Final Program and Abstracts

SIAM Conference on Mathematics of Planet Earth
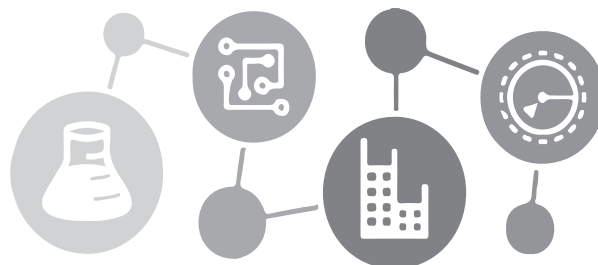
September 30 - October 2, 2016
DoubleTree by Hilton Hotel Philadelphia Center City
Philadelphia, Pennsylvania, USA

SIAM Conference on Applied Mathematics Education

September 30–October 2, 2016
DoubleTree by Hilton Hotel,
Philadelphia Center City
Philadelphia, Pennsylvania, USA

The SIAM Conference on Mathematics of Planet Earth (MPE16)

is sponsored by the SIAM Activity Group on Mathematics of Planet Earth.

The purpose of this activity group is to provide a forum for mathematicians and computational scientists to study Planet Earth, its life-supporting capacity, and the impact of human activities. By opening up a new area of applications, the SIAG will stimulate interesting research in the mathematical sciences. Activities of the SIAG will include the biennial SIAM Conference on Mathematics of Planet Earth, minisymposia at SIAM Annual Meetings and other conferences.

The SIAM Conference on Applied Mathematics Education (ED16)

is sponsored by the SIAM Activity Group on Applied Mathematics Education.

The purpose of the SIAM Activity Group on Applied Mathematics Education is to advance the development and practice of educational programs, courses, and resources in applied mathematics. This will include but not be limited to organizing conferences, maintaining a curated web-based repository of resources in modeling, computational and applied mathematics, and mathematical sciences, including the applications domains. The potential constituencies of the SIAG will include faculty members in colleges and universities who are interested in applied and computational mathematics and have a strong interest in educational innovation, practice, improvement and faculty development; mathematics teacher educators, especially for in-service professional development; and graduate students in applied mathematical areas with ambitions for careers in academia with a strong education component.

siam.

Table of Contents

MPE16 Organizing Committee Conference Co-chairs

Hans Engler
Georgetown University, USA

Hans Kaper
Georgetown University, USA

Antonios Zagaris
Wageningen University and Research Centre, The Netherlands

Mary Lou Zeeman
Bowdoin College, USA

Organizing Committee

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Howard University, USA

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Padmanabhan Seshaiyer
George Mason University, USA

SIAM Registration Desk

The SIAM registration desk is located in Aria B, on the 3rd Floor. It is open during the following hours:

Thursday, September 29
5:00 PM - 8:00 PM

Friday, September 30
7:15 AM - 5:00 PM

Saturday, October 1
7:45 AM - 5:00 PM

Sunday, October 2
7:45 AM - 1:30 PM

Hotel Address

DoubleTree by Hilton Hotel Philadelphia Center City
237 South Broad Street
Philadelphia, Pennsylvania 19107-5686
USA
Phone Number: +1-215-893-1600
Toll Free Reservations (USA and Canada): 800-445-8667
Fax: +1-215-893-1663
Hotel web address: http://doubletree3.hilton.com/en/hotels/pennsylvania/doubletree-by-hilton-hotel-philadelphia-center-city-PHLBLDT/index.html

Hotel Telephone Number

To reach an attendee or leave a message, call +1-215-893-1600. If the attendee is a hotel guest, the hotel operator can connect you with the attendee's room.

Hotel Check-in and Check-out Times

Check-in time is 4:00 PM.

Check-out time is 11:00 AM.

Child Care

The Philadelphia Convention and Visitors Bureau provided the following list of child care providers for attendees interested in child care services. Attendees are responsible for making their own child care arrangements.

The Philadelphia Nanny Network
http://www.nannyagency.com/

Your Other Hands
(215) 790-0990

Kiddie Korp
http://www.kiddiecorp.com/

Kindercare Learning Centers
www.kindercare.com

Gills Babysitting Agency
5039 Akron St
Philadelphia, PA 19124
(215) 533-5366

Sitter City
https://www.sittercity.com/babysitters/pa/philadelphia.html

Corporate Members and Affiliates

SIAM corporate members provide their employees with knowledge about, access to, and contacts in the applied mathematics and computational sciences community through their membership benefits. Corporate membership is more than just a bundle of tangible products and services; it is an expression of support for SIAM and its programs. SIAM is pleased to acknowledge its corporate members and sponsors. In recognition of their support, non-member attendees who are employed by the following organizations are entitled to the SIAM member registration rate.

