



POTSDAM INSTITUTE FOR
CLIMATE IMPACT RESEARCH



What needs ISIMIP to in order to say something about climate change and agriculturally related poverty?

Anne Biewald

ISIMIP – Cross-sectoral workshop, 23.June 2016

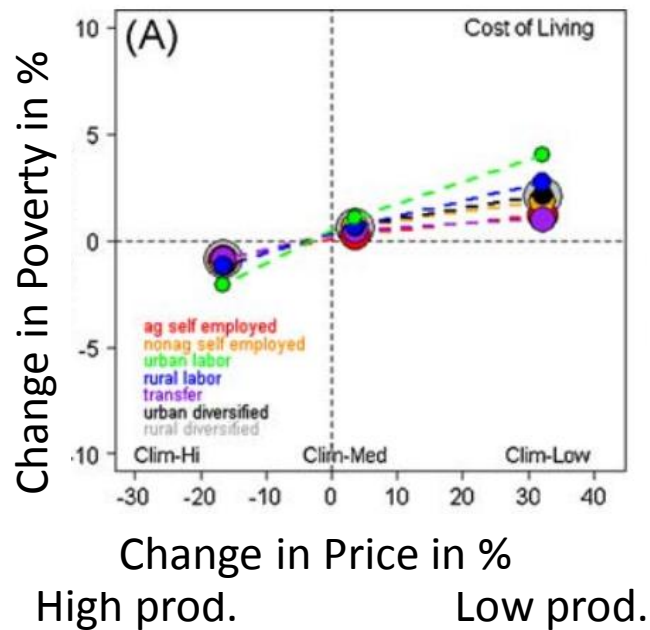
Motivation

„Accumulating evidence suggests that agricultural production could be greatly affected by climate change, but there remains little quantitative understanding of how these agricultural impacts would affect economic livelihoods in poor countries“

Hertel et al., GEC 2009

- Agriculture presents 2.4% of global GDP, but in many poor countries more than 40%
- Many poor people are net-producers of agricultural products

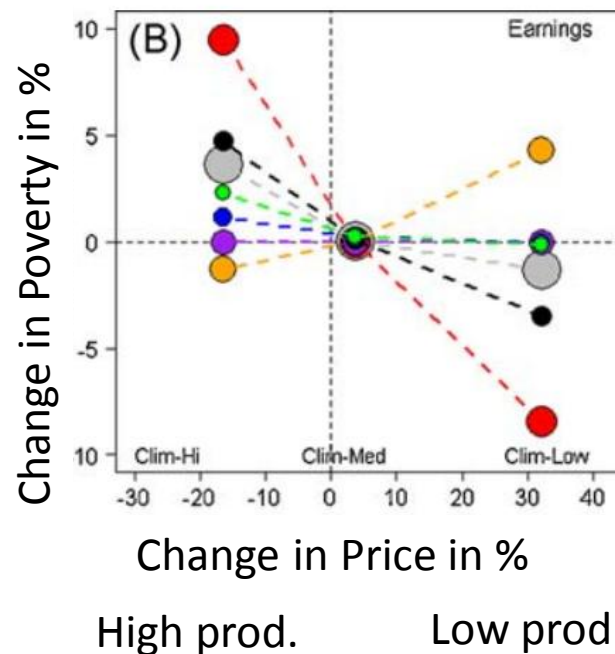
The impact of changes in agricultural productivity on costs of living (A) – Food prices – consumer side



