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Farmers’ and academia’s views”

Attributing historical changes and recent events in crop production to observed climate change

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Abstract

Agriculture is projected to be increasingly affected by climate change, not least in many tropical countries prone to food insecurity. Where and which observed variations in agricultural production are already attributable to climate change to date is less clear, although such climate impact attribution can be important for understanding and assessing loss and damage, for informing and financially enabling adaptation policies, and for motivating both adaptation and mitigation efforts.

Here, we use observationally-derived counterfactual climate data together with both statistical modelling and process-based models for impact attribution in crop agriculture. For the latter, we use an ensemble of state-of-the-art crop models from the Global Gridded Crop Model Intercomparison (GGCMI) of the Agricultural Model Intercomparison and Improvement Project (AgMIP) and the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP3a). The use of a multi-impact model ensemble allows characterisation of model-contributed uncertainty and assessment of the robustness of the results. This study is complemented by work using statistical crop modelling approaches. The statistical models complement the process-based models in terms of different shortcomings and benefits. For the factual and counter-factual climate we, use the recently published ATTRICI data set.

The analysis includes both long-term changes globally and nationally as well as individual events in selected regions. By collaborating with international and local stakeholders, we maximise relevance of the results and ensure appropriate consideration of regionally relevant factors and data availability and quality issues. Our work combines perspectives of climate attribution, disaster risk reduction, and agricultural science to enhance the science of attributing climate impacts in agriculture relevant for loss and damage and beyond.

Keywords: Attribution, climate change, climate impacts, crop yields