



## Agriculture Impacts of Regional Nuclear Conflict

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One of the major consequences of nuclear war would be climate change due to massive smoke injection into the atmosphere. Smoke from burning cities can be lofted into the stratosphere where it will have an e-folding lifetime more than 5 years. The climate changes include significant cooling, reduction of solar radiation, and reduction of precipitation. Each of these changes can affect agricultural productivity. To investigate the response from a regional nuclear war between India and Pakistan, we used the Decision Support System for Agrotechnology Transfer agricultural simulation model. We first evaluated the model by forcing it with daily weather data and management practices in China and the USA for rice, maize, wheat, and soybeans. Then we perturbed observed weather data using monthly climate anomalies for a 10-year period due to a simulated 5 Tg soot injection that could result from a regional nuclear war between India and Pakistan, using a total of 100 15 kt atomic bombs, much less than 1% of the current global nuclear arsenal. We computed anomalies using the NASA Goddard Institute for Space Studies ModelE and NCAR's Whole Atmosphere Community Climate Model (WACCM). We perturbed each year of the observations with anomalies from each year of the 10-year nuclear war simulations. We found that different regions respond differently to a regional nuclear war; southern regions show slight increases of crop yields while in northern regions crop yields drop significantly. Sensitivity tests show that temperature changes due to nuclear war are more important than precipitation and solar radiation changes in affecting crop yields in the regions we studied. In total, crop production in China and the USA would decrease 15-50% averaged over the 10 years using both models' output. Simulations forced by ModelE output show smaller impacts than simulations forced by WACCM output at the end of the 10 year period because of the different temperature responses in the two models.