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The treatment of climate science in Integrated Assessment Modelling: integration of climate step function response in an energy system integrated assessment model.

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Integrated Assessment Models (IAMs) are used as crucial inputs to policy-making on climate change. These models simulate aspect of the economy and climate system to deliver future projections and to explore the impact of mitigation and adaptation policies. The IAMs' climate representation is extremely important as it can have great influence on future political action.
The step-function-response is a simple climate model recently developed by the UK Met Office and is an alternate method of estimating the climate response to an emission trajectory directly from global climate model step simulations. Good et al., (2013) have formulated a method of reconstructing general circulation models (GCMs) climate response to emission trajectories through an idealized experiment. This method is called the "step-response approach" after and is based on an idealized abrupt CO_2 step experiment results.
TIAM-UCL is a technology-rich model that belongs to the family of, partial-equilibrium, bottom-up models, developed at University College London to represent a wide spectrum of energy systems in 16 regions of the globe (Anandarajah et al. 2011). The model uses optimisation functions to obtain cost-efficient solutions, in meeting an exogenously defined set of energy-service demands, given certain technological and environmental constraints. Furthermore, it employs linear programming techniques making the step function representation of the climate change response adapted to the model mathematical formulation.
For the first time, we have introduced the "step-response approach" method developed at the UK Met Office in an IAM, the TIAM-UCL energy system, and we investigate the main consequences of this modification on the results of the model in term of climate and energy system responses. The main advantage of this approach (apart from the low computational cost it entails) is that its results are directly traceable to the GCM involved and closely connected to well-known methods of analysing GCMs with the step-experiments.

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References:
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