GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

Croplands Research Group Meeting

Hotel Divinus, Nagyerdei krt. 1, Debrecen, Hungary

28-29 August 2014

Meeting Report

OVERVIEW

The sixth meeting of the Croplands Research Group (CRG) of the Global Research Alliance on Agricultural Greenhouse Gases ("the Alliance") was held at the Hotel Divinus, Debrecen, Hungary on 28 and 29 August 2014 following the European Society of Agronomy annual meeting. The Alliance meeting was chaired by USA (Dr Alan Franzluebbers, USDA-ARS) and Brazil (Dr Ladislau Martin, EMBRAPA) as Co-Chairs of the Croplands Research Group.

This report is a summary of the key discussions and outcomes of the meeting. PDF's of the presentations are provided separately on the member's area of the Global Research Alliance website.

PARTICIPANTS

The meeting was attended by 31 participants, representing 18 Alliance member countries, one observer country and an invited speaker.

- **Alliance Members attending:** Brazil, Canada, Chile, China, Denmark, Finland, France, Germany, Italy, Japan, Korea, Netherlands, Norway, Poland, Spain, Sweden, UK, USA.

- **Alliance Members unable to attend:** Australia, Argentina, Colombia, Costa Rica, Ghana, Ireland, Malaysia, Mexico, New Zealand, Nicaragua, Indonesia, Peru, Philippines, Switzerland, Thailand, Uruguay, Viet Nam.

- **Observer country attending:** Lithuania

MEETING OUTCOMES

The meeting achieved the following outcomes:

- Update from the Alliance Secretariat including outcomes from the latest Council meeting.
- Research updates from member countries.
- Updates from Cross-Cutting Groups of the Alliance.
- Report on the three component activities of the CRG.
- Agreement to contribute to a regular series of CRG webinars.
- Presentation and discussion on communicating the activities.
- Identification of new collaborations and activities.
- Next steps for the Group and discussion about future meetings.

SUMMARY OF DISCUSSIONS

OPENING REMARKS

1. The meeting was opened by Dr Alan Franzluebbers (Agricultural Research Service-USDA) as US Co-Chair and Brazil Co-Chair Dr Ladislau Martin (EMBRAPA). The Chair welcomed all participants to the meeting, particularly Poland attending their first meeting since joining the Alliance and the representatives from Lithuania attending as observers.

2. The Chair provided an overview of the outcomes from the fifth CRG meeting in Tampa, Florida including:

- the development of a modelling workshop;
- launch of the GRAMP website;
- development of the MAGGnet database;
- update on the literature database;
- a discussion on nitrogen fertiliser efficiency;
- possible collaborations with CCAFS;
- information around two capability programmes, Borlaug fellowships and LABEX;
- announcement of an agroforestry workshop; and
- a discussion of the synergies between adaptation and mitigation that apply to croplands.

3. A significant topic of discussion from the Alliance Council meeting was the need to promote the Alliance and showcase the achievements from the past four years. The Group was asked to consider how the CRG can show progress to member countries and those outside of the Alliance as well as making sure that the outputs from the Group are made available for use. Each Member country has the opportunity to create a page on the Alliance website and to include information about the Alliance activities they contribute to or support. Countries can use the webpage to promote the Alliance to their own science communities and policy makers as well as other Alliance members.

SECRETARIAT UPDATE

4. A presentation form the Secretariat included an update on the outcomes from the most recent meeting of the Alliance Council, membership of the Alliance and updates on activities and meetings of the other Research Groups. The 2014 Alliance Council meeting was hosted by the incoming Council Chair the Netherlands. Outcomes from the Council meeting included five actions proposed to the Council during the Research Group report on:

1. Framework
    - Promote practical outcomes to stakeholders
2. Developing Partner relationships
    - Research Groups to develop Partner roadmaps
3. Communication
    - Develop targeted communications, including promotion of outputs
    - dedicated country contacts for each of the Groups
4. Adaptation
    - Stocktake of synergies between adaptation and mitigation
5. Cross-cutting Issues
    - RGs to support Cross-Cutting meetings and activities
    - Integrated Networks: Modelling, Monitoring, Inventories

5. The Group was also provided with an update on the activities of the Secretariat including a focus on promoting the Alliance through social media and a request that member countries update their activities on the Alliance website. The Secretariat will also be working with the Chair and interested members to develop terms of reference for Council representatives including activities such as communicating with country participants in the Research Groups.