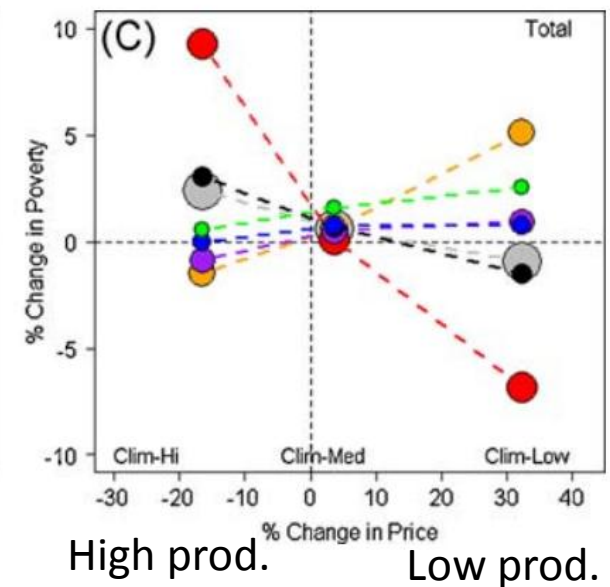
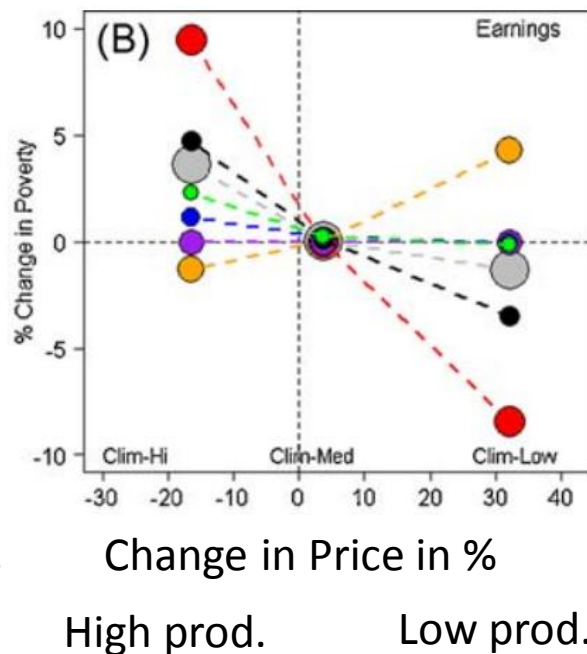
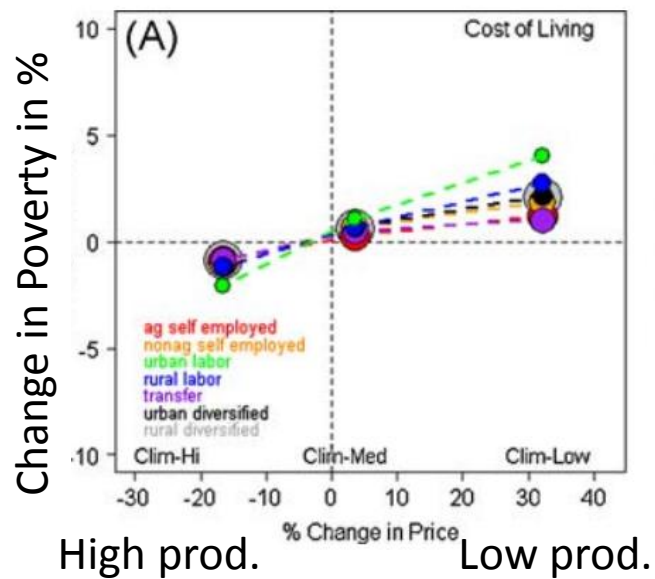
Negative numbers mean a decrease in poverty

The impact of changes in agricultural productivity on Earnings (B)

Food prices – producer side



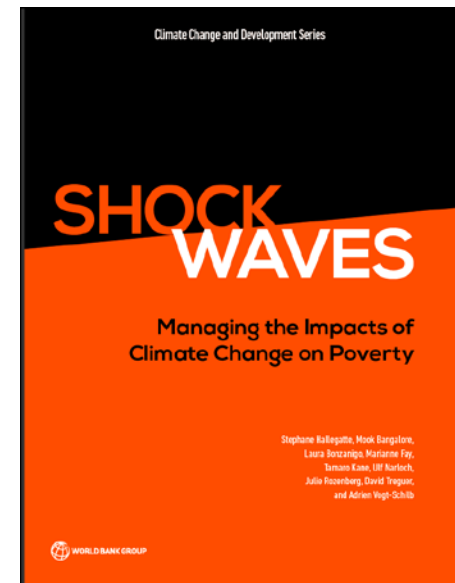
The total impact of changes in agricultural productivity on poverty, combining the producer and consumer side



