

# Integrated assessments of climate change impacts, adaptation, and vulnerability in Austrian crop production

Dissertation by Hermine Christiane Mitter

Supervisor: Univ.Prof. DI Dr. Erwin Schmid

Co-advisors: DI Mag. Dr. Martin Schönhart, Ao.Univ.Prof. DI Dr. Marianne Penker

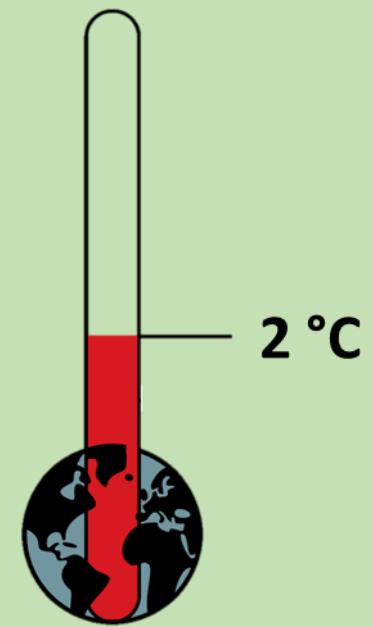
10. Semester Touchdown der Agrarwissenschaften

BOKU, 14.01.2016



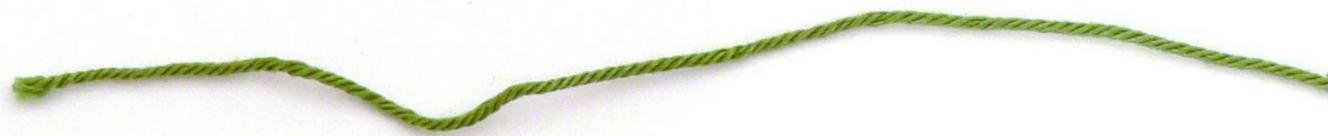
***“This is truly a historic moment. For the first time, we have a universal agreement on climate change, one of the most crucial problems on earth.”***

*Ban Ki-moon  
United Nations Secretary-General,  
About the Paris Agreement, 12.12.2015*



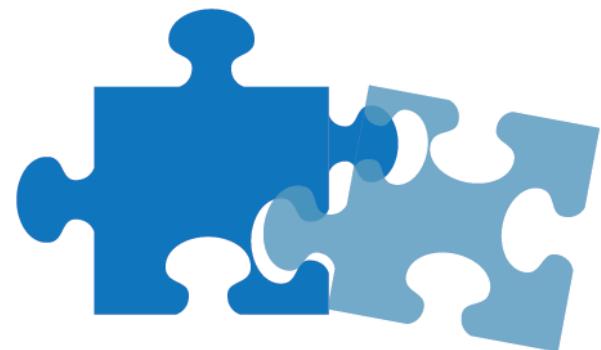
# Overview

- Research objectives
- Integrated assessment framework
- Selected results
- Discussion & Outlook

