Newly certified models in the CoMSES model library and newly published models added to the model library.

... a node in the CoMSES Network

# CoMSES Digest: Winter 2017

## Volume 5, No. 4  September 16, 2017  – December 15, 2017

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## From the Editor:

Welcome to the CoMSES Digest, Winter 2017! This quarter we focus on the ongoing effort to collaborate with CSDMS to work toward developing the Next Generation of Modeling for Human-Earth Systems; see the discussion by Michael Barton in the 'CoMSES News' section.

**John T. Murphy,**
**CoMSES Digest Editor**

## CoMSES News:

## October Board Meeting

The October CoMSES meeting was attended by Michael Barton, Marco Janssen, Allen Lee, Calvin Pritchard, Forrest Stonedahl, and John Murphy. The major points discussed included:

- The then-upcoming CoMSES Virtual Conference. We'll be providing a fuller write-up of this in a future digest.
- A presentation on model integration to be given at the American Geophysical Union meetings in New Orleans, by those involved in the model integration work. The focus of the presentation was linking a hydrology model with a crop model as an example of more general model integration strategy.
- Continued work with the Open Modeling Foundation
- Adjustments to the download policy for the OpenABM model library, to address downloads by bots

## Next Generation Modeling for Human-Earth Systems

C. Michael Barton

Over the past year and a half, CoMSES Net has collaborated with CSDMS (Community Surface Dynamics Modeling System) and AIMES (Analysis and Integrated Modeling of the Earth System, a core project of Future Earth) to coordinate an expanding community of social and natural scientists in creating a vision for new, transdisciplinary approaches for advanced, integrative computational modeling of coupled human-Earth systems. To date, this effort has included a series of workshops, meeting presentations, and a paper.

CoMSES Net has had an ongoing collaborative initiative with CSDMS for the past several years, with a CoMSES Net member co-chairing the CSDMS Human Dimensions Focus Research Group (http://csdms.colorado.edu/wiki/Anthropocene_Focus_Research_Group) and presenting Keynote talks and hands-on clinics on modeling human systems at CSDMS annual meetings. In May of 2016,  the Human Dimensions FRG organized an international workshop on the topic of “Linking Earth System Dynamics and Social System Modeling”, with additional support from AIMES and NSF (http://csdms.colorado.edu/wiki/CHESS). A joint paper presenting case studies that illustrate the importance of integrative modeling of human and environmental systems and their feedbacks is currently in revision with the open access journal Earth System Dynamics. This meeting began to sketch a long-term science plan for next generation modeling of human-Earth systems.

The May workshop was followed in September 2016 by an AIMES sponsored workshop in Kyoto, Japan, discussing “Modeling Challenges for Sustainability”.  Several CoMSES members were invited to participate in this discussion. Another workshop took place in Potsdam, Germany, March, 2017 sponsored by AIMES and co-organized by AIMES and CoMSES Net. The Potsdam workshop was especially pivotal in that attendees began to lay out an implementation strategy for an international open-source collaborative to transform the ideas of previous meetings into a set of community standards, model coupling protocols, model code meeting the new standards, and avenues to translate narrative models into quantitative ones.

In April 2017, Professor Li An at San Diego State University organized an NSF sponsored workshop on the future of agent based modeling. This workshop was unconnected with the other efforts, but many attendees of the Potsdam workshop and CoMSES Net

members were also in attendance at the SDSU workshop. In breakouts and keynotes, they presented the ideas and goals of the prior meetings to attendees of this workshop, and they were very well received. CoMSES was repeatedly invoked as an exemplar organization for model archival and sharing, and for promoting best practices for ABM. This workshop presented a serendipitous opportunity to further expand the community of modeling scientists to support a nextgen modeling initiative.

In May 2017, CoMSES Net co-sponsored the CSDMS annual meeting: “Modeling Coupled Earth and Human Systems - The Dynamic Duo”, in Boulder, CO (http://csdms.colorado.edu/wiki/CSDMS_meeting_2017). In this meeting, CoMSES Net members exposed a large community of Earth system modelers to new approaches for integrative modeling of human-Earth systems through keynote presentations, breakout sessions, and hands-on clinics. It also provided an opportunity for technical staff of CSDMS and CoMSES Net to work together to test some of the approaches to coupling human and Earth system modeling proposed in prior workshops. These initial tests were successful in that they demonstrated that diverse models of both human systems and natural systems could apply the same set of standard protocols to allow them to be coupled together in flexible ways.

Finally, in August 2017, the rationale for an international initiative for nextgen modeling and plans for an open source collaborative to support it were presented at the launch of AIMES 2.0 at the Stockholm Resilience Conference.

