CropM International Symposium and Workshop:  
Modelling climate change impacts on crop production for food security  
10-12 February 2014 at Clarion Hotel Royal Christiana, Oslo, Norway

RATIONALE

Advanced climate change risk assessments for agriculture and food security depend on robust and reliable modelling tools. Among the various empirical-statistical and mathematical simulation techniques, crop models play a central role as they are at the core of any climate impact assessment for the agricultural sector. These and related topics are addressed in FACCE MACSUR (www.macsur.eu) and other agricultural research projects and networks. The last international symposium on crop models capabilities, gaps and challenges dates back more than ten years ago and there is an urgent need to facilitate exchange among ongoing initiatives on crop modelling for food security under climate change.

This first CropM International Symposium and Workshop, held at Oslo, 10-12 February 2014 attempts to fill this gap. The event as a whole has four major goals:

(i) to discuss the state-of-the-art and future perspectives of crop modelling and approaches for climate change risk assessment, including the challenges of integrated assessments for the agricultural sector

(ii) to develop a joint vision and research agenda for crop modelling for the future

(iii) to present and discuss CropM highlights and related activities and identify next steps to achieve its contribution to MACSUR goals

(iv) to foster international collaboration in the interconnected research areas of food security, climate change and agrosystems modelling

Research questions dealt with will include: How can we better capture impacts of climatic variability and extreme weather events in crop models? How can we improve the simulation of interactions between CO₂, temperature, and limitations of water and nutrient supply? How can we introduce genotypes into the modelling of phenotypes? What experiments and experimental data do we need to improve current models? Can monitoring data from fields, farms and regional scale (e.g., remote sensing or flux measurements) be used for improving models? Do we need fundamentally new modelling approaches?
The event is organized by CropM /MACSUR in collaboration with the European Society of Agronomy, AgMIP, CCAFS and other international partners. It is sponsored by the Research Council of Norway and hosted by the Norwegian Consortium of Bioforsk, Norwegian Agricultural Economics Research Institute (NILF) and Norwegian University of Life Sciences (NMBU). Additional support has been received from MTT Agrifood Research Finland and University of Bonn.

PROGRAMME

10 February (Monday)

1800- Registration

1900-2100h  **Evening Reception:** with scientific and socio-cultural programme

Welcome speeches by:

1. **BIOFORSK Research Director (Nils Vagstad):** Challenges for crop production and food security in a changing climate

2. **FACCE MACSUR Hub Coordinators (Richard Tiffin):** Why Malthus is not the answer to Food Insecurity: Lessons from a not-so-dismal scientist
11 February (Tuesday)

830h- Registration available

**900-1030h** Opening session (Chair: Frank Ewert)

900 – 915h Welcome addresses

The Research Council of Norway (Kristin Danielsen): FACCE JPI: The importance of knowledge hub for meeting grand challenges

CropM co-ordination (Reimund Rötter): Climate change and food security: The role of CropM

915 – 1030h Keynotes


Keynote 2: Critical Challenges for Integrated Modelling of Climate Change and Agriculture: Addressing the Lamppost Problem (G. C. Nelson)

**1030-1100h** Refreshments

**1100-1300h** Parallel Session 1

1.1 Uncertainties in model-based agricultural impact assessments (including entire modelling chain, i.e. from climate via impact to economic/trade modelling) (Chair: Alex Ruane; Rapporteur: Margarita Ruiz-Ramos)

Andy Challinor et al.: How have uncertainties in projected yields changed between AR4 and AR5?

Pierre Martre et al.: Error and uncertainty of wheat multimodel ensemble projections

Nina Pirttioja et al.: Examining wheat yield sensitivity to temperature and precipitation changes for a large ensemble of crop models using impact response surfaces

Alex Ruane: The AgMIP Coordinated Climate-Crop Modeling Project (C3MP)

Carlos Angulo et al.: Investigating the variability uncertainty of soil input data resolution - A multi-model regional study case in Germany

1.2 Impact and adaptation assessment studies at field and farm level (Chair: K. Christian Kersebaum; Rapporteur: Thomas Gaiser)

Taru Palosuo et al.: Simulating historical adaptations of barley production across Finland

Chris Kollas et al.: Improving yield predictions by crop rotation modelling? A multi-model comparison

Roberto Ferrise et al.: Using seasonal forecasts for predicting durum wheat yield over the Mediterranean Basin

Asha Sanjeewani Karunaratne et al.: Modeling climate change impact and assessing adaptation strategies for rice based farming systems in Sri Lanka

Jordi Doltra et al.: Simulating seasonal nitrous oxide emissions from maize and wheat crops grown in two different cropping systems in Atlantic Europe
1300-1400h  
**Lunch break**

