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NETWORK

CoMSES Digest: Spring 2022

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Editor's Note

Happy spring from the CoMSES Net team! As Covid precautions begin to ease in many places, we welcome the opportunity to travel and meet colleagues, some of whom we have only seen through the small boxes of Zoom calls. We continue to be mindful, however, of world events that have altered the lives of some of our colleagues and friends and to be vigilant as new Covid variants emerge.

With thoughts of the global pandemic and its impact on life and scholarship, Forrest Stonedahl, one of the newly re-elected members of the CoMSES Net Executive Board, discusses epidemiological modeling as our guest editor for this edition:

Back in May 2020, CoMSES was instrumental in orchestrating an open letter urging the scientific modeling community to publish all pandemic models in an open and transparent way, rather than merely publishing models' results/predictions. Almost two years later, epidemiological models are still on my mind.

I am by no means an expert on epidemiological modeling. I coauthored one paper about "viral marketing" many years ago. As quick response to the pandemic in summer 2020, I tossed together a short undergraduate-level special-topics summer course about agent-based modeling of virus spread, where we developed and analyzed simple models to understand concepts like "R0" and "herd immunity".

Google scholar tells me that my single "most cited" model is "Virus on a Network ", which I contributed to the NetLogo models library when I was a graduate student at the CCL at Northwestern. However, I wrote it as a simple sample model to demonstrate the use of NetLogo's network primitives and the "link" agent type, which were relatively new at that time. While I am gratified that so many people have found this model useful to refer to, it is easy for me to list many things that are "wrong" with that model-- e.g., the spatially-embedded network topology makes for a nice visualization but is a poor reflection of real-world systems. I am intimidated by the thought of attempting to extend a model like that to include enough carefully calibrated parameters and behavioral details that it could predict the path/timeline for a real computer virus/worm, or for SARS-CoV-2.

As a result, I have great respect for those who do real-world epidemiological modeling. I also have much sympathy for them, as the world has repeatedly pressed them to produce predictions of future case counts, hospitalizations, and deaths in various geographic regions… and more sympathy as so many of these predictions have proved to be far from accurate. I am sure these modelers were aware of how much uncertainty was baked into their predictions, and the difficulty in estimating confidence intervals with so many variables that no one was confident about. I can imagine their hesitation to see their models' estimates digitally engraved into "front-page" internet news. At the same time, there are policy-makers desperate for a crystal ball that will help them make decisions about medical resources, staffing, and mitigation strategies – not to mention everyday people like me, who are eager to know whether it's safe to book foreign travel for the upcoming summer! But models aren't crystal balls.

This brings me to a question I've been musing about lately: with the new focus, increased resources, and vast amounts of new data pouring in over the past couple years, have the pandemic models been getting better at predicting the future? I hope so. It would be great if they were. However, one of the most important lessons that people can learn from computational models is that sometimes no one can accurately predict the future of some complex systems. This inability to predict the future is most familiar to physicists who study chaos theory. Complex systems, while not chaotic, are sometimes described as being "at the edge of chaos". A model may show us that there are tipping points, phase transitions, cyclic patterns, and certain attractors for long-term behavior… but even using a "valid" detailed model we may not be able to predict which way things will tip, exactly when the transition will come, how long the cycles will be, or which basin of attraction the system will land in. Does this mean the model has failed? By no means! Even if we can't use a model for accurate long-range prediction, it may still offer many interesting and useful insights about the phenomenon.

For a far more complete and eloquent articulation than I can provide about the value of modeling beyond "prediction", I direct the reader to Joshua Epstein's classic article Why Model?.

Best regards,
Forrest Stonedahl, CoMSES Net Guest Editor, Augustana College

CoMSES News

CoMSES Net is Hiring!

Join CoMSES Net and help us build software tools that support open, transparent, reusable, and interoperable scientific computation in the study of complex social and natural systems. We have

an opening for a junior front-end software engineer; this entry-level position will help the successful candidate grow in their ability to build functional, intuitive user interfaces and data visualizations as well as robust and scalable backend web services. As part of the ASU College of Global Futures, our mission is to improve the ways we understand and collectively navigate our increasingly complex world.

For more information, and to apply, please visit the full job announcement here.