6. The Group discussed the difficulties some members face in finding funding to attend meetings of the CRG, as there is often a gap between the funders and the scientists. Funding providers of a country will need to see the benefit of participating in any activity of the Alliance; meeting participants that do not having funding available for travel should identify and participate in collaborations of the Group which could bring additional funding, or provide a reason for travel funding. Sending a participant to international meetings can generate international support and experience for existing work programmes, beyond what would have been gained otherwise. It is important for researchers involved in the Alliance to show where countries can gain this additional influence.

7. Each country then provided a short presentation on the research activities underway in their country. Summaries of these presentations may be found in Appendix 2 and copies of the presentations are available on the website.

COMPONENT 1 – NET GREENHOUSE GAS EMISSIONS

8. The report to the Group on activities completed under Component 1 concentrated on the development of the Managing Agricultural Greenhouse Gas Network (MAGGnet) database. The

presentation was given by Mark Liebig of USDA-ARS. MAGGnet is an international database bringing together information on long term experiment sites and research expertise. The first call for metadata and experimental site data was made in February 2012; additional improvements were made ahead of the second call in 2013. The project received funding through the FACCE-JPI multi-country funding call on mitigating agricultural greenhouse gases (GHG) and the database now includes information from over 200 experimental sites in 17 countries and many treatments, including grasslands as well as crops.

Recent activities

- Provided the Soil Carbon and Nitrogen Group project with long term experiment metadata.
- The Paddy Rice Research Group is adapting the template for use in rice systems.
- Developing a data sharing agreement, a draft version has been circulated.
- The next update is nearly complete (v1.2), with country comments requested.
- Additional response data for GHG emissions, soil carbon and crop yield will be requested from select sites in the future (as part of the FACCE-JPI project).
- Efforts continue on identifying how the database could be used to support the modelling community.

9. MAGGnet includes long term experiment sites with published data available on soil carbon and/or greenhouse gas emissions.

COMPONENT 3 – MODELLING EMISSIONS FROM CROPLANDS

N_2O workshop

10. The outcomes from the N2O modelling workshop under Component 3 were presented by Pierre Cellier of INRA. The workshop was held in Paris during March 2014 alongside a workshop of the Soil Carbon and Nitrogen Cycling Cross-Cutting Group (SCN) and discussed models used to describe N2O emissions from croplands and what further information is required to account for the use of different mitigation practices.

11. The workshop was attended by 62 participants from 21 countries with an introduction to N2O processes, models and databases as well as four sessions on the key croplands management practices; tillage, fertilisation, cover cropping and other managements and techniques. The workshop identified the knowledge gaps around each of these processes and will now work with the Soil C and N Cross-Cutting Group to identify models suitable for specific circumstances. The participants will write a series of five synthesis papers, with authors and journals still to be identified, the first draft will be complete by December 2014.

GRAMP Project

12. An update on the GRA Modelling Platform (GRAMP) was presented by Jagadeesh Yeluripati from the James Hutton Institute, UK. GRAMP is an open source web platform for modelling greenhouse gas emissions from crops and was launched at the last meeting of the CRG.

13. GRAMP will bring together the numerous carbon and nitrogen processed based models available which model greenhouse gas emissions and soil carbon stocks from crop soils to improve our ability to compare experimental results. The platform is able to document all aspects of the

modelling process including any changes made to create a new version of the model and the parameters used when running experiments. GRAMP has four components:

1. Data storage and records;

2. Model trees documenting the evolution and versions of the models;

3. Applications database which will test all models against the benchmark sites (in collaboration with AgMIP) and record the ability of models to perform under different conditions; and

4. Training and education, including the ability to host webinars. A schedule of monthly webinars will be circulated in the near future

14. The example model used is DNDC, and this is currently available on the platform so users may explore the features available. The website will be open for user registration within the next few months opening the functions for expansion to other models. The platform and the information on DNDC already included have been developed in collaboration with the Agricultural Modelling Hub (AGRIMOD) and the Global DNDC Network. We anticipate that once registration goes live Daycent/Century will be added to the model database fairly rapidly.

COMPONENT 2 – AGRICULTURAL PEATLANDS AND WETLANDS

15. Coordinators of the agricultural peatlands and wetlands component, Lillian Øygarden from Bioforsk, Norway and Kristiina Regina from MTT, Finland provided an update of the activities in this topic, including the publication of country case studies from cultivated peatlands and developing a database of experts and researchers.

