CoMSES Digest: Fall 2019

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Table of Contents:

Editor's Note
CoMSES News
- CoMSES: An International Scientific Network
- CoMSES @ Science Gateways Community Institute Focus Week
- Call for CoMSES Fellows

Calendar of Events
- Submission Deadlines
- Conferences and Workshops
- Courses

Model Library
- New Model Uploads
- Most Downloaded Models

Editor's Note

Welcome to the Fall 2019 Issue of the CoMSES Digest! We hope that you have had summers that were (somehow) both productive and relaxing, and that you are back at research, teaching, and whatever else the fall brings to your modeling endeavors.

We hope you are all looking forward to the CoMSES virtual conference, which will get underway on October 7th and run through the 25th. See https://www.comses.net/conference/2019/ for details. The official conference page will be live soon - we'll announce it via email - and the slate of videos and discussions, all under 12 minutes, will be available for comment and discussion with the video's authors. It's one of the most exciting, interactive, and intellectually interesting parts of the CoMSES calendar, and we hope you will join in the fun.

As always, if you are starting a class on modeling, encourage your students to view the model

library for inspiration and insight when they begin, and when they're done to contribute their models to the library for others.

Happy Modeling!

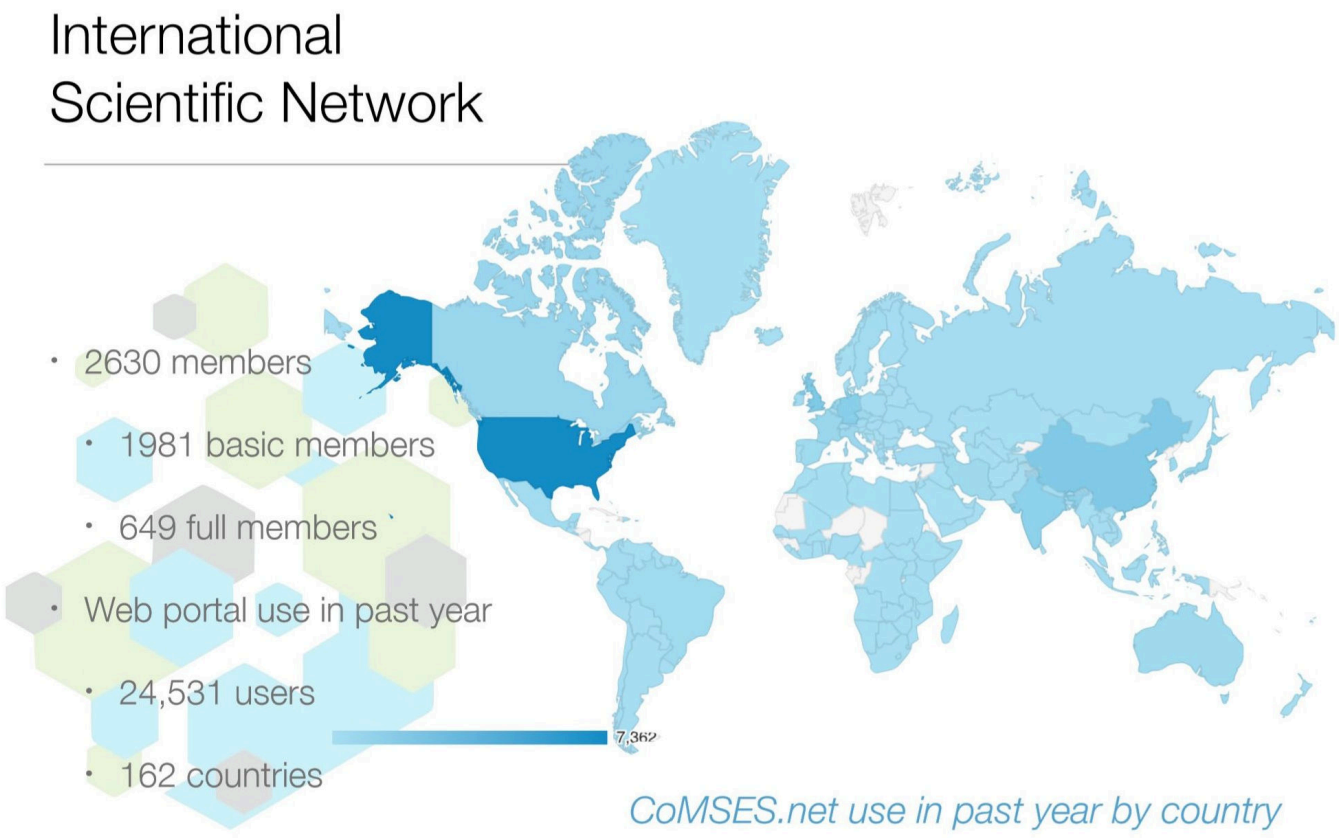
Best,

John T. Murphy
CoMSES Digest Editor

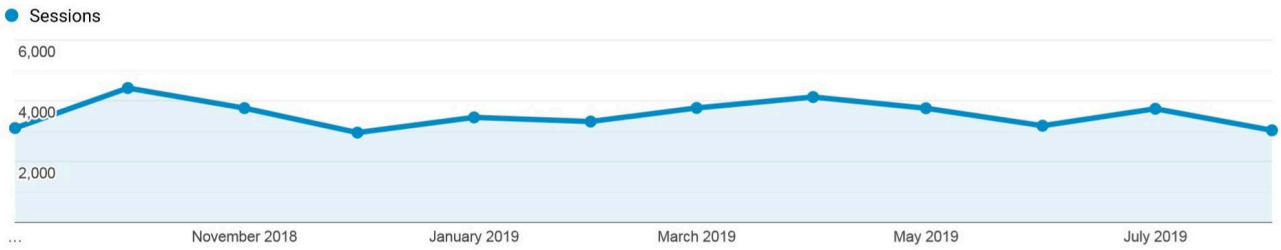
CoMSES News

CoMSES: An International Scientific Network

From Michael Barton, a pair of images that illustrate the reach of CoMSES as a network for international science.



Web Portal & Model Library



- 3000-4000 unique sessions accessing web portal per month
- 658 published models in CoMSES Computational Model Library
- 88 new models published in past year
- 44,317 model downloads in past year

CoMSES @ Science Gateways Community Institute Focus Week