Corporate Institutional Members

The Aerospace Corporation

Air Force Office of Scientific Research

Amazon

Aramco Services Company

Bechtel Marine Propulsion Laboratory

The Boeing Company

CEA/DAM

Department of National Defence (DND/CSEC)

DSTO- Defence Science and Technology Organisation

Hewlett-Packard

Huawei FRC French R&D Center

IBM Corporation

IDA Center for Communications Research, La Jolla

IDA Center for Communications Research, Princeton

Institute for Defense Analyses, Center for Computing Sciences

Lawrence Berkeley National Laboratory

Lawrence Livermore National Labs

Lockheed Martin

Los Alamos National Laboratory

Max-Planck-Institute for Dynamics of Complex Technical Systems

Mentor Graphics

National Institute of Standards and Technology (NIST)

National Security Agency (DIRNSA)

Naval PostGrad

Oak Ridge National Laboratory, managed by UT-Battelle for the Department of Energy

Sandia National Laboratories

Schlumberger-Doll Research

United States Department of Energy

U.S. Army Corps of Engineers, Engineer Research and Development Center

U.S. Naval Research Labs

List current August 2016.

Funding Agency

SIAM and the Conference Organizing Committee wish to extend their thanks and appreciation to the U.S. National Science Foundation for its support of these conferences.

Leading the applied mathematics community

Join SIAM and save!

SIAM members save up to $130 on full registration for the SIAM Conference on Mathematics of Planet Earth (MPE16) and SIAM Conference on Applied Mathematics Education (ED16)! Join your peers in supporting the premier professional society for applied mathematicians and computational scientists. SIAM members receive subscriptions to *SIAM Review, SIAM News* and *SIAM Unwrapped,* and enjoy substantial discounts on SIAM books, journal subscriptions, and conference registrations.

If you are not a SIAM member and paid the *Non-Member* or *Non-Member Mini Speaker/Organizer* rate to attend the conferences, you can apply the difference between what you paid and what a member would have paid ($130 for a *Non-Member* and $65 for a *Non-Member Mini Speaker/Organizer*) towards a SIAM membership. Contact SIAM Customer Service for details or join at the conference registration desk.

If you are a member of SIAM but not a member of either the SIAM Activity Group on Mathematics of Planet Earth (SIAG/MPE) or the SIAM Activity Group on Applied Mathematics Education (SIAG/ED), you may be

eligible to for a free membership in one of those SIAGs. Check at the registration desk or contact *membership@siam.org*.

Free Student Memberships are available to students who attend an institution that is an Academic Member of SIAM, are members of Student Chapters of SIAM, or are nominated by a Regular Member of SIAM.

Join onsite at the registration desk, go to *www.siam.org/joinsiam* to join online or download an application form, or contact SIAM Customer Service:

Telephone: +1-215-382-9800 (worldwide); or 800-447-7426 (U.S. and Canada only)

Fax: +1-215-386-7999

E-mail: membership@siam.org

Postal mail: Society for Industrial and Applied Mathematics, 3600 Market Street, 6th floor, Philadelphia, PA 19104-2688 USA

Standard Audio/Visual Set-Up in Meeting Rooms

SIAM does not provide computers for any speaker. When giving an electronic presentation, speakers must provide their own computers. SIAM is not responsible for the safety and security of speakers' computers.

The Plenary Session Rooms will have two (2) screens, one (1) data projector and one (1) overhead projector. The data projectors support VGA connections only. Presenters requiring an HDMI or alternate connection must provide their own adaptor.

All other concurrent/breakout rooms will have one (1) screen and one (1) data projector. The data projectors support VGA connections only. Presenters requiring an HDMI or alternate connection must provide their own adaptor.

If you have questions regarding availability of equipment in the meeting room of your presentation, please see a SIAM staff member at the registration desk.

Internet Access

Attendees booked within the SIAM room block will receive complimentary wireless Internet access in their guest rooms. All conference attendees will have complimentary wireless Internet access in the meeting space and lobby area of the hotel.

SIAM will provide a limited number of email stations for attendees during registration hours.

Registration Fee Includes

- Admission to all technical sessions
- Coffee breaks daily
- Room set-ups and audio/visual equipment
- SIAG/MPE Business Meeting *(open to SIAG/MPE members)*
- SIAG/ED Business Meeting *(open to SIAG/ED members)*
- Poster Session
- Welcome Reception

Job Postings

Please check with the SIAM registration desk regarding the availability of job postings or visit *http://jobs.siam.org*.

Important Notice to Poster Presenters

The poster session is scheduled for Friday, September 30 from 8:00 PM - 10:00 PM. Poster presenters are expected to set up their poster material on the provided 4' x 6' poster boards in the Symphony Ballroom on the 3rd floor after 5:00 PM on Thursday, September 29. All materials must be posted by Friday, September 30 at 8:00 PM, the official start time of the

session. Posters will remain on display through 10:00 PM on Friday, September 30. **Posters must be removed at the conclusion of the poster session, 10:00 PM on Friday, September 30.**

SIAM Books and Journals

Display copies of books and complimentary copies of journals are available on site. SIAM books are available at a discounted price during the conference. The books booth will be staffed on Friday and Saturday from 8:30 AM - 4:30 PM. If a SIAM books representative is temporarily away from the booth, completed order forms and payment (credit cards are preferred) may be taken to the SIAM registration desk. The books table will close at 4:30 PM on Saturday.

