



GLOBAL
RESEARCH
ALLIANCE

ON AGRICULTURAL GREENHOUSE GASES

Managing Agricultural Greenhouse Gases Network (MAGGnet): Exploring Greenhouse Gas Mitigation Potential of Cropland Management Practices

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MACSUR Workshop
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The Mitigation Challenge

- Need for cooperative research frameworks focused on GHG mitigation (Baker and Follett, 2012)
 - Subject complexity
 - Regional variability
 - Standardized methods
 - Data/sample archives
 - A long-term issue... ..continuity is essential!



Why should scientific organizations with similar interests labor along in ignorance of each other's efforts?

Presentation Overview

- What is MAGGnet?
- Current status
- Report recent project activity

MAGGnet

Managing
Agricultural
Greenhouse
Gases network



Global Research Alliance on Agricultural Greenhouse Gases

- **Established:** December 2009, United Nations Climate Change Conference, Copenhagen, Denmark
- **Purpose:** Facilitate research, development and extension of technologies and practices that will help deliver ways to grow more food (and more climate-resilient food systems) without growing greenhouse gas emissions.
- **Current Membership:** 46 countries (Europe, Americas, Asia Pacific, Africa)

<http://globalresearchalliance.org/>

GRA Organizational Structure

- The Global Research Alliance is composed of four research groups:
 - ✓ Livestock
 - ✓ Croplands
 - ✓ Paddy Rice
 - ✓ Integrative



<http://globalresearchalliance.org/>

GRA Croplands Research Group

Croplands Research Group – Key Work Areas:

1. Understanding the current research landscape (facilitating communication among members)
2. Building capacity (e.g., Borlaug fellowships, USA; LABEX scientist exchanges, Brazil)
3. Research networks and databases **MAGGnet**
4. Collaborative research
5. Providing policy support and links to international initiatives
6. Good practice guidance and technical methodologies

<http://globalresearchalliance.org/>

What is MAGGnet?

- Managing Agricultural Greenhouse Gases Network
- MAGGnet represents a coordinated, multi-national approach for inventory and analysis of greenhouse gas mitigation research.
- Initiated February 2012. Major activities include two metadata calls, update, and grant proposal (FACCE-JPI).

<http://globalresearchalliance.org/maggnet/>

MAGGnet

- Hypotheses

- GHG networks provide a forum for generating creative solutions to critical mitigation challenges using diverse perspectives
- data archives and management activities often serve as a key focus for GHG networks using modelling approaches
- high-quality field data are essential to feed modelling and meta-analyses to inform mitigation policies

- Objectives

- to compile metadata from experimental sites* throughout the world where greenhouse gas fluxes and soil carbon dynamics are monitored.

*[Sites with published data]