Two members of the CoMSES development team participated in the recent Science Gateways Community Institute Focus Week in Chicago, IL. The workshop was an intensive weeklong training exercise to help new and established scientific gateways better serve their community in a wide range of areas; facilitating community engagement, increasing the quantity and quality of their scientific resources, and developing pathways to financial sustainability and continued growth. We have identified a number of strategies to improve the CoMSES site and increase community engagement so keep posted for more upcoming opportunities (like the next one)!

Call for CoMSES Fellows

Would you like to like to become more involved in CoMSES activities? Many hands make light work, and we have openings for more CoMSES Fellows like Garry Sotnik to continue to improve and help maintain our content. Some initial ideas include hosting a virtual book / journal club related to computational modeling and social ecological sciences on a special category in our forums, collecting more feedback on Edmund Chattoe-Brown's ABM bibliography, revisiting seminal papers on modeling, discussing new / relevant publications or exploring applications

of Judea Pearl's causal inference and do-calculus work to modeling science. If you are interested, please apply via our contact form and include a brief note about your interests – bonus points for having an up to date CoMSES profile since we'll be highlighting our Fellows on our people page soon.

Calendar of Events

Submission Deadlines

World Conference on Natural Resource Modeling 2020: Decision support methods for natural systems at risk

January 8-10, 2020
Deadline: October 15th
Valparaiso, Chile
https://www.comses.net/events/541/

Conferences and Workshops

Workshop on Cognitive Modules for NetLogo @ SocSim 2019

September 22, 2019
Mainz, Germany
https://www.comses.net/events/530/

PhD Colloquium at the Social Simulation Conference 2019

September 23, 2019
Mainz, Germany
https://www.comses.net/events/548/

rOpenSci Community Call: Reproducible Workflows at Scale with drake

September 24, 2019
Online
https://www.comses.net/events/551/

The International Society for Ecological Modelling Global Conference 2019

October 1-5, 2019
Salzburg, Austria
https://www.comses.net/events/524/

Doctoral Course on Simulation for Business Research

October 6-10
Kiel, Germany
https://www.comses.net/events/545/

CoMSES Virtual Conference

October 7-25
Online
https://www.comses.net/events/544/

Seminar in Experimental and Computational Studies on Mother-Infant Relationship
October 8 & 15
Porto Alegre, Brazil
https://www.comses.net/events/549/