Table Top Displays

IOP Publishing

Princeton University Press

SIAM

Name Badges

A space for emergency contact information is provided on the back of your name badge. Help us help you in the event of an emergency!

Comments?

Comments about SIAM meetings are encouraged! Please send to:

Cynthia Phillips, SIAM Vice President for Programs (*vpp@siam.org*).

Get-togethers

- Welcome Reception
  Thursday, September 29
  6:00 PM – 8:00 PM

- MPE16 and ED16 Poster Session
  Friday, September 30
  8:00 PM – 10:00 PM

- SIAG/MPE Business Meeting
  (open to SIAG/MPE members)
  Saturday, October 1
  5:30 PM – 6:30 PM
  *Complimentary beer and wine
  will be served.*

- SIAG/ED Business Meeting
  (open to SIAG/ED members)
  Saturday, October 1
  8:00 PM - 8:45 PM
  *Complimentary beer and
  wine will be served.*

Statement on Inclusiveness

As a professional society, SIAM is committed to providing an inclusive climate that encourages the open expression and exchange of ideas, that is free from all forms of discrimination, harassment, and retaliation, and that is welcoming and comfortable to all members and to those who participate in its activities. In pursuit of that commitment, SIAM is dedicated to the philosophy of equality of opportunity and treatment for all participants regardless of gender, gender identity or expression, sexual orientation, race, color, national or ethnic origin, religion or religious belief, age, marital status, disabilities, veteran status, field of expertise, or any other reason not related to scientific merit. This philosophy extends from SIAM conferences, to its publications, and to its governing structures and bodies. We expect all members of SIAM and participants in SIAM activities to work towards this commitment.

Please Note

SIAM is not responsible for the safety and security of attendees' computers. Do not leave your laptop computers unattended. Please remember to turn off your cell phones, pagers, etc. during sessions.

Recording of Presentations

Audio and video recording of presentations at SIAM meetings is prohibited without the written permission of the presenter and SIAM.

Social Media

SIAM is promoting the use of social media, such as Facebook and Twitter, in order to enhance scientific discussion at its meetings and enable attendees to connect with each other prior to, during and after conferences. If you are tweeting about a conference, please use the designated hashtag to enable other attendees to keep up with the Twitter conversation and to allow better archiving of our conference discussions. The hashtag for MPE16 is #MPE16. The hashtag for ED16 is #SIAMED16. SIAM's Twitter handle is @TheSIAMNews.

MPE16 Minitutorials

All Minitutorials will take place in Ormandy Ballroom West - Lobby Level.

Friday, September 30
9:30 AM - 11:30 AM

MT1 Conceptual Climate Models
Organizers and Speakers:

James Walsh, *Oberlin College, USA*
Esther Widiasih, *University of Hawai'i - West O'ahu, USA*

———————————————

Saturday, October 1
9:30 AM - 11:30 AM

MT2 Mathematical Issues in Food Systems and Food Security
Organizers and Speakers:

Hans Kaper, *Georgetown University, USA*
Mary Lou Zeeman, *Bowdoin College, USA*

MPE16 Invited Plenary Speakers

All MPE16 Invited Plenary Presentations will take place in Ormandy Ballroom West - Lobby Level

Friday, September 30

1:00 PM - 1:45 PM

IP1 Earth System Stability and Mass Extinctions

Daniel Rothman, *Massachusetts Institute of Technology, USA*

4:30 PM - 5:15 PM

IP2 The Problem of Translating Climate Change into Impacts

Michael Hanemann, *Arizona State University and University of California, Berkeley, USA*

————————————

Saturday, October 1

1:00 PM - 1:45 PM

IP3 Public Lecture - Assessing Risks to Global Food Systems: Mathematicians, Food System Experts and Insurance

Molly Jahn, *University of Wisconsin, Madison, USA*

4:30 PM - 5:15 PM

IP4 Feedbacks Between Soil Engineers and Vegetation Can Increase Ecosystem Robustness

Corina Tarnita, *Princeton University, USA*

————————————

Sunday, October 2

8:15 AM - 9:00 AM

IP5 Smarter Planet 2.0

Sean McKenna, *IBM Research, Ireland*

ED16 Invited Plenary Speakers

All ED16 Invited Plenary Presentations will take place in Ormandy Ballroom East - Lobby Level

Friday, September 30

8:15 AM - 9:00 AM

IP1 Mathematical Modeling with Elementary School-Aged Students

Elizabeth A. Burroughs, *Montana State University, USA*

1:00 PM - 1:45 PM

IP2 Graduate Student Education in Computational Mathematics and Scientific Computing

Margot Gerritsen, *Stanford University, USA*

Saturday, October 1

8:15 AM - 9:00 AM

IP3 Mathematical Modeling:
Changing the Landscape of the Mathematics Classroom

Maria Hernandez, *North Carolina School of Science and Mathematics
and Deerfield Academy, USA*

1:00 PM - 1:45 PM

IP4 Lean Out: Connecting Outside the Ivory Tower

Suzanne L. Weekes, *Worcester Polytechnic Institute, USA*

Sunday, October 2

8:15 AM - 9:00 AM

IP5 Title Not Available

Philip Uri Treisman, *The University of Texas at Austin, USA*

SIAM Books

Visit the SIAM booth to see these and other SIAM books!

