



Modelling European Agriculture with Climate Change for Food Security  
– a FACCE JPI knowledge hub –



# Climate change and food security: The role of CropM

CropM International symposium and workshop  
Oslo, 11<sup>th</sup> February 2014

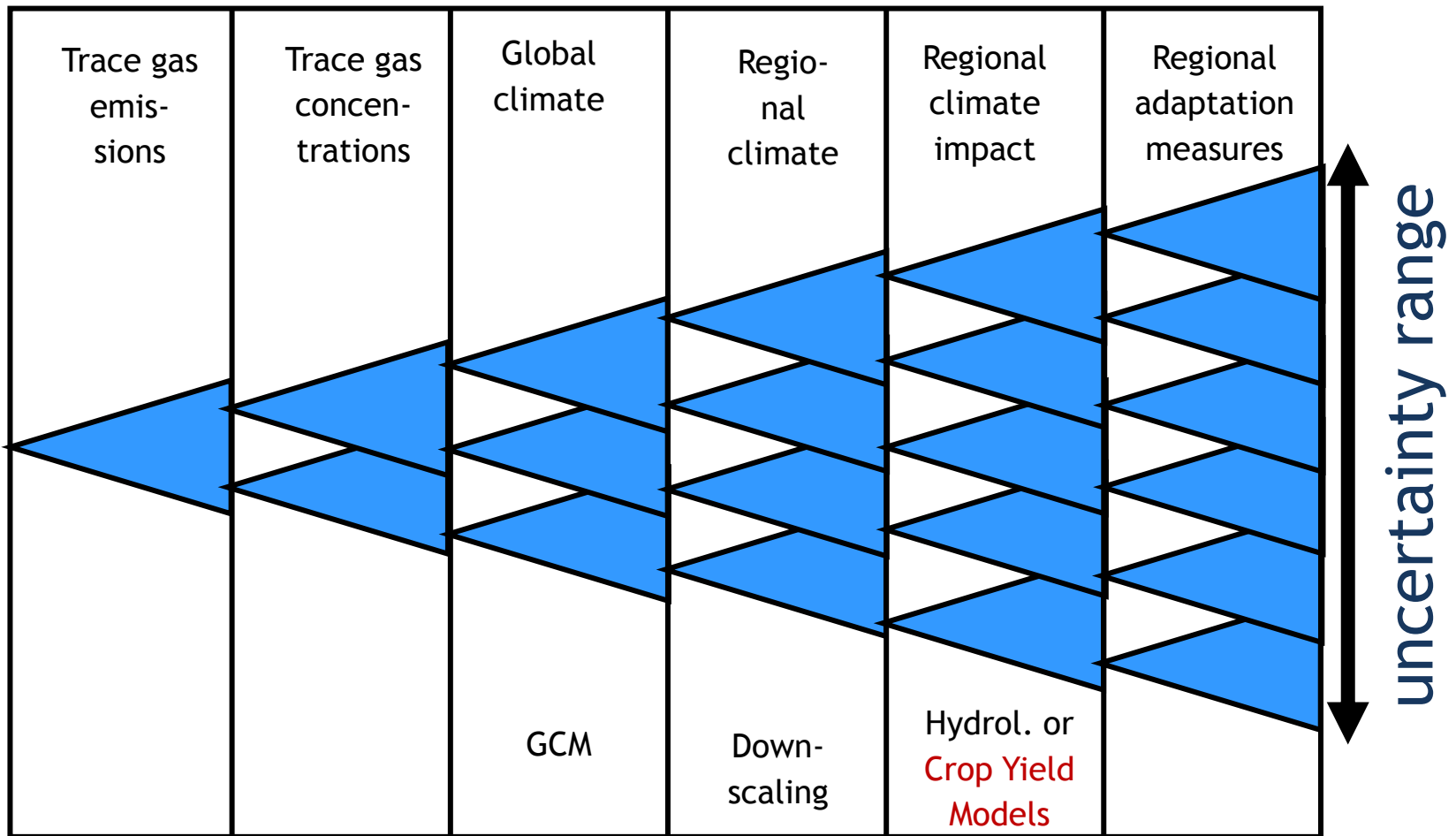
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# KEY ISSUES