16. A total of 13 countries are interested in participating in the topic to manage agricultural peatlands, although no funding has been made available to support the development of activities or coordinate the network. To promote the network the coordinators aim to use the GRA website to provide reports and information about the activities underway. Future activities of the component will include developing best practice guidelines to manage agricultural peatlands and including datasets from peatlands into modelling and MAGGnet databases.

Publication on policy options for cultivated peat soils.

17. Participants have written a paper reviewing management practices to reduce emissions from cultivated peat soils. The review also includes four country case studies on mitigation options for peat soils from Denmark, Finland, Norway and Indonesia. Once the paper has been published a link will be circulated to the CRG and Council and provided on the Alliance website.

18. The paper focuses on policies that encourage management of peatlands as international discussions are increasingly interested on mitigation and improvements in peatlands management. Inconsistent policies are the main barrier restricting the implementation of known management practices.

Workshop on managing agricultural peatlands

19. The Coordinators would like to develop a network of experimental sites measuring emissions from peatlands and hope to develop this idea more at a workshop specific to peatlands greenhouse gas measurements. The workshop will also consider how the component can collaborate with other Alliance Research Groups and projects as well as international organisations such as the Food and Agriculture Organisation (FAO).

20. The Group discussion following this presentation of activities showed a wide interest in participating in a wider discussion on managing agricultural peatlands. The Coordinators will look for an opportunity and for funding to hold a workshop in 2015 and hope that participants from the Cross-Cutting Groups and the Paddy Rice Research Group will also attend.

PERSPECTVE FROM THE ALLIANCE COUNCIL CHAIR

21. Sjoerd Croque from the Ministry of Economic Affairs, The Netherlands was invited to attend the CRG meeting and share the views of the Netherlands as Alliance Council Chair with the Group.

22. World leaders are becoming more aware of agriculture, food security and climate change issues with new initiatives established like the Alliance on Climate Smart Agriculture and FAO developing a report on livestock mitigation options. The CRG should consider contributing to a report similar in style to the FAO publication with a croplands focus. The Alliance is a voluntary organisation and to achieve success member countries will need to support and contribute to activities in each Research Group. The Chair has written a letter addressing member country Ministers to improve the links between Alliance Council representatives and the Research Groups.

23. The points raised in the letter include:

- Emphasis on research to support policy and farmers.
- Framing the Alliance to meet global food security and adaptation interests
- New issues on improved farm management and environmental awareness
- New ways of working with council representatives to secure resources and identifying how the Research Groups can support policy, improving the conversations with famer organisations and partners.

COMMUICATIONS

24. Communication of the CRGs outputs is essential for the outputs of the Group to be of use and to find the funding for further activities. The Alliance has now reached the stage where communicating information to different audiences is required to meet our aims.

CABI

25. Carol McNamara from the non-profit organisation CABI was invited to attend the meeting and speak to the Group about the communications work that they do and possible collaborations with the CRG. CABI provide agricultural information and science knowledge to farmers across 48 member countries, including some of the poorest and most food insecure. The organisation has been in operation for over 100 years and is divided into two parts; scientific publishing (e.g CAB abstracts) and international development focusing on knowledge to support farmers and government decision making.

26. CABI projects develop communications strategies that can feed both ways, providing information to the farmers but also relaying the needs of farmers back to the project team. The information is often printed and available in several languages but increasingly web and mobile based communications are being developed to collect and disseminate data e.g. text messaging to alert farmers about nearby pest outbreaks. Examples of CABIs work includes the Plantwise project to provide pest and disease notifications/treatments to African farmers and the African soil health

project, funded by the Gates foundation, where technical teams provide correct information on soil management to farmers.

27. CABI meets every three years, with the next meeting planned for 2016, an Alliance side event could be held alongside this to raise awareness of activities and promote membership. CABI also holds regular regional conferences.

28. The Group discussed possible collaborations with CABI including: dissemination of information and databases, Communications at both policy and farmer level, and how to develop targeted communications for funders or assist with identifying funders for joint CABI/Alliance projects.

29. The group will continue to explore opportunities to work with CABI at the CRG level and possible Partnership with the Alliance as a whole.