Learning LaTeX, *Second Edition*

David F. Griffiths and Desmond F. Higham

"A quick-start guide for LaTeX beginners that will have readers off and TeX-ing in no time. Highly recommended for newbies, though veterans will also appreciate it as an essential reference. There are many examples throughout Learning LaTeX*, and the appendices feature detailed examples of an article, a report, a beamer presentation, and a poster. Everyone will enjoy the light-hearted section on 'LaTeX Through the Years'. Highly recommended as part of every professor's lending library and every student's essentials."*

— Tamara G. Kolda, Sandia National Labs

"...I never would have thought it possible, but the new edition is a substantial improvement with the additional coverage of BiBTeX, Beamer, and posters. Learning LateX *should be handed to new graduate students in mathematical sciences along with their office key and ID card."*

— Don Estep, Colorado State University

2016 • Approx. x + 103 pages • Softcover • 978-1-611974-41-6
List $29.00 • SIAM Member $20.30 • OT148

Handbook of Writing for the Mathematical Sciences, *Second Edition*

Nicholas J. Higham

The subject of mathematical writing has been infused with life once again by Nick Higham as he follows up his successful HWMS volume with this popular and much-praised second edition. As is Higham's style, the material is enlivened by anecdotes, unusual paper titles, and humorous quotations. This handy new volume provides even more information on the issues you will face when writing a technical paper or talk, from choosing the right journal in which to publish to handling your references. Its overview of the entire publication process is invaluable for anyone hoping to publish in a technical journal.

1998 • xvi + 302 pages • Softcover • 978-0-898714-20-3
List $62.50 • SIAM Member $43.75 • Student Price $26.10 • OT63

Mathematics and Climate

Hans Kaper and Hans Engler

Winner of the Atmospheric Science Librarians International Choice Award as the best book of 2013, *Mathematics and Climate* is a timely textbook with wide appeal. It is aimed at students and researchers in mathematics and statistics who are interested in current issues of climate science, as well as at climate scientists who wish to become familiar with qualitative and quantitative methods of mathematics and statistics. The authors emphasize conceptual models that capture important aspects of Earth's climate system and present the mathematical and statistical techniques that can be applied to their analysis.

2013 • xx + 295 pages • Softcover • 978-1-611972-60-3
List $59.00 • SIAM Member $41.30 • OT131

Mathematics of Planet Earth: *Mathematicians Reflect on How to Discover, Organize, and Protect Our Planet*

Hans Kaper and Christiane Rousseau

Our planet faces many challenges. In 2013, an international partnership of more than 140 scientific societies, research institutes, and organizations focused its attention on these challenges. This project was called Mathematics of Planet Earth and featured English- and French-language blogs, accessible to nonmathematicians, as part of its outreach activities. This book is based on more than 100 of the 270 English-language blog posts. Readers will learn about the challenges that confront the Earth today, and how mathematics and mathematicians contribute to a better understanding of some of these challenges.

2015 • xii + 206 pages • Softcover • 978-1-611973-70-9
List $39.00 • SIAM Member $27.30 • OT140

Climate Modeling for Scientists and Engineers

John B. Drake

Climate modeling and simulation teach us about past, present, and future conditions of life on earth and help us understand observations about the changing atmosphere and ocean and terrestrial ecology. Focusing on high-end modeling and simulation of earth's climate, the author presents observations about the general circulations of the earth and the partial differential equations used to model the dynamics of weather and climate and covers numerical methods for geophysical flows in more detail than many other texts. Parallel algorithms and the role of high-performance computing used in the simulation of weather and climate are also discussed.

2014 • viii + 165 pages • Softcover • 978-1-611973-53-2
List $69.00 • SIAM Member $48.30 • MM19

Mathematics of Social Choice: *Voting, Compensation, and Division*

Christoph Börgers

This fun and accessible book takes an entertaining look at the choices made by groups of people with different preferences, needs, and interests. Divided into three parts, the text first examines voting methods for selecting or ranking candidates. A brief second part addresses compensation problems wherein an indivisible item must be assigned to one of several people who are equally entitled to ownership of the item, with monetary compensation paid to the others. The third part discusses the problem of sharing a divisible resource among several people.

2009 • xii + 245 pages • Softcover • 978-0-898716-95-5
List $39.00 • SIAM Member $27.30 • OT119

SIAM Activity Group on
Mathematics of Planet Earth (SIAG/MPE)
www.siam.org/activity/mpe

The purpose of the SIAM Activity Group on Mathematics of Planet Earth is to provide a forum for mathematicians and computational scientists to study Planet Earth, its life-supporting capacity, and the impact of human activities.

