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America's Farming Future: The Impact of Climate Change on Crop Yields

Interim Report

For my project, I am predicting crop yields out to 2100. First, I downloaded crop yield data for corn from 1970 to present for each individual county in the U.S. Then, I downloaded daily weather station data for all weather stations with data since 1970. Next, I computed the means (ex. summer average temperature) and the extremes (ex. number of heat waves: 3 consecutive days above the 90th percentile) for every county. After finding the closest weather station to the center of every county, I correlated the crop yield with the means and extremes for that year and in doing so, created a statistical model. This model is simply the equation of the best fit line for each county that predicts crop yields based on the weather mean and extreme. Next I downloaded future model data from a CMIP5 climate model simulation dataset. I found the closest model grid to the center of every county. Then I found the means and extremes of the future and used my statistical model of correlations to predict the crop yield out until year 2100. However, I have only done this process for one crop: corn, and on one future scenario: RCP8.5. Next, I plan to redo this process for soybeans, rice, and cotton and for the scenario RCP4.5 to see how the future changes if we burn fewer fossil fuels. My results show that the yield is predicted to decrease in the future, especially if we continue to burn fossil fuels at the constant rate.