Group Communications - Webinars

30. The Chair introduced the idea of the Group hosting a series of webinars with partners or countries invited to speak on particular topics. The presentations would be monthly or on a regular basis and could look at using the webinar function built into the GRAMP website in the first instance. The webinar series could also include presentations from other Research Groups. A partner of the CRG, Climate Change and Food Security (CCAFS) has offered to be the first invited speaker to present a webinar.

31. The Group agreed to contribute to the development of a webinar series, with the representatives from the Soil C and N Cross-Cutting Group willing to present a webinar and participate in this activity.

FRAMING OUR PROFILE

32. This session discussed ways that the CRG could promote the Alliance more widely and ensures that our activities are of use to farmers and policy makers as well as the science community. The areas where the CRG should focus on developing activities include:

- Improve knowledge sharing, access to and application by farmers. For example assembling information options by region that can be used on farm.
- Facilitate information exchange among scientists around the world.
- Build capacity or scientists around the world.
- Improve measurement and estimation of greenhouse gas emissions, information that is important for metadata and models.
- Enhance synergies between adaptation and mitigation efforts.
- Build partnerships among farmers and farmer organisations, communications to have impact.

33. The Group discussed the development of networks and the different impacts that could be achieved by establishing regional or thematic networks. The LRG has achieved good success with the six thematic networks they have organised. There are already strong regional networks in many parts of the world which could be linked to, so there is no need to duplicate effort. The Group agrees to keep Networks global focusing on subjects that may be regional or may involve similar agriculture systems/condition from several parts of the world.

34. It is important to develop networks that will have impact and identify the outcomes before creating new activities. The Group can use activities already underway to help identify themes that are of the most benefit and could generate information on possible mitigation options for farmers/farmer organisations. These activities include:

- The SCN modelling project;
- The MAGGnet database; and
- Synthesis of multiple national mitigation options, such as the report that France has completed.

PROPOSALS FOR NEW NETWORKS AND COLLABORATIONS

35. Several members presented to the Group opportunities for collaborative projects or possible new network topics. These suggestions are listed below.

36. China is interested in comparing GHG emission measurements between chambers and eddy covariance towers. The first year of this study in China has shown a 20% difference between the N2O emissions recorded using the two different methods in vegetable crops. The experiment will use eddy covariance to compare all GHGs from vegetable crops and are interested in coordinating with other countries looking at similar systems. Germany expressed an interest in this project; other countries that are interested in comparing results should contact xunhua.zheng@post.iap.ac.cn.

37. Spain proposed a network on crops important to Mediterranean climates such as olives and vineyards. Any countries interested in working on similar systems should contact Spain (GRA@magrama.es). Chile noted that they also have an interest in similar crops in dryland agriculture systems and will discuss developing this network further with Brazil and Spain.

38. An existing Spanish Network 'Remedia" was presented to the Group by Alberto Sanz-Corbena from the technical University of Madrid. The Spanish network on agricultural GHG emissions focuses on science knowledge and information to policy makers and science communities and also promotes international collaborations. The blog communicates activities to policy makers and farmers, including the translation of international activities into Spanish. The next Remedia workshop will be held in March 2015 and is titled "Opening Remedia" to encourage attendance from other Spanish speaking countries. More information will be provided to the Group on the benefits of joining and how to register for the workshop

39. The Netherlands presented an ongoing European project identifying areas that are vulnerable to climate change and those areas that have high GHG emissions, looking for the areas where these two criteria occur together. The "Hotsposts" project is identifying these as target areas for mitigation efforts. Another project on global yield gap analysis aims to identify regions that may have capacity to increase crop yields, and provides options to increase yield. Both projects could be of interest to the GRA. If interested, contact peter.kuikman@wur.nl or rene.schils@wur.nl.

STRENGTHENING LINKS WITH THE CROSS-CUTTING GROUPS

Interactions with the Soil C N Cross-cutting Group

40. Soil Carbon and Nitrogen Cycling Cross-Cutting Group (SCN) Co-Chair Jean François Soussana (INRA, France) presented an update on SCN activities. The SCN is closely connected with the work of the other Research Groups through the development of improved modelling methods for mitigation

options across agricultural systems. The Group coordinates scientists to test mitigation options through the comparison of models or by using combinations/components of different models. The eventual outcome is that the SCN will develop a platform of models that can be applied to identify potential mitigation options for specific systems and conditions. The Group is working initially with both arable crops (with a wheat pilot) and with grasslands, and will eventually move into more complex integrated livestock/crop systems.