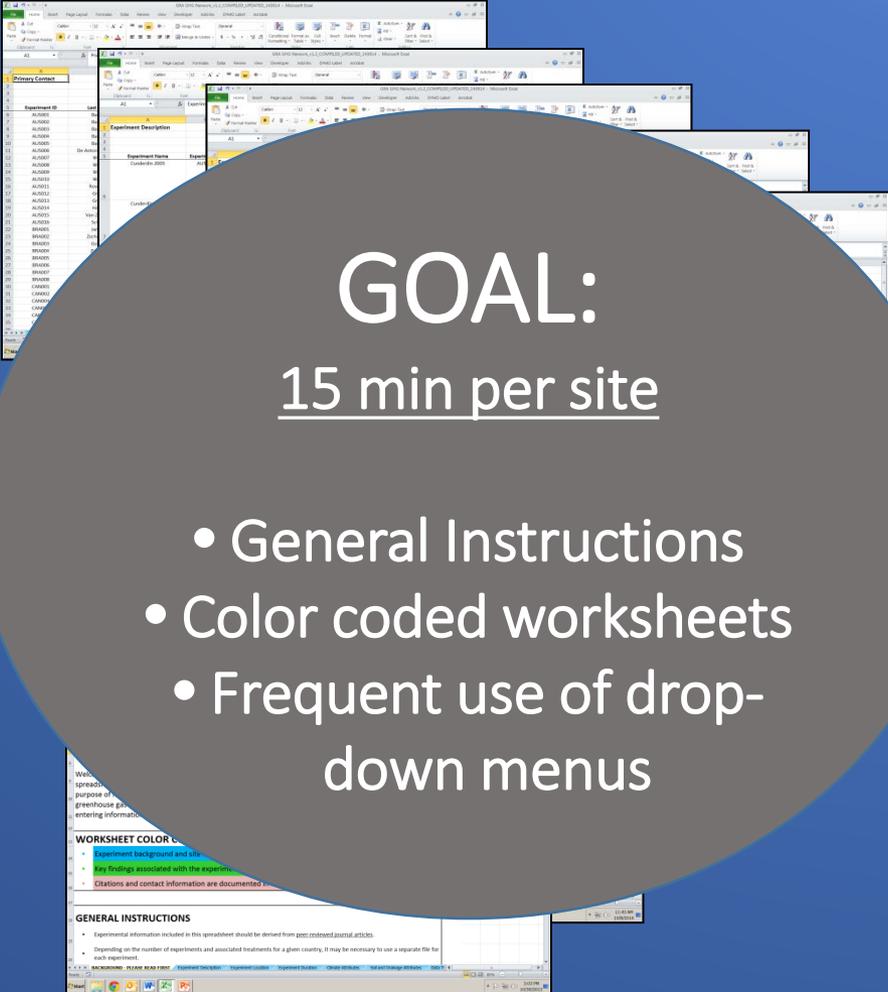
<http://globalresearchalliance.org/>

MAGGnet

Metadata Entry Template

Worksheet Tabs

- Experiment description
- Experiment location
- Experiment duration
- Climate attributes
- Soil and drainage attributes
- Data type
- Treatments
- Key Findings
- Journal citations
- Primary contact



GOAL:
15 min per site

- General Instructions
- Color coded worksheets
- Frequent use of drop-down menus

MAGNet - April 2016

1 view

All changes saved in Drive

Add layer Share

Google maps input 042516.xlsx

Uniform style

3 rows couldn't be shown on the map.
Fix errors highlighted red in the data
table. [Open data table](#) [Dismiss](#)

 All items (172)

Base map

- 14 unique climate subdivisions
- 11 surface soil textures

➤ 23 countries
➤ 318 experiments

Table 2. Number, current status and duration of studies included in the Managing Agricultural Greenhouse Gases Network (MAGG-net), December 2015.

Country	No. of studies	Status		Duration		
		Completed	Ongoing	1–3 yr	3–10 yr	> 10 yr
Argentina	10	4	6	8	1	1
Australia	16	16	0	16	0	0
Brazil	8	8	0	8	0	0
Canada	12	11	1	11	0	1
Costa Rica	1	1	0	1	0	0
Denmark	5	2	3	0	0	5
Finland	12	12	0	8	4	0
France	104	90	14	95	8	1
Germany	15	15	0	14	1	0
Indonesia	2	2	0	2	0	0
Ireland	7	7	0	2	5	0
Italy	19	0	19	1	4	14
Japan	9	4	5	2	2	5
Korea	1	0	1	0	1	0
New Zealand	2	1	1	1	1	0
Spain	12	3	9	3	9	0
Switzerland	10	6	4	0	3	7
United Kingdom	36	36	0	35	0	1
United States	30	15	15	6	15	9
Uruguay	4	0	4	1	0	3
Total	315	233	82	214	54	47

Experimental Sites Summary

Status

- 236 completed
- 82 ongoing

Duration

- 217 short-term (<1-3 yr)
- 54 mid-term (>3-10 yr)
- 47 long-term (>10 yr)

Common Treatments

- Fertilizer rate (69)
- Manure/Amendments (53)
- Tillage type (44)