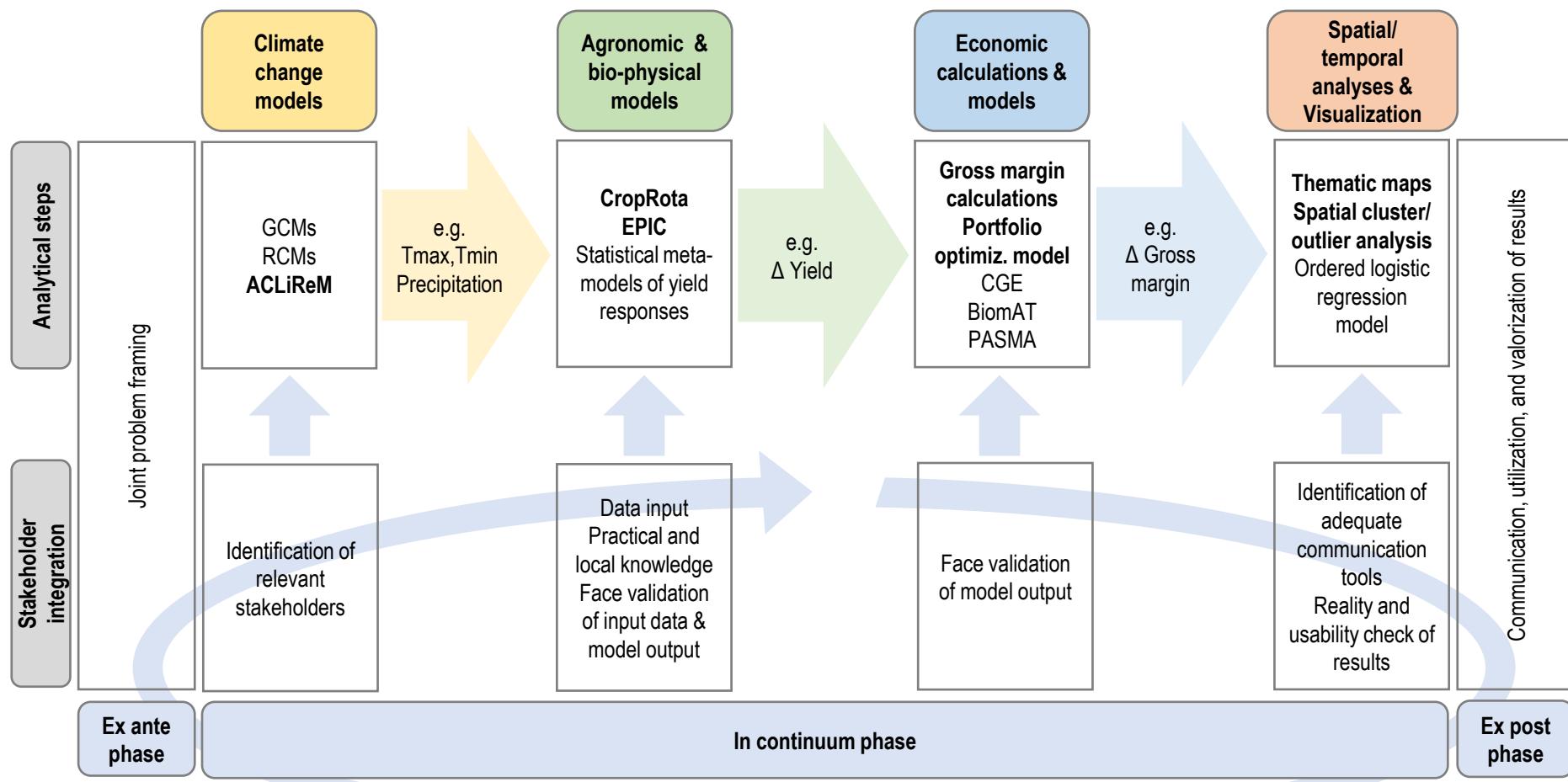


# Research objectives

- Optimal crop production systems
  - Climate change and policy scenarios
  - Risk preferences
  - Environmental outcomes
- Integrated assessment framework
  - Integrating disciplinary data and models
  - Integrating stakeholders' knowledge