ACTIVITIES INCLUDE:
* Special sessions at SIAM Annual Meetings
* Biennial conference

BENEFITS OF SIAG/MPE membership:
* Listing in the SIAG's online-only membership directory
* Additional $10 discount on registration for the SIAM Conference on Mathematics of Planet Earth (excludes student)
* Electronic communications about recent developments in your specialty
* Eligibility for candidacy for SIAG/MPE office
* Participation in the selection of SIAG/MPE officers

ELIGIBILITY:
* Be a current SIAM member

COST:
* $15 per year
* Student members can join two activity groups for free!

2015-16 SIAG/MPE OFFICERS
* Chair: Hans G. Kaper, Georgetown University, USA
* Vice-chair: Mary Lou Zeeman, Bowdoin College, USA
* Secretary: Antonios Zagaris, Wageningen UR, the Netherlands
* Program Director: Hans Engler, Georgetown University, USA

SIAM Conference on Mathematics of Planet Earth

September 30 - October 2, 2016
DoubleTree by Hilton Hotel Philadelphia Center City
Philadelphia, Pennsylvania, USA

TO JOIN:

SIAG/MPE: *my.siam.org/forms/join_siag.htm*
SIAM: *www.siam.org/joinsiam*

MPE16 Program

SIAM Conference on Mathematics of Planet Earth

September 30 - October 2, 2016
DoubleTree by Hilton Hotel Philadelphia Center City
Philadelphia, Pennsylvania, USA

Thursday, September 29

Registration
5:00 PM-8:00 PM

Room:Aria B - 3rd Floor

Welcome Reception
6:00 PM-8:00 PM

Room:Hotel Restaurant - Balcony

Friday, September 30

Registration
7:15 AM-5:00 PM

Room:Aria B - 3rd Floor

Welcoming Remarks
8:45 AM-9:00 AM

Room:Ormandy Ballroom West - Lobby Level

Coffee Break
9:00 AM-9:30 AM

Room:Symphony Ballroom - 3rd Floor

Friday, September 30

MT1

Conceptual Climate Models
9:30 AM-11:30 AM

Room:Ormandy Ballroom West - Lobby Level

Chair: James Walsh, Oberlin College, USA

Chair: Esther Widiasih, University of Hawaií West Oáhu, USA

An introduction to conceptual models of climate will be presented in this minitutorial. A focus will be placed on the interactions of major climate components, including incoming solar radiation, outgoing longwave radiation, positive ice albedo feedback, and atmospheric greenhouse gases. Both 0-dimensional and 1-dimensional energy balance models will be discussed, the latter model additionally coupled to a dynamic ice line. We also present a conceptual model of the Atlantic Meridional Overturning Circulation, a major component of the thermohaline circulation, or "ocean conveyor belt." Important concepts such as tipping points and hysteresis arise naturally in the analysis of such models, an analysis that is informed by a dynamical systems perspective.

Speakers:

James Walsh, Oberlin College, USA

Esther Widiasih, University of Hawaií, West Oáhu, USA

Friday, September 30
MS1
Mathematics of Ice Sheets - Part I of II
9:30 AM-11:30 AM

Room:Aria A - 3rd Floor

For Part 2 see MS10

Understanding the dynamic response of the large Antarctic and Greenland ice sheets to climate forcing is crucial to projections of sea level rise in the 21st century and beyond. Modeling this response presents many mathematical and computational challenges: solution of complex nonlinear equations, non-trivial numerical treatment of ice advance and retreat, development of realistic models for calving and subglacial hydrology, coupling physics with different spatial and temporal scales, solution of large-scale forward and inverse problems, and uncertainty quantification in high-dimensional parameter spaces. This minisymposium will address these computational and modeling aspects required for reliable simulations of ice sheet dynamics.

Organizer: Mauro Perego
Sandia National Laboratories, USA

Organizer: Daniel Martin
Lawrence Berkeley National Laboratory, USA

Organizer: Irina K. Tezaur
Sandia National Laboratories, USA

9:30-9:55 Ice Sheet Initialization Through Large Scale PDE-constrained Optimization

Mauro Perego, Sandia National Laboratories, USA; Alessandro Barone, Emory University, USA; Stephen Price, Los Alamos National Laboratory, USA; Georg Stadler, Courant Institute of Mathematical Sciences, New York University, USA

10:00-10:25 Bayesian Inversion for Ice Sheet Models

Noemi Petra, University of California, Merced, USA; Omar Ghattas and Toby Isaac, University of Texas at Austin, USA; Georg Stadler, Courant Institute of Mathematical Sciences, New York University, USA

10:30-10:55 Inferring Changing Subglacial Hydrologic Conditions from Ice Sheet Surface Speed

Matthew Hoffman, Los Alamos National Laboratory, USA; Mauro Perego, Sandia National Laboratories, USA

11:00-11:25 The Albany/felix First Order Stokes Finite Element Ice Sheet Dynamical Core Built Using Trilinos Software Components: Performance, Next-Generation Capabilities and Validation

Irina K. Tezaur, Andrew Salinger, Mauro Perego, and Raymond Tuminaro, Sandia National Laboratories, USA; Stephen Price, Los Alamos National Laboratory, USA

Friday, September 30
MS2
Multi-Scale Modeling of Natural Disasters - Part I of II
9:30 AM-11:30 AM

Room:Concerto A - 3rd Floor

For Part 2 see MS18

The socioeconomic impact of natural disasters such as tsunamis, volcanic eruptions, earthquakes can be major, especially so for communities that have limited resources to face their damage. As they often happen on a large range of space-time scales, specialized mathematical modeling technologies become necessary for understanding the underlying processes and, hence, the development of mitigation strategies. This minisymposium wants to bring together applied mathematicians to report on the modeling and numerical solution of these events. The minisymposium is organized in the following two sessions: 1) coastal flows, tsunami-triggered flooding, and storm surges, 2) volcanic eruptions, volcanic ash transport, and earthquakes.