- Uncertainty
- Model intercomparison and improvement
- Integration /IAM

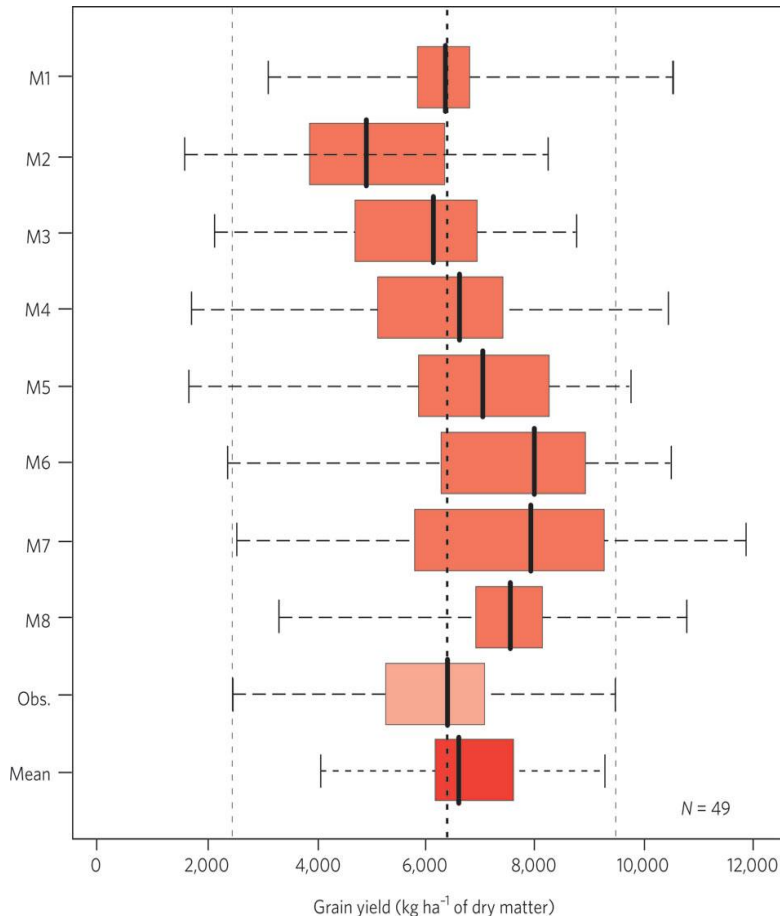
# Uncertainty cascade:

Propagation of uncertainties along the biophysical modelling chain

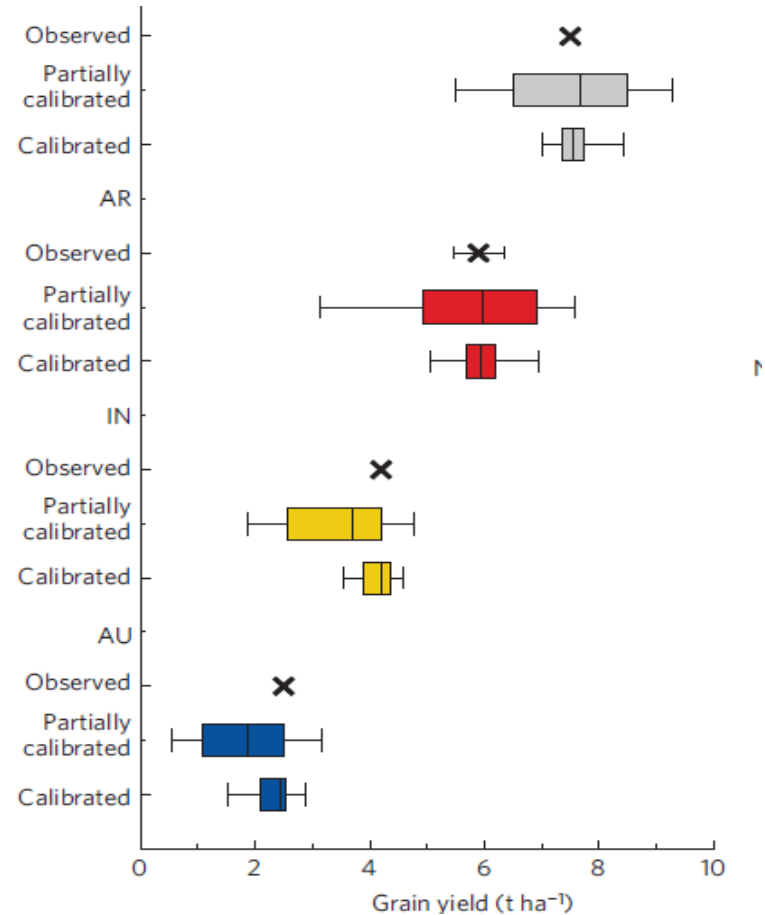


# Model intercomparison

COST 734 (blind test, current climate); AgMIP wheat (partially and fully calibrated, current and future)



Source: Rötter et al., Nature Clim. Change 1, 175-177 (2011)

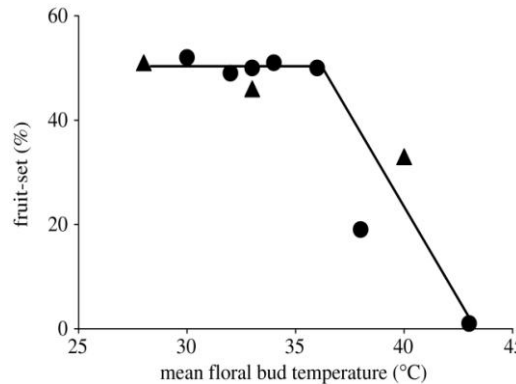


Source: Asseng et al., Nature Clim. Change 3, 827-832 (2013)

# Model intercomparison and Improvement:

## Better crop models are needed in any case

1. Renaissance: model intercomparisons -> examine use of ensemble modelling
2. Need to better report uncertainties (also in IAM)
3. Reduce model deficiencies and test models for better capturing climatic variability and extremes
4. Seek synergies between crop simulation modelling and other impact assessment tools .
5. Duly consider needs of integrated assessments (farm to..... global)

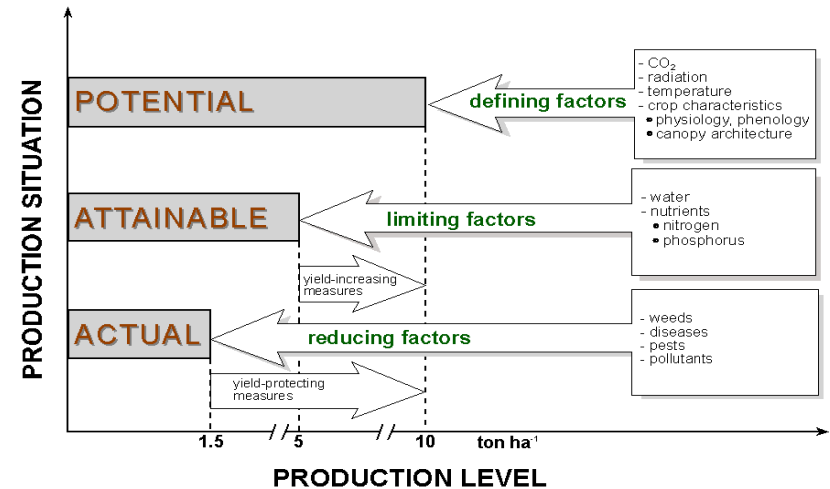


$$HI = dHI/dt \times GF$$

Challinor et al., 2005; GLAM-HTS

Examples of implementations:  
 Barley, Rice, Sunflower, Wheat  
 (Nendel 2011; Horie, 1991; Kropff, 1993; Moriondo, 2011...)