41. The three main activities for the Group are:

- Model intercomparison
- Model sensitivity testing
- Statistical modelling

42. The next step for collaborative activities between the CRG and the SCN will be for the SCN to test key mitigation options from crop systems as identified by the CRG.

43. CRG members discussed the possibility of expanding the systems tested to explore models for tree crops (grapes and olives) and accounting for crop rotation. These systems can be included in the work; the SCN will need a group of experts, data and high quality models that can account for these systems to be identified by members that are interested in these activities.

Inventories and Monitoring Cross-cutting Group

44. Denis Angers from Agriculture and Agri-Food Canada present an update on the Inventories and Monitoring (I&M) Group. The name has been changed from Inventories and Measurement to Inventories and Monitoring to better reflect the activities of this Cross-Cutting Group. The 13 work areas originally identified by this Group have been refocused to four priority activities.

1. remote sensing for inventories.
2. Best practice guidance for estimating soil carbon changes.
3. GHG emissions from farming system typologies.
4. Guidance on determining emissions intensity.

45. The group is willing to collaborate with projects relating to inventories activity. There is a major need in developing countries to have support for inventories and this was one of the reasons for organizing the I&M Group. One of the gaps is the measuring and monitoring of soil carbon stocks in grasslands and integrated landscapes, which links to work in the CRG.

KEY GLOBAL PARTNERS

46. During the Alliance Council meetings Co-Chairs agreed to develop partner roadmaps. The CRG is already working with GRA Partner organisations and should consider how to develop these relationships further and regularly provide outcomes and information to these Partners.

47. As an invited partner, CCAFS previously attended meetings of the CRG and offered to support the CRG. A handout described on-going and potent projects with the GRA. CCAFS offered to present a webinar once this activity is developed.

48. The WorldBank has restructured their funding, with increased funds allocated to agriculture and climate change activities. The GRA has been invited to present proposals that support developing country farmers to the World Bank. These projects should be focused on the transfer of existing knowledge to farmers.

49. The Group agreed that proposals to the World Bank need to be organised across the research Groups, with the support of the Secretariat. Suggestions for CRG proposals could include: indicators to assess climate risk in areas where the World Bank provides crop insurance and a proposal on showing how crop failure produces GHG emissions waste as well as food security concerns.

NEXT STEPS

Communication

50. CRG members will develop and participate in a regular series of webinars. The first presentations should explain the GRA and how to become involved with interesting and engaging topics lined up for the future.

Adaptation

51. The CRG will contribute to the GRA stocktake across all members to better establish what activities with synergies between adaptation and mitigation are already underway.

Next Meeting

52. The Co-Chair from Brazil invited the CRG to hold the 2015 in Brasilia alongside a world congress on integrated crop, livestock and forest systems. The congress will be held 12-17 July and include a field tour to the Brazilian savannah region. The CRG/GRA could propose a special session on GHG emissions for the congress with the annual meeting held 11-12 July.

53. Canada proposed holding a joint meeting with the I&M Cross-cutting Group alongside the 2015 meeting of the CRG in Brazil on the topic of quantification of GHG emissions and removals in integrated crop-livestock systems. The Group also discussed the benefits of inviting all Council Members to participate in the joint meetings, which has the benefits of creating a sense of belonging to a wider Group and having the Council understand the work of the Research Groups. The Co-Chairs will bring discussion up during the next Co-Chairs teleconference.

54. Spain would like to make the offer to host a meeting or a workshop of the CRG next year, and would be open to a topic being proposed.

