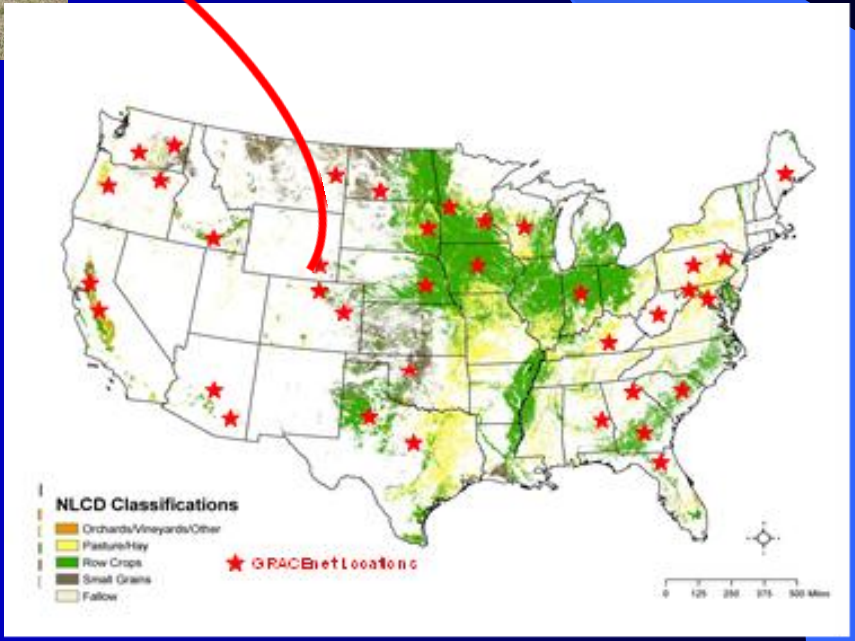
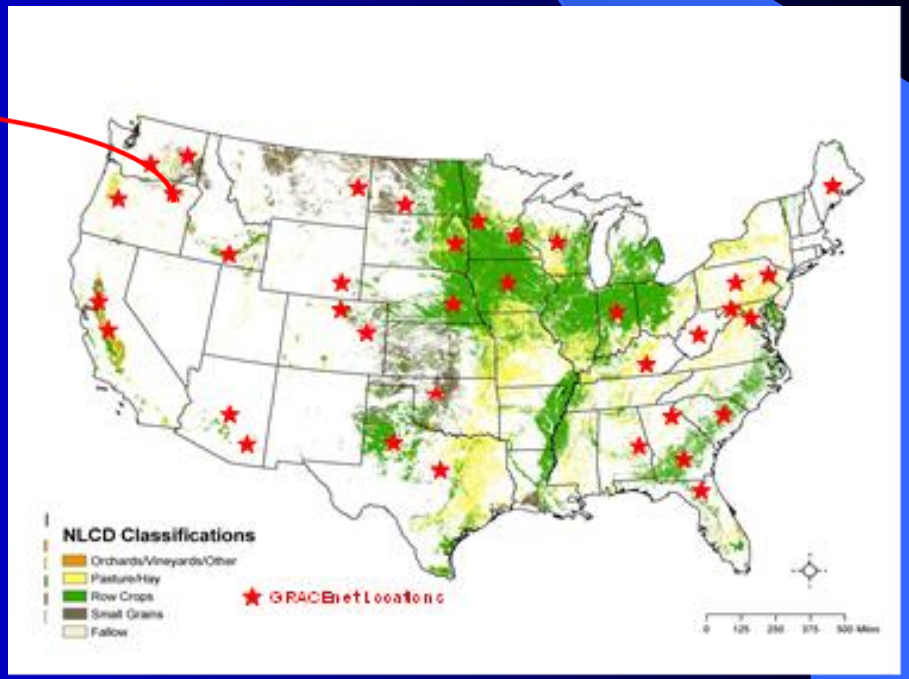