CoMSES Net International Modeling School 2022
Marco Janssen, Director for the Center for Behavior, Institutions and the Environment, Arizona State University

CoMSES Net hosted its sixth International Winter School on Agent Based Modeling of Social Ecological Systems on January 18-28, 2022. The Winter School was held entirely online which allows broad international participation although with sometimes challenging time zones. 25 graduate students, postdocs, and faculty joined the Winter School and worked closely with our tireless mentors on projects related to urban vulnerability, hurricane evacuations, and agricultural systems. Before the live events, students did an online program to learn best practices on model sharing and documentation and learned the basics of Github. During the 2 week program, there were short live lectures on social and ecological sciences, follow-up hands-on training on Github, and model analysis. The second week focused on applied projects to apply lessons learned, including the collaborative model development using Github. Participants also provided brief presentations about their own research. Participants presented their group projects on the last day of the school and all made substantive contributions to their projects despite the challenges of distributed and often-times asynchronous collaboration.

Thanks to all of our participants and mentors for their patience and perseverance during this online format.

Join an Open Modeling Foundation Working Group
Michael Barton, Executive Director of the Open Modeling Foundation

The Executive Committee of the OMF asks that you proactively encourage the members of the organization you represent to participate in the Open Modeling Foundation by joining a Working Group. Much of the most significant activity of the Open Modeling Foundation will take place within our Working Groups for Standards, Certification, Education and Outreach, and Cyberinfrastructure.

The OMF Working Groups are open to all individuals involved in modeling science as developers, users, or other stakeholders and do not have to belong to an OMF member organization. If you know of any individuals or groups outside your organization who might be interested in participating in the OMF, please pass this information along to them too.

Information on the working groups can be found here:
https://openmodelingfoundation.github.io/governance/working-groups/

Along with these working groups, the OMF also has an Early Career Scholars Group that gives individuals at this stage of their career a voice in the OMF and provides opportunities for peer support and networking. Please encourage any graduate students and other early career scholars to join this group.

More information about the Early Career Scholars group can be found here:
https://openmodelingfoundation.github.io/governance/charter/#affiliated-early-career-scholars

To join a Working Group or the Early Career Scholars group, please send the following information in an email to support@openmodelingfoundation.org:
- Your Name
- Email Address
- Professional Organization (Employer for non-students or academic institution for students)
- Sector: Education, Private, Public, Other (please specify), Prefer not to say
- Name of Working Group you wish to join
- If you are interested in joining the Early Career Scholars, please indicate whether you are a student

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Model Reproduction and Systematic Comparison
Bruce Edmonds, Centre for Policy Modelling, Manchester Metropolitan University Business School

The difficulty and importance of simulation model reproduction has been long known (e.g. Axtel et al. 1996, Edmonds and Hales 2003). CoMSeS facilitates this by providing an archive of simulations and encouraging good documentation practice. However, reproducing a model takes a lot of effort and so is not often done (the NetLogo model library being a shining exception). This is especially important when models have a policy impact (Chattoe et al. 2021).

But reproduction is only a basic scientific check on models, to completely understand a model one needs to systematically compare to standardised sets of data and thus to how alternative models do on the same task. Systematic model inter-comparison projects have helped make climate modelling to be more rigourous and thus underpinned the IPCC's conclusions, but this is not standard practice in other areas of simulation modelling (Bithell et al. 2021).

We are considering starting network projects that would facilitate, encourage both reproduction and systematic model inter-comparison. If you are a reasonably experienced simulation modeller and this is something you would want to be involved with, contact Bruce Edmonds <bruce@edmonds.name>.

Axtell, R., Axelrod, R., Epstein, J. M., & Cohen, M. D. (1996). Aligning simulation models: A case study and results. Computational & mathematical organization theory, 1(2), 123-141.

Bithell, M., Chattoe-Brown, E. and Edmonds, B. (2021) The Systematic Comparison of Agent-

Based Policy Models - It's time we got our act together!. Social Simulation Conference, Warsaw, 2021. http://cfpm.org/model-comparison/

Chattoe-Brown, E., Gilbert, N., Robertson, D. A., & Watts, C. J. (2021). Reproduction as a Means of Evaluating Policy Models: A Case Study of a COVID-19 Simulation. medRxiv. https://doi.org/10.1101/2021.01.29.21250743

Edmonds, B. and Hales, D. (2003) Replication, Replication and Replication - Some Hard Lessons from Model Alignment. Journal of Artificial Societies and Social Simulation 6(4) (http://jasss.soc.surrey.ac.uk/6/4/11.html).

Update your CoMSES Net Profile!

Please consider keeping the CoMSES community informed by updating your user account on CoMSES Net! Let fellow researchers and modelers get to know you by including a biography, research interests, and/or institutional affiliation. You can navigate to your account in the upper right corner of the website to edit your profile and link your account to GitHub and ORCID. As always, feel free to join the conversation by visiting the Forums tab or by starting a discussion on a specific model, event, or job posting.