APPENDIX 1: Participants List

Country	Attendees
Alliance Member Countries	
Brazil	Ladislau Martin: Embrapa (Ladislau.martin@embrapa.br)
Canada	Denis Angers: Agriculture and Agri-Food Canada (denis.angers@agr.gc.ca)
China	Xunhua Zheng: Chinese Academy of Sciences (xunhua.zheng@post.iap.ac.cn)
Chile	Carlos Ovalle, INIA (covalle@inia.cl)
Denmark	Lars Munkholm: (lars.munkholm@agrsci.dk)
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Spain	María José Alonso Moya: Ministerio de Agricultura, Alimentación y Medio Ambiente (MJAMoya@magrama.es) Alberto Sanz-Cobena, Tech University Madrid (a.sanz@upm.es)
Sweden	Thomas Kätterer: Swedish University of Agricultural Sciences (Thomas.katterer@slu.se)
UK	Luke Spadavecchia: DEFRA (luke.spadavecchia@defra.gsi.gov.uk) Jagadeesh Yeluripati: James Hutton Institute (Jagadeesh.yeluripati@hutton.ac.uk)
USA	Alan J. Franzluebbers: USDA-ARS (alan.franzluebbers@ars.usda.gov) Mark Liebig: USDA-ARS (mark.liebig@ars.usda.gov)
Other Participants	
Lithuania: Dovilė Karpičiūtė, Ministry of Agriculture (dovile@zum.lt) Lithuania: LaimaTaparauskiene, Stulginskis University (laima.taparauskiene@asu.lt) CABI: Carol McNamara, CABI (c.mcnamara@cabi.org) USA: Susan Liebig, USDA-NRCS (susan.samsonliebig@nd.usda.gov) UK: Robin Matthews, James Hutton institute (robin.matthews@hutton.ac.uk)	
Secretariat: Deborah Knox (Deborah.knox@mpi.govt.nz)	

APPENDIX 2: Country Updates

Brazil

- Brazil has announced a voluntary commitment to reduce Agricultural GHG emissions,
- The low carbon emissions plan was developed to encourage farmer to take up these practices.
- livestock and forestry projects are developed under a programme called FLUXUS
- Climate scenarios are used to understand future agriculture production
- A system "FACE" has been developed to identify pests and diseases
- Measurement chambers for enteric methane measurements from cattle.
- A focus on integrated farming systems including crops, livestock and forests

Canada

- National Agricultural GHG Programme (AGGP)
- Funded 27 million to universities, NGOs and provincial governments to improve understanding and training (2010-2015)
- Competitive selection of projects from four priority areas, livestock, crops, agricultural water use and agroforestry.
- Highlights include measuring N_2O from water, gas flux sensors for on farm use, and capacity building on agricultural GHG research in Canadian universities

Chile

- Measuring GHG emissions from crops is a new research area, developing methods for chambers measurements and emission factors from southern Chilean Grasslands and measurements from Paddy Rice
- Developing a project on intensive crop systems – corn/wheat grown on irrigated drylands
- Focus on carbon sequestration in agricultural soils and recovery of degraded soils
- developing local emission factors and technologies to reduce emissions
- New NAMA for Chile on carbon sequestration.

China

- Taking a model based approach to explore the best management strategies, plans to develop a catchment-ecosystem model
- Many field observations and experiments measuring methane and N_2O across China
- Training and developing protocols for sampling, measurements and equipment.
- Central database of measurements to store and access information for all experiments
- Developing an online database – called flux net which would make metadata available to all.
- ChinaFlux network of eddy covariance towers with some comparisons made with chamber based measurements
- An emission factor for N_2O has been developed and is included in the inventory.

Denmark

- Research activities on rotation, tillage, residue management, carbon storage
- Measuring the effect of winter cover crops and tillage on N_2O emissions
- mitigation strategies for N_2O from soil; grassland cultivation and mobile green manure (used in organic farming systems where mown grass is digested and sprayed on fields)
- Field experiments testing bioenergy crops and the total GHG balance.
- Biogas production systems considering carbon storage and N_2O emissions when applying manure and digestates to the field.

France

- a number of projects on N_2O emissions funded under a national funding call (Ministry of Environment, INRA and Ademe)
- Coordination and exchanges between research groups working on N_2O emissions developing common actions, meetings and modelling databases.
- A synthesis report of agricultural GHG emissions from France has been developed by 22 experts from INRA, to understand how French agriculture can contribute to reducing GHG emissions.
- Range of national and European projects coordinating N_2O research including stakeholders.

Finland

- CAOS project
- Contribution to MAGGnet project
- Reviewing peatlands paper and submitting this for publication.
- Improved communication between researchers and policy
- Beginning to develop methods to quantify the effects of adaptation measures on mitigation.

Germany

- Three new projects in this area
- CAOS – climate smart agriculture on organic soils, a multi-country project coordinated by Germany.
- National network on reducing emissions from oilseed rape crops also includes an international workshop to increase Nitrogen use efficiency, and reduce N_2O emissions.
- A multi-partner research project (ICON) is underway on non-flooded crops in rice dominated landscapes. In collaboration with IRRI alternating flooding in rice and non-flooded (e.g. maize) crops.

