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: Summer 2017

Volume 5, No. 2 March 16, 2017 – June 15, 2017

Table of Contents:

From the Editor:

Welcome to this quarter's CoMSES Digest! The focus in this issue is on CoMSES activities- things that CoMSES members have been doing and can participate in over the next several months. These include:

- The CSDMS meeting in Boulder, Colorado, which was held in late May and co-sponsored by CoMSES
- The CoMSES 'virtual' conference (submissions DUE July 1st!)
- The Winter School on Agent-Based Modeling of Social-Ecological Systems, to be held at ASU in January 2018

These activities are allowing CoMSES to grow in new ways, and to provide new opportunities for CoMSES members to interact, share their work, and grow the field. All CoMSES members are encouraged to be involved! This issue includes a new section,

"From the Field," with a personal account of the CSDMS session by Sara Rimer, a member whose attendance was sponsored by CoMSES. Look for more opportunities soon for yourselves and your students!

John T. Murphy,
CoMSES Digest Editor

CoMSES News:

CSDMS 2017 A Success

The Community Surface Dynamics Modeling System conference was held in May in Boulder, Colorado, with the theme of "Modeling Coupled Earth and Human Systems- The Dynamic Duo," and with CoMSES serving as a co-sponsor. Keynote addresses included talks by current CoMSES board member Moira Zellner, and CoMSES organizer Marco Janssen. Allen Lee, the CoMSES lead cyberinfrastructure developer, gave a clinic on reproducible scientific computation, which was one of a dozen clinics on a variety of theoretical and practical issues in human-earth system modeling. More than 60 other talks and posters were presented. For the abstracts and titles of clinics and talks, see:

http://csdms.colorado.edu/wiki/Form:Annualmeeting
http://csdms.colorado.edu/wiki/CSDMS_meeting_2017_abstract_list

More than 130 people registered for the conference, which represents a very successful collaboration between the CSDMS community and the CoMSES Network.

CoMSES Net Virtual Conference 2017

CoMSES Net will be hosting a conference in October. This will be a 'virtual' conference: papers will be presented as videos by members, with online interaction (questions and responses) facilitated by the CoMSES network. The online conference will take place from October 2-20, 2017.

Details: We welcome papers dealing with agent-based modeling of social, ecological and social-ecological systems, as well as methodological issues in the context of agent-based modeling. This conference will occur online and is intended for CoMSES Net members. During the conference, which will take place over three weeks, talks will be available for viewing on the conference website. Q&A will also take place online during this period, as participants and other CoMSES members will be able to pose questions to speakers via online comments and speakers will be able to reply in the same way. We prioritize talks for which the model code and documentation will be available.

We realize that a virtual conference will not have the same intensity as a face-to-face conference, but we expect that this still leads to a lively interaction between the

participants. The reason we organize such a conference is to provide low cost opportunity to interact with other CoMSES Net members. There will be no registration fee for the conference, but one needs to be registered as a CoMSES member.

We welcome two types of submissions:

- Individual talks (15-17 minutes)
- Panel sessions (10-12 minutes) for a maximum of 5 presentations.

Instead of traveling to the conference to attend panels and deliver a talk, speakers will do the following:

1) Film yourself giving a talk of 15-17 minutes. This can be done with your own desktop or laptop. You can film you giving a talk or have a narrated slide show, or pursue a more ambitious edited video which combines you talking, slides and model simulations. Giving the increase relevant software available, it is now possible, and relatively easy, to record a talk of good quality.

2) During the conference, participants can ask you questions, and you are expected to respond to questions raised by your talk. You will automatically receive an email each time a new question is posed. Only CoMSES members can log in and pose questions. .

3) View other presentations and ask questions to other speakers. Since the conference is over a three week period you do not experience the problem of many parallel sessions as in face-to-face conference.

Abstracts of 500 words, information on the availability of the model code & documentation should be submitted by July 1, 2017 to https://easychair.org/conferences/?conf=comsesnet2017 . You are also expected to have an up to date profile page at the comses.net website by the time of submission. By submitting an abstract you agree both to the above conference participation requirements and to allow your talk to be posted to the conference website, as well as the CoMSES Net YouTube account.

Participants will be informed if their submissions have been accepted by July 15, 2017. Videos of the talks will be due by September 15.

