

# Celeste Vallejo

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Mathematical Biosciences Institute  
The Ohio State University  
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**RESEARCH INTERESTS** mathematical and simulation modeling, stochastic processes, uncertainty quantification, time series analysis

**ACADEMIC APPOINTMENTS** **Mathematical Biosciences Institute at The Ohio State University**, co-sponsored by Battelle Memorial Institute, Columbus, OH  
Postdoctoral Fellow **September 2018 - present**

**EDUCATION** **University of Florida, Gainesville, FL**

- **PhD, Mathematics** **2018**
  - Advisor: James Keesling
  - Thesis title: "Some Techniques for Analyzing Stochastic Models with Application to Epidemiology"
- **MS, Mathematics** **2015**
  - Advisor: James Keesling
  - Thesis title: "Little's Law Applied to a Stochastic Model of Poliomyelitis"
- **BA, Mathematics** **2013**
  - Advisor: James Keesling
  - Thesis title: "Epidemiology of MdSGHV in *Musca domestica*"

**PUBLICATIONS** **Celeste Vallejo**; Carl A. B. Pearson; James Koopman; Thomas Hladish. Evaluating the probability of silent circulation of polio in small populations using the silent circulation statistic. *Infectious Disease Modelling* **2019**, *4*, 239-250.

**Celeste Vallejo**; James Keesling; James Koopman; Burton Singer. Silent Circulation of Poliovirus in Small Populations. *Infectious Disease Modelling* **2017**, doi: 10.1016/j.idm.2017.11.001.

Josh Hiller; **Celeste Vallejo**; Leo Betthausen; James Keesling. Characteristic patterns of cancer incidence: Epidemiological data, biological theories, and multistage models. *Progress in Biophysics and Molecular Biology* **2017**, *124*, 41-48.

Josh Hiller; **Celeste Vallejo**; Leo Betthausen; James Keesling. Cancer incidence and the biology of extreme old age. *Integrative Molecular Medicine* **2016**, *4*(1).

**Vallejo, Celeste** and James Keesling, *Epidemiology of MdSGHV in Musca domestica*, *SIURO*, 7 (2014), <http://www.siam.org/students/siuro/vol7/S01237.pdf>.

**Vallejo, C.R.**; Lee, J.A.; Keesling, J.E.; Geden, C.J.; Lietze, V.-U.; Boucias, D.G. A Mathematic Model That Describes Modes of MdSGHV Transmission within House

Fly Populations. *Insects* **2013**, 4 (4), 683-692.

Lietze, V.-U.; Keesling, J. E.; Lee, J.A.; **Vallejo, C.R.**; Geden, C.J.; Boucias, D.G. Muscavirus (MdSGHV) disease dynamics in house fly populations - how is this virus transmitted and has it potential as a biological control agent?. *J. Invertebr. Pathol.* **2013**, 112, S40-S43.

**MANUSCRIPTS  
IN  
PREPARATION**

**Celeste Vallejo**, Po-Hsu Allen Chen, Tyler Coy, and Jarrod Olson. Using the Law of Total Variance to Estimate the Uncertainty of an Alternative Payment Discrete Event Simulation Model.

Jennifer Crodelle, **Celeste Vallejo**, Markus Schmidtchen, Chad M. Topaz, and Maria R. D'Orsogna. Impacts of California Proposition 47 on crime trends in Santa Monica, CA.

**Celeste Vallejo**; Burton Singer. Garki Revisited: Estimating Malaria Incidence and Recovery Rates Using a Two-Component Markov Mixture Model.

