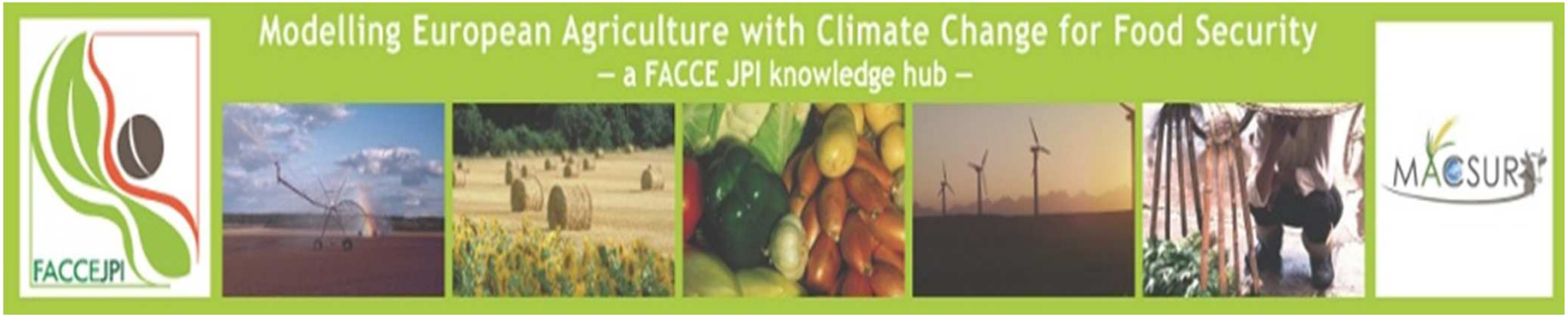

CropM

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Progress overview

Frank Ewert, Reimund Roetter and WP leaders

MACSUR Mid-term Meeting, Sassari, 1st - 4th April 2014

Demand for Crop Modelling

- Better understanding of crop growth and yield
  - Under climate change
  - Improving food security
  - Policy and decision support
- Impact assessments:
  - To reduce risks of production
  - To identify adaptation and mitigation options
  - To allow integrated assessment (bio-physical and socio-economic)
  - To allow multi-scale assessment (from field, to farm, region and continent)

Issues in Crop Modelling

- Model intercomparison
- Generation of new data for model improvement
- Methods for scaling
- Uncertainty analysis
- Building research capacity
- Climate scenario data for crop models

Key ambition (scientific excellence)

- To develop methods for a European comprehensive impact assessment of climate change and policy on European crop production and food security.
- To develop first shared continental assessment and tool
  - (Full) range of important crops
  - Important crop rotations
  - Advanced scaling methods
  - State-of-the-art scenario construction
  - Novel impact uncertainty assessment and reporting
  - Advanced link to farm and sector models
- To train integrative crop modeller

Networking /communication

CropM at international conferences:

- AgMIP global workshop in Rome/FAO Oct 2012
- AgMIP global workshop in New York Oct 2013
- Climate Smart Agriculture conference at UC Davis /CA ,March 2013
- Impacts World 2013 at Potsdam /PIK, May 2013
- First Internat. Conference on Global Food Security, Noordwijkerhout, NL, Sep 2013
- **CropM International Symposium & workshop,** Oslo, Norway, 10-12 February 2014
- **MACSUR Mid-term Meeting**, Sassari, Italy, 1-4 April 2014

Networking /communication

CropM at international conferences (upcomming):

- **AgMIP Wheat Symposium and Workshop** on Modeling Wheat Under Changing Environment , Clermont-Ferrand, France, 1-4 April 2014
- **5th Annual AgMIP Global Workshop, 2014**
- **Breedings Crops for better coping with Climate Change, Leeds, 2014**
- **5th Farming Systems Design Symposium**, Montpellier, France, 2015
- …

Integration, Impact Assessment Modelling (IAM)