Winter School on Agent-Based Modeling of Social-Ecological Systems

When: January 3-7, 2018
Where: Tempe, Arizona, USA
Deadline: September 1st

The overall aim of the winter school is that the participants will learn about the

opportunities and challenges of agent-based modeling of social-ecological systems. Participants will engage intensely with a few comprehensive models, learn best practices in doing modeling, and learn about the different modeling challenges across the various social and natural sciences.

The winter school has two main components: 1) lectures and 2) project work. Lectures will introduce participants to different concepts in the social and natural sciences critical for modeling social-ecological systems, such as human behavior, collective behavior, hydrology, and land cover change. Students will also learn and use best practices to do modeling (reproducibility, model documentation, analysis of models). The participants will be introduced to various stylized agent-based models of actual research projects on social-ecological systems. Groups of participants will chose one of the models and adapt, expand, and analyze the model to better understand the impact of a particular assumptions on the overall outcome of the social-ecological system. The models are written in NetLogo. Therefore, participants must be able to read and write NetLogo programming code. Furthermore, participants are expected to know the basics of R which will be used for model analysis.

The deadline for applications is September 1. For more information visit our website: https://complexity.asu.edu/winter-school-2018

From the Field:

A new CoMSES Member attends the CSDMS meeting

By Sara Rimer, Postdoctoral Researcher, Argonne National Laboratory

I recently joined the Argonne National Laboratory as a postdoctoral researcher, and one of my hopes in this new position was to find professional communities that are both intriguing, collaborative, and most importantly, congenial. As a graduate student, my formal training was in hydraulics and environmental fluid mechanics. But my dissertation research lead me down a more interdisciplinary path that included computational modeling of human decision-making — an area of research quite foreign to many of my academic communities. Thus, I struggled quite a bit as a graduate student to find a community that was able to provide me with the support that I desired for my different research areas and their corresponding overlap.

Fortunately, I was introduced to the CoMSES community within a few months of joining Argonne National Laboratory by my colleague, John Murphy, and via CoMSES I attended the CSDMS meeting in Colorado in May. As a first-time attendee to both a CSDMS and CoMSES meeting, I found it difficult to believe that these two were ever not connected before this year’s meeting. Indeed, it was a sentiment shared by longtime members of both communities. For those in attendance, the daily exclamation became “of course a complete understanding of physical systems cannot be considered without also including

the underlying humans shaping their continued existence!" And it was this proclamation that I found so missing in all of my meetings that I attended as a graduate student—a proclamation for those of us who understand human systems and physical systems are not mutually exclusive, and for those of us who realize our respective disciplines are only the richer when we surrender to this added and necessary complexity.

From an organizational standpoint, I found synergy between both the CoMSES and CSDMS communities, especially regarding their approaches to coordination, dissemination, and cooperation of both of their communities. Both organizations recognize the need for open science, open data, and open computation — and this recognition has led to both groups to develop their own platform to publish their respective community's various models. Additionally, I was struck by the collegiality of both organizations, and the small, collaborative, and intimate atmosphere of the meeting that included a combination of keynotes, workshops, and poster sessions. Because of this style of meeting, I felt as though I was able to talk to almost everyone in attendance, learn about almost every research idea presented on, and become an active member in almost every breakout group workshop for which I wanted to be a part. I look forward to many more such meetings in the future, and I hope the worlds of CoMSES and CSDMS continue to intertwine.

From the Forums

General Forum

Title: Last call for abstracts... Beyond Schelling and Axelrod: Computational Models of Ethnocentrism and Diversity
http://www.openabm.org/forum/last-call-abstracts-beyond-schelling-and-axelrod-computational-models-ethnocentrism-and

Title: ESSA Social Simulation Conference 2017 in Dublin
http://www.openabm.org/forum/essa-social-simulation-conference-2017-dublin

Title: Model definition language
http://www.openabm.org/forum/model-definition-language

Title: Programme & Call for Participation: Beyond Schelling and Axelrod: Computational Models of Ethnocentrism and Diversity
http://www.openabm.org/forum/programme-call-participation-beyond-schelling-and-axelrod-computational-models-ethnocentrism

Title: Call for Abstracts - New Satellite (Evolution, Development & Complexity) at CCS17
http://www.openabm.org/forum/call-abstracts-new-satellite-evolution-development-complexity-ccs17

Title: CSSSA Annual Conference on Computational Social Science - CSS 2017

http://www.openabm.org/forum/csssa-annual-conference-computational-social-science-css-2017

