# Development of an impact function of global crop productivity for climate change policy support models

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Abstract

Global warming will affect various sectors such as agriculture, water resources, etc. Decision-making on climate stabilization target and reduction pathway of greenhouse gases (GHG) emission is the issue to be solved through international cooperation. For the purpose of supporting the decision-making based on integrated assessment of impacts on multiple sectors, an integrated analyses tool named AIM/Impact[Policy] was developed. In AIM/Impact[Policy], climate change impacts on various sectors under the assumed GHG-emission pathways are projected based on what we call impact functions.

An impact function is a look-up table of the country-averaged (or prefecture-averaged in Japan) impacts on a certain sector under many arbitrary conditions of climate change, and the look-up table is created based on a sensitivity analysis of the impact by running a full-scale impact model for many times with varying key climatic variables. In this poster, we introduce the development procedure and the overview of the impact functions of global crop productivity for maize, wheat, and paddy-rice.

We conducted the sensitivity analysis using the M-GAEZ model with varying two key climatic variables, temperature and precipitation, and averaged the outputted productivity for each country to obtain the impact functions.

According to the analysis of the impact functions, the sensitivity of crop productivity to the temperature and the precipitation differs by crops and countries. The level of change in temperature and in precipitation where a reduction in productivity becomes visible also varies with both crops and countries. In India, wheat hardly grows when the annual mean temperature increases by 4°C or more. The maize productivity in Brazil and the paddy-rice productivity in Indonesia decrease in most of the cases in the sensitivity analysis conducted. The impact functions enable us to derive the impacts on crop productivity in each country under various assumptions of climate change immediately, and it is useful to support policy decisions.