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A. Shchiptsova
International Institute for Applied Systems Analysis, shchipts@iiasa.ac.at

D. Kovalevsky
Nansen International Environmental and Remote Sensing Centre, Saint Petersburg State University, d_v_kovalevsky@list.ru

E. Rovenskaya
International Institute for Applied Systems Analysis, Lomonosov Moscow State University, rovenska@iiasa.ac.at

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A. Shchiptsova[a], D. Kovalevsky[b,c], E. Rovenskaya[a,d]
a: International Institute for Applied Systems Analysis, Schlossplatz 1, A-2361 Laxenburg, Austria
b: Nansen International Environmental and Remote Sensing Centre, 14th Line 7, Office 49, Vasilievsky Island, 199034 St. Petersburg, Russia
c: Saint Petersburg State University, Universitetskaya Emb. 7-9, 199034 St. Petersburg, Russia
d: Lomonosov Moscow State University, Faculty of Computational Mathematics and Cybernetics, 2nd ducational Building, Leninskie Gory, 119991 Moscow, Russia
shchipts@iiasa.ac.at, d_v_kovalevsky@list.ru, rovenska@iiasa.ac.at

Abstract: To date, no model building process can guarantee full representation of the complex climate-economic processes and narrow down the uncertainty associated with future climate projections. Multiple highly detailed models are developed by individual research groups to capture various known aspects of the climate processes. Normally, these models represent only a part of the climate-society system due to its complexity. On the other hand, a number of the simplified integrated assessment models (IAMs) have been put forward in the attempt to introduce the full causal loop between accumulated emissions, economy and climate, and study associated uncertainty. We present a simplified system dynamics IAM based on the model reported in Kovalevsky and Hasselmann (2014) with stochastic climate sensitivity and a nonlinear climate damage function, whose outcomes principally agree with the results of the more detailed conventional models under the business-as-usual scenario and the mitigation scenario (with carbon tax).
Our goal is to explore the structural sensitivity of the long term projections (with the focus on global temperature, global economy output, GHG emissions and atmospheric concentrations) to a probabilistic distribution describing the climate sensitivity, which is considered as one of the most important parameters to which the IAM is sensitive. We look for robustness of economy-climate system dynamics under different assumptions on climate sensitivity distribution using the approach suggested in Kryazhimskiy (2013).
The results show that integration based on mutual compatibility of outcomes in the model ensemble, leads to a higher mean global output, emissions and concentrations and lower mean global temperature than both prior means, coming along with lower uncertainty in the integrated scenario.

***Keywords**:* system dynamics, climate change, multi-model ensembles

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