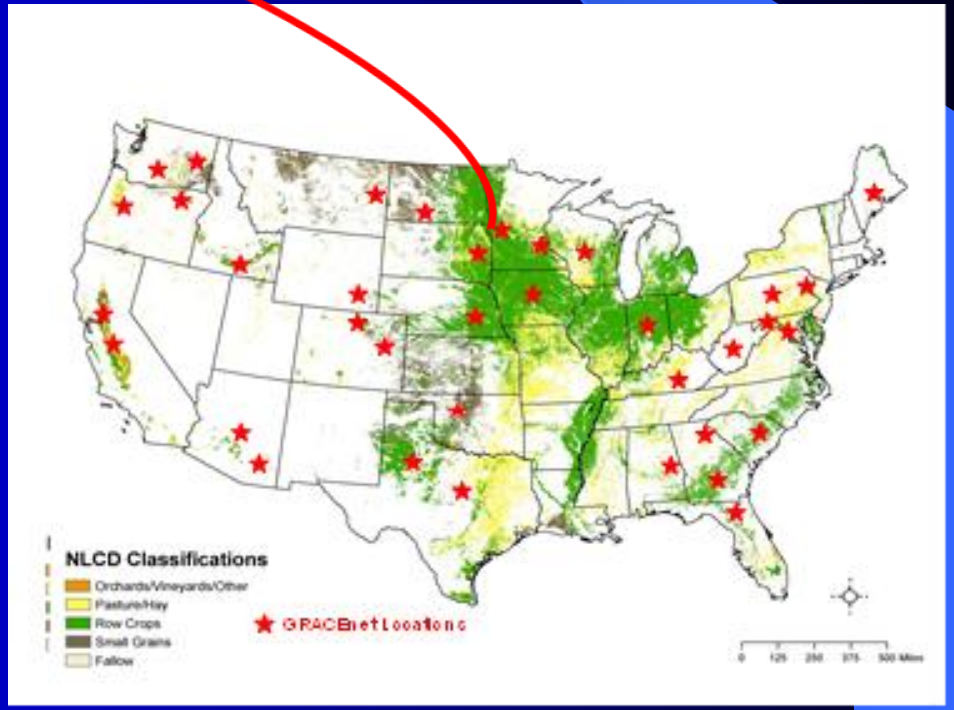
# GRACEnet Sampling


**Pendleton OR**
**Year round GHG measurements and $CO_2$ flux chamber**



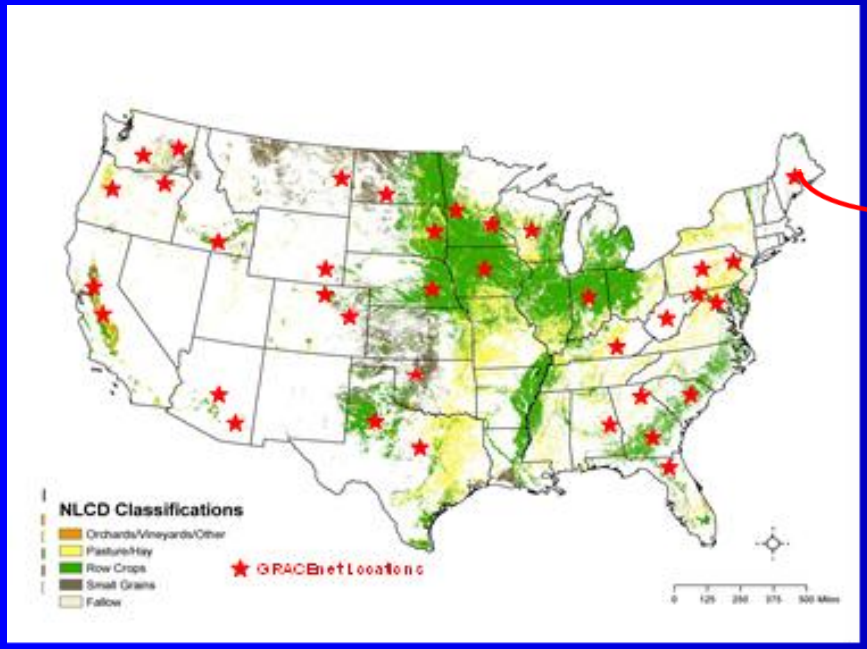
# GRACEnet Sampling

**Morris MN**
**Dynamic Open Chamber**
**measuring tillage induced $CO_2$**



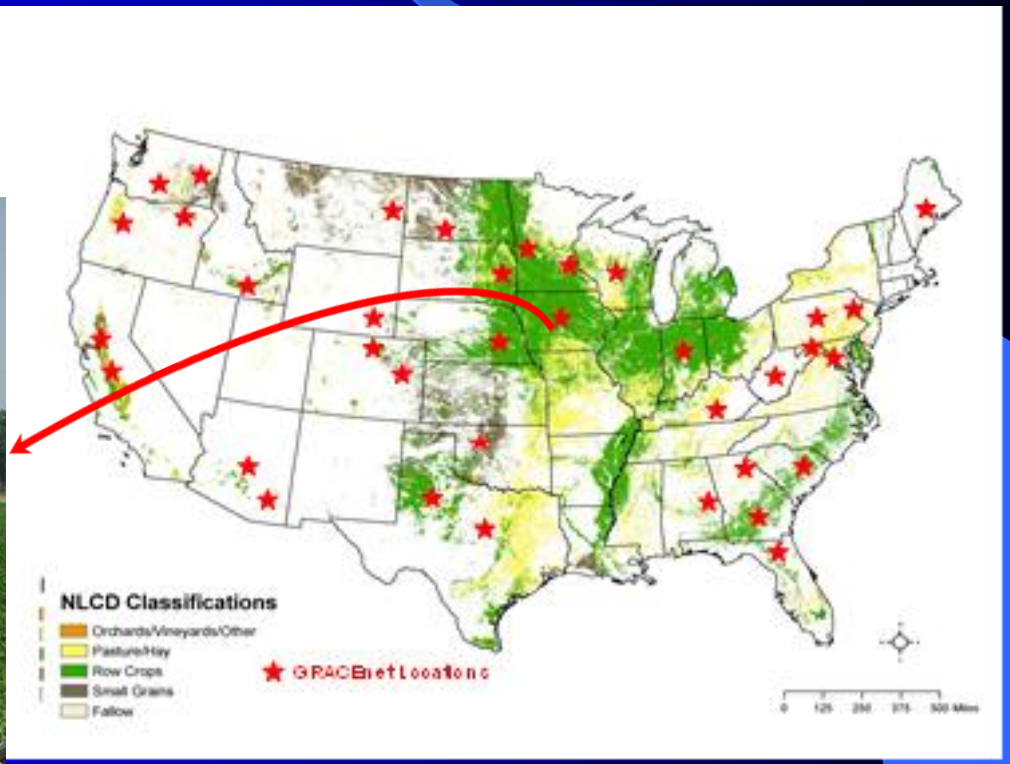
