

# Managing Agricultural Greenhouse Gases: The Basis of GRACEnet

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GRACEnet – What is it?

**G**reenhouse gas

**R**eduction through

**A**gricultural

**C**arbon

**E**nhancement

**net**work

# GRACEnet – What is it really?

**A dedicated network of ARS scientists at  
~30 locations**

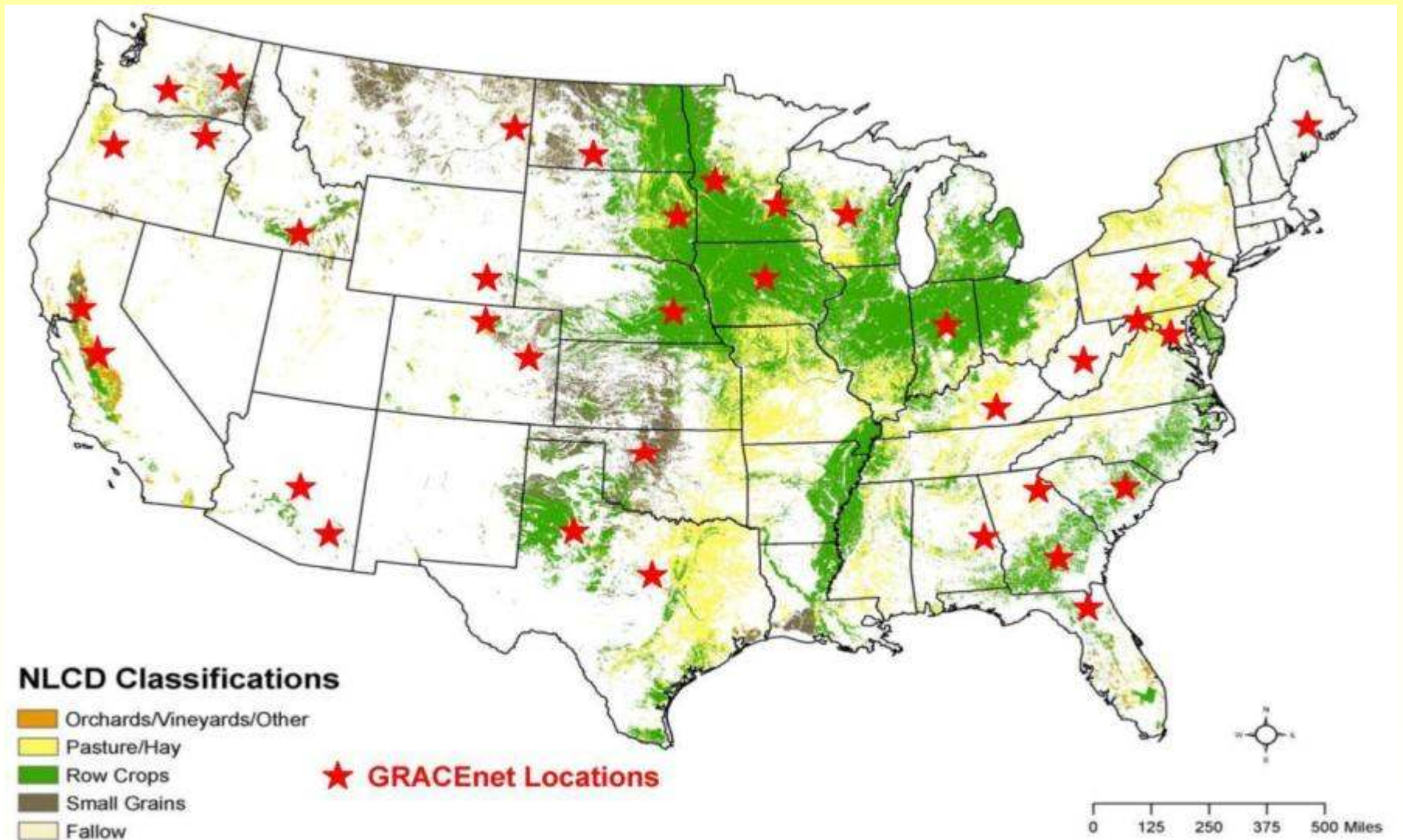


Prosser WA



Gainesville FL

# GRACEnet – Locations



# Objectives

1. Evaluate the status and direction of change in soil organic C from existing typical and alternative agricultural systems



# Objectives

2. Determine the net GHG emission ( $\text{CO}_2$ ,  $\text{CH}_4$ , and  $\text{N}_2\text{O}$ ) from existing typical and alternative agricultural systems



