



FACCE-MACSUR

Climate dependent equilibrium model

Anne Biewald^{1*}

¹ Potsdam Institute of Climate Change Impact, Potsdam, Germany

*anne.biewald@pik-potsdam.de

| | |
|------------------------------------|---|
| Instrument: | Joint Programming Initiative |
| Topic: | Agriculture, Food Security, and Climate Change |
| Project: | Modelling European Agriculture with Climate Change for Food Security (FACCE-MACSUR) |
| Start date of project: | 1 June 2012 |
| Duration: | 36 months |
| Theme, Work Package: | TradeM 2 |
| Deliverable reference num.: | D-T2.3 |
| Deliverable lead partner: | PIK |
| Due date of deliverable: | month 30 |
| Submission date: | 2015-07-28 |
| Confidential till: | — |

| Revision | Changes | Date |
|----------|---------------|------------|
| 1.0 | First Release | 2015-07-28 |

Summary

In the framework of AgMIP (Agricultural Model Intercomparison Project; www.agmip.org), several articles have been published in which about 10 leading, agro-economic models analysed the impact of climate change on agricultural yields, area, consumption and food prices (Lotze-Campen et al. 2014, Nelson et al. 2014a,b Schmitz et al. 2014). A part of these articles are available freely through the publisher (e.g. <http://www.pnas.org/content/111/9/3274>). PIK has not only contributed through model simulations with the spatially explicit, agro-economic model MAgPIE, but also by coordinating this activity. Starting with AgMIP phase II in 2015, AgMIP has now for the first time conducted the model-analysis for different "Shared Socio-economic Pathways" (short SSPs). A first study has been published in the renowned journal "Environmental Research Letters" (Wiebe et al. 2015). These are important contributions to task 2.3 which aimed at simulating the impact of global climate changes on agricultural systems.

Another study which is under revision in the journal PNAS, investigates the impact of climate change on agricultural welfare. The results of this paper are based on simulations with 20 different General Circulation Models (GCMs). This provides the opportunity to understand the uncertainty inherent in the different climate models better and improves the credibility of results.

All mentioned articles and results are based on harmonized yield changes, which are a result of multi-model simulations, conducted in the framework of ISI-MIP (Inter-Sectoral Impact Model Intercomparison Project) and coordinated at PIK. These model results are publicly available (www.isi-mip.org) and part of an open source strategy of the institute. The modelling group around the agro-economic model MAgPIE (Model of Agriculture and its Impact on the Environment) currently discusses an open source strategy for publishing the model code. As a first step, a detailed description of the model will be available shortly (<http://redmine.pik-potsdam.de/projects/magpie/wiki>).

PIK and the modelling group around MAgPIE have also contributed to the geoportal GLUES (Global Assessment of Land Use Dynamics, Greenhouse Gas Emissions and Ecosystem Services) where project partners can publish and share global and regional data sets as well as model results on scenarios of land use, climate change and economic development. MAgPIE results on landuse change, emissions and deforestation for different socio-economic scenarios have been made available there (<http://catalog-glues.ufz.de/terraCatalog/Start.do;jsessionid=80F6A3D2C446674B898881D0589887E4>).

Acknowledgements

This report is a contribution to the FACCE MACSUR knowledge hub.

References

- Lotze-Campen H, von Lampe M, Kyle P, Fujimori S, Havlik P, van Meijl H, Hasegawa T, Popp A, Schmitz C, Tabeau A, Valin H, Willenbockel D, and Wise M. 2014, Impacts of increased bioenergy demand on global food markets: an AgMIP economic model intercomparison, *Agric. Econ.*, 45, 103-116, doi: 10.1111/agec.12092.
- Nelson, G. C., Valin, H., Sands, R. D., Havlik, P., Ahammad, H., Deryng, D., Elliott, J., Fujimori, S., Heyhoe, E., Kyle, P., von Lampe, M., Lotze-Campen, H., Mason d’Croz, D., van Meijl, H., van der Mensbrugge, D., Müller, C., Popp, A., Robertson, R., Robinson, S., Schmid, E., Schmitz, C., Tabeau, A., Willenbockel, D. (2014): Climate

change effects on agriculture: Economic responses to biophysical shocks. PNAS, 111, 9, 3274-3279.

Nelson, G. C., van der Mensbrugghe, D., Ahammad, H., Blanc, E., Calvin, K., Hasegawa, T., Havlik, P., Heyhoe, E., Kyle, P., Lotze-Campen, H., von Lampe, M., Mason d'Croz, D., van Meijl, H., Müller, C., Reilly, J., Robertson, R., Sands, R. D., Schmitz, C., Tabeau, A., Takahashi, K., Valin, H. and Willenbockel, D. (2014), Agriculture and climate change in global scenarios: why don't the models agree. *Agricultural Economics*, 45: 85-101. doi: 10.1111/agec.12091

Schmitz C, van Meijl H, Kyle P, Nelson GC, Fujimori S, Gurgel A, Havlik P, Heyhoe E, d'Croz DM, Popp A, Sands R, Tabeau A, van der Mensbrugghe D, von Lampe M, Wise M, Blanc E, Hasegawa T, Kavallari A, and Valin H. 2014, Land-use change trajectories up to 2050: insights from a global agro-economic model comparison, *Agric. Econ.*, 45, 69-84, doi: 10.1111/agec.12090