# GRACEnet Sampling

**Orono Maine**
**Chamber monitoring GHG emissions in potatoes**



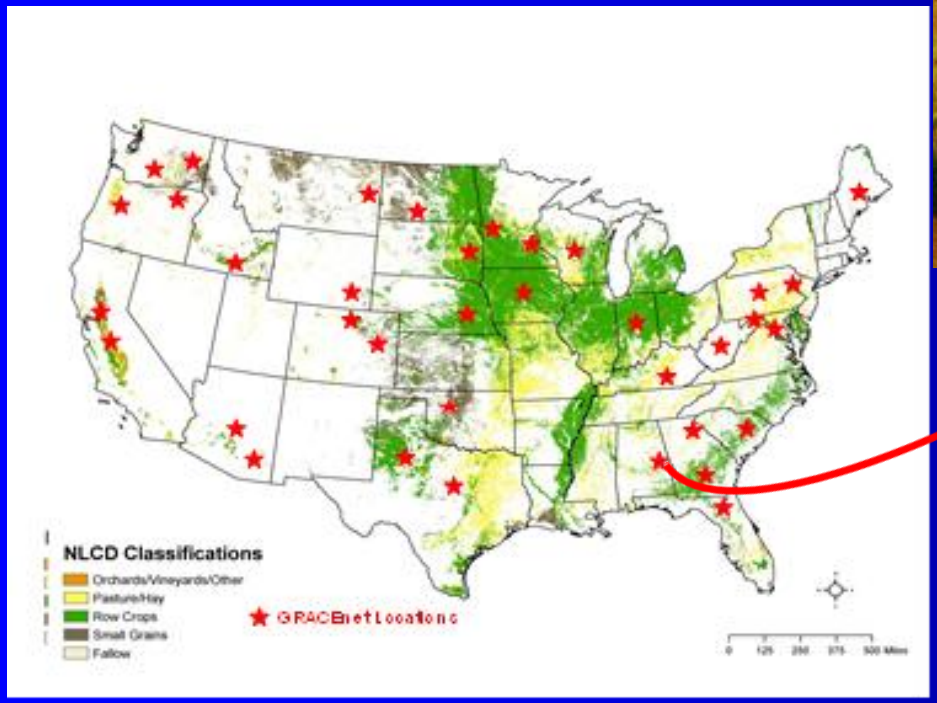
# GRACEnet Sampling

**Ames IA**
**Temporal variability of $N_2O$ emissions using automated chambers**
**Annual C balance in corn/soybean fields using eddy covariance**