In order to move beyond discussion to putting plans into practice, CoMSES Net, CSDMS, and several global scale modeling groups submitted large grant proposals to jump-start an integrative, next generation modeling initiative: to NSF, the US Department of Defense, and to the Arthur Sloan Foundation. So far, these funding attempts have not been successful. But they have allowed us to refine our narratives and define the needed protocols in greater detail.

At an informal meeting in August, 2017, some of the organizations collaborating on the NSF proposal (DSSAT crop modeling team, CSDMS, and CoMSES Net) agreed to forge ahead with a smaller-scale prototype and demonstration project for a next generation modeling environment. This work is currently underway with a paper on the effort presented at the December American Geophysical Union meeting. A joint software development site has been set up in GitHub for this work—and potentially for other groups who might want to join this effort. Gerald Nelson, UIUC and former coordinator of the AgMIP (Agricultural Model Intercomparison Project) has been helping coordinate this effort and is in discussions with several other internationally known modeling teams who are interested in contributing.

We invite all interested CoMSES Net members to participate in this initiative. Please contact CoMSES Net ( EMAIL ) if you can contribute.

## From the Forums

General Forum

Title: CfP: Special Issue of Social Science Computer Review on "Simulation Models of Ethnocentrism and Diversity"
https://www.openabm.org/forum/cfp-special-issue-social-science-computer-review-simulation-models-ethnocentrism-and-diversity
Title: CFP new journal Socio-Environmental Systems Modeling (SESMO)
https://www.openabm.org/forum/cfp-new-journal-socio-environmental-systems-modeling-sesmo
Title: Help for Beginners to Verify Models
https://www.openabm.org/forum/help-beginners-verify-models

Jobs and Appointments

Note: Some of the postings have application deadlines that have already passed; we include all of them here for those who are curious about the state of the field, and remind those of you who may be actively searching for a new position that you can subscribe to this forum via the OpenABM website and receive these posts as soon as they are added. For the information listed here, be sure to check the deadline as given in the original post or from the institutions directly.

Title: Two Faculty Research Positions: Agent-based Modeling & System Dynamical Modeling
https://www.openabm.org/forum/two-faculty-research-positions-agent-based-modeling-system-dynamical-modeling
Title: Spatial ecologist with experience in agent based modelling, Denmark Copenhagen area
https://www.openabm.org/forum/spatial-ecologist-experience-agent-based-modelling-denmark-copenhagen-area
Title: PhD Position in ABM and Ecologiacal Economics at ESCP Europe Berlin
https://www.openabm.org/forum/phd-position-abm-and-ecologiacal-economics-escp-europe-berlin
Title: Post-doc position at the Groningen Center for Social Complexity Studies, University of Groningen, The Netherlands
https://www.openabm.org/forum/post-doc-position-groningen-center-social-complexity-studies-university-groningen-netherlands
Title: RESEARCH FELLOW IN COMPUTATIONAL COGNITIVE SCIENCE (Melbourne)
https://www.openabm.org/forum/research-fellow-computational-cognitive-science-melbourne
Title: PhD Studentship in Modelling Dynamic Responses to Dynamic Threats at Loughborough University
https://www.openabm.org/forum/phd-studentship-modelling-dynamic-responses-dynamic-threats-loughborough-university
Title: Three Postdoc Positions, Urban Simulation

## Model Library

### New Model Uploads

Twelve new models were contributed to the model library. Two models related to human trafficking were submitted: Brant Horio and Kyle Ballard have submitted a model that models a victim-centered approach for detecting human trafficking; the other, by Ballard, explores how permissive immigration policies might impact such detection. Ballard has also submitted a model of illicit fishing and forced labor, while Emilie Lindkvist has modeled mobility among fishing groups pursuing fish and revenue. Lars Spang contributes a model that creates clusters of turtles and applies cluster analyses to them. Jonas Hauke, Iris Lorscheid, Matthias Meyer contribute an empirically validated model of semiconductor supply chains. Emilio Sulis's 'ED Simulation' examines the flow of patients through an Emergency Department. Paul Smaldino has submitted two models dealing with ecological cooperation, one using cooperation on networks and another against a varied background of selective pressures. J. Applegate and Ned Wellman explore empathy and power on networks, while Dominik Klein and Johannes Marx explore power of a different kind in a model that simulates information flow preceding upheaval and regime change. And archaeologists have Benjamin Davies, Simon Holdaway, and Patricia Fanning have contributed a model of the formation of surface archaeological features and sites.