Calendar of Events

Please follow the links to the local event organizers for the latest information or go to https://comses.net/events/ for a listing of all recent events. You can also subscribe to new events by following us on Twitter or subscribing to our RSS Events feed.

Upcoming Deadlines

BIGSSS Computational Social Science Summer School on Data-driven Modeling of Social Cohesion

Dates: July 4-15, 2022
Submission Deadline: March 27, 2022

The BIGSSS-CSS Summer School on social cohesion takes place on July 4 – 15, 2022 at the Department of Sociology of the University of Groningen (Netherlands). The summer school will serve as a research incubator aimed at fostering the use of computational methods in the social sciences and developing a topical contribution to research about social cohesion. https://www.comses.net/events/623/

CSDMS 2022: Environmental Extremes and Earthscape Evolution (E4)

Dates: May 17 - 19, 2022
Registration Deadline: April 15, 2022

This year's CSDMS annual meeting will be broad in scope, showcasing modeling-oriented projects that range from fundamental research in evolution of the landscape and seascape to more specific experimental or applied work involving the impact of environmental extremes on the Earthscape. Where environmental extremes are widely defined to capture the morphodynamic impact of for example wildfires, hydrologic extremes, tsunamis, storm surges, or hurricanes, on the Earthscape. After careful consideration, CSDMS has decided to hold this year's annual meeting onsite at the University of Colorado, Boulder.

11th International Congress on Environmental Modelling & Software (iEMSs 2022)

Dates: July 4 - 8, 2022
Registration Deadline: May 15, 2022

iEMSs 2022 is the official biennial conference of the International Environmental Modelling & Software Society, sponsors of the high impact journal, Environmental Modelling & Software, and the open access, community-driven journal, Socio-Environmental Systems Modelling. The theme for the conference is "Environmental Modelling and Software for science based decision making." This year's conference will take place in Brussels, Belgium. https://www.comses.net/events/620/

Model Library

Newly Reviewed

Five models passed CoMSES's peer review process this quarter. Three are still unpublished while their companion publications undergo journal peer review; others are currently under review by CoMSES. Published models include the following:

- The Communicating Hazard Information in the Modern Environment (CHIME) ABM of Hurricane Evacuation facilitates the analysis of information flow and protective decisions across space and time during hazardous weather events. CHIME ABM provides a platform for testing hypotheses about collective human responses to weather forecasts and information flow, using empirical data from historical hurricanes. The model uses real world geographical and hurricane data to set the boundaries of the simulation, and it uses historical hurricane forecast information from the National Hurricane Center to initiate forecast information flow to citizen agents in the model. (Sean Bergin)
- Infectious diseases model for mixed-methods research chapter is a curricular model to teach students the basics of modeling complex systems using agent-based modeling. It is a simple SIR model that simulates how a disease spreads through a population as its members change from susceptible to infected to recovered and then back to susceptible. The dynamics of the model are such that there are multiple emergent outcomes depending on the parameter settings, initial conditions, and chance. The curricular model can be used with the chapter Agent-Based Modeling in Mixed Methods Research (Moritz et

al. 2022) in the Handbook of Teaching Qualitative & Mixed Methods (Ruth et al. 2022). (Mark Moritz)

New Model Uploads

24 new models were published in the CoMSES Model Library on a wide variety of topics that illustrate the depth and breadth of our community. These include:

- space colonization of humans from Earth into the Milky Way
- historically tracking milk consumption in Britain
- exploring police funding decisions amongst heterogeneous hardship and legitimacy values
- simulations of land-use governance, identifying macro-level patterns of interaction among governments, commodity producers, and NGOs
- predicting HIV infections for a wide range of distinct scenarios or levers

These models and more can be discovered at the CoMSES Model Library - you can also keep up-to-date with newly published models on our Twitter and RSS feeds.

Most Downloaded Models

Published models were downloaded a total of 10,823 times this quarter, across 951 unique codebases. Here are the top 5:

1. Dawkins Weasel by Kristin Crouse (161 downloads)
2. Evolution of Sex by Kristin Crouse (141 downloads)
3. Artificial Anasazi by Marco Janssen (105 downloads)
4. An Agent-based Model of Firm Size Distribution and Collaborative Innovation by Inyoung Hwang (83 downloads)
5. Multilevel Group Selection I by Garry Sotnik, Thaddeus Shannon, and Wayne W. Wakeland (74 downloads)

Have news to share?

Have a newsworthy item to share with the CoMSES Net Community? Send it to us!

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ASU Arizona State University

CoMSES Net is headquartered in The School of Complex Adaptive Systems College of Global Futures