

ACRE SEMINAR
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HUMAN FEEDBACKS IN THE EARTH SYSTEM

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Abstract

It is now widely accepted that climate change would affect the terrestrial and marine carbon cycle, and the latest climate models include these feedbacks on natural emissions. Anthropogenic emissions, however, are assumed to be independent of climate. I test this assumption with a series of experiments with loosely coupled climate, impact, and economic models. This test determines the necessary degree of integration of the human dimension into earth system models. Models of natural and social systems are not readily integrated, because of differences in soft- and hardware, variable metrics, and disciplinary traditions; and because theories are incomplete. Using a conceptual model, I show that the impact of climate change on the growth rate of the economy, the main driver of emissions, is limited. Parameter combinations that would lead to large effects are implausible. Using a simulation model of international tourism flows, I show that regional shifts in carbon dioxide emissions can be substantial; the analysis suggests that changes in other emissions may be larger still. Using a computable general equilibrium model, I show that the indirect economic effects on shifts in tourism on carbon dioxide emissions are again small. Comparison to other types of impacts shows that this holds more generally; and that increases and decreases of emissions largely cancel. As a tentative conclusion, climate change would not affect global emissions much, but may influence regional emissions and hence regional climate change.

Bio-sketch

Richard S.J. Tol is the Michael Otto Professor of Sustainability and Global Change, Departments of GeoSciences and Economics, and Director, Research Unit on Sustainability and Global Change, Centre for Marine and Climate Research, Hamburg University, Germany; a Principal Researcher, Institute for Environmental Studies, Vrije Universiteit, Amsterdam, the Netherlands; and an Adjunct Professor, Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA, USA. He received an M.Sc. in econometrics (1992) and a Ph.D. in economics (1997) from the Vrije Universiteit Amsterdam.