Title: Call for Application MISS-ABMS 2017
http://www.openabm.org/forum/call-application-miss-abms-2017

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

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

Title: Two postdoc positions at IFISC
http://www.openabm.org/forum/two-postdoc-positions-ifisc

Title: Post-doctoral Fellowship in Computational Finance
http://www.openabm.org/forum/post-doctoral-fellowship-computational-finance

Title: Research fellow in socio-ecological systems modelling
http://www.openabm.org/forum/research-fellow-socio-ecological-systems-modelling

Title: PhD position on computational models of collective escape of bird flocks
http://www.openabm.org/forum/phd-position-computational-models-collective-escape-bird-flocks

Title: Programmer to optimize agent-based model of an endangered species
http://www.openabm.org/forum/programmer-optimize-agent-based-model-endangered-species

Title: Post-doc position in social simulation
http://www.openabm.org/forum/post-doc-position-social-simulation

Title: Postdoctoral Fellow in Computational Simulation of Social Behavior, UCF

http://www.openabm.org/forum/postdoctoral-fellow-computational-simulation-social-behavior-ucf

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Model Library

Newly Certified Models

Aniruddha V. Belsare and Matthew E. Gompper have received certification for their model of the spread of Canine Distemper Virus in populations of dogs and foxes in a landscape with three types of habitats. The model, implemented in NetLogo, allows for the exploration of alternative management strategies that attempt to prevent spillover into other wild species.

New Model Uploads

Fourteen models were uploaded. Five of these were submitted generously by Garvin H. Boyle, exploring topics related to sustainable economics, including monetary systems, 'teleological pruning', model economies in 'perpetual motion', the 'Maximum Power Principle', and the 'Primordial Soup', the last of these being an ostensibly biological model of evolution that Boyle sees as part of the economic puzzle that the models collectively explore.

The other models contributed explore the range and variety of topics that has characterized the CoMSES network from the start. Oestmo, Janssen, and Marean return to a topic from other archaeological models and examine stone raw material procurement. Boumans explores the feeding and social interaction of pigs, while Cutler looks at the adaptation (resistance, accommodation, or retreat) of coastal regions to climate change. Meyer looks at the use of a common-pool resource (groundwater), while Bas and colleagues examine the effects of policy on deep see shipping fuel consumption and emissions. Taillandeer, Banos, and Corson explore traffic dynamics at a very fine temporal scale; Spang explores butterflies across seasons; Koch explores team creation and collaboration; and Thron and Tran contribute a model of tracking wifi in urban areas.

Most Downloaded Models

A very large number of model downloads occurred this quarter. The most downloaded model was the Janssen 'Artificial Anasazi' model (continuing at the top spot from the preceding quarter), but the other four of the top five are newcomers, and the total number of downloads of the top five models was almost double the average of the same number over all preceding periods (454 vs. 240). It's difficult to know what prompted this spike, but it will be interesting to see if it starts a 'new normal' for download traffic.

New Model Uploads

MarPEM: An Agent Based Model to Explore the Effects of Policy

Instruments on the Transition of the Maritime Fuel System

G Bas, K De Boo, AM Vaes - Van de Hulsbeek, I Nikolic

To lower the emissions of deep sea shipping, policymakers aim to decrease the use of heavy fuel oil (HFO) as a maritime fuel. Multiple alternatives for HFO exist, but despite new regulations, their use is still limited. To stimulate shipping companies to replace HFO by one of the alternatives, policymakers can use a variety of policy instruments. MarPEM is an agent-based model that can be used to study the effects of policy instruments on the transition away from HFO. In contrast to existing studies on reducing maritime emissions, our system perspective captures the relations and dynamics between different components of the maritime fuel system. Thereby, it can account for the feedback and non- linear dynamics in the system.

CPNorm

Ruth Meyer

CPNorm is a model of a community of harvesters using a **common pool** resource – in this case a groundwater reservoir. Over time they have identified the optimal groundwater extraction level and it has become a social **norm** to adhere to this. Harvesters can either follow the norm (cooperators) or decide not to and extract more water (defectors or cheaters). Violation of the norm is sanctioned through social disapproval (ostracism) by the norm followers, thus reducing the utility that the norm violators receive from the resource.