1400-1600h  
**Parallel Session 2**

2.1 How to improve modelling of crop growth and development processes including the tightening of links to experimenters?  
*(Chair: Jørgen E. Olesen; Rapporteur: Senthold Asseng)*

*Kurt Christian Kersebaum et al.*: A scheme to evaluate suitability of experimental data for model testing and improvement

*Enli Wang et al.*: Causes for uncertainty in simulating wheat response to temperature

*Ann-Kristin Koehler et al.*: Exploring synergies in field, regional and global yield impact studies

*Silvia Caldararu et al.*: A new approach to crop growth modelling: a process-based model based on the optimality hypothesis

*Christian Biernath et al.*: Modeling crop adaption to atmospheric CO2 enrichment based on protein turnover and use of mobile nitrogen

2.2 Impact and adaptation assessment studies at regional and continental/global  
*(Chair: Martin K. van Ittersum; Rapporteur: Andy Challinor)*

*Christoph Mueller et al.*: AgMIP’s Global Gridded Crop Model Intercomparison

*Stefan Niemeyer et al.*: Assessing climate change impacts and adaptation measures on crop yield at European level

*Hermine Mitter et al.*: Integrated climate change impact and adaptation assessment for the agricultural sector in Austria

*Luca Giraldo et al.*: Representing the links among climate change forcing, crop production and livestock, and economic results in an agricultural area of the Mediterranean with irrigated and rain-fed farming activities

*René Schils et al.*: Yield gap analysis of cereals in Europe supported by local knowledge

1600-1700h  
**Reporting back from the sessions and plenary discussion**  
*(Chairs: Frank Ewert and Reimund Rötter)*

1700-1830h  
**POSTER tour**

1930h  
**Conference Dinner at Clarion Hotel Royal Christiana**
12 February (Wednesday)

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<th>Time</th>
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<td>830-1215h</td>
<td><strong>CropM workshop: Session on Progress and Highlights</strong>&lt;br&gt; (Chair: Reimund Rötter; Rapporteur: Taru Palosuo)</td>
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<td>830-915h</td>
<td>CropM activities – an overview (<em>CropM Co-ordinators and WP leaders</em>)</td>
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| 915-1030h| First set of short presentations on results of concrete exercises of CropM<br>  
  - *Petr Hlavinka et al.*: Water balance and yield estimates for field crop rotations - present versus future conditions based on transient scenarios<br>  
  - *Holger Hoffmann et al.*: Effects of climate input data aggregation on modelling regional crop yields<br>  
  - *Gang Zhao et al.*: Responses of crop’s water use efficiency to weather data aggregation: a crop model ensemble study<br>  
  - *Mikhail Semenov*: Delivering local-scale CMIP5-based climate scenarios for impact assessments in Europe |
| 1030-1100h| Refreshments                                                                                |
| 1100-1215h| Second set of short presentations on results of concrete exercises of CropM<br>  
  - *Fulu Tao et al.*: Assessing climate impacts on wheat yield and water use in Finland using a super-ensemble-based probabilistic approach<br>  
  - *Mats Höglind et al.*: Breeding forage grasses: simulation modelling as a tool to identify important cultivar characteristics for winter survival and yield under future climate conditions in Norway<br>  
  - *Clara Gabaldon-Leal et al.*: Adaptation Strategies to Climate Change for summer crops on Andalusia: evaluation for extreme maximum temperatures<br>  
  - *Øyvind Hoveid*: An economist’s wish list for crop modeling |
| 1215-1300h| Lunch                                                                                       |
| 1300-1400h| Break-outs for CropM group work (to exchange about specific ongoing studies)(opportunity to tour POSTERS for others) |
**1400-1530h  Break-out Session on Challenges for Crop Modelling – what steps to take next?**

Dealing with lessons learned from previous conference day (e.g. 4 break-out group sessions)

1) Crop rotation modelling and assessing impacts of indirect climate interference with plant growth and production  
   *(Chair: Marco Bindi; Rapporteur: Chris Kollas)*

2) Is it possible to improve crop models without new modelling approaches and experiments?  
   *(Chair: John R. Porter; Rapporteur: Enli Wang)*

3) Ensemble model simulations, uncertainty analysis  
   *(Chair: Mikhail Semenov; Rapporteur: Mike Rivington)*

4) Scaling methods and integration with economic models  
   *(Chair: Sander Janssen; Rapporteur: Pier Paolo Roggero)*

**1530-1545h  Refreshments**

**1545-1630h  Final Plenary (Chairs: Frank Ewert and Reimund Rötter):**

Reporting back from the sessions and discussion

Wrap-up and closing (with concluding remarks by M. Banse)