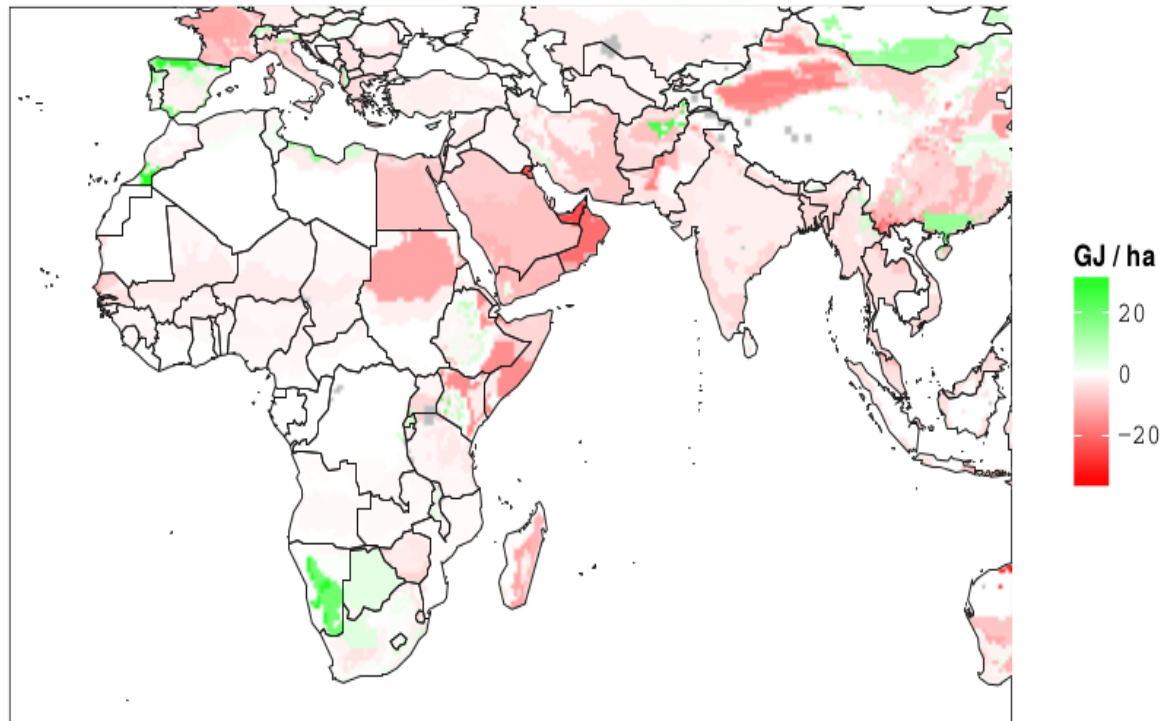
Modeling the impact of climate change on agriculture and hunger at a subnational scale



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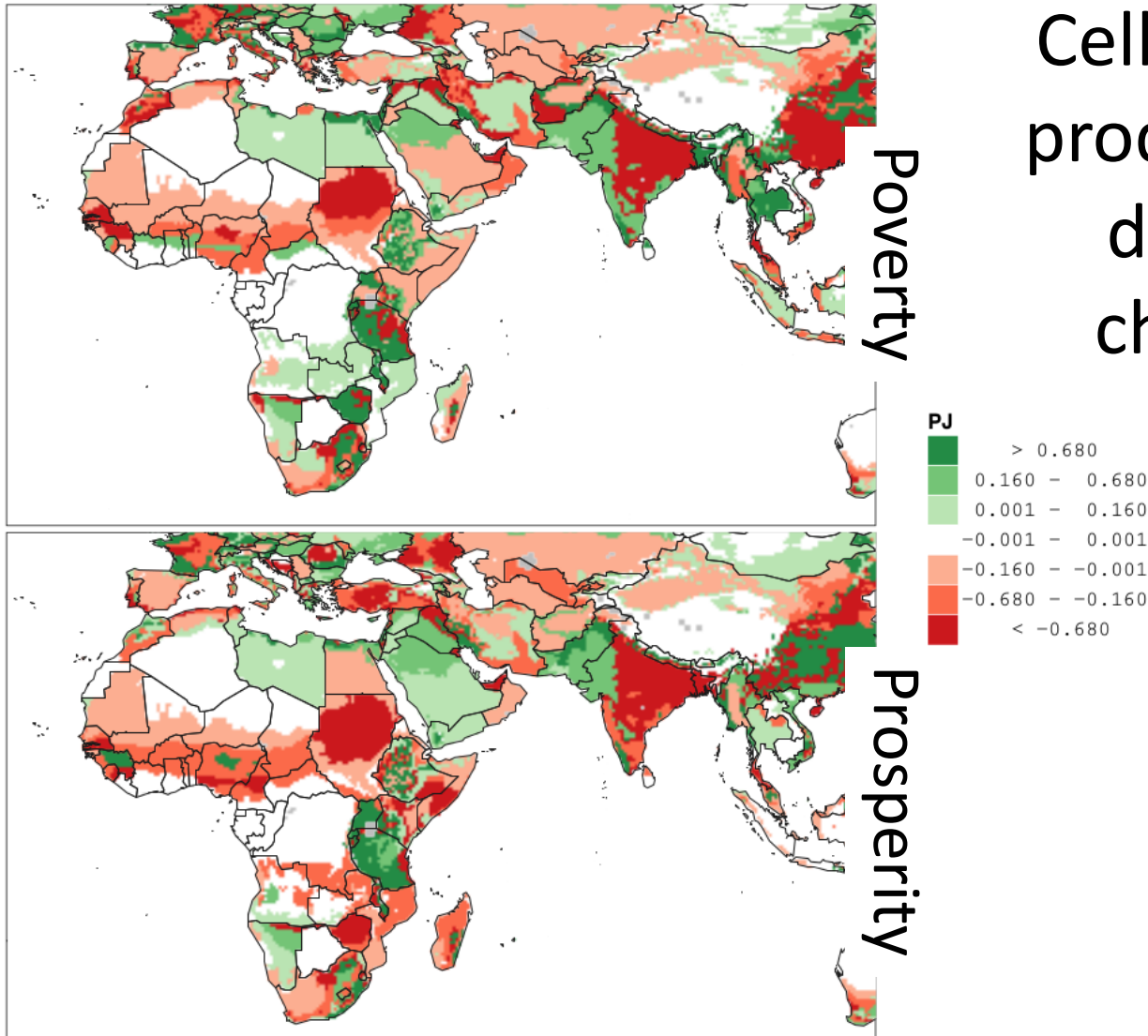