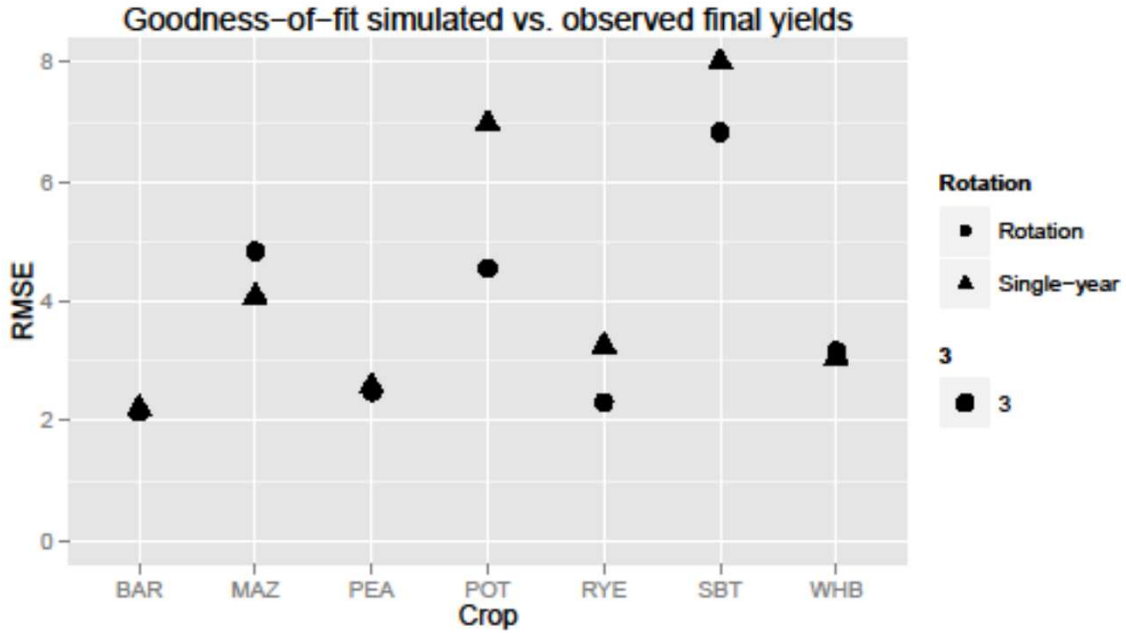
Regional pilots /integrated studies 3 show-cases
(Fi-Au-It) stakeholder consultations

CropM WP1: Model inter-comparison and improvement

- WP leaders: K Christian Kersebaum, M Bindi
- Objectives:
  - Identification of **major cropping systems** and model capabilities **in Europe**
  - Common **protocol for model inter-comparisons** and a methodological framework for multi-criteria model evaluation
  - Minimum requirements and **classification of data** sets depending on data quality and consistency to be used for calibration or validation
  - **Model inter-comparisons** for uncalibrated and calibrated runs
  - Identifying gaps and deficits

Simulations (12 models, 5 locations) of crop rotations vs. single crops

> See this conference, day 2



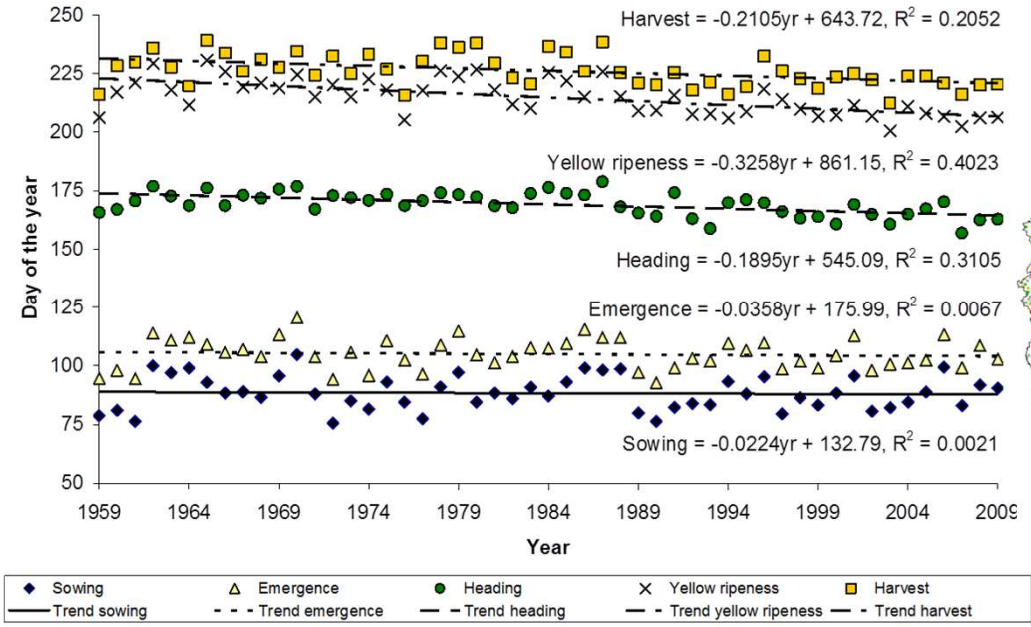
CropM WP1: Model inter-comparison and improvement