# Objectives

3. Determine the ancillary environmental responses (e.g. water, air and soil quality) from agricultural systems developed to reduce GHG emission and increase soil C storage



Watkinsville GA



University Park PA

# Approach

## ➤ **four location-specific scenarios**

### **1. Business as usual**

Typical agricultural  
management practices

Typified by a majority of  
producers in the region

May be many variations  
on typical practices



Lincoln NE



Brookings SD



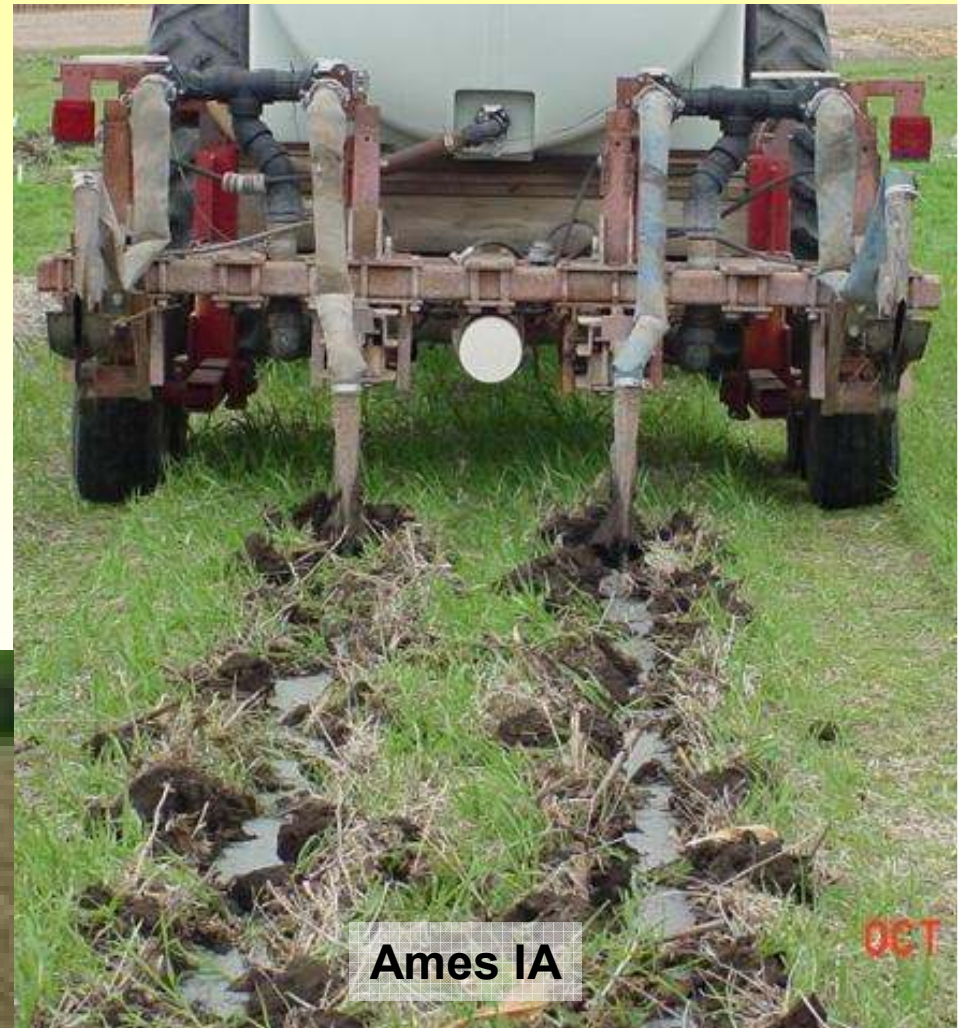
Orono ME



# Approach

## ➤ **four location-specific scenarios**

1. Business as usual
2. Maximizing soil organic carbon sequestration rate



# Approach

## ➤ **four location-specific scenarios**

1. Business as usual
2. Maximizing soil organic carbon sequestration rate
3. **Minimizing net GHG emission**



Mandan ND

# Approach

## ➤ **four location-specific scenarios**

1. Business as usual
2. Maximizing soil organic carbon sequestration rate
3. Minimizing net GHG emission
4. **Maximizing environmental benefits**

# Methodology

## Chamber methods for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O



Ames IA

Beltsville MD

# Protocols

[www.ars.usda.gov/gracenet](http://www.ars.usda.gov/gracenet)

