



Jul 13th, 11:30 AM - 11:50 AM

## A simple integrated assessment approach to global change simulation and evaluation

K. B. Z. Ogutu

*Dedan Kimathi University of Technology, Laboratoire de Météorologie Dynamique (CNRS and IPSL), Ecole Normale Supérieure, okeroboto@gmail.com*

F. D'Andrea

*Laboratoire de Météorologie Dynamique (CNRS and IPSL), Ecole Normale Supérieure, dandrea@lmd.ens.fr*

M. Ghil

*Laboratoire de Météorologie Dynamique (CNRS and IPSL), Environmental Research & Teaching Institute, Ecole Normale Supérieure, University of California at Los Angeles, ghil@lmd.ens.fr*

Follow this and additional works at: <https://scholarsarchive.byu.edu/iemssconference>



Part of the [Civil Engineering Commons](#), [Data Storage Systems Commons](#), [Environmental Engineering Commons](#), [Hydraulic Engineering Commons](#), and the [Other Civil and Environmental Engineering Commons](#)

Ogutu, K. B. Z.; D'Andrea, F.; and Ghil, M., "A simple integrated assessment approach to global change simulation and evaluation" (2016). *International Congress on Environmental Modelling and Software*. 78. <https://scholarsarchive.byu.edu/iemssconference/2016/Stream-A/78>

This Event is brought to you for free and open access by the Civil and Environmental Engineering at BYU ScholarsArchive. It has been accepted for inclusion in International Congress on Environmental Modelling and Software by an authorized administrator of BYU ScholarsArchive. For more information, please contact [scholarsarchive@byu.edu](mailto:scholarsarchive@byu.edu), [ellen\\_amatangelo@byu.edu](mailto:ellen_amatangelo@byu.edu).

# A simple integrated assessment approach to global change simulation and evaluation

**K. B. Z. Ogutu<sup>a, b</sup>, F. D'Andrea<sup>b</sup>, and M. Ghil<sup>b, c, d</sup>**

<sup>a</sup>Department of Mathematics & Physical Sciences, School of Science, Dedan Kimathi University of Technology, Nyeri, Kenya ([okeroboto@gmail.com](mailto:okeroboto@gmail.com))

<sup>b</sup>Laboratoire de Météorologie Dynamique (CNRS and IPSL), Ecole Normale Supérieure ([dandrea@lmd.ens.fr](mailto:dandrea@lmd.ens.fr))

<sup>c</sup>Environmental Research & Teaching Institute, Ecole Normale Supérieure ([ghil@lmd.ens.fr](mailto:ghil@lmd.ens.fr))

<sup>d</sup>Department of Atmospheric & Oceanic Sciences, University of California at Los Angeles, Los Angeles, USA

**Abstract:** We further develop and study a Coupled Climate-Economy-Biosphere (CoCEB) model. This simple and highly idealized model constitutes the basis of our integrated assessment approach to simulating and evaluating global change. CoCEB is composed of a physical climate module, based on Earth's energy balance, and an economy module that uses endogenous economic growth with physical and human capital accumulation. A biosphere model is likewise under study and will be coupled to the existing two modules. We concentrate on the interactions between the two subsystems: the effect of climate on the economy, via damage functions, and the effect of the economy on climate, via a control of greenhouse gas emissions. Simple functional forms of the relation between the two subsystems permit simple interpretations of the coupled effects. The CoCEB model is used to make hypotheses on the long-term effect of investment in emission abatement, and on the comparative efficacy of different approaches to abatement, in particular by investing in low carbon technology, in deforestation reduction or in carbon capture and storage (CCS). The CoCEB model is very flexible and transparent, and it allows one to easily formulate and compare different functional representations of climate change mitigation policies. Using different mitigation measures and their cost estimates, as found in the literature, one is able to compare these measures in a coherent way.

**Keywords:** Integrated-assessment; climate-change; economy; biosphere; impacts; mitigation.