# Integrated assessment framework

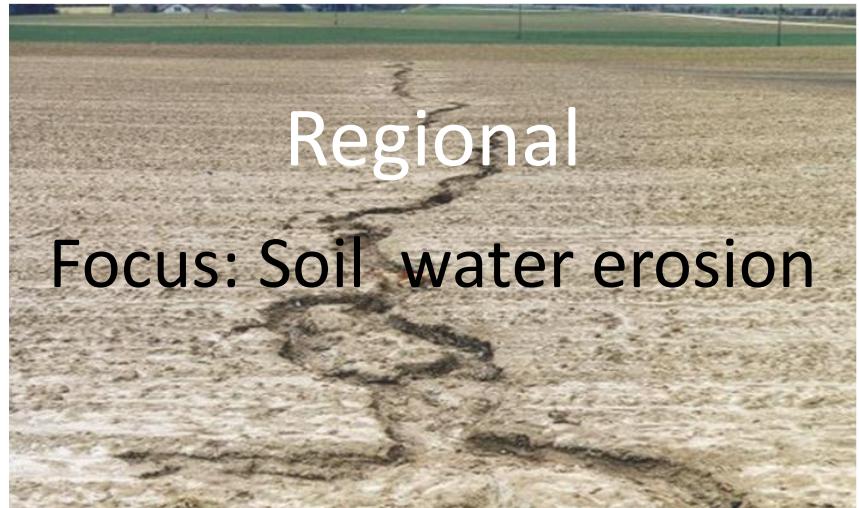


# Selected results



National  
Focus: Crop yields and  
gross margins

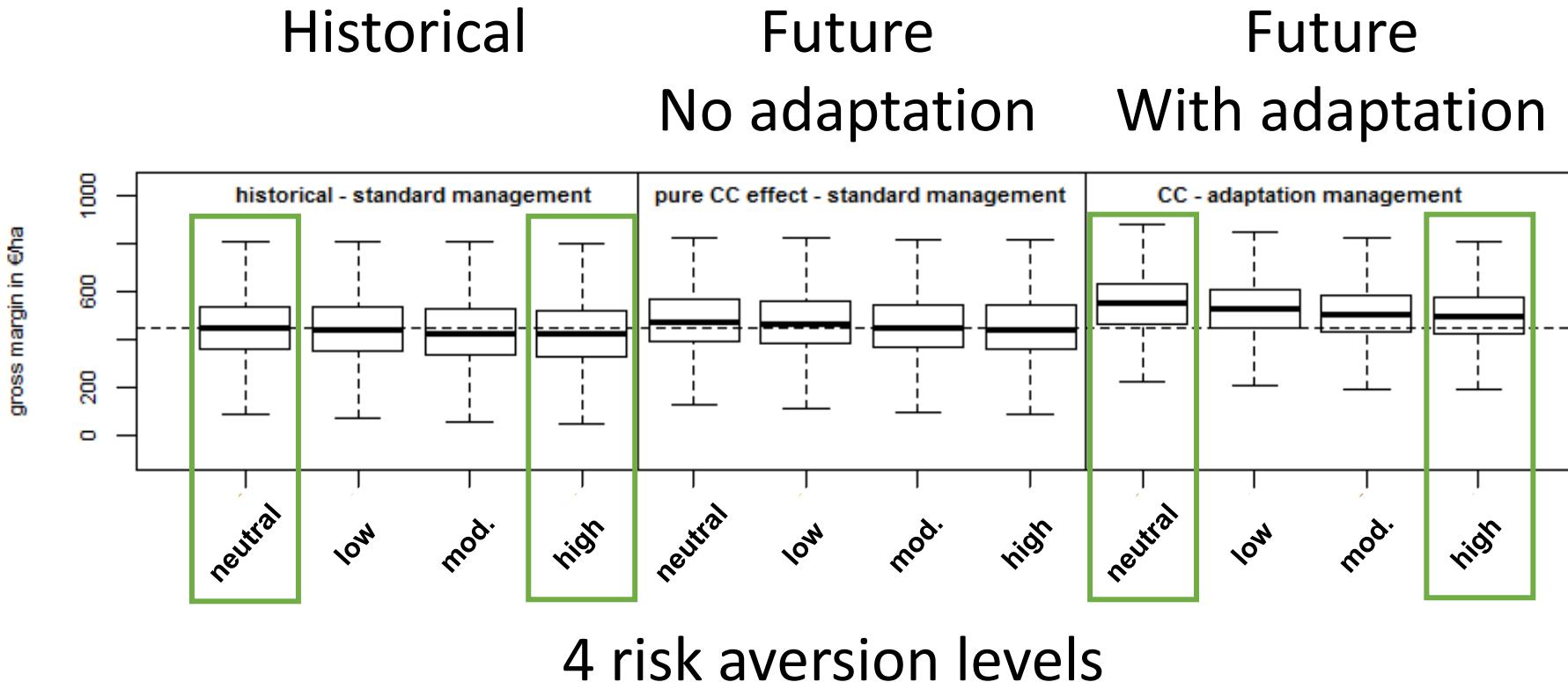
**Mitter, H., Heumesser, C., Schmid, E., 2015.**  
Spatial modeling of robust crop production  
portfolios to assess agricultural vulnerability  
and adaptation to climate change.  
*Land Use Policy* 46, 75–90.  
doi:10.1016/j.landusepol.2015.01.010



Regional  
Focus: Soil water erosion

**Mitter, H., Kirchner, M., Schmid, E., Schönhart,  
M., 2014.** The participation of agricultural  
stakeholders in assessing regional vulnerability  
of cropland to soil water erosion in Austria.  
*Regional Environmental Change* 14, 385–400.  
doi:10.1007/s10113-013-0506-7

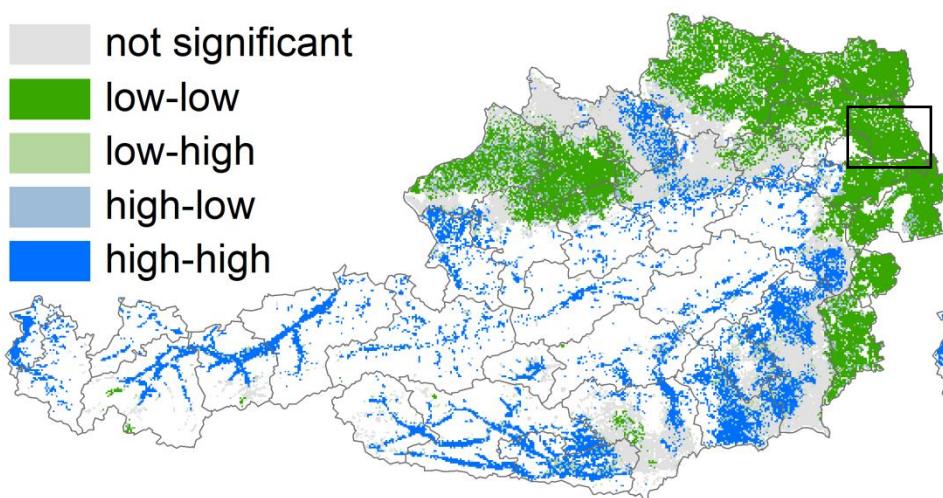
# Gross margins (€/ha/a) at national level



