



EDUCATION

PhD

Mathematics and Statistics
University of Melbourne, Australia

 Feb. 2016 - Feb. 2020

Thesis: Understanding the regulation of epidermal tissue structure by molecular and cellular processes using multi-scale models.

Supervisors: Dr James Osborne, Prof. Edmund Crampin.

For my PhD I built a multi-cellular model of the epidermis to understand how epidermal height is regulated. In order to complete this project I developed a good understanding of the biology of the epidermis, and how this biology can be represented in mathematical models. My work involved extensive model development, building on an existing C++ biological modelling library, Chaste, and model analysis and interpretation.

Bachelor of Engineering

University of Adelaide, Australia

 2009-2012

(Computational and Mechanical) with First Class Honours

Honours thesis: Fully coupled simulations of the 2005 Wangary Fire.

My project, under supervision of Dr Trent Mattner, assessed the validity of the fully coupled atmospheric-fire model WRF-Fire for an Australian fire event.



WORK EXPERIENCE

Graduate Fellow, CSIRO

CSIRO, Melbourne, Australia

 July 2013 - Jan. 2016

Computational modelling and software group

My research, under supervision of Dr James Hilton, focused on the team's bushfire spread model, developed in C++. This research also included geospatial data processing, data analysis, and collaboration with experimental researchers.

Vacation Scholar, CSIRO

CSIRO, Melbourne, Australia

 Nov. 2011 - Feb. 2012

Mathematics and Information Sciences division

My first exposure to research, under supervision of Dr Gary Delaney, was on the random packing of ellipsoids using discrete element methods.



AWARDS

RTP PhD Scholarship

University of Melbourne, Australia

 2016-2019

Australian Government Research Training Program (RTP) Scholarship.

Formerly known as APA (Australian Postgraduate Award).

T.M Cherry Prize

ANZIAM Conference

 2017

Annual award for the best student paper presented at the ANZIAM (Australian and New Zealand Industrial and Applied Mathematics) conference.

DFEEST Defence Scholarship

University of Adelaide, Australia

 2012

SA Department of Further Education, Employment, Science & Technology Defence Honours Scholarship.



JOURNAL ARTICLES

Claire Miller, Edmund Crampin, James Osborne. *Maintaining the stem cell niche in multicellular models of epithelia*. arXiv:1811.10781 [q-bio.TO] (2019).

Claire Miller, Matt Plucinski, Alec Stephenson, Carolyn Huston, Kay Charman, Mahesh Prakash, Andrew Sullivan, Simon Dunstall. *Electrically caused wildfires in Victoria, Australia are over-represented when fire danger is elevated*. *Landscape and Urban Planning* 167:267-274 (2017).

James Hilton, Claire Miller, Jason Sharples, Andrew Sullivan. *Curvature effects in the dynamic propagation of wildfires*. *International Journal of Wildland Fire* 25(12):1238-1251 (2016).

James Hilton, Claire Miller, Andrew Sullivan. *A power series formation for two-dimensional wildfire shapes*. *International Journal of Wildland Fire* 25(9):970-979 (2016).

James Hilton, Claire Miller, Andrew Sullivan, Chris Rucinski. *Effects of spatial and temporal variation in environmental conditions on simulation of wildfire spread*. *Environmental Modelling and Software* 67:118-127 (2015).



CONFERENCE PROCEEDINGS

Claire Miller, James Hilton, Andrew Sullivan, Mahesh Prakash. *SPARK – A bushfire spread prediction tool*. *Environmental Software Systems; Infrastructures, Services and Applications*, pp. 262-271 (2015).

James Hilton, Claire Miller, Matt Bolger, Lachlan Hetheron, Mahesh Prakash. *An Integrated Workflow Architecture for Natural Hazards, Analytics and Decision Support*. *Environmental Software Systems; Infrastructures, Services and Applications*, pp. 333-342 (2015).