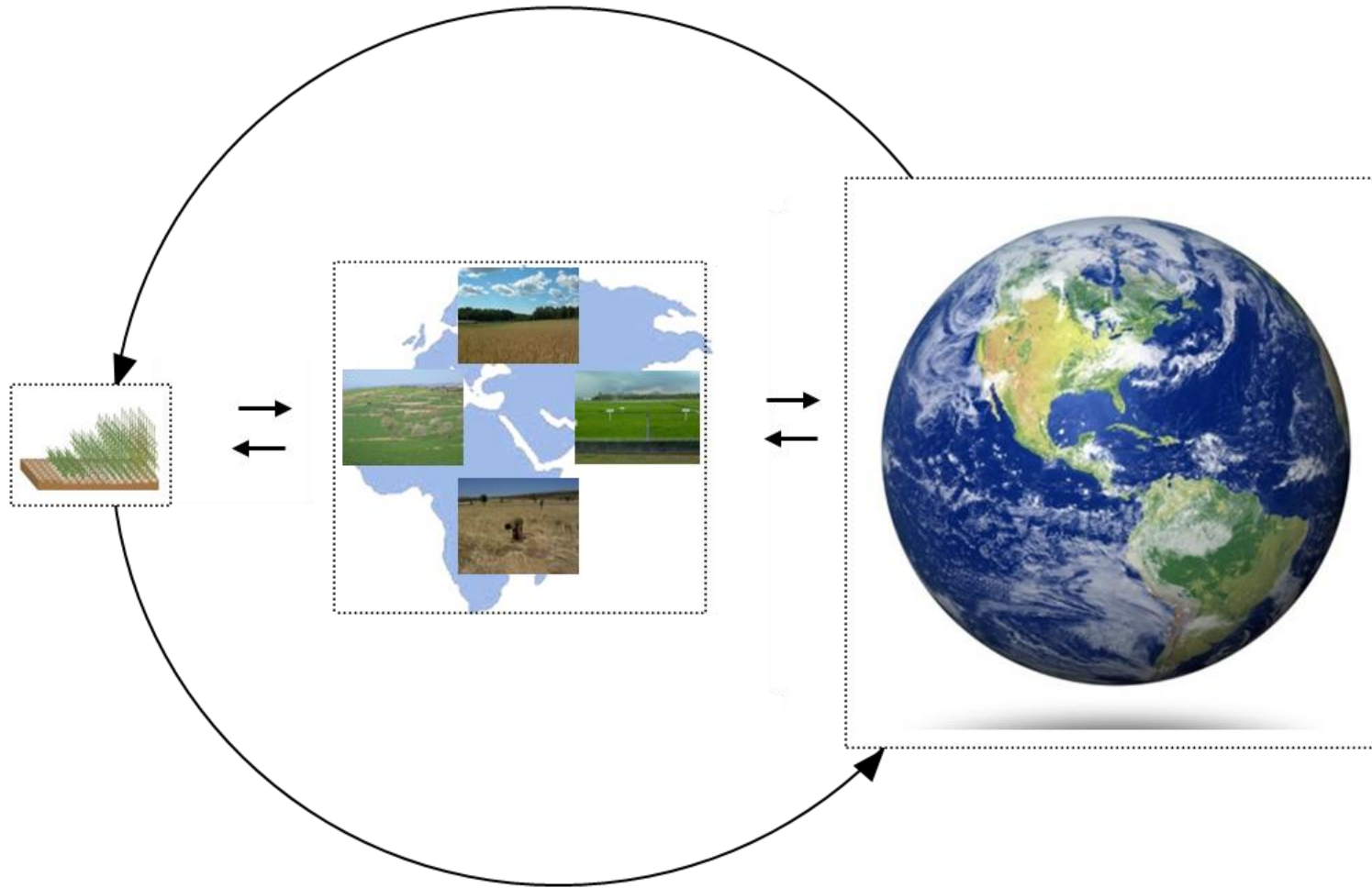
Relationship between percentage fruit set (angular transformed data) and mean floral temperature, from 08:00 to 14:00h, 9 days after flowering in **groundnut** (Vara Prasad et al. 2000). Source: Porter J R , and Semenov M A Phil. Trans. R. Soc. B 2005;360:2021-2035 –