Cellular changes in food crop yields due to climate change in 2030



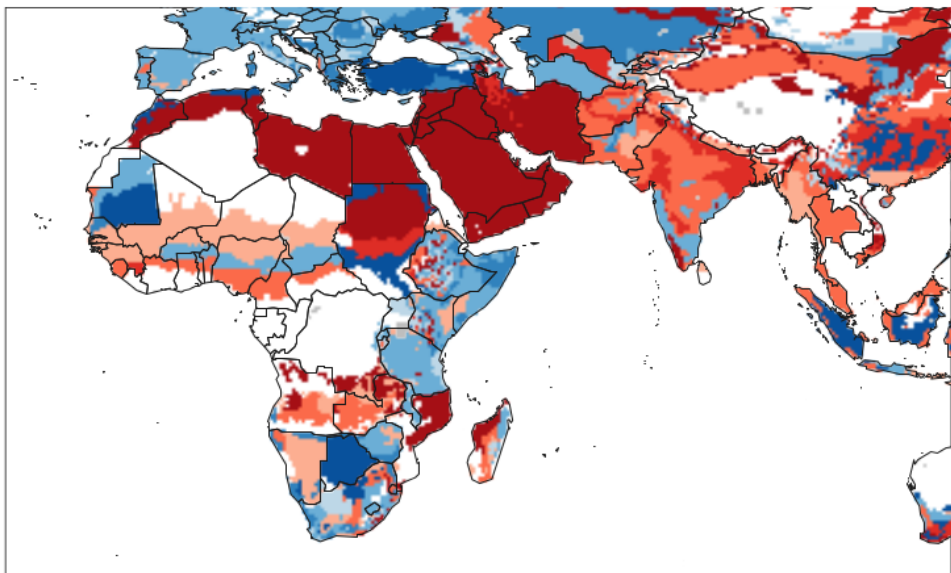
Difference in cell-based yields between a scenario with CC and one without (median for 5 GCMs, for the most important food crops and no CO₂-fertilization) [in GJ/ha, 1GJ = 10⁹ Joule]