Organizer: Stefan Vater
University of Hamburg, Germany

Organizer: Simone Marras
Stanford University, USA

Organizer: Jenny Suckale
Stanford University, USA

9:30-9:55 Challenges in the Simulation of Natural Disasters -- with Application to Tsunami-Inundation Modelling

Stefan Vater and Jörn Behrens, University of Hamburg, Germany

10:00-10:25 Multiple Scales in Storm Surge Modeling

Kyle T. Mandli, Colton Conroy, and Jiao Li, Columbia University, USA

Friday, September 30

MS2

Multi-Scale Modeling of Natural Disasters - Part I of II

9:30 AM-11:30 AM

Room:Concerto A - 3rd Floor

continued

10:30-10:55 A High-order Discontinuous Galerkin Solution of the Shallow Water Equations with Wetting and Drying and Adaptive Artificial Diffusion

Simone Marras and Jenny Suckale, Stanford University, USA; Michal A. Kopera and Francis X. Giraldo, Naval Postgraduate School, USA; Emil Costantinescu, Argonne National Laboratory, USA; Brent Lunghino, Stanford University, USA

11:00-11:25 Connecting Earthquake and Tsunami Warnings: The Role of Observations and Simulations

Diego Melgar, University of California, Berkeley, USA

Friday, September 30

MS3

Data Driven Infectious Disease Models and Applications - Part I of II

9:30 AM-11:30 AM

Room:Concerto B - 3rd Floor

For Part 2 see MS19

Data–driven models of infectious diseases can illustrate mechanisms of transmission routes and strategies for outbreak management. The indirect transmission of pathogens through the environment will be a key feature in some of the talks, including work on cholera. Others talks will discuss diseases involving vectors or parasites, like malaria or leishmaniasis. The effect of changes in human behavior on disease spread will be presented in the cases of HIV and Ebola.

Organizer: Suzanne M. Lenhart
University of Tennessee, USA

Organizer: Abdul-Aziz Yakubu
Howard University, USA

9:30-9:55 Modeling the Role of Education in Preventing An Outbreak of the Ebola Virus Disease

Christina Edholm, University of Nebraska, USA

10:00-10:25 Preemptive Intervention on Networks Informed by Demographic Covariates of Cholera Risk

Michael R. Kelly and Joseph Tien, The Ohio State University, USA

10:30-10:55 Immune Response to Infection by Leishmania: A Mathematical Model

Nourridine Siewe and Abdul-Aziz Yakubu, Howard University, USA; Avner Friedman and Abhay R Satoskar, The Ohio State University, USA

11:00-11:25 A Canine Distemper Outbreak Modeled in An Animal Shelter

Benjamin Levy, University of Tennessee, USA; Ashley Dantzler, University of Tennessee, Chattanooga, USA; Margaux Hujoel, Harvey Mudd College, USA; Virginia Parkman, University of Tennessee, USA; Ayana Wild, Tennessee State University, USA; Suzanne M. Lenhart, University of Tennessee, USA; Rebecca Wilkes, University of Georgia, USA

Friday, September 30

MS4

Methodologies for Probabilistic Hazard Assessment - Part I of II

9:30 AM-11:30 AM

Room:Maestro A - 4th Floor

For Part 2 see MS22

Probabilistic hazard assessment is a topic of increasing interest to scientists and policy makers who study natural hazards, such as earthquakes, tsunamis, tropical storms, landslides, and volcanic hazards. A number of challenges transcend the specific hazard, including the need to define a probability space of potential future events in spite of inadequate data, efficient methodologies for sampling this space when individual model runs can be very expensive, and the need for better approaches to communicating probabilistic assessments of hazards (and the associated risks) to the public or emergency managers. This minisymposium will explore several of these issues.