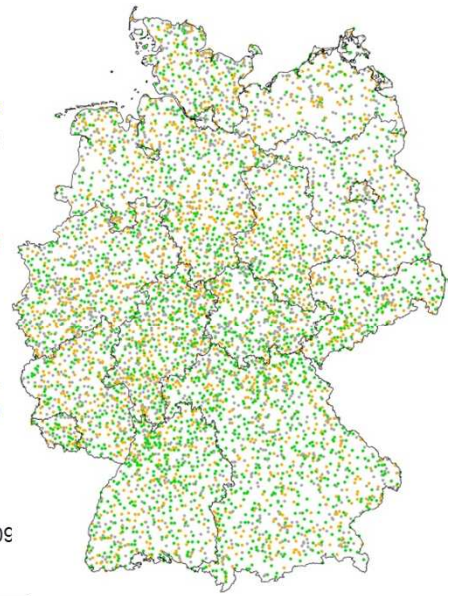
- **MAIN ACCOMPLISHMENTS AND ACTIVITIES:**

Specific outputs	Responsible persons	Partners involved	Timeline
Data set evaluation and classification for model testing (software/paper)	C. Kersebaum C. Nendel, J.S. Jorgenson	Olesen, Bindi, Boote, Kollas, Rötter, Gaiser, Ruget, Frühauf, Trnka..	Paper submitted on 5.2.2014 to EMS Software ready
Protocol for model inter-comparison	Taru Palosuo	K. C. Kersebaum	finished
Analysis of first runs on crop rotations	C. Kersebaum C. Kollas	18 modelling teams	1. March first run, June second run finalised
Protocoll and methodol. framework for multi-criteria model evaluation	M. Acutis G. Bellocchi	WP C1 and WP L2 members	Test and analysis using inter-comparison outputs by end 2014
Preliminary data set and crop modelling evaluation for a model intercomparison on grapevine	Marco Bindi	F. Spanna, C. Cassardo, M. Ruiz-Ramos, C. Kersebaum, Inaki Garcia de Cortazar Atauri, C. Nendel	Preliminary simulations by the end of 2014

CropM WP2: Data management

- WP leaders: JE Olesen, M Trnka
- Objectives:
  - **Data management** for assessments of crop models at different scales
  - **Protocols for new experimental data** and for data collection and storage
  - Web-based **interface for data exchange**
  - Procedures for **visualizing model inputs and outputs**
  - Derive **statistical relationships for crop performance**





-14 days
(sowing-yellow ripe)
-17 days
(yellow ripeness)

Oats
Germany
1959-2008
6000 stations

Siebert and Ewert, 2012

CropM WP2: Data management

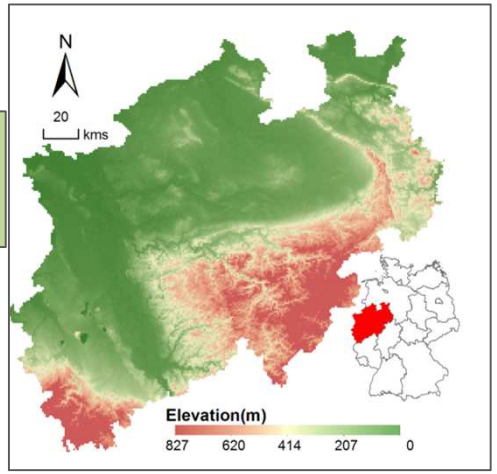
- **MAIN ACCOMPLISHMENTS AND ACTIVITIES:**