Cellular changes in production amount due to climate change in 2030

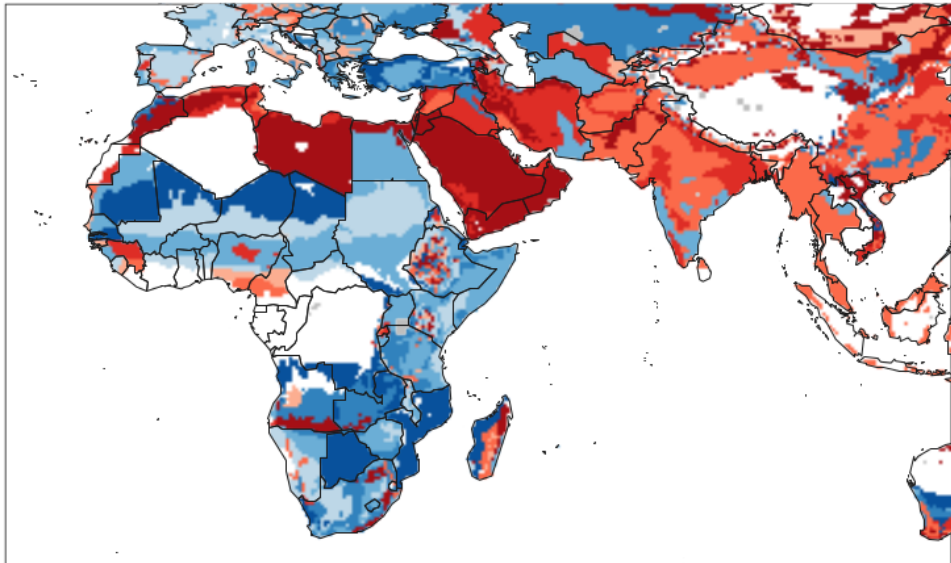
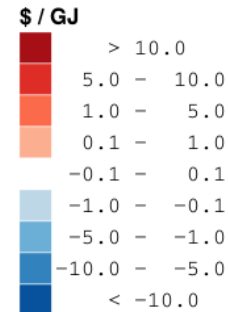


Difference in cell-based production amounts between a scenario with CC and one without for two different SSPs (median for 5 GCMs, average for all food crops)