Organizer: Randall LeVeque
University of Washington, USA

Organizer: Clint Dawson
University of Texas at Austin, USA

9:30-9:55 Evaluation of Coastal Protection Systems for Hurricane Storm Surge

Clint Dawson and Jennifer Proft, University of Texas at Austin, USA

10:00-10:25 Process Complexity and Uncertainty in Coastal Hydrodynamics Hazards Modeling

Joannes Westerink and Brian Joyce, University of Notre Dame, USA; Jessica Meixner, National Centers for Environmental Prediction, USA

10:30-10:55 Analysis and Modeling of Tropical Cyclone Climatology

Ning Lin and Renzhi Jing, Princeton University, USA

11:00-11:25 Performing and Communicating Probabilistic Tsunami Hazard Assessment

Donsub Rim, Randall LeVeque, Frank I. Gonzalez, and Loyce Adams, University of Washington, USA

Friday, September 30

MS5

Computation and Dynamics in Climate Models - Part I of II

9:30 AM-11:30 AM

Room:Maestro B - 4th Floor

For Part 2 see MS24

The threat posed by climate change highlights the importance of mathematical models in climate and the geosciences. Dynamical systems theory provides a general framework for analyzing the dynamics of these models. However, the analysis is often extremely challenging and so robust numerical techniques and computer simulations have become indispensable tools for studying their dynamics. In this minisymposium we discuss applications of computational mathematics and numerical analysis in climate and related models.

Organizer: Andrew J. Steyer
University of Kansas, USA

Organizer: Erik Van Vleck
University of Kansas, USA

9:30-9:55 Overview and Bifurcation Phenomena in a Predator-Prey Based Cloud Dynamics Model

Erik Van Vleck, University of Kansas, USA; Graham Feingold, National Oceanic and Atmospheric Administration, USA; Dave Mechem, University of Kansas, USA

10:00-10:25 Data Assimilation for the 3D Planetary Geostrophic Model Using Temperature Measurements

Aseel Farhat, University of Virginia, USA; Evelyn Lunasin, United States Naval Academy, USA; Edriss S. Titi, Texas A&M University, USA and Weizmann Institute of Science, Israel

10:30-10:55 Multi-Model Cross Pollination in Time: Address Model Inadequacy Via Data Assimilation

Hailiang Du, University of Chicago, USA

11:00-11:25 Sequential Implicit Sampling Methods for Bayesian Inverse Problems

Xuemin Tu and Chen Su, University of Kansas, USA

Friday, September 30

Lunch Break

11:30 AM-1:00 PM

Attendees on their own

IP1

Earth System Stability and Mass Extinctions

1:00 PM-1:45 PM

Room:Ormandy Ballroom West - Lobby Level

Chair: Daan Crommelin, Centrum voor Wiskunde en Informatica (CWI), Netherlands

The five great mass extinctions of the geologic past are each associated with significant perturbations of Earth's carbon cycle. But many past environmental events are not associated with mass extinction. What makes them different? Previous analyses have usually focused on aspects of ancient environments associated with specific events. Here we study all events. By transforming geochemical signals to physical variables, we find that mass extinctions are associated with rates of environmental change that exceed a limit imposed by mass conservation in a normal carbon cycle. We identify this limit with marginal stability of the Earth system. We conclude with brief remarks on the relevance of these findings to modern environmental change and a potential sixth extinction.

Daniel Rothman
Massachusetts Institute of Technology, USA

Coffee Break

1:45 PM-2:15 PM

Room:Symphony Ballroom - 3rd Floor

Friday, September 30

MS6

The Mathematics of Plankton

2:15 PM-4:15 PM

Room:Ormandy Ballroom West - Lobby Level

Plankton are single-celled organisms in the ocean that drift, swim and float in the oceans and waterways all around the world. Many species can fix CO_2 using photosynthesis, and it is estimated that as much as 30-50% of CO_2 produced by burning fossil fuels are absorbed by plankton photosynthesis. While plankton are simple organisms, quantitative modeling, simulation and analysis of their complex behaviors and ecosystems remains elusive. Responsible stewardship of the oceans will require a detailed understanding of these complex marine systems. This problem lies at the interface of mathematics and biology. This minisymposium brings together like-minded members of both communities to share ideas and techniques for understanding plankton ecologies.

Organizer: Louis F. Rossi
University of Delaware, USA

2:15-2:40 Biophysical Interactions of Plankton with Environments: From Individual Locomotion to Population Dynamics

Jian Sheng, Texas Tech University, USA

2:45-3:10 Simulation and Analysis of the Predator-Prey Dynamics of Dinoflagellates

Michael J. Mazzoleni, Duke University, USA; Tim Antonelli, Worcester State University, USA; Kathryn Coyne and Louis Rossi, University of Delaware, USA

3:15-3:40 Survival Games: Planktonic Diversity Examined Through Non-Cooperative Game Theory

Susanne Menden-Deuer, University of Rhode Island, USA

3:45-4:10 Effect of Light on the Growth of Non-nitrogen-fixing and Nitrogen-fixing Phytoplankton in an Aquatic System

Yuan Yuan, Memorial University, Newfoundland, Canada

Friday, September 30

MS7

Mathematical Avances in Hydrology: Non-stationarity and Data Assimilation - Part I of II

2:15 PM-4:15 PM

Room:Concerto A - 3rd Floor

For Part 2 see MS12

Many spatiotemporal analysis techniques used in hydrology heavily rely on the assumption of stationarity of the underlying physical processes. While evidence exists to support this assumption in certain settings, scientists begin to question its validity in other areas such as drought and flood modeling. Often new mathematical and statistical measures are needed in order to come up with a justifiable answer and develop new methods suitable for non-stationary problems. Similar need is felt in the data assimilation field. This minisymposium will bring together scientists and mathematicians to stimulate discussion on these issues and foster closer collaboration between the two communities.