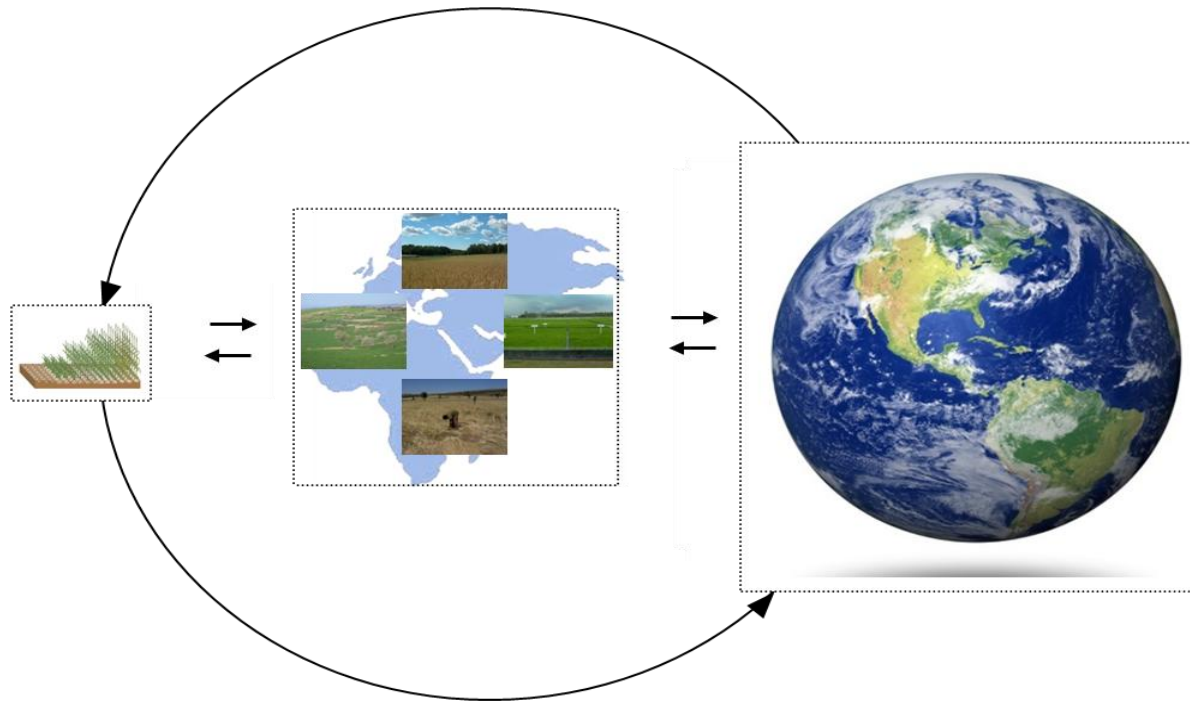
After van Ittersum & Rabbinge 1997

# Integration /IAM :

Multi-scale, integrated and iterative analysis: farm to global



# Need for INTEGRATION



## UNCERTAINTY caused by ...

SSP, scenarios, e.g.  
New technologies  
/their diffusion ?

Model deficiencies/  
lack of data /scaling  
and model linkage

Short-term  
variability/  
volatility

# Symposium Sessions

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*)

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



*Drunken Alcibiades Interrupts the Symposium.* 1648

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

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