

# Impact on agricultural production of extreme weather events

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Climate change will affect agricultural production and threaten food security. The IPCC AR5 WG1 assessment report states that extreme weather events tend to happen more frequently along with global warming in the future. This calls for integrated assessment of the impact on agricultural production of extreme weather events. In the HIWAVES3 project, by a global macroeconomic model GRACE (Aaheim, et al. 2018), we will simulate climate change impact on agricultural production based on a large ensemble of climate model data and identify extreme weather events that have the highest impact on agricultural production. These high-impact events are likely different from meteorological extreme events.

The GRACE model is a global multi-sector multi-regional computable general equilibrium (CGE) model supporting studies of the consequences of human activities affecting the drivers of climate change. The model comprehensively describes all economic activities, and links greenhouse gas emissions and climate change impacts to these economic activities at regional and sectoral level. The comprehensiveness together with the modelling of individual behavior makes GRACE a tool for integrating knowledge from different perspectives while considering dependencies between countries, sectors and scales.

The GRACE model has been used to study the impact of extreme precipitation events on crop production in China. Three extreme weather scenarios are examined for three main crops in China (Wei, et al. 2017). One scenario assumes a year when every province has precipitation corresponding to the lowest level in the province over the last three decades. Another scenario assumes the highest precipitation for every province; and the last scenario assumes that the most harmful level of precipitation on crops occurs for every province – whether too little or too much. Results show that national impacts of extreme precipitation on crop harvests are modest for China. The maize harvest is the most negatively affected in a range of 1-4% reduction. However, the impacts within a province may be considerable and even become worse with adaptation. Good harvests might not make farmers better off due to lower crop prices although consumers benefit.

Key words: High impact extremes, integrated assessment, CGE modelling, crop production, China

## References

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