Cellular changes in food production costs due to CC 2030



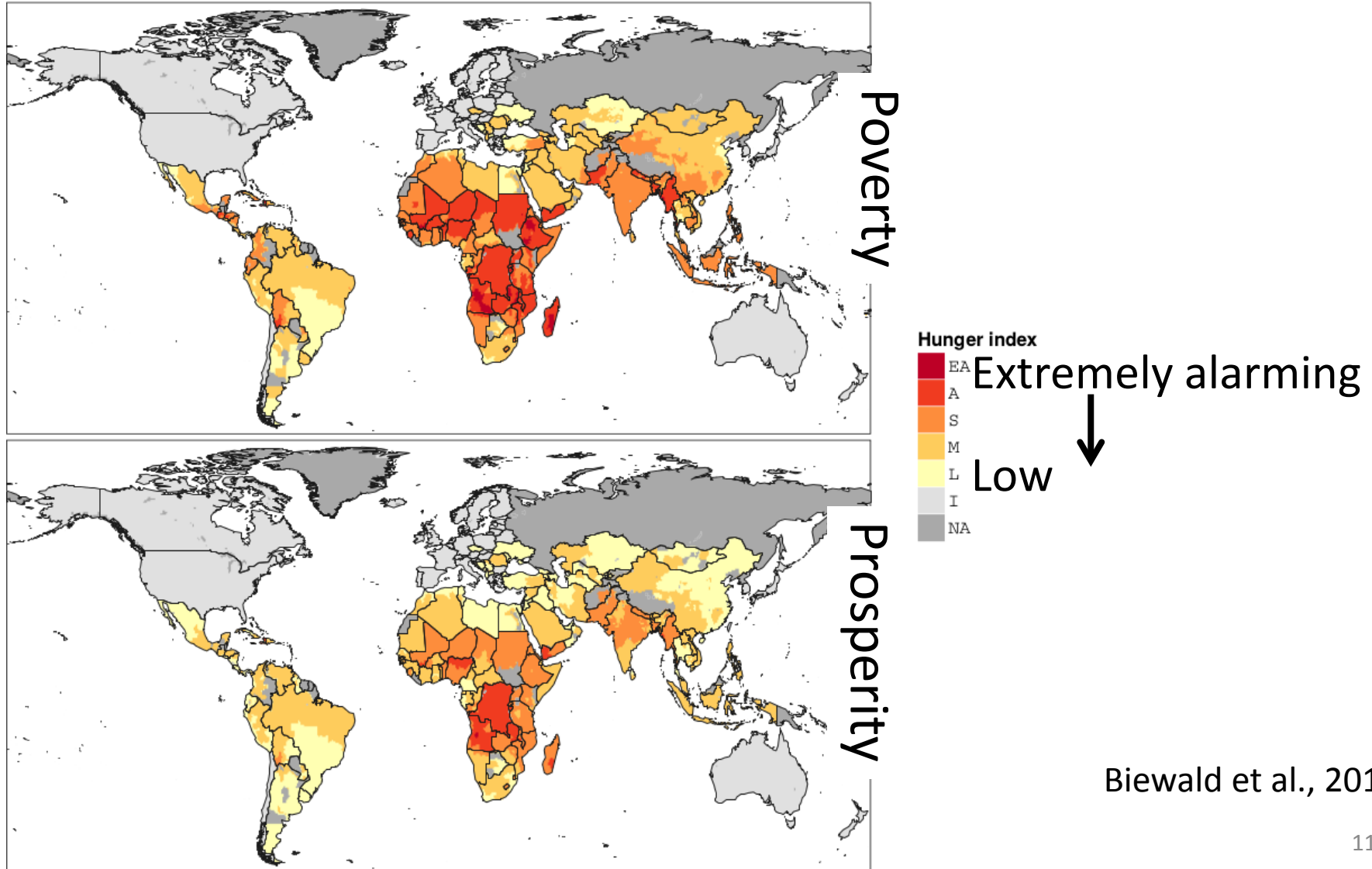
Poverty



Prosperity

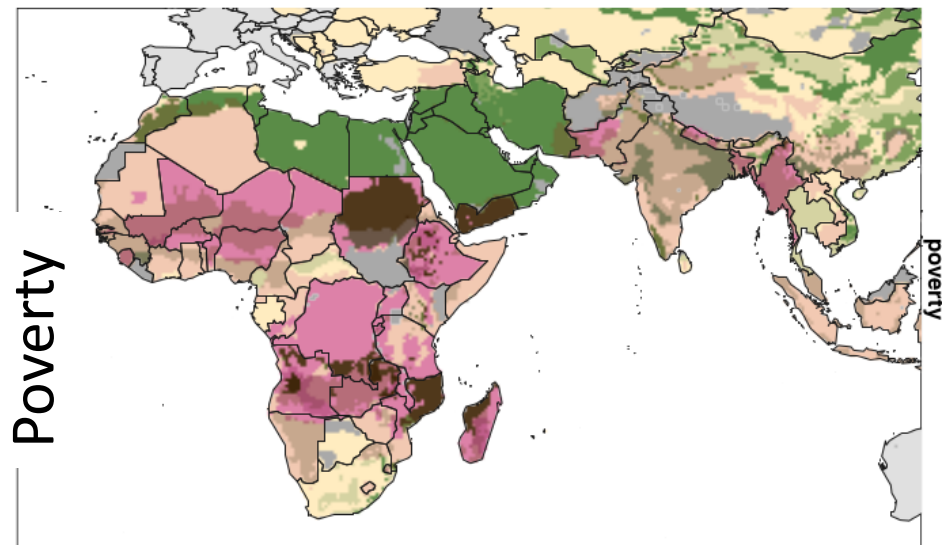
Difference in cell-based production costs between a scenario with CC and one without for two SSPs (median for 5 GCMs, average for all food crops).

The Hunger Index, projected for the two scenarios to 2030

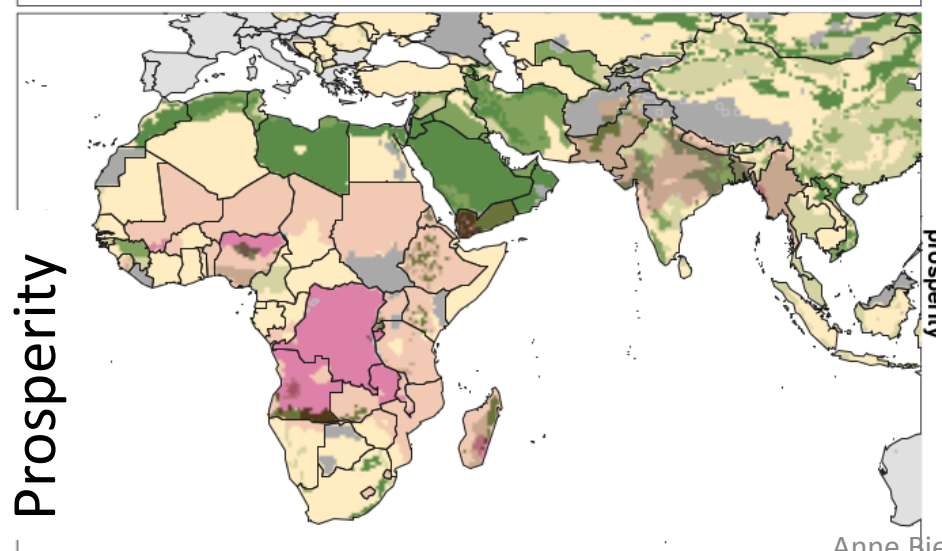
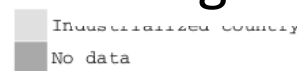