**Celeste Vallejo**; James Keesling. Using Little's Law in Stochastic Modeling.

**FUNDED  
RESEARCH**

**Research Assistant**

**January 2017 - August 2018**

*University of Michigan (remote hire)*

- Assistant to James Koopman, Professor of Epidemiology, University of Michigan
- Constructed an event-driven individual-based model of polio transmission and silent circulation that includes the environment as a source of contamination.
  - Created an immuno-epidemiological partial differential equations model (includes between-host and within-host dynamics) to support the development of the individual-based model.
- This is joint work with Thomas Hladish, University of Florida

**Research Assistant**

**January 2017 - August 2018**

*Department of Emergency Medicine, University of Florida*

- Assistant to J. Adrian Tyndall, Chairman, Department of Emergency Medicine, UF Health
- Analyzed financial data to facilitate developing the yearly budget for the Emergency Department.
- Streamlined billing practices by creating benchmarks and standards for faculty's note taking practices using protected health information (PHI) data.

**UNFUNDED  
RESEARCH**

**Research Assistant**

**August 2013 - May 2018**

- *The Spread of Aerosolizable Nosocomial Pathogens through the Air*
  - We identified the air as a significant contributor to the spread of pathogens in a hospital.
  - We quantified the relative number of pathogens spread by the air versus through hand-touch sites.
  - This was joint work with James Keesling, Louis Block, Jo Ann Lee, Ross Ptacek, Nicole Iovine, and J. Glenn Morris, Jr.

**INVITED  
TALKS**

**SIAM Data Science Conference**, Cincinnati, OH (May 2020)

*Using Markov Mixture Models to Estimate Continuous-Time Rates from Discrete-Time Data With Application to Malaria Incidence and Recovery Rates*

**Ohio Wesleyan University**, Delaware, OH (January 2020)

*Using Markov Mixture Models to Estimate Continuous-Time Rates from Discrete-Time Data With Application to Malaria Incidence and Recovery Rates*

**University of Louisiana at Lafayette Applied Mathematics Seminar**, Lafayette,

LA (October 2019)

*Using Markov Mixture Models to Estimate Continuous-Time Rates from Discrete-Time Data With Application to Malaria Incidence and Recovery Rates*

**John Carroll University's Biology Seminar**, Cleveland, OH (September 2019)

*Estimating Continuous-Time Rates from Discrete-Time Data*

**Society for Mathematical Biology Annual Meeting**, Montreal, Canada (July 2019)

*The impact of small and unvaccinated subpopulations on polio elimination*

**BioMath2019, Mathematical Methods in Cancer Immunology and Infectious Diseases Mini-Symposium**, Bedlewo, Poland (June 2019)

*Using Markov Mixture Models to Calculate Continuous-time Rates from Discrete-time Data*

**BioMath2019**, Bedlewo, Poland (June 2019)

*The impact of small and unvaccinated subpopulations on polio elimination*

**Infectious Disease Institute**, The Ohio State University (February 2019)

*The impact of small and unvaccinated subpopulations on polio elimination*

**Center for Inference and Dynamics of Infectious Diseases Trainee Call**, University of Florida (online call) (March 2018)

*Using Little's Law in Stochastic Modeling*

**Graduate Mathematics Association**, University of Florida (November 2017)

*"All models are bad but some are useful"*

**CSQUID/CIDID Working Group**, University of Florida (November 2017)

*Silent Circulation of Poliovirus in Small Populations*

**MIDAS group meeting**, University of Michigan (October 2017)

*Individual-Based Modeling of Silent Circulation of Poliovirus*

**Graduate Mathematics Association**, University of Florida (December 2015)

*Little's Law Applied to a Stochastic Model of Poliomyelitis*

## CONTRIBUTED TALKS

**Mathematical Biosciences Institute**, The Ohio State University (October 2019)

*Using Markov Mixture Models to Estimate Continuous-Time Rates from Discrete-Time Data*

**Computational and Mathematical Population Dynamics 5**, Florida Atlantic University (May 2019)

*The impact of small and unvaccinated subpopulations on polio elimination*

**Mathematical Biosciences Institute**, The Ohio State University (January 2019)

*Evaluating the probability of silent circulation of polio in small populations using the silent circulation statistic*

**Derek Cummings' Lab Meeting**, University of Florida (October 2018)

*Examining the probability of silent circulation of polio using the endemic potential statistic*