## **National Program 212: Climate Change, Soils, and Emissions**

### **GRACEnet**

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- 1 - [GRACEnet Overview](#)
- 2 - [GRACEnet Sampling Protocols](#)
- 3 - [Reference Materials](#)
- 4 - [GRACEnet Participants](#)
- 5 - [Photo Gallery](#)
- 6 - [GRACEnet Data Entry Template](#)

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### **GRACEnet Sampling Protocols**

**Sampling Protocols (2010)†**

*R. F. Follett (editor)*

# Protocols

[www.ars.usda.gov/gracenet](http://www.ars.usda.gov/gracenet)

**Chapter 1.** [Guidelines for Site Description and Soil Sampling, Processing, Analysis, and Archiving](#) ----- Pages 1-1 to 1-5  
*Mark Liebig, Gary Varvel, and Wayne Honeycutt*

**Chapter 2.** [Plant Sampling Guidelines](#) ----- Pages 2-1 to 2-10  
*Jane Johnson and Jack Morgan*


**Chapter 3.** [Chamber-Based Trace Gas Flux Measurements](#) ----- Pages 3-1 to 3-39  
*Tim Parkin and Rod Venterea*

**Chapter 4.** [Micrometeorological Measurements](#) ----- Pages 4-1 to 4-10  
*John Baker and Bruce Kimball*

**Chapter 5.** [Guidelines to Populate the GRACEnet Database Template](#)-----Pages 5-1 to 5-4  
*Steve Del Grosso, Jeffrey White, David James, and Greg Wilson*

# Products

## 1. A national database of GHG flux and soil organic C storage

USDA United States Department Of Agriculture  
Agricultural Research Service GraceNet 

Home Comments

Welcome gracenet | logout

Locations Crops Management Amendments Grazing Soil Climate Spatial

Tillage:  Organic

Residue Removal:  Management:

GraceNet Scenario:  Nitrogen Addition:

Select Table to Display:

Display Selected Data

Download All Data

Download GraceNet Spreadsheet

GraceNet Web Site

Treatment ID	Date	Detailed Crop Management Practices
MDFSP_1.1	01/01/2007	3 Year Synthetic No-Till Corn-Soybean-Wheat/Soybean rotation; nutrient: synthetic; weed management: herbicide
MDFSP_1.3	01/01/2005	3 Year Synthetic No-Till Corn-Soybean-Wheat/Soybean rotation; nutrient: synthetic; weed management: herbicide
GAJPCSR1_F1H0	04/11/1994	Mineral N, Unharvested
GAJPCSR1_F1H1	04/11/1994	Mineral N, Low Intensity Grazing
GAJPCSR1_F1H2	04/11/1994	Mineral N, High Intensity Grazing
GAJPCSR1_F1H3	04/11/1994	Mineral N, Hayed
GAJPCSR1_F2H0	04/11/1994	Clover N, Unharvested
GAJPCSR1_F2H1	04/11/1994	Clover N, Low Intensity Grazing
GAJPCSR1_F2H2	04/11/1994	Clover N, High Intensity Grazing

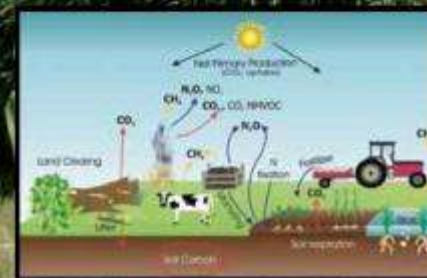
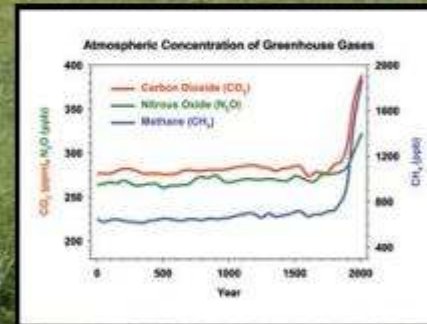
# The next product



## MANAGING AGRICULTURAL GREENHOUSE GASES

Coordinated Agricultural Research through GRACEnet to Address our Changing Climate

Edited by  
Mark A. Liebig  
Alan J. Franzluebbers  
and Ronald F. Follett





# GRACEnet

- ✓ **Networking and leveraging of resources among numerous ARS locations has fostered scientific advancements in quantifying (a) soil organic C sequestration and (b) emission of GHGs from agriculture**
  - **Created a cohesive, scientific culture within a multi-tasking organization**
  - **Developed a strong national and international reputation of scientific inquiry in the field of greenhouse gases (e.g. key member of the Global Research Alliance on Agricultural Greenhouse Gases – [www.globalresearchalliance.org](http://www.globalresearchalliance.org))**