Climate Change Adaptation in Coastal Regions

Emma M. Cutler

This model simulates climate change adaptation in the form of resistance, accommodation, and managed retreat in coastal regions vulnerable to sea level rise and storm surge. Agents are individual households that can choose to implement adaptation decisions in response to sea level rise and stochastic extreme flood events, provided they have sufficient adaptive capacity. Community level adaptation is also possible in the form of resistance or incentives that encourage individual accommodation and retreat. Agents are connected to each other in a social network that creates an “attachment to place,” discouraging relocation. However, there is an upper limit on the amount of resistance or accommodation in place that is possible, forcing some agents to migrate. As some households leave, the remaining ones become less attached and are therefore more likely to follow suit. It is a generic, spatially explicit model with minimal empirical data and tracks how the population changes over time as households retreat to higher ground under three sea level rise scenarios and several different social network structures.

A Model on Feeding and Social Interaction Behavior in Pigs

Iris J.M.M. Boumans

This model simulates feeding and social interaction behavior of commercially group-housed pigs. Pigs in the model express their behavior based on their internal motivations and environmental conditions. Their motivations are affected by their internal physiological

states (e.g. energy balance, stomach load, feeding drive and satiation) and external situation (e.g. food-related competition level and displacement at the feeding place). The model increases understanding of interaction between internal physiological factors and external social factors underlying behavior of pigs. Furthermore, the model shows the effect of behavioral strategies of pigs (e.g. avoid or approach) to food-related competitive situations in various feeding and social interaction patterns.

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/.

The Effect of Spatial Clustering on Stone Raw Material Procurement

Simen Oestmo, Marco A Janssen, Curtis W Marean

Changes in the frequency of stone tool raw materials are observed in stone age records across the world and throughout time. These are normally interpreted as showing important changes in human behavior. Brantingham (2003) proposed a neutral model to explain observed data on stone tool raw material procurement as an alternative to behavioral interpretations of raw material changes, but his model used unrealistic distributions of raw material across a landscape. Spatial clustering of raw material sources simulates a more realistic scenario because raw material sources are located on the landscape according to geological structures and geophysical processes, which often results in same type raw material sources clustering together on the landscape. One key measure that is collected in the model to evaluate the effect that spatial clustering has is time without raw material in toolkit. Another limitation of the original neutral model that is addressed is the unrealistic assumption that there are 5000 unique raw material types distributed across the landscape. It is more realistic that 1-25 raw material types are distributed among 5000 sources, which in turn are distributed across the landscape according to geological structures and geophysical processes.

Agent-based Model of WiFi tracking System in Urban Environment

Christopher P Thron, Khoi Tran

The model provides proof-of-concept for a sensor network system for tracking WiFi

users in outdoor urban environments. Sensors are fixed, and are capable of measuring signal power from users' WiFi devices. The location algorithm takes into account the effects of power control, and is self-calibrating in that the signal power model used by the algorithm is adjusted and improved as part of the operation of the network.

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.

00 PSoup V1.22 - Primordial Soup

Garvin H. Boyle

This might be viewed as a purely ecological model, having nothing to do with economics. However, I have come to see it in more general terms. In 1922 A.J. Lotka proposed two principles that he believed dominated both ecological systems and economic systems. In 1955 H.T. Odum and R.C. Pinkerton took up the ideas and named them the Maximum Power Principle (MPP). In my ongoing study of the dynamics of intergenerational economies and the MPP, I use the C1 "Palmiter genes" and the C2 genes to provide the biophysical sub-system of my hybrid biophysical/economic models.

01b ModEco NLG V1.39 - Model Economies - The PMM

Garvin H. Boyle

01a ModEco C++ is the older, wiser, more sophisticated sister of this model. It has more optional features, and lots of associated documentation. However, with all of that sophistication, I was only able to produce a single type of sustainable economy which I called the PMM. PMM stands for Perpetual Motion Machine. 01b ModEco NLGis a re-implementation of that model, but using the NetLogo platform, and focusing on that single scenario – the PMM. The PMM achieves sustainability by balancing on the knife edge of an unstable point of equilibrium. In the PMM, a central government redistributes wealth, manages waste, and manages the estates of dead agents. Prices are strictly controlled. Most agents can expect a life of poverty and starvation. This would seem to be the nature of a sustainable economy. The challenge is to find out why.

