



## **Extreme weather and the impacts on agriculture**

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Climate change is estimated to have already affected crop production adversely. The major way in which climate influences crop production is through extreme weather events such as droughts, floods and extreme temperature (heat and frosts). Numerous studies have examined the influence of historical and potential future climate means on crop production. However few have quantified the influence of extreme weather events. We used a statistical approach, “superposed epoch analysis” or compositing, to estimate for the first time national crop production losses across the globe due to historical weather-related disasters from 1961-2007. We obtained historical data on floods, droughts, extreme heat, and extreme cold events from the Emergency Events Database, EM-DAT and related these to historical national-level harvested area, yield, and production statistics for cereal crops from the FAOSTAT database. We found that droughts and extreme heat events have had a substantial influence on cereal crops, on average reducing crop production by 9-10%, while cold waves and extreme cold events exhibit no statistically discernible influence. We further find that the influence of droughts is through a combination of reduced harvested area and yields, while extreme heat seems to have mainly affected yields. The underlying reasons for these different crop responses are unknown, as the statistical approach only estimates the revealed relationships and does not explore causes. Nevertheless these findings raise new questions on why certain weather events seem to have had substantial production impacts while others have not. We suggest that greater attention should be paid to studying the influence of actual weather events on crops, rather than the influence of mean climate alone.