



CoMSES Digest: Spring 2017

Volume 5, No. 1 December 16, 2016 – March 15, 2016

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From the Editor: A Busy Time

Welcome to this quarter's CoMSES Digest- and the start of Volume 5! It's a busy time; the Digest will be in a condensed version, but there is a very important opportunity in the 'CoMSES News' section- don't miss it!

I'm writing from the Society for Applied Anthropology annual meetings in Santa Fe, which is a nice time to reflect on the importance of modeling Socio-Ecological Systems. The impacts of human life on planet earth, and the changes in our ways of life as the environment changes on short and long time scales, are the stage and scenery on which all of the dramas of every individual's life plays out. Many of the sessions here integrate natural-human systems into broader themes of equity and social justice, and are a great reminder of the importance of understanding socio-ecological systems. Computational Modeling is a key view into this. As of this writing there are approximately 300 CoMSES members; I hope that our community grows, the professional and transparent approach to modeling which our community is committed continues to strengthen, and that the benefits of this science are carried beyond our numbers and into society and policy at large.

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

From the Board: Board Election Results

The election for new CoMSES Executive Board officers was completed this December. Bill Rand will be continuing as a Board member with a new term, along with newcomer Andrew Bell, a professor of Environmental Studies at New York University. The makeup of the board is now:

Andrew Bell, Bill Rand (2017 through 2019)
Moiria Zellner, Forrest Stonedahl (2016 through 2018)
Mariam Kiran, Gary Polhill (2015 through 2019)

In addition, I have been invited to continue to serve in my role as Digest editor as an ex-officio member.

CoMSES News:

An Opportunity for CoMSES Members

Here is a unique opportunity for members of CoMSES Net to meet and engage with colleagues modeling biophysical Earth systems.

CSDMS (pronounced like 'systems') is a parallel scientific network for earth science modeling. Like CoMSES Net, CSDMS is supported by NSF, has an international membership, supports a model archive, and provides other resources for modeling in earth sciences. CoMSES Net has been collaborating for the last several years to support the [Human Dimensions Focus Research Group](#) within CSDMS. CSDMS is also one of CoMSES Net's partners in the new Big Data Spoke award from NSF.

This May, CoMSES Net will co-sponsor the CSDMS annual meeting, which will focus on modeling the dynamic interaction of human and earth systems in the anthropocene. There will be clinics on earth systems modeling, agent based modeling of human systems (by Tatiana Filatova), and best practices for reproducible scientific computation. In addition to other keynotes, Marco Janssen will speak on ABM and IAM approaches to modeling human systems.

Any CoMSES net member is invited to attend this conference. A block of rooms is available at the Millennium Hotel in Boulder. There are other hotels in Boulder, but it is good to book early.

We encourage CoMSES Net members to submit abstracts to present posters on modeling social and ecological systems. You can register [here](#) and submit a poster abstract [here](#).

We will have a limited number of travel support grants for full members of the CoMSES Network to attend this unique scientific event. To apply for support to attend this conference, please send an email to editors@openabm.org describing why you would like to attend this meeting and how your education, research, or teaching could benefit. Please reach out by ASAP, as early requests will be given priority. Preference will be given to those presenting posters or other active contributions to the meeting.

Please contact: editors@openabm.org or CSDMSweb@colorado.edu if you have questions.

From the Forums

As usual, this is a quick summary of Forum topics and posts; if you are interested in these or would be interested in others like them, log in and subscribe to receive email notices when posts are added.

General Forum

Title: ESSA Social Simulation Conference 2017 in Dublin

<https://www.openabm.org/forum/essa-social-simulation-conference-2017-dublin>

Title: Last call for abstracts... Beyond Schelling and Axelrod: Computational Models of Ethnocentrism and Diversity

<https://www.openabm.org/forum/last-call-abstracts-beyond-schelling-and-axelrod-computational-models-ethnocentrism-and>

Title: Call for contributions: Interdisciplinary Workshop on Opinion Dynamics and Collective Decision Making

<https://www.openabm.org/forum/call-contributions-interdisciplinary-workshop-opinion-dynamics-and-collective-decision-making>

Title: Humboldt State short course on teaching individual/agent-based modeling

<https://www.openabm.org/forum/humboldt-state-short-course-teaching-individualagent-based-modeling>

Title: Application Open for Training in Open Science and Synthesis through the Gulf Research Program

<https://www.openabm.org/forum/application-open-training-open-science-and-synthesis-through-gulf-research-program>

Title: Call for abstracts on Computational Models of Ethnocentrism and Diversity

<https://www.openabm.org/forum/call-abstracts-computational-models-ethnocentrism-and-diversity>

Title: ABM about human decisions using the ODD (corruption, white collar crime, etc.)?
<https://www.openabm.org/forum/abm-about-human-decisions-using-odd-corruption-white-collar-crime-etc>

Title: Dresden summer school in agent-based modeling
<https://www.openabm.org/forum/dresden-summer-school-agent-based-modeling>

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 web site 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 postdoc positions at IFISC
<https://www.openabm.org/forum/two-postdoc-positions-ifisc>