Specific outputs	Responsible persons	Partners involved	Timeline
Data sharing and publishing agreement	J.E. Olesen	Kersebaum, Trnka	Collecting agreements from partners
Website for data storage and sharing	J.G. Hansen	Olesen, Kollas, Jorgenson	In operation
Protocol for field experimentation	M. Trnka	Olesen	Finished
Overview of experimental data for modelling	J.E. Olesen M. Trnka		Finished
Protocols for data publishing	S. Janssen		Proposal
Data collection and analysis for oilseed rape	B. Sharif	Trnka, Kersebaum	Ongoing
Analysis of extremes for wheat in Europe	M. Trnka	Ramos, Rötter, Kersebaum, Olesen, Semenov	In press Nature CC

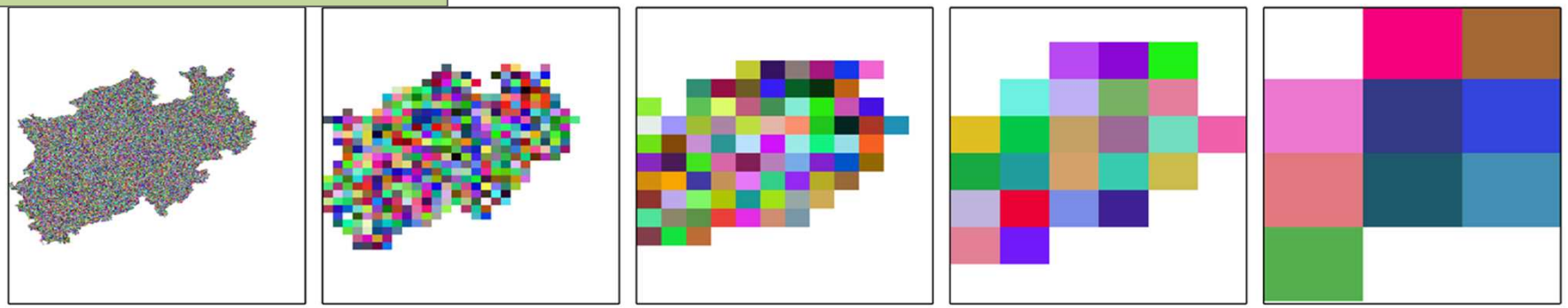
CropM WP3: Methods of scaling and model linking

- WP leaders: FA Ewert, M van Ittersum, S Janssen
- Objectives:
  - Overview of scaling methods
  - Evaluation of scaling methods
  - Approaches to link crop models for integrated assessment