Soil/GHG/Plant parameter	Projects measuring parameter (%)
Soil carbon	78
N ₂ O flux	78
CO ₂ flux	43
CH ₄ flux	28
Grain	53
Stover	34
Roots	8

MAGGnet Contributions

Model Inter-comparison Exercise (INRA, France)

- MAGGnet used to help identify sites for modeling exercise

Template used by GRA Paddy Rice Research Group (NIAES, Japan)

- MAGGnet template adapted for rice production

GRA Modeling Platform (GRAMP) Collaboration (James Hutton Inst., UK)

- MAGGnet metadata shared through interactive map

<http://globalresearchalliance.org/maggnet/>

FACCE-JPI Project (2014-2017)

Quantifying Greenhouse Gas Mitigation Effectiveness through MAGGnet

Objectives:

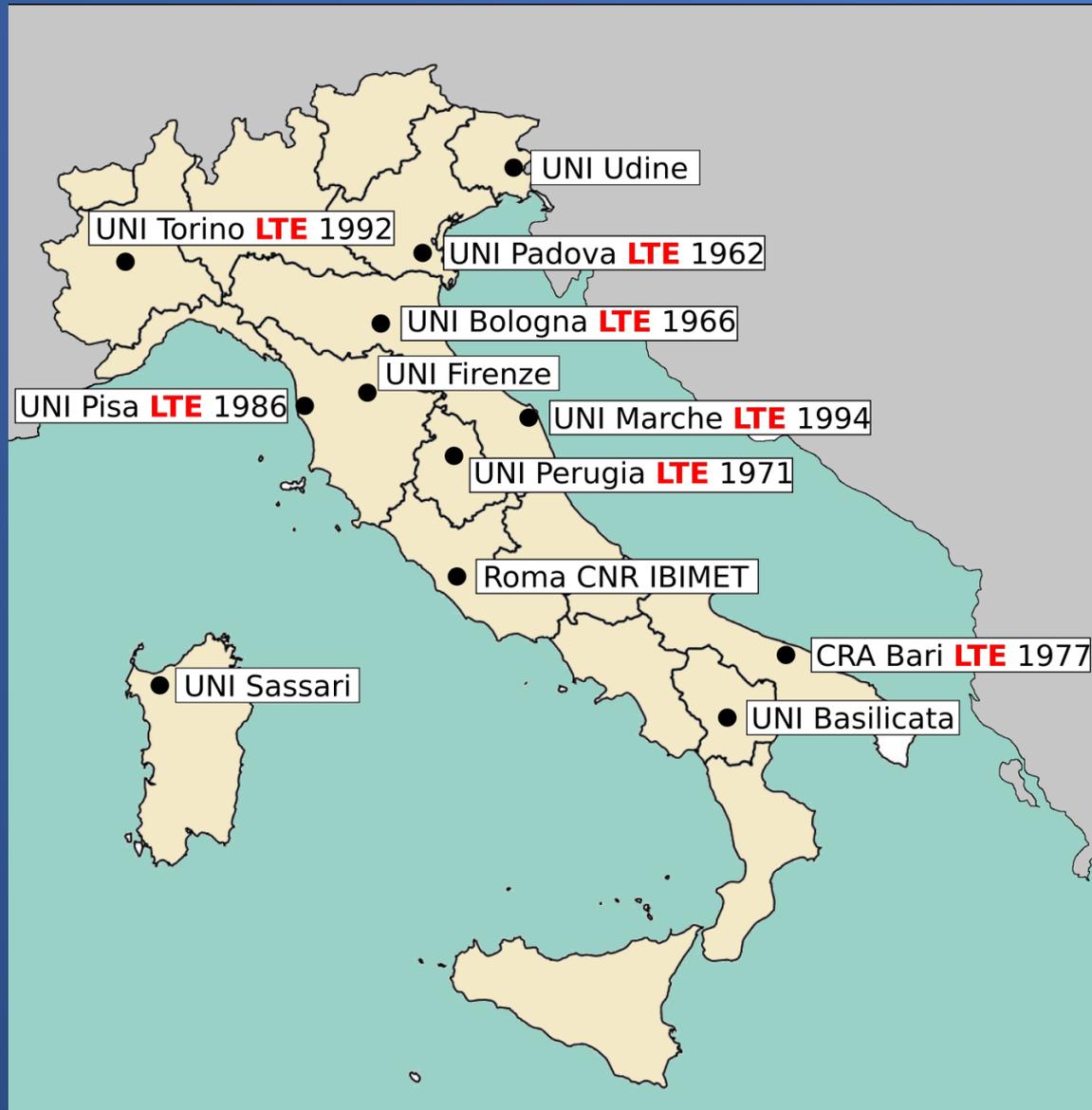
- Quantify the effectiveness of specific mitigation practices,
- Quantify potential tradeoffs in GHG mitigation and crop yield, and
- Identify and communicate critical data gaps.