Japan

- Have a well developed GRA network, including a list of participants and contact points for each CRG component. Representatives provide reports and identify activities for Japanese participation.
- Ongoing work to develop and emission factor for manure
- Participating in MAGGnet.
- Difficulty developing N_2O process models due to high proportion of andosols.
- Interested in developing the links between components of CRG and PRRG.
- Develop DNDC model for use in Japanese andosols.
- Identifying mitigation options to manage paddy and upland soils.

Italy

- Have a large national project underway with results from 7 sites and 18 long term experiments.
- The sites cover a range of different climates and agricultural systems
- The project will validate models against these long term experiment sites.

Netherlands

- The Netherlands is involved in projects under most Research and Cross-Cutting Groups.
- Aim to iincrease global membership and visibility of the GRA
- Connect to farmers and private sector e.g. Potato network
- Connect to and add value to other global initiatives e.g. Sustainable Intensification: Global Yield Gap Atlas
- Show visible benefits for member countries

Norway

- Norwegian Environment agency, developing a report to show how agriculture can increase production and reduce emissions.
- brochures for farmers – extension activity sharing mitigation activities to be presented at farmer organisation meetings in the coming months
- the effects of biochar and carbon storage on GHG's
- Stability of biochar in soils and priming effects
- Field experiments and measurements
    - restoring cultivated peatlands
    - Mechanism for high nitrogen loss from clover over winter – as N_2O?
    - Long term experiments provided with measurement chambers
    - MIGMIN – mitigation by mafic mineral application

Spain

- Spanish research across 12 research Groups covering diverse agriculture systems
- Research on the effect of crop/soil management includes fertiliser, tillage, cover crops, biochar and irrigation.
- Use of process based models to compare management practices,
    - synergies between adaptation and mitigation in grasslands
    - Carbon sequestration
    - Irrigation and water management
    - Agro-forestry

Sweden

- Long term soil carbon field experiments looking at management impacts
- Modelling soil carbon for inventory –completed the third round of soil inventory
- Drained organic soils
- Manure handling and biogas residues
- Eddy Flux towers in some agriculture fields and participating in the ICOS network
- Writing a structured review on soil carbon stock changes in temperate regions related to different managements. The database of all information will be made available and the review includes published and grey literature.

UK

- Supporting projects that add value to existing GHG research and development programme (www.ghgplatform.org.uk): We consider the data and protocols developed through the platform as an in-kind contribution. We have added value to our existing programme of work through procurements to take forward GRA projects, e.g. the GRA Modelling Platform and the Earth Observation stocktake under the Inventories and Monitoring group. We are keen to work with others to improve collective understanding and consistency of approaches. Please contact Luke.Spadavecchia@defra.gsi.gov.uk for more info.
- Measuring GHG's from different systems: Nitrous oxide emissions factors will vary spatially by agro-climatic zones, defined by soil texture and annual rainfall. Methane emissions will vary by livestock type, diet and management systems. The Methane ResearCH_4 project is now complete and the final report will be published after we have completed peer review. All data from the platform will be made publically available through a dedicated data archive (still in development).
- We have developed a model (FARMSCOPER) to examine the impacts of policy interventions on agricultural emissions. FARMSCOPER accounts for the impacts of mitigation measures on

a wide range of pollutants to air and water, soil, food production and agricultural income. The tool is suitable for producing multi-pollutant marginal abatement cost curves.

- Anaerobic Digestate and Compost in Agriculture (DC- agri) project (http://www.wrap.org.uk/content/digestate-compost-agriculture) is measuring GHG and ammonia emissions from the application of these materials. For free draining soils nitrate leaching is also being measured. Crop yield and quality data is also available. All results can be shared.
- We have recently established a sustainable intensification platform. This research is looking at the potential to increase food production whilst maintaining or improving environmental outcomes from agriculture at the individual farm, landscape and whole food chain scales.
- UK is currently conducting its second Climate Change Risk Assessment (http://www.theccc.org.uk/tackling-climate-change/preparing-for-climate-change/climate-change-risk-assessment-2017/) which will inform our next National Adaptation Programme.

<u>USA</u>

- Three USDA projects that are related to the CRG
- A large review has been finalised on the topic of quantifying GHG's from forestry and agriculture providing information on management practices and sharing methods.
- Sustainable intensification project, linking 18 sites into a network that evaluates ecosystem services over the long term.
- GRACEnet continues across 30 sites with all data available online.