# Spatial clusters: Future, With adaptation

## Crop yields

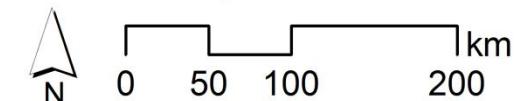
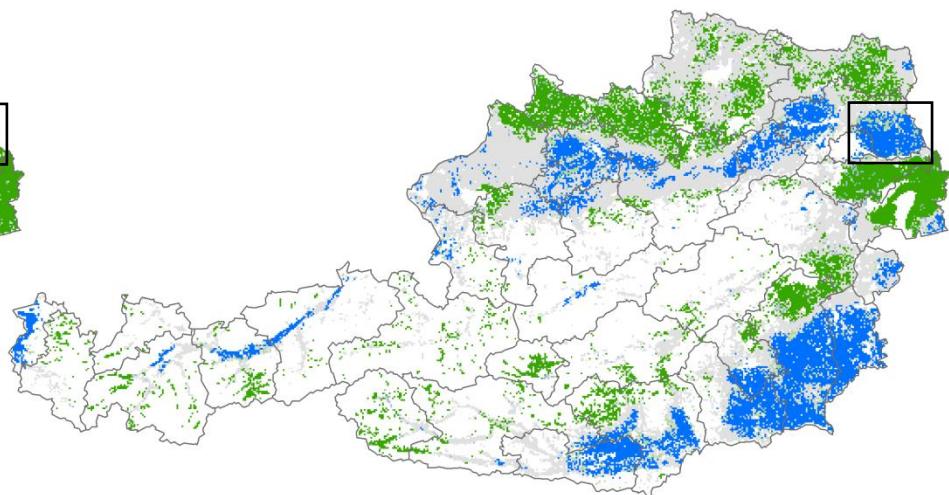
- not significant
- low-low
- low-high
- high-low
- high-high