### Most Downloaded Models

The most downloaded models include two new arrivals on the list: a model of voter turnout by Bruce Edmonds, Laurence Lessard-Phillips, and Ed Fieldhouse, and a model of flood risk and insurance in several London Boroughs (Camden, Bromley, and Croydon) by J. J. Dubbelboer, I. Nikolic, K. Jenkins, and J. Hall. The other three (MayaSim, Artificial Anasazi, and Smart Metering) are most-downloaded all-stars, having appeared in the top five in the first two issues of the Digest (2013) and at frequent intervals since.

## New Model Uploads

### Zero, Some, or Zero-Sum: Exploring Trade-Offs in Identifying Human Trafficking Among Migration Flows

***Brant M. Horio and Kyle M. Ballard***

This model measures the selectiveness of simulated government immigration policies. A "Permissive Score" is used to compare the impact of a policy on the identification of human trafficking victims.

### Modeling a Victim-Centered Approach for Detection of Human

## Trafficking Victims within Migration Flows

***Brant M. Horio and Kyle M. Ballard***

This model explores the victim-centered approach used for detecting human trafficking victims. Outcomes are responsive to changes in initial cooperation levels and minimum system conditions for the spread of migrants' intention to self-identify.

## The Mobility Model

***Emilie Lindkvist***

This model includes four distinct fishing regions including differences in species. Fishers may move towards higher revenues based on word of mouth when they encounter others.

## Demand Planning Model

***Jonas Hauke, Iris Lorscheid, and Matthias Meyer***

This model focuses on the semiconductor supply chain. It focuses on the cognitive abilities of actors within the supply chain. Results highlight the importance of emergent interactions in addition to cognitive and sensing abilities for accurate prediction.

## The Informational Dynamics of Regime Change

***Dominik Klein and Johannes Marx***

This model studies political uprising in authoritarian regimes by analyzing informational dynamics. Agents attempt to discern levels of discontent within the population without risking their own identity. They do this by individually sampling other opinions in the population based about their beliefs about society and the other individual. Differences in mobility, learning heuristics, level of discontent, and short term informational shocks to the system are tested.

## ED simulation

***Emilio Sulis***

This model models the flow of patients in a medical environment that includes multiple activities such as registration, triage, and exams. It creates patients and medical operator agents which make choices about where to move in the environment based on urgency ratings.

## Holy Mackerel! An Exploratory Agent-Based Model of Illicit Fishing and Forced Labor

***Kyle M. Ballard***

Positive feedback loops may exist for fishing that stem from pressures such as the use of forced labor and commercial fishing. These may act as drivers for illegal behavior and economic decline. The model is intended as a consolidation point for multiple theories and assumptions which exist against a dearth of data.

## Cluster analysis

***Lars G Spang***

This model computes a cluster analysis on a random distribution of agents.

## Empathy and Power

***J M Applegate and Ned Wellman***

This model examines team decision making based on pro-social agents with different expertise and power configurations. Agents decisions are influenced by empathy and their decision provides utility to the overall team pro-social score. Agents vote on decisions and this experience defined as a win or a loss acts as a feedback to their empathy for future decisions.

## Institutions and Cooperation in an Ecology of Games

***Paul Smaldino***

In this model agents participate in public goods games within a bipartite network. Agent attributes that impact the outcomes include: capacity constraints, cognitive constraints, and reputation based exclusion.

## Simulating the evolution of the human family

***PE Smaldino***

This model looks at how environmental stresses and variability interact with human social structure via the contributions to raise and invest in others offspring. Hardship increases the likelihood of such contributions and variability allows for the propagation of a more diverse set of traits.

## HMODEL: An Exploratory Simulation of Surface Archaeological formation

***Benjamin Davis, Simon Holdaway, and Patricia Fanning***

This model focuses on surface archaeological formation dynamics and evaluation of preservation of features based on episodic disequilibrium.

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# Most Downloaded Models in the Model Library

**(March16, 2017 – June 15, 2017)**

**1. (139 Downloads)** A consumer-demand simulation for Smart Metering tariffs (Innovation Diffusion) ***by Martin Rixin***

**2. (45 Downloads)** An Agent-Based Model of Flood Risk and Insurance ***by JJ Dubbelboer, I Nikolic, K Jenkins, J Hall***

**3. (44 Downloads)** A Complex Model of Voter Turnout ***by Bruce Edmonds***

**4. (40 Downloads)** MayaSim: An agent based model of the ancient Maya social-ecological system ***by Scott Heckbert***

**5. (37 Downloads)** Artifical Anasazi ***by Marco Janssen***

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