Approach

- Identify experimental sites with measurements of soil organic C, N₂O flux, and grain yield.
 - 97 sites, 9 countries
- Gather journal publications reporting metrics outlined above for each experimental site.
 - 126 publications
- Partition reported data by management variable into 'Business as Usual' and 'Alternative' treatments
 - N fertilization, N source, Crop Rotation, Tillage

IC-FAR

Linking Long Term Observatories
with Crop Systems Modeling For a
better understanding of Climate
Change Impact and Adaptation
StRategies for Italian Cropping
Systems



19 Italian LTE's

Crops	Sites
Wheat (start yr 1962-09)	17 (incl.6 durum wheat)
Maize (Start yr 1962-06)	12 (incl. 4 with silage)
Sugarbeet (1962-08)	7
Pulses (1962-98)	6
Sunflower	6
Vegetables	4
Grasslands and forages	1-2
Other (6 crops)	1-3

19 Italian LTE's

Treatments	Sites
Fertilization (organic)	10 (6)
Crop residue mgt	7
Crop rotation	6
Tillage	5
Organic farming	3
Soil type	2
Cover crops	2

Italian partnership in MAGGnet

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Editorial

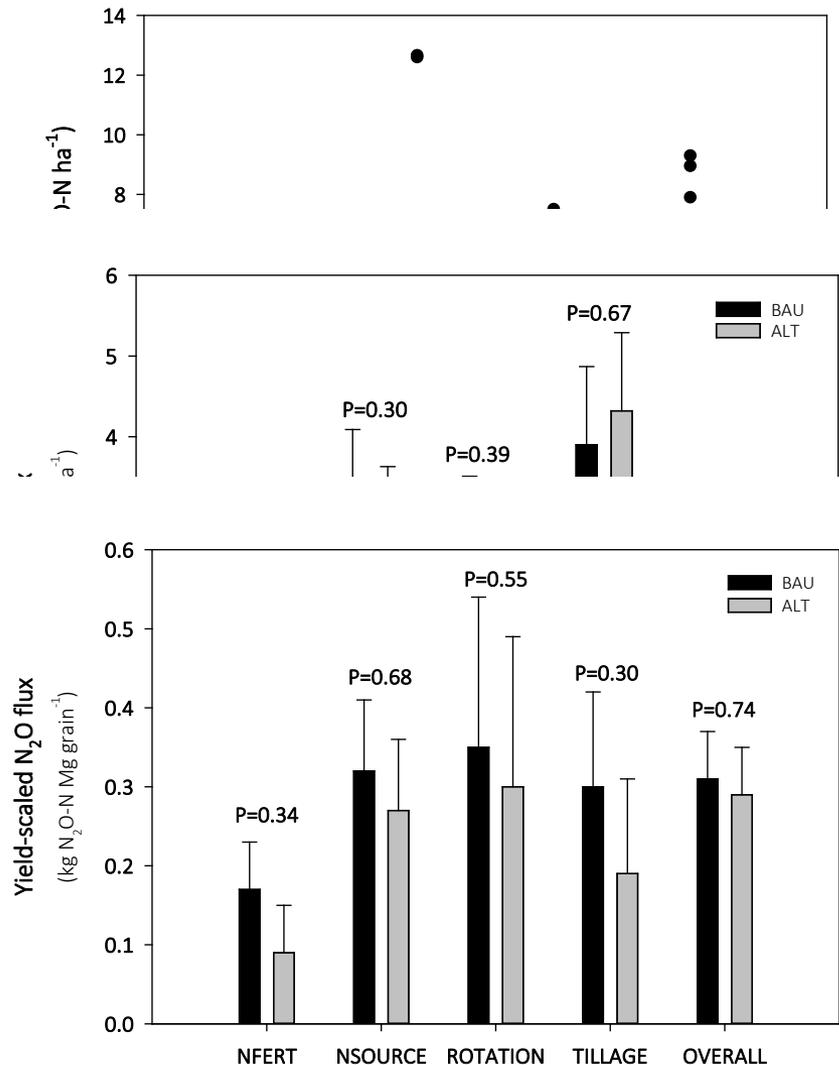
IC-FAR - Linking long term observatories with crop system modelling for a better understanding of climate change impact and adaptation strategies for Italian cropping systems