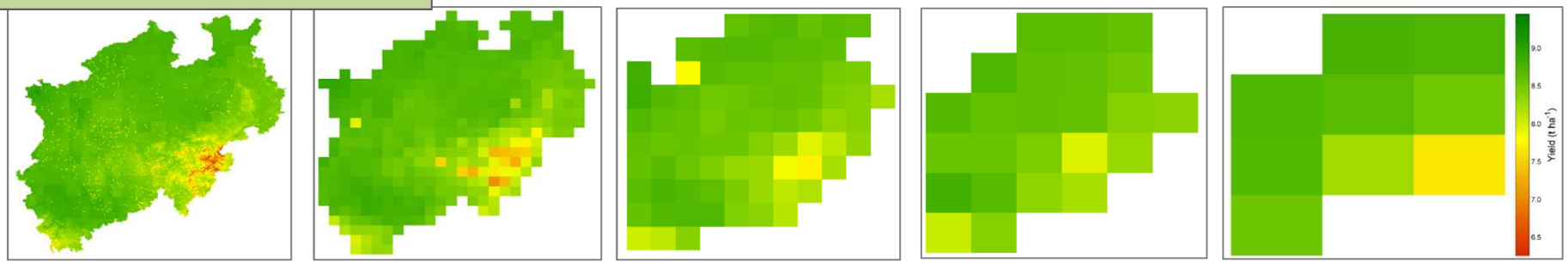
Scaling excercise



Aggregation of input data



Yield (wheat) response



CropM WP3: Methods of scaling and model linking

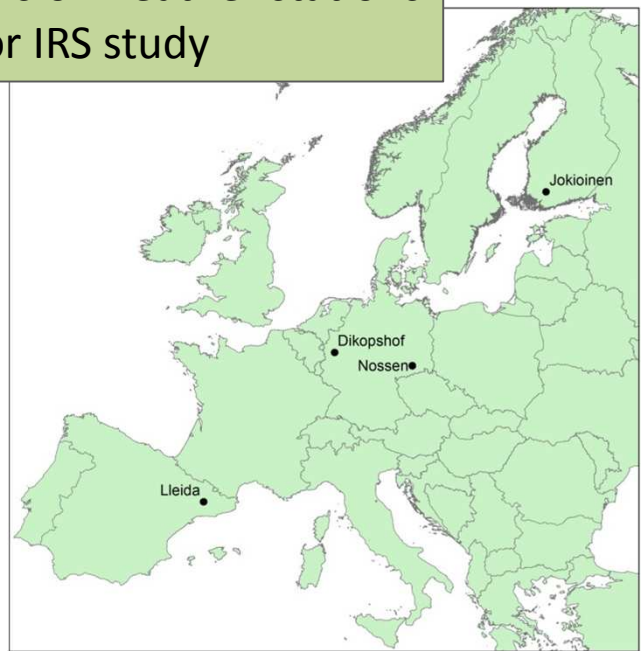
- **MAIN ACCOMPLISHMENTS AND ACTIVITIES:**

Specific outputs	Responsible persons	Partners involved	Timeline
Review of Scaling methods	L Van Bussel, F Ewert,	WP3 partners	Summer 2014
Effect of scaling methods for **simulating crop yield**	H Hoffmann	Constantin, Dechow, Eckersten, Ewert, Gaiser, Grosz, Haas, Hoffmann, Kuhnert, Kiese, Nendel, Raynal, Roer, Sosa, Specka, Teixeira, Wallach, Wang, Zhao	Summer 2014
Effect of scaling methods for **simulating water cycles**	G Zhao	Constantin, Dechow, Eckersten, Ewert, Gaiser, Grosz, Haas, Hoffmann, Kuhnert, Kiese, Nendel, Raynal, Roer, Sosa, Specka, Teixeira, Wallach, Wang, Zhao	Summer 2014
Effect of scaling methods for **simulating SOC**	M Kuhnert	Constantin, Dechow, Eckersten, Ewert, Gaiser, Grosz, Haas, Hoffmann, Kuhnert, Kiese, Nendel, Raynal, Roer, Sosa, Specka, Teixeira, Wallach, Wang, Zhao	Autumn 2014
Effect of scaling methods for **simulating nitrogen dynamics**	E Haas	Constantin, Dechow, Eckersten, Ewert, Gaiser, Grosz, Haas, Hoffmann, Kuhnert, Kiese, Nendel, Raynal, Roer, Sosa, Specka, Teixeira, Wallach, Wang, Zhao	Autumn 2014
Crop model integration methods for IAM	M van Ittersum	WP3 partners	End 2014

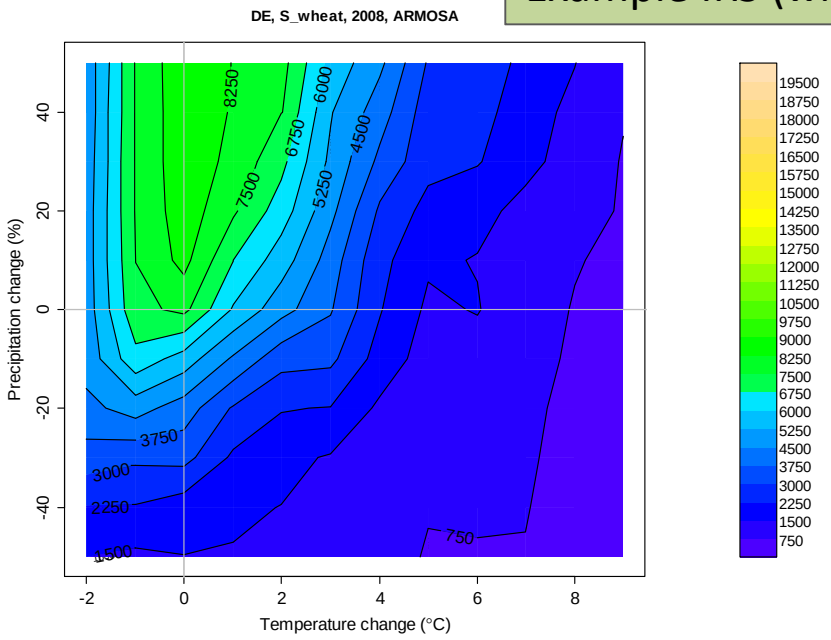
CropM WP4: Scenario dev. & uncertainty analysis