Gary Delaney, James Hilton, Paul Cleary, Claire Miller. *The role of inter-grain friction in determining the mechanical and structural properties of superellipsoid packings*. *Powders and Grains 2013: Proceedings of the 7th International Conference on Micromechanics of Granular Media* (2013).



CONFERENCE PRESENTATIONS

Claire Miller, Edmund Crampin, James Osborne. *Mechanistic control of epidermal tissue height*. Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Conference 2019.

Claire Miller, Edmund Crampin, James Osborne. *Multi-cellular modelling of cellular mechanisms gives insights on the maintenance of epidermal tissue structure*. 2018 Annual Meeting of the Society for Mathematical Biology and the Japanese Society for Mathematical Biology.

Claire Miller, Edmund Crampin, James Osborne. *Maintaining the stem cell niche in cell-based models of epithelia*. MATRIX workshop; Virtual tissues: progress and challenges in Multicellular Systems Biology 2018.

Claire Miller, Edmund Crampin, James Osborne. *Multi-cellular modelling of cellular mechanisms gives insights on the maintenance of epidermal tissue structure* (poster presentation). Biophysical society Annual Meeting 2018.

Claire Miller, James Osborne, Edmund Crampin. *The impact of stem cell division models in epithelial multi-cellular tissue modelling*. Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Conference 2018.

Claire Miller, James Osborne, Edmund Crampin. *How thick is your skin? The effect of cell behaviour on epidermal tissue structure*. Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Conference 2017. Talk awarded T.M. Cherry Prize (see awards).

Claire Miller, James Hilton, Andrew Sullivan, Mahesh Prakash. *SPARK-A Bushfire Spread Prediction Tool*. International Symposium on Environmental Software Systems (ISESS) 2015.

Claire Miller, James Hilton, Andrew Sullivan, Mahesh Prakash. *Spark - a new research tool for investigating novel bushfire spread concepts*. Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) Conference 2015.

James Hilton, Carolyn Huston, Mahesh Prakash, Claire Miller, and Andrew Sullivan. *Parameter sensitivity evaluation in bushfire spread modelling*. 20th International Congress on Modelling and Simulation (MODSIM) 2013.



TEACHING/SUPERVISION EXPERIENCE

Tutoring

 2018 S1/2

Mathematics for Biomedicine course, School of Mathematics and Statistics, The University of Melbourne.

Computer lab demonstrator

 2017 S2/2018 S1

Systems Biology course, Biomedical Engineering, The University of Melbourne.

Intern supervision

 2015

3 month supervision of a Masters Intern at CSIRO.



TRAINING AND PERSONAL DEVELOPMENT

Science Impact

 2017

3-day workshop about taking science beyond the University.

Publishing with Impact

 2014

2-day workshop on the writing and publication process of scientific papers.

Presentation skills

 2012

Day workshop on scientific presentations.



COMMUNITY ENGAGEMENT AND OUTREACH

SES Volunteer

 2017-2019

State emergency services (SES) volunteers provide emergency assistance, mainly in storm events. This role encourages teamwork and critical thinking under pressure.

Science outreach

 2013-Current

I actively participate in many science outreach programs, including:

- Developing/running a workshop in Mathematical Biology for international high school students as part of the World Mathematics Championships.
- Developing/running a workshop on fire modelling for rural school students.
- Presenting at epidemiology workshop for the ConocoPhillips Science Program.
- Presenting at The University of Melbourne CHOOSEMATHS Day 2018.
- Presentations at grad expos, interviews in University webinars, filming for undergraduate course planning videos, and sitting on career panels.

STAMPS Secretary

 2016

Statistics and Mathematics Postgraduate Society (STAMPS) is a graduate group at the University of Melbourne that organises social events for postgraduate students.



TECHNICAL SKILLS

Programming languages:

- C++ (7 years)
- R (5 years)
- Matlab (9 years)

Version control:

- Git (4 years)
- SVN (2 years)

HPC systems (8 years)

LaTeX (8 years)