www.ICFAR.it

Preliminary Results (N₂O flux)

- Small number of treatment contrasts (46)
- N fertilization yielded only significant difference among management variables
- No difference in yield-scaled emissions



Plans Going Forward

- Continue expansion of meta-database
- Online search function by site attributes, crops, management, etc.
- Progress on FACCE-JPI work plans
- Refine/Update input for GRA Modeling Platform (<http://gramp.org.uk/>)
- Explore collaborations/partnerships
 - Livestock Research Group, Integrative Workgroup

Opportunities and Challenges

Opportunities...

- Online search function by site attributes, crops, management, etc.

Challenges...

- It is easier to fund initial network development than ongoing activities.
- Scientist engagement (*The 'It's my (meta)data!' and 'What's in it for me?' Syndromes*).

For additional detail, please see...

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MAGNet: An international network to foster mitigation of agricultural greenhouse gases

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ABSTRACT
Research networks provide a framework for review, synthesis and systematic testing of theories by multiple scientists across international borders critical for addressing global-scale issues. In 2012, a GHG research network referred to as MAGNet (Managing Agricultural Greenhouse Gases Network) was established within the Croplands Research Group of the Global Research Alliance on Agricultural Greenhouse Gases (GRA). With involvement from 46 alliance member countries, MAGNet seeks to provide a platform for the inventory and analysis of agricultural GHG mitigation research throughout the world. To date, metadata from 315 experimental studies in 20 countries have been compiled using a standardized spreadsheet. Most studies

KEYWORDS
Carbon sequestration; Global Research Alliance; Managing Agricultural Greenhouse Gases Network; Nitrous oxide

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MAGNET

Managing Agricultural Greenhouse Gases Network (MAGNet)

About MAGNet

MAGNet was initiated in the spirit of advancing greenhouse gas mitigation science through a multi-national research effort facilitated by the Global Research Alliance on Agricultural Greenhouse Gases (GRA).

By employing a user-friendly spreadsheet template, MAGNet seeks to compile metadata from experimental sites throughout the world where greenhouse gas fluxes and soil carbon dynamics are monitored. Priority is given to sites with published data.

Since 2012, MAGNet has compiled metadata from over 315 experimental studies from 20 countries. Metadata contributors include scientists engaged in the Croplands Research Group and Paddy Rice Research Group of the GRA.



Joining MAGNet

To obtain access to the latest versions of the MAGNet metadata entry template and sharing agreement, please download the available files listed below:

- Metadata Entry Template
- Sharing Agreement

Consent to the download of MAGNet files, a courtesy email to the MAGNet Coordinator would be greatly appreciated (contact information listed below). Doing so will facilitate accurate record keeping of downloaded files, as well provide a conduit to more easily assist with potential questions associated with the network.

Contact Details

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Thank you!