- WP leaders: RP Rötter, M Semenov, M Rivington, D Wallach
- Objectives:
  - Methodology & protocols for uncertainty analysis
  - Methodology for standardized model evaluation
  - Local-scale climate scenarios & uncertainties in climate projections
  - Methodology for probabilistic assessment of CC impacts using **impact response surfaces (IRS)**
  - Methodology for probabilistic evaluation of alternative adaptation options

Locations of weather stations used dor IRS study



Example IRS (wheat, GER)



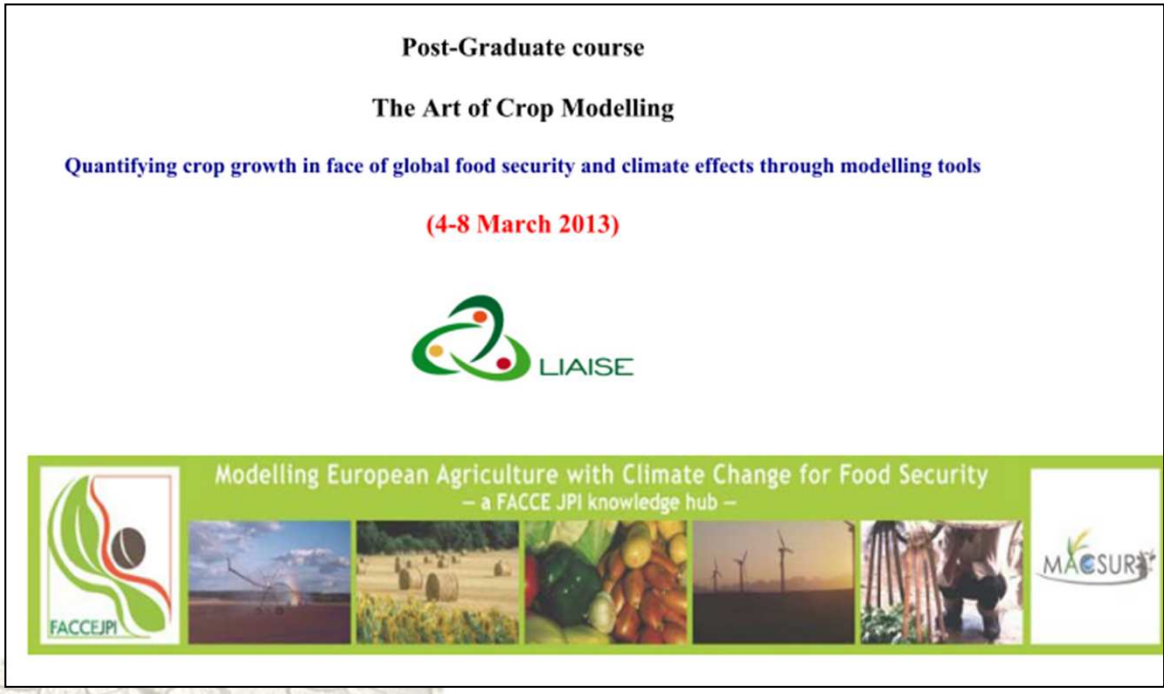
CropM WP4: Scenario dev. & uncertainty analysis