**Biomathematics Seminar**, University of Florida (October 2018)

*Examining the probability of silent circulation of polio using the endemic potential statistic*

**Biomathematics Seminar**, University of Florida (October 2017)

*Silent Circulation of Poliovirus in Small Populations*

**Fall Southeastern Sectional Meeting**, University of Central Florida (September 2017)

*Analyzing a Stochastic Model of Cholera Using Little's Law*

**Biomathematics Seminar**, University of Florida (February 2017)

*Silent Circulation of Poliovirus in Small Populations*

**Joint Mathematics Meeting 2017**, Atlanta, GA (January 2017)

*Using Little's Law in Stochastic Modeling*

**Biomathematics Seminar**, University of Florida (September 2016)

*On the Absorption Probabilities and Absorption Times of Finite Homogeneous Birth-Death Processes*

**Biomathematics Seminar**, University of Florida (January 2016)

*Using Little's Law in Stochastic Modeling*

**Queuing Seminar**, University of Florida (September 2015)

*Karl Sigman's Proof of Little's Law*

## POSTERS

**MIDAS Network Meeting**, Atlanta, GA (May 2017)

*Silent Circulation of Poliovirus in Small Populations*

**2017 Emerging Pathogens Institute Research Day**, Gainesville, FL (February 2017)

*Silent Circulation of Poliovirus in Small Populations*

**Association for Women in Mathematics Workshop at SIAM 2016**, Boston, MA (July 2016)

*Little's Law Applied to a Stochastic Model of Poliomyelitis*

**Society for Mathematical Biology 2015 Annual Meeting and Conference**, Georgia State University (June 2015)

*Stochastic Models for the Silent Circulation of Polio*

**Emory University STEM Research and Career Symposium**, Emory University (April 2013)

*Epidemiology of MdSGHV*

**University of Florida's Undergraduate Research Symposium**, University of Florida (March 2013)

*Epidemiology of MdSGHV*

**Florida Undergraduate Research Conference**, University of Florida (February 2013)

*Epidemiology of MdSGHV*

## WORKSHOPS ATTENDED

**AIM Workshop: Identifiability problems in systems biology**, San Jose, CA (August 2019)

**American Mathematical Society's Mathematics Research Communities: Agent-based Modeling in Biological and Social Systems**, West Greenwich, RI (June 2018)

**Spring School Series 2018: Models and Data**, University of South Carolina, Columbia (February 2018)

**Uncertainty Quantification for Biological Models Tutorial**, NIMBioS at the University of Tennessee, Knoxville (June 2017)

## TECHNICAL SKILLS

C++, Python, Wolfram *Mathematica*, MATLAB, R, LaTeX, Git, Octave

## TEACHING EXPERIENCE

**Department of Mathematics**, University of Florida

*Discussion Leader*, Analytic Geometry and Calculus I (Fall 2016)

*Discussion Leader*, Analytic Geometry and Calculus I (Spring 2016)

*Discussion Leader*, Analytic Geometry and Calculus I (Fall 2015)

## FELLOWSHIPS AND GRANTS

AMS Travel Grant (2018 & 2019)

Fall 2017 Graduate Travel Award (2017)

SEARCDE 2016 Travel Grant (2016)

Association for Women in Mathematics Travel Grant (2016)

Center for Applied Mathematics Travel Support (UF) (2016)

Landahl Travel Grant (Society for Mathematical Biology) (2015)  
College of Liberal Arts and Sciences Graduate Student Travel Grant (UF) (2015 & 2016)  
The Bridge to Doctorate Fellowship (2013-2015)  
University Scholars Program (University of Florida research grant) (2012-2013)

**OUTREACH**      Gave a talk to undergraduate and masters students in biology/pre-health to stimulate interest in mathematics.

**PROFESSIONAL** Society for Mathematical Biology  
**AFFILIATIONS** Infectious Disease Institute (The Ohio State University)  
Center for Inference & Dynamics of Infectious Diseases  
VectorBiTE