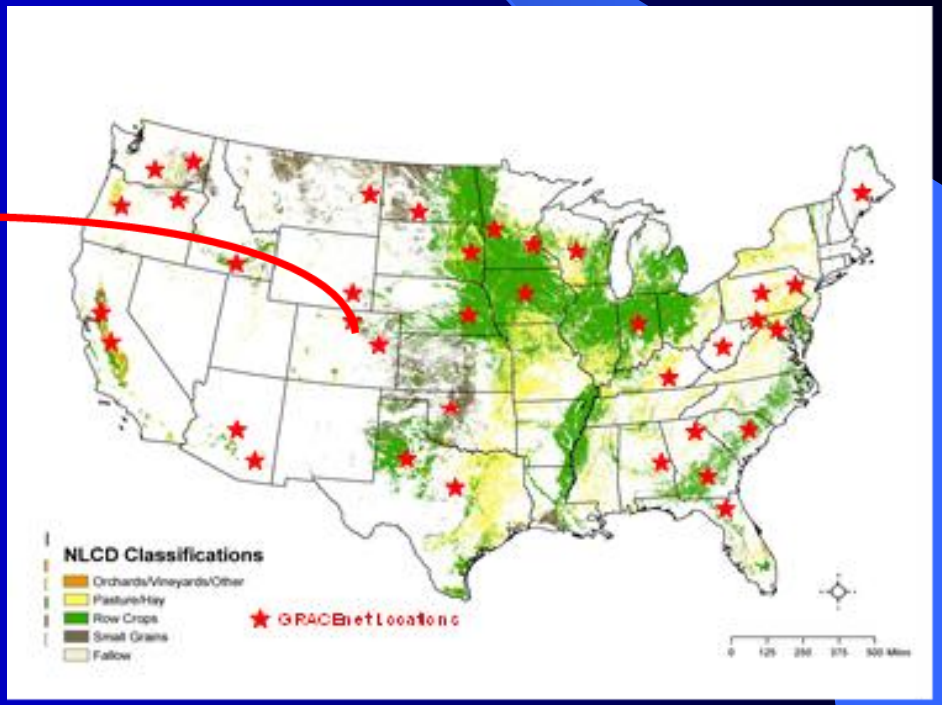
# GRACEnet Sampling

**Auburn, AL**
**Effects of elevated atmospheric $CO_2$ on cropping and pasture systems of the southeast**



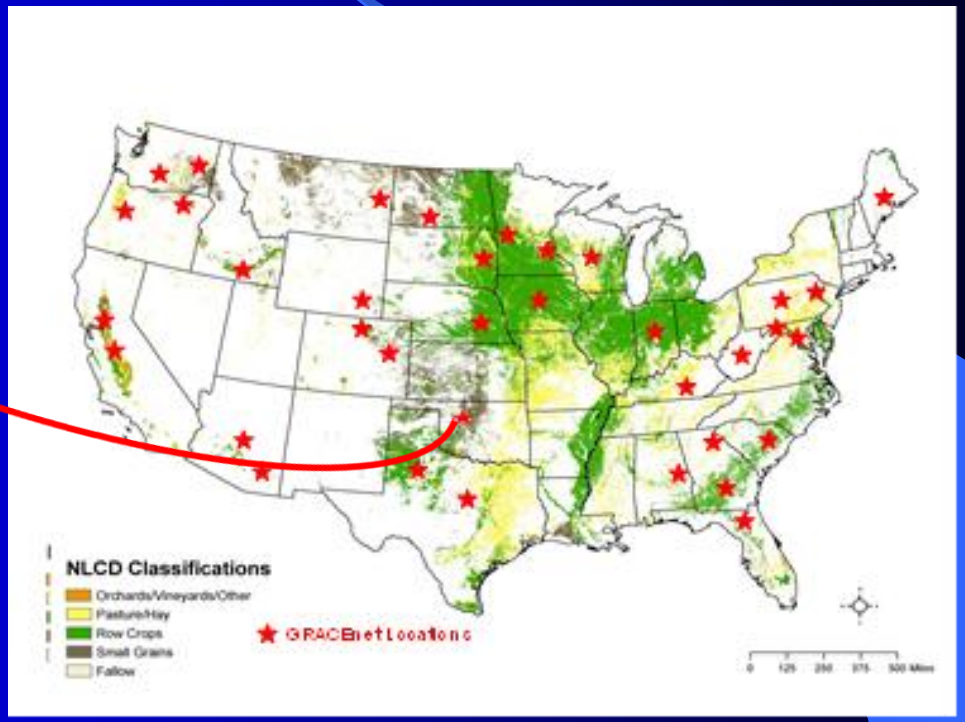
# GRACEnet Sampling


**Fort Collins CO**
**Nitrogen fertilization effects on GHG emissions from irrigated cropping systems**



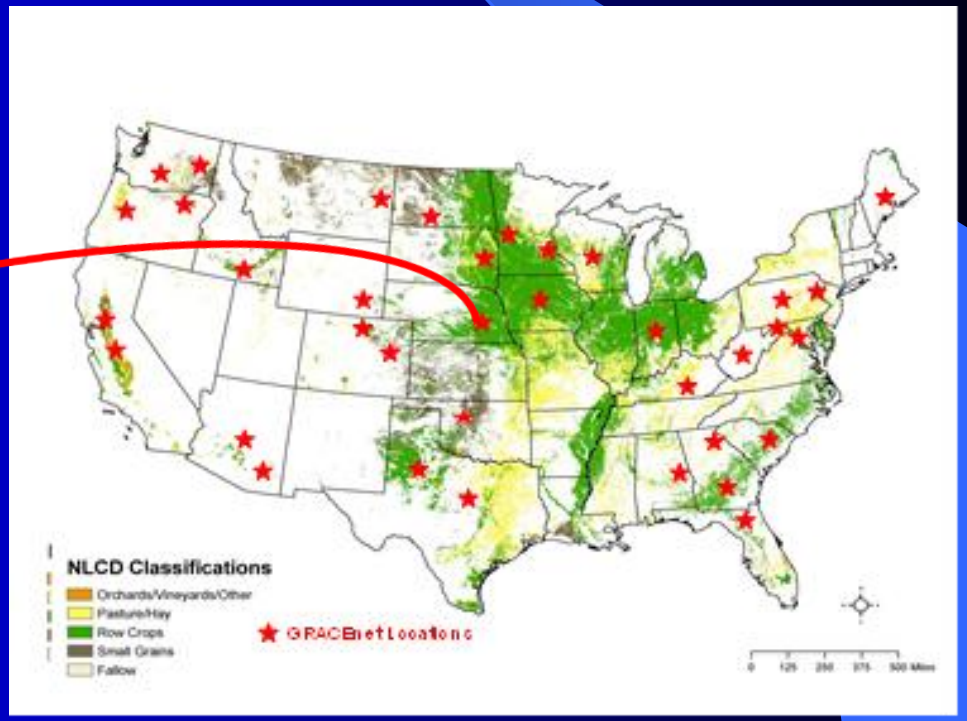
# GRACEnet Sampling

**Woodward OK**
**Soil Carbon sequestration assessment of rangeland plots in Southern Plains**



# GRACEnet Sampling

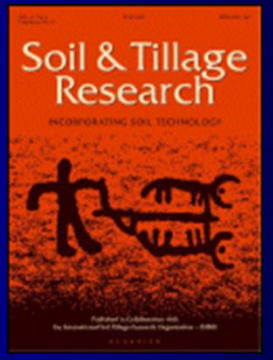
**Lincoln, NE**
**Soil carbon sequestration with depth under plots of biofuel corn and switchgrass after nine years**

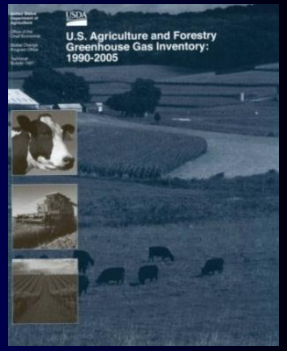