The Computational Social Science Society of the Americas 10th Anniversary International Conference
Oct 24 – 27, 2019
Santa Fe, NM
https://www.comses.net/events/529/

22nd International Conference on Principles and Practice in Multi-Agent Systems, PRIMA
October 28–31, 2019
Torino, Italy
https://www.comses.net/events/536/

33rd European Simulation and Modelling Conf. - ESM'2019
October 28-30, 2019
Palma de Mallorca, Spain
https://www.comses.net/events/520/

Winter Simulation 2019
December 8-11, 2019
National Harbor, Maryland
https://www.comses.net/events/519/

Agriculture and Climate Session at AGU Fall Meeting
December 9-13
San Francisco, CA
https://www.comses.net/events/547/

World Conference on Natural Resource Modeling 2020: Decision support methods for natural systems at risk
January 8-10, 2020
Submission Deadline: October 15th
Valparaiso, Chile
https://www.comses.net/events/541/

Courses

Winterschool ABM of SESs
January 5-11 2020

Tempe, Arizona
https://www.comses.net/events/543/

Model Library

New Model Uploads

21 new models were uploaded this quarter- nearly tying the record of 22 from Spring of this year and continuing the trend: no quarter prior to this year had reached 20 uploads, and no quarter this year has been below 20. The uploads cover the usual wide range of topics, extending that range with a few surprising additions, e.g. cryptocurrency design, chess, narcotrafficking. This collection has also included some rarer modeling platforms: spark, mesa, gama, matlab join stalwarts Repast and, of course, NetLogo.

A Toy Model for the Abilene Paradox

Victor Sahin | Published Mon Jun 17 09:55:28 2019

This version adds a Maslowian entropy to each agent decision based on Kendrick et. al. Rudimentary implementation assumes agents with lower scores are more likely to make decisions autonomously rather than sociotropically.

Organizational behavior in the hierarchy model

Smarzhevskiy Ivan | Published Tue Jun 18 10:33:33 2019

In a two-level hierarchical structure (consisting of the positions of managers and operators), persons holding these positions have a certain performance and the value of their own (personal perception in this, simplified, version of the model) perception of each other. The value of the perception of each other by agents is defined as a random variable that has a normal distribution (distribution parameters are set by the control elements of the interface).

Individual-based modelling as a tool for elephant poaching mitigation

Emily Neil Jens Koed Madsen Ernesto Carrella Nicolas Payette Richard Bailey | Published Tue Jun 18 14:07:24 2019

We develop an IBM that predicts how interactions between elephants, poachers, and law enforcement affect poaching levels within a virtual protected area. The model is theoretical at this stage and is not meant to provide a realistic depiction of poaching, but instead to demonstrate how IBMs can expand upon the existing modelling work done in this field, and to provide a framework for future research. The model could be further developed into a useful management support tool to predict the outcomes of various poaching mitigation strategies at real-world locations. The model was implemented in NetLogo version 6.1.0.

An agent-based artificial stock with a dynamic investor network

Matthew Oldham | Published Tue Jun 25 09:06:26 2019

The model is an agent-based artificial stock market where investors connect in a dynamic network. The network is dynamic in the sense that the investors, at specified intervals, decide whether to keep their current adviser (those investors they receive trading advise from). The investors also gain information from a private source and share public information about the risky asset. Investors have different tendencies to follow the different information sources, consider differing amounts of history, and have different thresholds for investing.

Agent-Based Computational Modeling of Cryptocurrency Design

Felix Ude | Published Fri Jun 28 02:32:03 2019

Agent-Based Computational Model of the cryptocurrency Bitcoin with a realistic market and transaction system. Bitcoin's transaction limit (i.e. block size) and Bitcoin generation can be calibrated and optimized for wealth and network's hashing power by the Non-Dominated Sorted Genetic Algorithm - II.