Biewald et al., 2015

Agricultural Vulnerability Indicator, based on the differences in Costs of Food



Hunger



Difference between a CC and a no CC scenario in Costs of Food combined with the projected Hunger Index for the year 2030 for the two socioeconomic scenarios

Data necessary to say something about hunger/ poverty as a consequence of CC impacts on agriculture

(already in the ISIMIP protocol Nov 2015):

- Information on agr. Productivity
 1. Effective Crop Yields
 2. Total production
 3. Applied irrigation water
 4. Nitrogen application (management)
 5. Rate of crop yield increase (technology)

Data necessary to say something about hunger/ poverty as a consequence of CC impacts on agriculture

(already in the ISIMIP protocol Nov 2015):

- Consumption side
 1. Total per capita consumption
 2. Animal based per capita consumption
 3. Food use (waste)
 4. Feed use for livestock

Data necessary to say something about hunger/ poverty as a consequence of CC impacts on agriculture

(already in the ISIMIP protocol Nov 2015):

- Land use
 1. Total land use
 2. Land use pattern, irrigated
 3. Land use pattern, rainfed

Data necessary to say something about hunger/ poverty as a consequence of CC impacts on agriculture

(already in the ISIMIP protocol Nov 2015):

- Agro-economic information
 1. Ressource prices for water and land
 2. Weighted average producer price
 3. Weighted average export price
 4. Representative price on international markets

Agmip phase I: many results already exist (no SSPs), but need to be transferred to