# GRACEnet Database

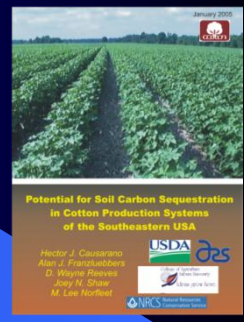
- **Strengthen partnership with IT professionals by forming scientist led data teams to improve the structure of the database, but one also suitable across additional science-driven data systems**
- **Work with IT professionals to build database entry, data retrieval, and web interface tools.**
- **Build a data system to allow data providers to describe their measurements, the geography with text and maps, and link to their publications.**

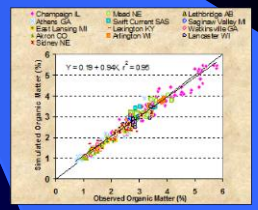
# GRACEnet

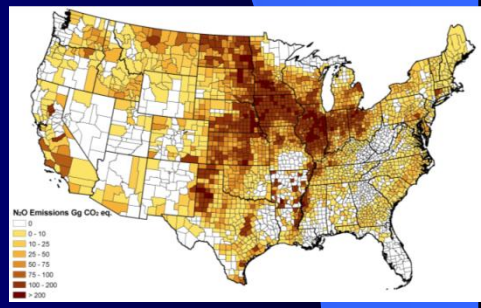



- **Products****
  - **National GHG flux & C storage database**
  - **Summary & synthesis papers for action agencies and policy makers**
  - **Regional & national guidelines for management practices**
  - **Development & evaluation of computer models**
- **Future**
  - **Increased $N_2O$ emphasis**
  - **Specialty crops (vegetables, fruits, nuts, horticulture, etc.)**
  - **Animal systems including increased pasture and range**
  - **Decision support & mitigation options**
  - **Domestic and international collaborations**
  - **Adaptation to future GCC**
  - **Enhanced database useability**




**208 refereed journal articles, books, book chapters, proceedings papers as of 10/08/2010

http://www.ars.usda.gov/research/GRACEnet

# GRACEnet Sampling

**Thank you,**

**Questions?**