### Mean crop yields

- ~ 6 t/ha/a
- ~ 12 t/ha/a

## Gross margins

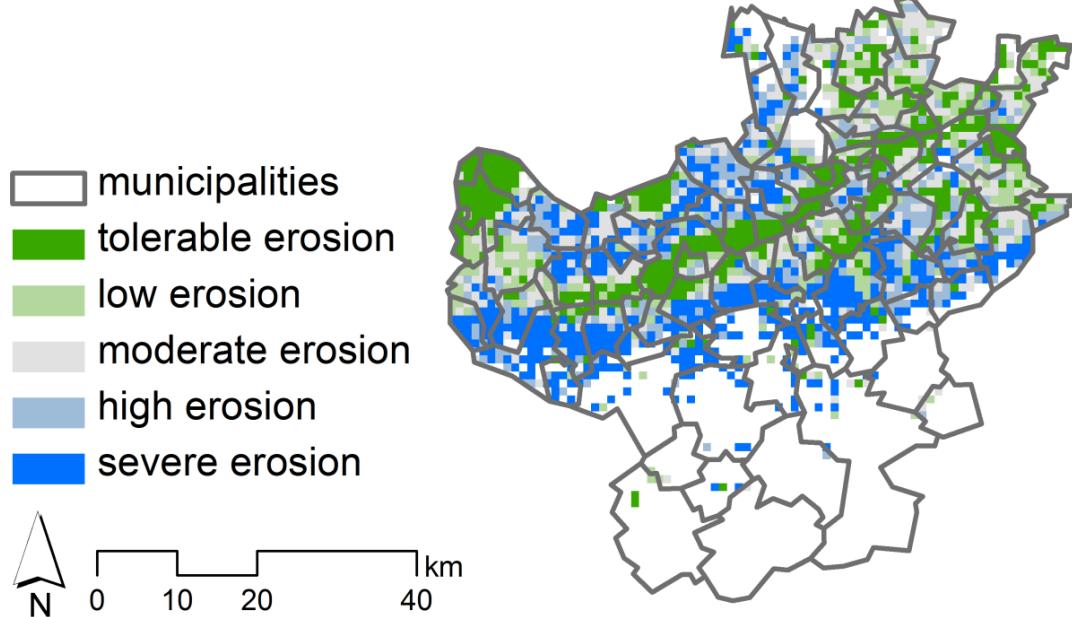


### Mean gross margins

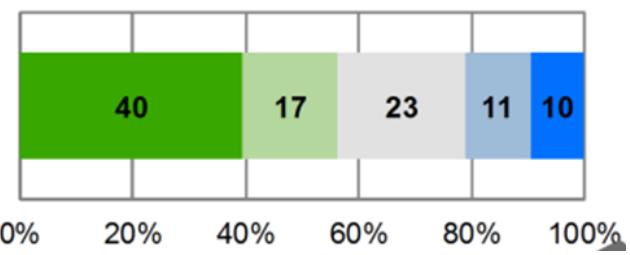
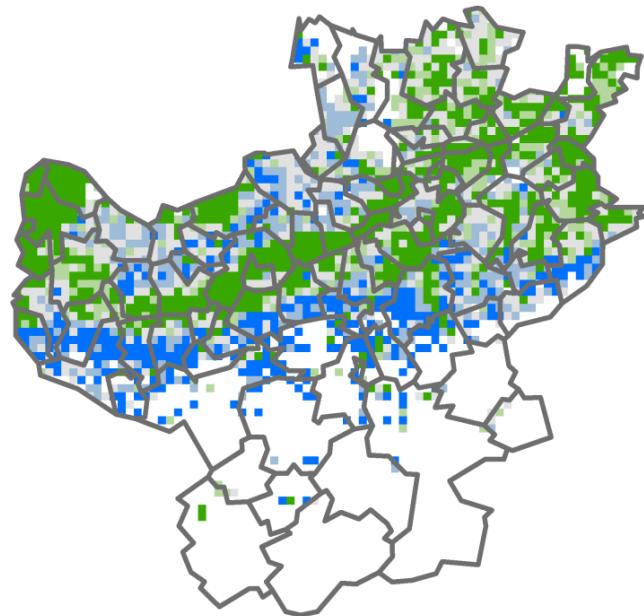
- ~ 400 €/ha/a
- ~ 700 €/ha/a

# Future erosion-prone cropland

## Conventional tillage



## Reduced tillage & winter cover crops

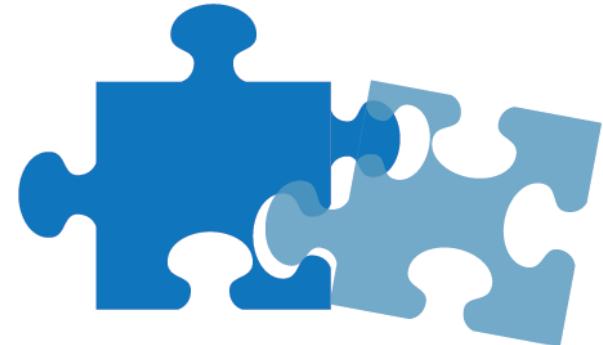


# Relevance of the model results for stakeholders

- Increase in total crop production until 2040
- Large spatial heterogeneities
- Effectiveness of adaptation measures
- Environmental impacts may increase
- Assumption: Moderate climate change

# The integrated assessment framework allows ...

- Quantitative, spatially explicit analyses at different scales
- Analyzing climate change and policy scenario impacts
- Analyzing environmental impacts
- Integrating disciplinary data and models
- Generating systems, target, and transformation knowledge
- Providing information for stakeholders



# Research needs

- Additional risk sources
- Additional adaptation measures
- Additional data sources
- Model inter-comparison, multi-model ensembles
- Communication tools

***“Finally, and this may be the most important point at the present time, the 2 ° limit is a strong call for action, and it is understood as such.”***

*Jaeger and Jaeger, 2010  
Reg Environ Change 11, 15–26*



# Thank you!

Hermine Mitter | hermine.mitter@boku.ac.at | www.boku.ac.at



# Picture credits

- Climate Change Centre Austria
- <http://www.stepupcanada.ca/why2degrees>
- <http://nurnichtdenfadenverlieren.blogspot.co.at/2015/06/mein-gruner-kleiderschrank-2015.html>
- <https://www.prestashop.com/blog/en/the-importance-of-call-to-action-buttons-on-your-e-commerce-site/>