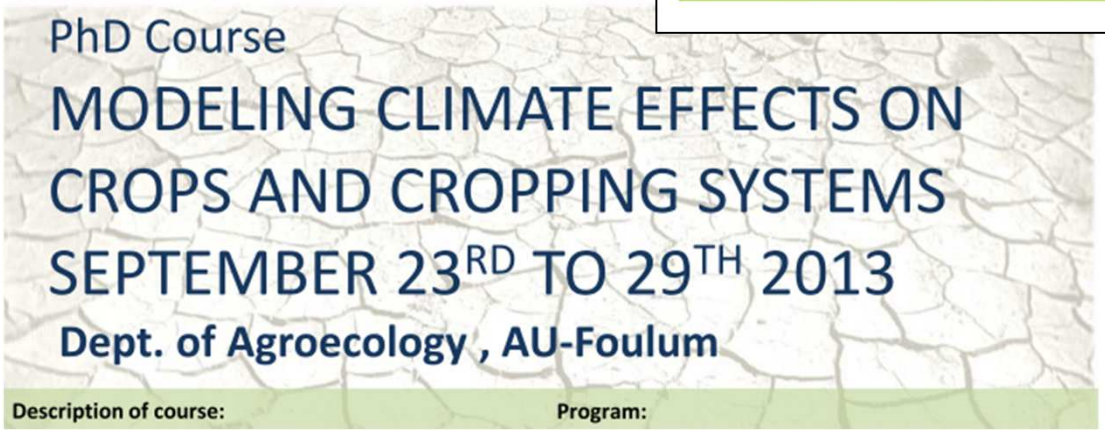
- **MAIN ACCOMPLISHMENTS AND ACTIVITIES:**

Specific outputs	Responsible persons	Partners involved	Timeline
Review on quantification of uncertainty	D Wallach, M Rivington	WP4 partners and AgMIP colleagues (L Mearns et al.)	Spring 2014
Delivery of local-scale CMP5-based scenarios..	M Semenov	P Stratonovicv, PL Calanca	(paper finished) still some RCPs..
Designing high-yielding wheat ideotypes	M Semenov	P Stratonovic	finished (paper)
IRS1: Basic impact response surface method; applied to wheat (3 sites)	N Pirttioja, S Fronzek, T Carter, R Rötter	27 modelling groups: WP4 members and AgMIP partners (S Asseng, E Wang, A Ruane)	Simulations done; paper in prep. Summer 2014
Analysis of extremes for wheat (jointly with WP2)	M Trnka	Ruiz-Ramos, Rötter, Kersebaum, Olesen, Semenov	ms submitted to NCC; 2nd paper planned for ?
IRS2: Application of impact response surface method to evaluate adaptations	M Ruiz-Ramos, S Fronzek, N Pirttioja, R Rötter	WP4 members and AgMIP partners	End 2014

CropM WP5: Capacity Building

- WP leaders: John R Porter
- Objectives:
  - Student exchange
  - PhD Schools
  - Online course





CropM WP5: Capacity Building

- **MAIN ACCOMPLISHMENTS AND ACTIVITIES:**

Specific outputs	Responsible persons	Partners involved	Timeline
PhD workshop PhD workshop	MvI, PL, JRP JO, MS	WUR, KU, INRA AU	March 2013 Oct 2013
PhD workshop	DW, CN	INRA, Zalf, KU, AgMIP	May 2014
PhD workshop	PR, MB	Sassari/Florence??	2014/2015
PhD workshop	MvI, PL, JRP	WUR, KU, INRA	2015
FACCE JPI KPI	JRP JRP	JPI FACCE KU	2014 2013

CropM WP6 Case and integrated pilot studies on impact assessment: linkage to decision-making and agri-food chain utilisation

- WP leaders: PP Roggero, D Steward, J Verhagen

- Objectives:
  - Identify and utilize coherent case and pilot studies for impact assessment on key crop
  - Define effective and efficient low carbon adaptation measures for the selected case studies
  - Develop strategies for engagement on adaptation and mitigation with national and EU policy makers and agro-food sector
  - Cross-theme (WP-L4, WP-T4)