03 MppLab V1.09 - Maximum Power Principle Laboratory

Garvin H Boyle

The MPP says that any system that is non-isolated with respect to energy flows will, through a process of natural selection, evolve such that (a) the system as-a-whole will capture and degrade energy at maximum power (maximum production of entropy); while (b) each component energy transformation will evolve to function at minimum power (minimum production of entropy) but at some intermediate efficiency. That is, within the system the components transfer still-useful energy at maximum power, while the system as-a-whole degrades that energy at a maximum rate, thereby generating complexity.

In a diary note available with this model, I have developed the concept of an abstract Open Atwood's Machine (OAM) which can be formed into webs of OAMs. In a fierce quasi-Darwinian competition for energy, these agents capture and expend energy, reproduce via fission, mutate, and struggle for survival. The main tenet of the MPP is exhibited: maximum power is achieved at an efficiency of ~50%, and the efficiency of the components of the system (the OAMs) converges to that common value.

04 TpLab V2.08 - Teleological Pruning Laboratory

Garvin H. Boyle

TpLab is a laboratory in which we can examine the ability of evolution to shape the belief systems and collected tribal wisdom of a simple biophysical society. I am calling this phenomenon "Teleological Pruning" (TP), and I consider it an effect that leads directly from the MPP, as enunciated by Lotka in 1922, and explains the persistence of NCE theory.

05 CmLab V1.17 - Conservation of Money Laboratory

Garvin H Boyle

CmLab explores some of the dynamics of monetary systems. Money is the life-blood of the modern global economy in which all nations participate, and which they use to trade their raw resources, manufactured goods and marketable services. And yet money remains an enigma that raises many questions and engenders many answers, but knows little consensus. For some people "money" means banknotes and coins, or bank ledgers, or net worth statements. Theorists think of a medium of exchange of property rights, or a lien on future production. There are debates about metallism versus chartalism, U-shaped versus C-shaped, and more tax versus less tax. Economists, bankers, corporate financiers, and money analysts categorize it by its liquidity, its velocity, its multiplicative effects, its derivative nature, or its risk. Net worth becomes the standardized measure of all that a person holds, and utility in the service of profits is the measure of all that exists. However, with all of this attention, there still remain some troubling questions. What is the impact of the diamond-water paradox? What is the source of the "time value of money"? Where do profits and/or interest really come from?

A Social Network Model to Analyze Team Assembly Mechanisms

Andreas Koch

This model investigates networking mechanisms of a social network that has empirical evidence due to a project conducted in a Styrian region, Austria. The model type is

exploratory, because it simulates the processes relevant to enhance collaboration between initially small project-related teams. The empirical project aimed to strengthen well-being among its inhabitants, in a region that struggles with demographic and mobility problems. The theoretical modeling background is given with “Team Assembly Mechanisms” by Guimera et al. (2005) and made available as a NetLogo model by Bakshy and Wilensky (2007). This initial model has been aligned to the specific needs of the empirical project.

Four Seasons

Lars G Spang

The model is an example of how turtles can change the behavior and appearance depending on the season. The patches are colored according to favored areas each season. When run, the butterflies leave the chrysalis in spring and summer. The butterflies turn into caterpillars at autumn, and pupate in a chrysalis in the winter.

Hybrid Traffic Model

Patrick Taillandier, Arnaud Banos, Nathalie Corson

This model aims at simulating the behavior of drivers at a fine temporal scale (1 simulation step = 1 second). It was designed in order to let the possibility to easily integrate unexpected events (car accident, natural or technological hazards) and take into account non normative behaviors. In addition, it gives the possibility to switch for each road between a micro and a macro model to simulate the flow on the roads.

Most Downloaded Models in the Model Library

(March16, 2017 – June 15, 2017)

1. (150 Downloads) Artificial Anasazi ***by Marco Janssen***

2. (104 Downloads) SLUCEII LUXE ***by Shipeng Sun, Dawn C Parker, Qingxu Huang, Dan G. Brown, Tatiana Filatova, Rick L. Riolo, Derek T Robinson, and Meghan Hutchins***

3. (79 Downloads) Lansing-Kremer model of the Balinese irrigation system ***by Marco Janssen***

4. (62 Downloads) 01a ModEco V2.05 - Model Economies - in C++ ***by Garvin H. Boyle***

5. (59 Downloads) FlowLogo: An agent-based platform for simulating complex human-aquifer interactions in managed groundwater systems ***by Juan Carlos Castilla-Rho***

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