PFS - Preference Falsification Simulation (PreFalSim)

Francis Tseng Francisco J. León-Medina Jordi Tena-Sanchez | Published Mon Jul 1 18:08:19 2019

A model for simulating the evolution of individual's preferences, incliding adaptive agents "falsifying" -as public opinions- their own preferences. It was builded to describe, explore, experiment and understand how simple heuristics can modulate global opinion dynamics. So far two mechanisms are implemented: a version of Festiguer's reduction of cognitive disonance, and a version of Goffman's impression management. In certain social contexts -minority, social rank presure- some models agents can "fake" its public opinion while keeping internally the oposite preference, but after a number of rounds following this falsifying behaviour pattern, a coherence principle can change the real or internal preferences close to that expressed in public.

Decision Models for Generalized Price's Equation and Companion Code

Victor Sahin | Published Tue Jul 2 21:55:22 2019

This is a series of simulations of binary group decisions and the outcomes applied to a generalized version of Price's Equation for system fitness.

Simulating Water, Individuals, and Management (SWIM)

John Murphy | Published Fri Jul 5 19:21:52 2019

SWIM is a simulation of water management, designed to study interactions among water managers and customers in Phoenix and Tucson, Arizona. The simulation can be used to study manager interaction in Phoenix, manager and customer messaging and water conservation in Tucson, and when coupled to the Water Balance Model (U New Hampshire), impacts of management and consumer choices on regional hydrology.

Agent-based Model of Industrial Evolution

Martin Zoričak Denis Horvath Vladimir Gazda Oto Hudec | Published Wed Jul 10 14:22:54 2019

This is a conceptual model of underlying forces creating industrial clusters. There are two contradictory forces - attraction and repulsion. Firms within the same Industry are attracted to each other and on the other hand, firms with the same Activity are repulsed from each other. In each round firm with the lowest fitness is selected to change its profile of Industries and Activities. Based on these simple rules interesting patterns emerge.

How to Manage Individual Forgetting

wiseyanjie | Published Wed Jul 17 03:58:36 2019

we extend the basic simulation model of March by incorporating forgetting and three knowledge management strategies—personalization, codification, and mixed—to explore the impacts of different knowledge management strategies and forgetting on organizational knowledge level.

Relational integration in schools through seating assignments

Marta Rado Károly Takács | Published Thu Jul 18 16:30:44 2019

We model interpersonal dynamics and study behavior in the classroom in the hypothetical case of a single teacher who defines students' seating arrangements. The model incorporates the mechanisms of peer influence on study behavior, on attitude formation, and homophilous selection in order to depict the interrelated dynamics of networks, behavior, and attitudes. We compare various seating arrangement scenarios and observe how GPA distribution and level of prejudice changes over time.

Automatic multi game chess

Julia Kasmire | Published Mon Jul 22 17:31:53 2019

This model converts cleaned up versions of .pgn files (records of real chess games) and conversts them into files that record all of the events and "possible" events within a game of chess. This is intended to be a way to create sets of data that capture event sequences within the relatively complex but finite context of chess games as a proxy or "toy" data set. Although not a perfect correlation, these toy data sets are a first step in analysing complex and dynamic systems of events and possible events that happen in the real world.

An Agent-Based Model of Language Contact

Marco Civico | Published Tue Jul 30 13:28:25 2019

This model is part of an article that discusses the adoption of a complexity theory approach to study the dynamics of language contact within multilingual communities. The model simulates the dynamics of communication within a community where a minority and a majority group coexist.

The individual choice of language for communication is based on a number of simple rules derived from a review of the main literature on the topic of language contact. These rules are then combined with different variables, such as the rate of exogamy of the minority group and the presence of relevant education policies, to estimate the trends of assimilation of the minority group into the majority one. The model is validated using actually observed data from the case of Romansh speakers in the canton of Grisons, Switzerland.

Simulation Software for Random-Subset Voting

Guilherme Amorim | Published Fri Aug 2 21:39:39 2019

This software simulates the Random-Subset Voting method for Borda, plurality, approval and Condorcet.

