Increasing crop yields under climate change scenarios in Nigeria

Scientific summary

Climate change is projected to cause unprecedented levels of global change and it will alter the ways in which humans currently rely on getting essential resources such as food. Africa is considered to be the most vulnerable continent to this change, with many countries that have low economic stability and insecure food sources a change to the way resources can be accessed could be detrimental to the population. One such example of this is agriculture: with the population expected to continue to rise stable sources of food will be needed, but climate change is making the production of high crop yields more difficult. This research studied the impact climate change will have on crop yields in Nigeria under the RCP 4.5 and the RCP 8.5 emissions scenarios from 1986 to 2100 using the LPJ-GUESS model. It showed that the average crop yields in Nigeria for maize, sorghum, wheat and pulses are likely to increase; even more so under the RCP 8.5 scenario due to higher estimated CO_2 fertilization effects. Different management strategies to increase this further were then modelled which illustrated that when cover crops, irrigation or additional nitrogen were used, crop yields increased further, where the latter management strategy was most effective. Of the different crops, maize and sorghum produced the highest yields and were most robust to climate change. In general, crop yields were highest in the north and lowest in the south of Nigeria, with the exception of pulse crops where the opposite was true. The different agroecological zones present in Nigeria also caused different management strategies to be more effective in different regions. Overall, this research highlights the importance of using management strategies to increase food production for Nigeria in the face of climate change.

Key words

Physical Geography, Agriculture, Climate Change, Crop Yields and Management Strategies