ISIMIP

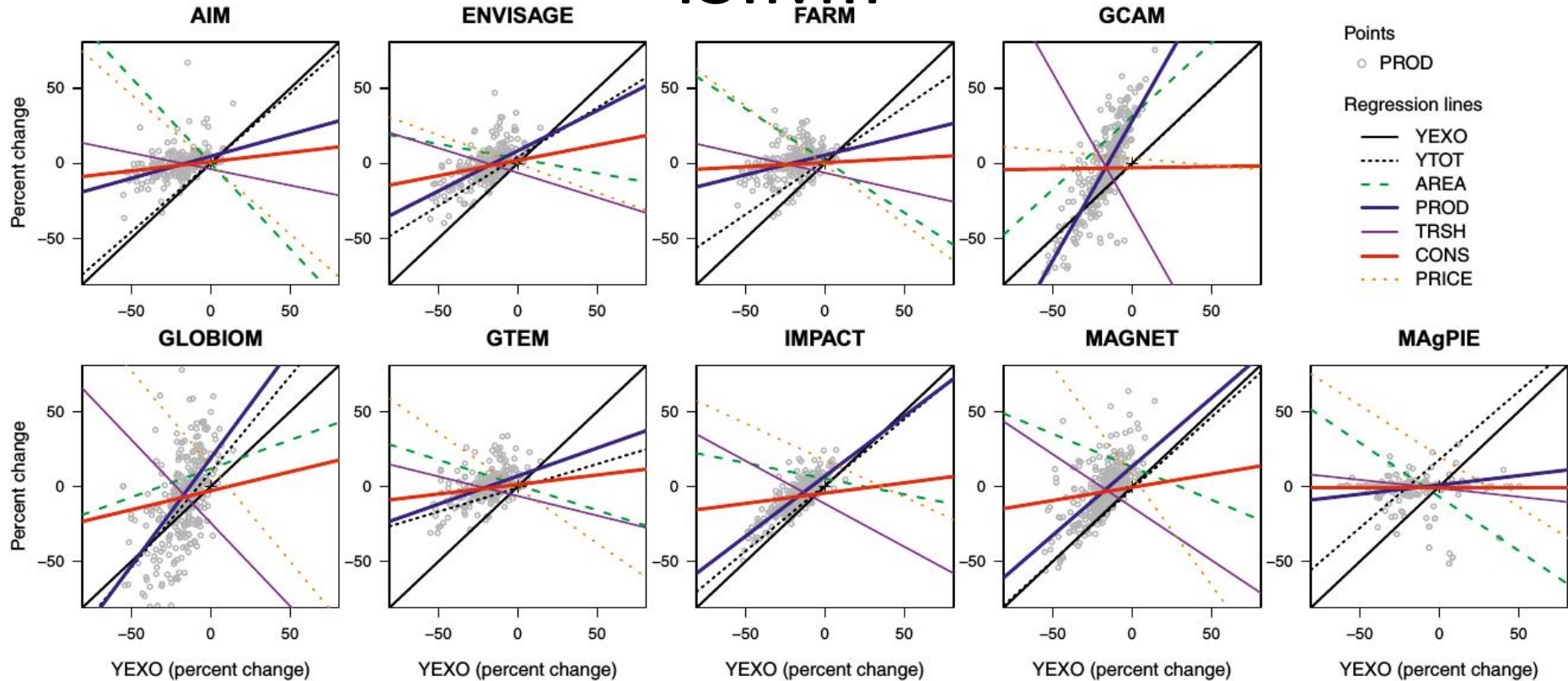
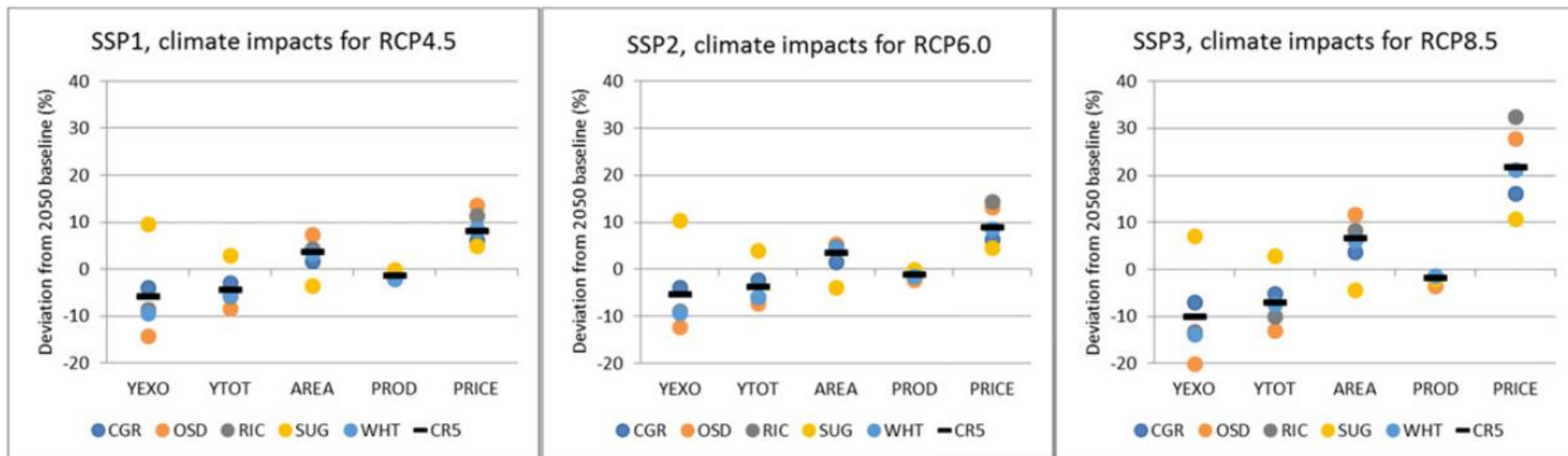


Fig. 3. Economic responses of model variables against YEXO, by model. The gray circles represent the PROD results on y axis versus YEXO input on the x axis, obtained in each model for the 13 regions, four crops, and seven scenarios of the analysis. The different lines represent results of univariate regressions for each variable against YEXO. The thick blue line corresponds to the regression on the gray circles; points for other variables are not displayed.

Nelson et al. 2013

Agmip phase II: first results with different SSPs, but only 4 models



Note: The plots show pooled results for five commodities and five global economic models, aggregated across three GCMs and thirteen regions (n = 5).

Crops: CGR = coarse grains, OSD = oilseeds, RIC = rice, YEXO = sugar, YTOT = wheat, CR5 = 5-commodity aggregate.

Variables: YEXO = exogenous yield shocks, YTOT = realized yields after management adaptation, AREA = agricultural area in production, PROD = total production, PRICE = price.

Conclusion

- How can a transfer from agmip to isimip be started and concluded?
- What ist the most relevant scale for these information?

Thank you!



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