PowerGen-ABM

Muhammad Indra Al Irsyad Anthony Halog Rabindra Nepal Deddy Priatmodjo Koesrindartoto | Published Sun Aug 4 14:49:11 2019

PowerGen-ABM is an optimisation model for power plant expansions from 2010 to 2025 with Indonesian electricity systems as the case study. PowerGen-ABM integrates three approaches: techno-economic analysis (TEA), linear programming (LP), and input-output analysis (IOA) and environmental analysis. TEA is based on the revenue requirement (RR) formula by UCDavis (2016), and the environmental analysis accounts for resource consumption (i.e., steel, concrete, aluminium, and energy) and carbon dioxide equivalent (CO2e) emissions during the construction and operational stages of power plants.

Roman Amphora reuse

Tom Brughmans | Published Wed Aug 7 13:41:32 2019

A model that allows for representing key theories of Roman amphora reuse, to explore the differences in the distribution of amphorae, re-used amphorae and their contents.

The foraging potential of the Holocene Cape South Coast of South Africa without the Palaeo-Agulhas Plain

Colin Wren Marco Janssen | Published Mon Aug 12 13:27:16 2019

The Palaeo-Agulhas Plain formed an important habitat exploited by Pleistocene hunter-gatherer populations during periods of lower sea level. This productive, grassy habitat would have supported numerous large-bodied ungulates accessible to a population of skilled hunters with the right hunting technology. It also provided a potentially rich location for plant food collection, and along its shores a coastline that moved with the rise and fall of sea levels. The rich archaeological and paleontological records of Pleistocene sites along the modern Cape south coast of South Africa, which would have overlooked the Palaeo-Agulhas Plain during Pleistocene times of lower sea level, provides a paleoarchive of this extinct ecosystem. In this paper, we present a first order illustration

of the “palaeoscape modeling” approach advocated by Marean et al. (2015). We use a resourcescape model created from modern studies of habitat productivity without the Palaeo-Agulhas Plain. This is equivalent to predominant Holocene conditions. We then run an agent-based model of the human foraging system to investigate several research questions.

A double-layer network and the contagion mechanism of China’s financial systemic risk

zou | Published Tue Aug 13 03:26:21 2019

We establish a double-layer network for China’s financial system, consisting of an interbank lending network and a cross-shareholding network. The loss of diffusion in an interbank lending channel independently, a cross-shareholding channel independently and a double-layer contagion channel after one of the financial institutions goes bankrupt with an initial shock are simulated to explore the nonlinear evolution mechanism of financial risk and impact factors of financial systemic risk in China.

Local soy value chains in northern Ghana

Tim Verwaart | Published Thu Aug 29 17:54:49 2019

The purpose of the simulation is to evaluate alternative interventions by a value chain development program, aiming to improve rural livelihood and food and nutrition security. In northern Ghana, where distrust between the partners can be a problem in the functioning of value chains, the program supports the incorporation of smallholder farmers in soy clusters or agriculture APEX organization (farmers’ co-operatives) with a fair business environment. The goal is to to include the smallholder farmers in a strong value chain and reduce distrust.

Coupled Housing and Land Markets (CHALMS)

Nicholas Magliocca | Published Thu Aug 29 18:29:11 2019

An economic agent-based model of Coupled Housing and Land Markets (CHALMS) simulates the location choices, insurance purchasing decisions, and risk perceptions of coastal residents, and how coastal risks are capitalized (or not) into coastal housing and land markets.

NarcoLogic

Nicholas Magliocca | Published Thu Aug 29 18:35:53 2019

Investigate spatial adaptive behaviors of narco-trafficking networks in response to various counterdrug interdiction strategies within the cocaine transit zone of Central America and associated maritime areas. Through the novel application of the ‘complex adaptive systems’ paradigm, we implement a potentially transformative coupled agent-based and interdiction optimization modeling approach to compellingly demonstrate: (a) how current efforts to disrupt narco-trafficking networks are in fact making them more widespread, resilient, and economically powerful; (b) the potential for alternative interdiction approaches to weaken and contain traffickers.

