Linking Climate Modeling to Economic Assessment of Climate Change: Analysis of MIROC-SPRINTARS AOGCM Experiments on Siberian Wildfires

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Climate change potentially affects the global macroeconomic performance through a number of pathways such as intensification of weather extremes and temperature-related yield losses of major crops. A wide range of economic research has been made for quantifying such impacts. The efforts have been synthesized by publications of the Social Cost of Carbon (e.g., [1]). Such estimations of economic impacts of climate change are often made in the use of Integrated Assessment Models (IAMs), which are models embodying modules for both macroeconomic and climatic simulations. However, there are some relatively neglected factors in the IAM literature so far, and among them are the climatic responses of aerosol emissions from wildfires.

This presentation will offer an overview of the IAM approach and propose a method of quantifying wildfires' impact on the macro-level economy through their climatic effects due to the changes of atmospheric aerosols. To this end, it discusses our analysis on Siberian wildfires as an attempt of such assessment. Specifically, we evaluate the potential scale of macroeconomic impacts of Siberian wildfires' climatic effects by drawing on results of sensitivity experiments on enhanced biomass burning (BB) emissions (i.e., aerosols: black carbon, organic carbon; precursor gas: SO2) over the defined Siberian domain using a global aerosol climate model, MIROC-SPRINTARS, in which the model was coupled with the ocean model (i.e., Atmosphere-Ocean coupled Global Climate Model: AOGCM). We use sets of simulation results differing in the conditions of BB emissions and climate, in which three different reference levels of BB emissions over the defined Siberian domain were used under the present (RCP scenario in 2005) or future climate (RCP2.6 and RCP8.5 in 2030) conditions. Differentials of annual average temperatures estimated by the simulations are used to compute monetary-equivalent economic impacts attributable to climatic effects of BB by applying the functions of the RICE-2010 model [3], which is a regionally disaggregated version of the most widely used IAM, the DICE model. The macroeconomic impacts are estimated for the most affected countries and regions, such as Russia, China and Europe.
References

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