

MAGGnet: A Meta-Database to Support Greenhouse Gas Mitigation Research

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Context

Concurrent efforts to mitigate agricultural greenhouse gases (GHGs) while adapting production practices to projected hardships of climate change will be essential to ensure long-term sustainability and food security. Relevant and timely agricultural research must focus on how to best respond to climate change by utilizing a balance of thoroughly tested and novel management practices and technologies.

In response to these opportunities, the **Global Research Alliance on Agricultural Greenhouse Gases** (GRA) was formed in 2009 to develop trans-national strategies for reducing GHG intensity of agricultural production. To facilitate focused efforts, the GRA is organized in four research groups (Cropland, Livestock, Paddy Rice, Integrative) each of which developed work plans to enable successful collaborations, as well as to share knowledge and best practices, build capacity and capability among participants, and move towards transformative solutions to reduce agricultural GHG emissions. The **Managing Agricultural Greenhouse Gases Network** (MAGGnet) contributes to these efforts.

Description

MAGGnet was established in 2012 to provide a platform for the inventory and analysis of agricultural GHG mitigation research. MAGGnet focuses on compiling metadata from experimental sites where GHG fluxes and soil carbon dynamics are measured. A simple metadata entry template is used to collect key experimental attributes listed in peer-reviewed publications.

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



Experimental Sites



Attributes Across Sites

Most experimental sites included in MAGGnet represent completed studies (74%) conducted within a 1-3 year duration (68%). Soil carbon and nitrous oxide emissions are common measurements, included in >75% of the studies. Among plant variables, grain yield is assessed across studies most frequently (55%). Long-term studies (>10 yr) comprise 15% of the sites.

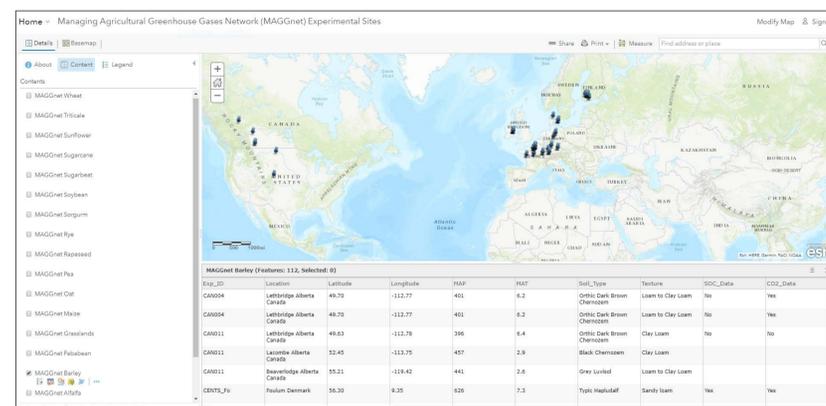
Contributions

- MAGGnet overview paper published in *Carbon Management* (Liebig et al., 2016; <http://dx.doi.org/10.1080/17583004.2016.1180586>)
- Metadata used to identify potential sites for inclusion in meta-analyses and model inter-comparison exercises (Ehrhardt et al., 2018; Sándor et al., 2018).
- Metadata entry template adapted by GRA Paddy Rice Research Group for documentation of rice production systems in Japan, Indonesia, Philippines, Thailand, and Vietnam.
- Online availability of metadata entry template, map, and sharing agreement through the GRA Croplands Research Group (<http://globalresearchalliance.org/maggnet/>)



Recent Activities

- An ArcView mapping feature was recently developed to facilitate more efficient selection of experimental sites for meta-analyses and modeling activities. Metadata site groupings were aligned by crop, allowing users to visualize specific experimental sites globally.
- In addition to the mapping feature, efforts to increase the number of experimental sites in MAGGnet are ongoing. The 2017/2018 GRA metadata call yielded 40 new experimental sites: USA (14), Canada (12), Finland (6), Italy (4), and New Zealand (4).



Mapped locations and associated metadata for experimental sites including barley (*Hordeum vulgare* L.).

Next Steps

- Once complete, provide online access to ArcView mapping feature.
- Continue expansion of MAGGnet meta-database.
- Seek out options to develop online interface for metadata collection and retrieval. Possible alignment of MAGGnet metadata within the GRA Modeling Platform (GRAMP) has potential to greatly increase the utility of both efforts.

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