

More accurate assessment of climate induced impacts

Karin VAN DER WIEL¹, Frank SELTEN¹, Richard BINTANJA¹, Russell BLACKPORT², James SCREEN²

¹ *Royal Netherlands Meteorological Institute, De Bilt, The Netherlands*

² *University of Exeter, Exeter, United Kingdom*

The investigation of disaster risk due to weather and climate events, and changes therein, is an example of policy relevant science. Disaster risk is the result of complex interactions between the physical environment (geophysical events or conditions, including but not limited to weather and climate events) and societal factors (vulnerability and exposure). The societal impact of two similar meteorological events at different times or different locations may therefore vary widely. Despite the complex relation between meteorological conditions and impacts, most climate research is focused on the occurrence or severity of extreme meteorological events. Here we argue that an approach of ensemble climate-impact modelling is required to accurately investigate the relationship between meteorology and impact extremes. By means of a case study of extreme potato crop yields, we demonstrate that extreme weather conditions do not always lead to extreme impacts; in contrast, extreme impacts may result from (coinciding) moderate weather conditions. Explicit modelling of climate impacts, using the complete distribution of weather realisations, is thus necessary to ensure that the most extreme impact events are identified. We further show that the approach provides higher accuracy for consequent estimates of disaster risk and that it allows for the investigation of high-impact meteorological conditions.

Key words: high impact weather, extremes, societal impact, risk