Title: Postdoctoral Research Assistant @ INET@Oxford
<https://www.openabm.org/forum/postdoctoral-research-assistant-inetoxford>

Title: Post-doctoral Fellow in Computer Modeling and Social Simulation
<https://www.openabm.org/forum/post-doctoral-fellow-computer-modeling-and-social-simulation>

Title: Two Postdoctoral Positions - Center for Modeling Complex Interactions
<https://www.openabm.org/forum/two-postdoctoral-positions-center-modeling-complex-interactions>

Title: PhD position in ABM and Network analysis
<https://www.openabm.org/forum/phd-position-abm-and-network-analysis>

Title: Professor of Geocomputation
<https://www.openabm.org/forum/professor-geocomputation>

Title: ABMer needed at Cambridge
<https://www.openabm.org/forum/abmer-needed-cambridge>

Title: PhD position in Multi-agent coordination applied to smart buildings
<https://www.openabm.org/forum/phd-position-multi-agent-coordination-applied-smart->

Model Library

Thirteen new models have been uploaded this quarter. As usual, the topics are diverse. A simulation by T. W. Briggs addresses an 'active shooter' situation. Several simulations address the rise of cooperation and other social interactions, including two by Jaffe ('Sociodynamica' and 'Biodynamica'), and another prisoner's dilemma simulation by Smaldino. Other topics include economics (Caiani, Catullo, and Gallegati; ten Broeke and colleagues), and agriculture (Thierry and colleagues; Gunda and colleagues), and biology (Spang; Oloo and Wallentin). The real-world effects of online opinion dynamics are explored by Xiaoyi Yuan, who looks at anti-vaccine extremism and disease outbreaks. Finally, Colin Wren adds to our collection of archaeological models with a model of foraging in the South African Paleoscape.

New Model Uploads

From Cyber Space Opinion Leaders and the Spread of Anti-Vaccine Extremism to Physical Space Disease Outbreaks

Xiaoyi Yuan

The main purpose of this model is to simulate how anti-vaccine opinion leaders in a scale-free network spread their extremism and how it creates anti-vaccine opinion clusters that causes disease outbreaks. The model provides a new way of modeling opinion dynamics and social influence by separating the cyber space and physical space. It identifies that the influence of anti-vaccine opinion leaders is two folded: (1) direct influence: this happens in the cyber space where the large amount of the followers receives information from opinion leaders and get influenced in certain degree; (2) indirect influence: in physical space, those who have been influenced by opinion leaders in cyber space carry such anti-vaccine sentiment and further have an impact in shaping opinions in their local communities. A disease transmission sub-model is applied after these two steps of extremism formation to test the degree of disease outbreaks cause by opinion clustering.

Increased costs of cooperation help cooperators in the long run

Paul Smaldino

This model replicates the model presented in the following paper:

Smaldino PE, Schank JC, McElreath R (2013) [Increased costs of cooperation help cooperators in the long run](#)(link is external). *The American Naturalist* 181: 451–463.

This model looks at how two variables: the cost of unreciprocated cooperation and environmental adversity interact to affect survival. Groups that have a high number of

cooperators can survive better under environmental threats, but the relative benefit to individuals of defecting under harsh conditions is also greater. This model uses a spatial agent based model to test the hypothesis that harsh conditions cause an increase in cooperation over the long term.

TransportVarese

Elena Maggi, Elena Vallino

This agent-based model reproduces transport choices of a sample of citizens of the city of Varese (Northern Italy) and the corresponding PM emissions of their daily commutes. The aim of the model is testing the impact of public policies willing to foster commuting choices with lower PM emissions. The model considers the commuters' decisions on the transport mode to be used. A set of preferences, one for each transport mode - private car, bicycle, public transport - is assigned to every agent. Throughout the process, agents decide about the means for commuting on the basis of the relative price of the different means of transport, of the social influence and of the intensity of the policies applied. The initial distribution of preferences for each transport mode are inspired to empirical data on Varese commuters

The Agricultural LandscApe Simulator (ATLAS)

Hugo Thierry, Aude Vialatte, Jean-Philippe Choisis, Benoit Gaudou, Hazel Parry, Claude Monteil

This model relies on initial GIS inputs for landscape composition and configuration. Users define typical rotations and crop phenology stages to be included, according to their objectives. In the study, we present two applications to contrasting landscapes, where ATLAS is capable of simulating accurate composition (crop area) and configuration (crop clustering) dynamics. ATLAS has potential applicability to a range of contrasting agricultural landscapes. The benefits of such a simulator are the possibility to study the effects of various simulated management scenarios of crop spatial-temporal availability in relation to target organisms and/or specific ecological processes (e.g. pest, biological control), within a single model framework.