CropM WP6 Case and integrated pilot studies on impact assessment

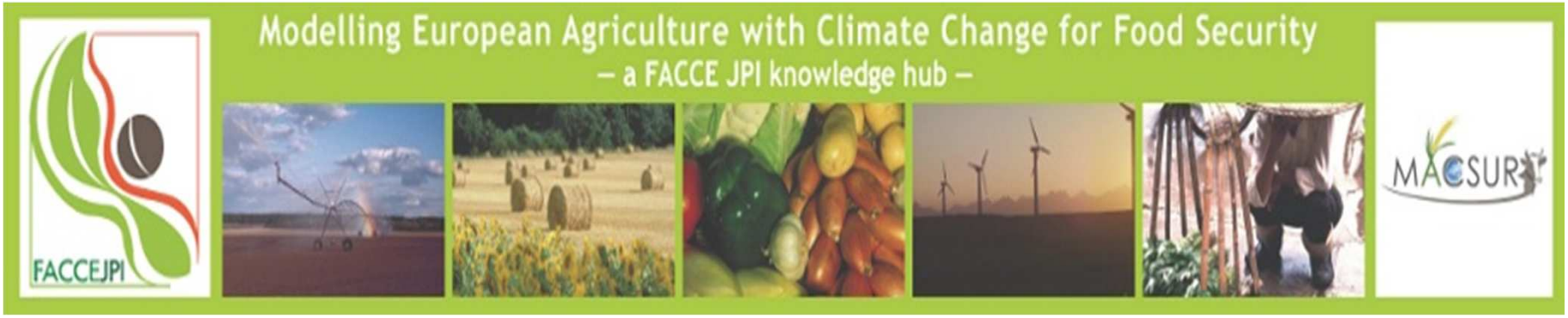
- **MAIN ACCOMPLISHMENTS AND ACTIVITIES:**

Specific outputs	Responsible persons	Partners involved	Timeline
T6.1 Regional pilot case studies identified, case study list on the MACSUR web site	Steward Verhagen Roggero	150, 195 (Wur), 24 (Uni-Madrid), 47, 122, 92(MTT), 115 (Uni-Bonn), 62 (Italy)	Coordination due
T6.1 Using different formalisms to represent water management at a territorial level and implementation under the RECORD platform	Bergez	206 (Inra)	End 2014
T6.2 Farm adaptation to CC in N-EU	Olesen	189 (Aarhus-Uni)	Paper published
T6.3 Development of Agroclima-SSP browser structure. Ruiz-Ramos et al 2014 book chap (in Spanish)	Ruiz-Ramos	24 (Uni-Madrid)	Report/CD published
T6.3 **Combined climate-crop-trade modelling at the Sardinia Regional Pilot case study**	Roggero et al Dono et al Bindi et al	62 (CNR, Uniss, Unitus, It)	paper submitted to EAAE. Journal papers to be submitted (July 2014)
T6.3 Drip irrigation in Potato (proposal Climate KIC)	Ben Schaap (Wageningen UR-DLO)	INRA FRA, farmers organisation, Netafim ES/NL, UPV Valencia ES	pre-proposal rejected. New proposal will be submitted in 2014.
T6.3 **Stakeholder learning session and Engagement methods session at mid term meeting**	Koenig, Helming, Roggero, Seddaiu	62 (Uniss, Italy) 147 (ZALF, De)	1-3 April 2014

CropM WP6 Case and integrated pilot studies on impact assessment:

- **MAIN ACCOMPLISHMENTS AND ACTIVITIES:**

Specific outputs	Responsible persons	Partners involved	Timeline
T6.3 Olive crop: physiologically based demographic model on *Bactrocera oleae (Gutierrez & Ponti, 2014, CABI Pub.)*	Ponti	62 (Enea)	Upcoming
T6.3 Olive crop: new water balance model (Ponti et al. 2013 Procedia Env Sci) in the context of a Marie Curie grant	Ponti, Basso Gutierrez	62 (Enea)	Done
T6.3 Olive crop: www.impact2c.eu (Med-wide assessment of +2°C impact on olive fruit fly)	Ponti	62 (Enea)	Manuscript under review
T6.3 Vineyard: Initialization and validation of the UTOPIA land surface model through ET field measurements in Piedmont	Cassardo et al	62 (Unito)	In progress, preliminary results by April 2014
T6.3 Maize: CC impact on yields, irrigation and N leaching in N-Italy. Submitting paper to Stoten special issue	Acutis	62 (Unimi)	Submission due by 28 Feb
T6.3 Vineyard: Validation of specific UTOPIA routine sets the on assessment of C assimilation rate	Cassardo et al	62 (Unito)	In progress, preliminary results by end of 2014



CropM

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Progress overview

Frank Ewert, Reimund Roetter and WP leaders

Thank you

MACSUR Mid-term Meeting, Sassari, 1st - 4th April 2014