

Dissertation Release

14.02.2022

Climate impacts on global food production

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| Title of the dissertation | Susceptibility of global crop production to climate variability and change |
| Contents of the dissertation | <p>For millennia, humans have grown their food in relatively stable Holocene climatic conditions, which are now perturbed by anthropogenic climate change. This dissertation analyzed how the climatic conditions across global croplands might change in the future. Worryingly, it estimates that climate change might push a third of global food crop production to climatic conditions where no crops are currently grown if greenhouse gas emissions keep growing in the future.</p> <p>Climate change is also projected to increase the frequency of extreme weather events. However, it is unclear how these changes will relate to agriculture. This dissertation found that weather extremes generally reduce crop productivity, with co-occurring heat and drought leading to the largest impacts. Alarmingly, the probability of hot and dry weather has increased in recent decades, especially during the wheat growing season for example in Europe and North America.</p> <p>Interannual variations in climatic conditions are also partially driven by climate oscillations. This dissertation observed that large-scale climate cycles, such as the El Niño Southern-Oscillation, influence agriculture across continents, with strong impacts observed in many parts of Australia, Africa, and South America. This suggests that predictions about the status of these oscillations could provide useful information for preparing against adverse weather in agriculture.</p> <p>As climate change already affects global crop production, future solutions should concentrate on increasing the resilience of farming systems to anomalous weather, in addition to mitigation actions.</p> |
| Field of the dissertation | Water and Environmental Engineering |
| Doctoral candidate | Matias Heino, M.Sc. (Tech.), born in 1989 in Uppsala, Sweden |
| Time of the defence | 25 February 2022 at 12:00 hours |
| Place of the defence | Online via Zoom; https://aalto.zoom.us/j/66893209461 |
| Opponent | Dr Andrej Ceglar, European Commission, Joint Research Centre, Italy |
| Supervisor | Associate Professor Matti Kummu, School of Engineering, Aalto University, Finland |
| Electronic dissertation | https://aaltodoc.aalto.fi/handle/123456789/112977 |
| Doctoral candidate's contact information | Matias Heino, Aalto University, matias.heino@aalto.fi |