Impact of Seasonal Forecast Use on Agricultural Income in a System with Varying Crop Costs and Returns

Thushara Gunda, Josh T Bazuin, John Nay, Kam L Yeung

The modeling effort is centered on a simplified representation of an individual farmer living in System MH, in Sri Lanka. The model is built on a system dynamics platform (specifically Powersim Studio 10 Expert) with a seasonal time step for a period of 64 dry seasons, which occur once per year. The model includes hydrological, economic, and behavioral components but not interactions between individuals or extreme weather events. Interactions between individuals (i.e., social components) and extreme weather events were outside the scope of the model. The model includes 3 climate scenarios (historical conditions, drier, wetter) as well as 3 farmer behaviors (an adaptive farmer that uses forecasts, a baseline farmer that uses average climate information, and a baseline farmer that only plants rice). The model structure and parameters are based on empirical

data and findings obtained as part of the ADAPT-SL effort: <https://my.vanderbilt.edu/srilankaproject/>.

A Spatial Model of Resource-Consumer Dynamics

Guus A ten Broeke, George AK van Voorn, Arend Ligtenberg, Jaap Molenaar

This model was developed as a test-case for application of sensitivity analysis methods to ABMs. It was designed to be as simple as possible, while containing all the properties that complicate sensitivity analysis for ABMs, such as tipping points and agent adaptation. The model simulates agents that compete for a common resource. The resource grows on patches and diffuses between patches. Agents can move between patches and harvest resource from patches. Harvested resource is converted to internal energy, which is required for performing actions and for paying energy upkeep. Agents die if they are unable to pay their energy upkeep. If an agent gathers a sufficient amount of energy it can create offspring. This offspring inherits its parents characteristics, with some random deviation. This inheritance ensures that natural selection can take place, and the agent population can adapt over time.

An Adaptive model of homing pigeons: A genetic algorithm approach

Francis Oloo, Gudrun Wallentin

This model implements the evolution of navigation behavior of homing pigeons. Specifically, a genetic algorithm approach is used to optimize navigation parameters of homing pigeons based on emulated GPS sensor streams that continuously and dynamically update the model. The results show that incorporating fine-grained spatio-temporal data into agent-based models does improve the predictive ability of such models. Additionally, the use of evolutionary methods, specifically genetic algorithms in this model, allowed for a simultaneous data-driven optimization and sensitivity analysis.

An Agent-based Approach to Weighted Decision Making in the Spatially and Temporally Variable South African Paleoscape

Colin D. Wren

In this agent-based modeling framework, based in optimal foraging theory, agent foragers make mobility and foraging decisions by weighing expected caloric returns against geographic and social factors, and forecasted future return rates. It applies their Paleoscape model to a spatially explicit South African coastal landscape to better understand the human foraging system of the Middle Stone Age when foragers began systematically exploiting a wide variety of flora and fauna in both terrestrial and inter-tidal environments.

Biodynamica

Klaus Jaffe

This is a replication of a previously published model, [Biodynamica](#).

This model is comprised of haploid, diploid or triploid agents which asexually or sexually reproduce new generations. The model allows researchers to vary the types of selective forces, different types of biocides, and observe which type of organisms are selected for.

Sociodynamica in a Browser

Klaus Jaffe

This is a replication of a previously published model: [Sociodynamica](#).

This model simulates scenarios that can compare between non-specialized resource attainment for survival with specialization. The model looks a spatially explicit area that includes two resources. Agents can engage in a money or barter economy. Synergistic benefits from the division of labor, profit and price emerge in some cases.

Active Shooter: An Agent-Based Model of Unarmed Resistance

Thomas W Briggs, William G Kennedy

This agent-based model (ABM) explores the potential for limiting casualties should a small proportion of potential victims swarm a gunman, as occurred on a train from Amsterdam to Paris in 2015. Results suggest that even with a miniscule probability of overcoming a shooter, fighters may save lives but put themselves at increased risk. While not intended to prescribe a course of action, the model suggests the potential for a reduction in casualties in active shooter scenarios

Certified Models

Miguel Pessanha Pais's model "[Fish Census](#)" completed the OpenABM certification process. FishCensus is an agent-based model that simulates underwater visual census of fish populations, a method used worldwide to survey shallow marine and freshwater habitats that involves a diver counting fish species to estimate their density. It can help estimate sampling bias, apply correction factors to field surveys and decide on the best method to survey a particular species, given its behavioural traits, detectability or speed. A modified vector-based boids-like movement submodel is used for fish, and complex behaviours such as schooling or diver avoidance / attraction can be represented.

Most Downloaded Models in the Model Library

(December 16, 2016 – March 15, 2017)

1. (67 Downloads) [Artificial Anasazi](#) by **Marco Janssen**
2. (52 Downloads) [Agent-Based Model for the Evolution of Ethnocentrism](#) by **Max Harshorn**
3. (52 Downloads) [CROSS - Crowd Behavior Modelling: A Festival Crowd Model](#) by

Nanda Wijermans

4. (51 Downloads) MedLanD Modeling Laboratory v.1 by C Michael Barton, Isaac Ulah, Gary Mayer, Sean Bergin, Hessam Sarjoughian, Helena Mitsova

5. (48 Downloads) Evaluating Government's Policies on Promoting Smart Metering Diffusion in Retail Electricity Markets by **Tao Zhang**

We would like to thank the National Science Foundation for their support via grants (NSF BCS-0623162 and GEO-0909394).

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