Minimal Genetic Algorithm

Cosimo Leuci | Published Tue Sep 3 07:52:29 2019

GeneGenetic algorithms try to solve a computational problem following some principles of organic evolution. This model has didactic purposes; it can give us an answer to the simple arithmetic problem on how to find the highest natural number composed by a given number of digits. We approach the task using a genetic algorithm, where the possible answers to solve the problem are represented by agents, that in logo programming environment are usually known as “turtles”.

PluchinoEtAl_ExtendedByAC

Andre Costopoulos | Published Tue Sep 3 17:29:33 2019

Extension of Pluchino et al.’s 2018 success vs talent model, to allow talented individuals to mitigate unlucky events.

TIP TOP Landscape

Patrick Taillandier Nesrine Ayari Claude Janin Benoit Sarrazin Dominique Trévisan | Published Wed Sep 4 06:42:24 2019

The model aims at reproducing the evolution of the land-use in an agricultural territory at the plot scale. It enables to simulate the affectation of land-use, the crop rotation and technical operations for each plot of the different farms of the territory. It allows as well for crop farms to simulate the daily state of plots (sowed, plowed, harvested, biomass indicator). The model is used as an input for the water pollution model allowing to determine the flow of nitrate, phosphorus and suspended matter in the territory according to the landscape configuration.

Demography, Industry and Residential Choice (DIReC) model

Jiaqi Ge | Published Wed Sep 4 12:33:05 2019

The integrated and spatially-explicit ABM, called DIReC (Demography, Industry and Residential Choice), has been developed for Aberdeen City and the surrounding Aberdeenshire (Ge, Polhill, Craig, & Liu, 2018). The model includes demographic (individual and household) models, housing infrastructure and occupancy, neighbourhood quality and evolution, employment and labour market, business relocation, industrial structure, income distribution and macroeconomic indicators. DIReC includes a detailed spatial housing model, basing preference models on house attributes and multi-dimensional neighbourhood qualities (education, crime, employment etc.).

Classical Swine Fever in wild boars

Cédric Scherer Martin Lange Volker Grimm Hans-Hermann Thulke Stephanie Kramer-Schadt | Published Fri Sep 6 08:52:07 2019

The model is a combination of a spatially explicit, stochastic, agent-based model for wild boars

(Sus scrofa L.) and an epidemiological model for the Classical Swine Fever (CSF) virus infecting the wild boars

Amazon smallholder resilience

Yue Dou | Published Mon Sep 9 19:35:39 2019

The purpose of this agent-based model is to simulate the behaviors of small farming households in the Amazon estuary region and evaluate their resilience to external shocks with the presence of several government cash transfer programs.

COMMAND-AND-CONTROL

Farzaneh Davari | Published Tue Sep 10 19:53:53 2019 | Last modified Thu Sep 12 03:07:04 2019

The command and control policy in natural resource management, including water resources, is a longstanding established policy that has been theoretically and practically argued from the point of view of social-ecological complex systems. With the intention of making a system ecologically resilient, these days, policymakers apply the top-down policies of controlling communities through regulations. To explore how these policies may work and to understand whether the ecological goal can be achieved via command and control policy, this research uses the capacity of Agent-Based Modeling (ABM) as an experimental platform in the Urmia Lake Basin (ULB) in Iran, which is a social-ecological complex system and has gone through a drought process.

Most Downloaded Models

All of the most downloaded models this quarter have appeared previously on the most downloaded models list, and several of them previously occupied the #1 spot. We note a general increase in volume over time: whereas the most downloaded models in Issues 1 and 2 of the Digest never reached 70 downloads, all of the top five now exceed that number.

1. **(99 Downloads)** Agent-based Renewables model for Integrated Sustainable Energy (ARISE) by Muhammad Indra Al Irsyad
2. **(84 Downloads)** Transport simulation in a real road network by Jiaqi Ge
3. **(71 Downloads)** A model of environmental awareness spread and its effect in resource consumption reduction by Giovanna Sissa
4. **(71 Downloads)** SimAdapt by François Rebaud
5. **(70 Downloads)** MOOvPOPsurveillance by Aniruddha Belsare

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