Organizer: Harbir Antil
George Mason University, USA

Organizer: Maria Emelianenko
George Mason University, USA

Organizer: Paul Houser
George Mason University, USA

Organizer: Viviana Maggioni
George Mason University, USA

Organizer: Tim Sauer
George Mason University, USA - Physica D, Elsevier

2:15-2:40 Land Surface Data Assimilation
Paul Houser, George Mason University, USA

2:45-3:10 Lagrange Multiplier Methods and the Problem of Estimating the Ocean Circulation from Sparse Observations and Models
Patrick Heimbach, University of Texas at Austin, USA

3:15-3:40 Improved Passive Microwave Retrievals of Precipitation from Space Using Sparse Approximation
Ardeshir Ebtehaj, University of Minnesota, USA

3:45-4:10 Reduced Basis Method in PDEs and Optimization
Harbir Antil, George Mason University, USA

Friday, September 30

MS8

Data Assimilation in Earth Systems

2:15 PM-4:15 PM

Room:Concerto B - 3rd Floor

Data assimilation is the assortment of methods that combine real-world data and model output in order to obtain the best estimate of the state of a system. The goal of this minisymposium is to discuss the specific challenges that arise when applying data assimilation in weather prediction, oceanography, and the carbon cycle. Data assimilation problems in these systems may be radically different in practice, and depend on the type of data available, where that data is collected, and on the properties of the numerical model, including the range of spatial and temporal scales that must be resolved.

Organizer: John Maclean
University of North Carolina at Chapel Hill, USA

2:15-2:40 An Introduction to Data Assimilation in Earth Systems
John Maclean, University of North Carolina at Chapel Hill, USA

2:45-3:10 Observing System Simulation Experiments to Assess the Potential Impact of Observing Systems on Global Numerical Weather Prediction
Kayo Ide, University of Maryland, College Park, USA

3:15-3:40 Carbon Cycle Data Assimilation: What Have We Learned, and Where Are We Going?
Abhishek Chatterjee and Brad Weir, NASA, Universities Space Research Association, USA

3:45-4:10 Accounting for Forcing Uncertainty in Oceanographic and Estuarine Data Assimilation
Matthew J. Hoffman, Rochester Institute of Technology, USA

Friday, September 30

MS9

Theoretical and Computational Geophysical Flows: Many Challenges are Still Left - Part I of II

2:15 PM-4:15 PM

Room:Maestro A - 4th Floor

For Part 2 see MS14

Since geophysical flows in atmosphere and ocean have high impact on economic and environmental outcomes, it is essential to make their fair predictions. This challenge has been tackled from both theoretical and numerical angles: statistical equilibrium theories have been developed, parameterisations to mimic critical transitions have been introduced. However, it is still unclear whether these statistical theories hold in the real life and how to overcome drawbacks of existing parameterisations. The purpose of this symposium is to highlight recent developments in theoretical and computational geophysical fluid dynamics such as statistical equilibrium theories, critical transitions and data assimilation.

Organizer: Svetlana Dubinkina
CWI, Amsterdam, Netherlands

2:15-2:40 Applications of Equilibrium Statistical Mechanics to Geostrophic Turbulence
Antoine Venaille, Laboratoire de Physique Statistique, Ecole Normale Superieure, France

2:45-3:10 A Nonequilibrium Statistical Theory of Subgrid-Scale Parameterization for Quasi-Geostrophic Turbulence
Bruce E. Turkington, University of Massachusetts, USA

3:15-3:40 Relevance of Conserved Quantities in Data Assimilation
Svetlana Dubinkina, CWI, Amsterdam, Netherlands

3:45-4:10 Reduced Order Gaussian Smoothing for Nonlinear Data Assimilation
Sarah King, Naval Research Laboratory, USA; Kazufumi Ito, North Carolina State University, USA

Friday, September 30

MS10

Mathematics of Ice Sheets - Part II of II

2:15 PM-4:15 PM

Room:Maestro B - 4th Floor

For Part 1 see MS1

Understanding the dynamic response of the large Antarctic and Greenland ice sheets to climate forcing is crucial to projections of sea level rise in the 21st century and beyond. Modeling this response presents many mathematical and computational challenges: solution of complex nonlinear equations, non-trivial numerical treatment of ice advance and retreat, development of realistic models for calving and subglacial hydrology, coupling physics with different spatial and temporal scales, solution of large-scale forward and inverse problems, and uncertainty quantification in high-dimensional parameter spaces. This minisymposium will address these computational and modeling aspects required for reliable simulations of ice sheet dynamics.

Organizer: Mauro Perego
Sandia National Laboratories, USA

Organizer: Daniel Martin
Lawrence Berkeley National Laboratory, USA

Organizer: Irina K. Tezaur
Sandia National Laboratories, USA

2:15-2:40 Modeling Calving Front Dynamics Using a Level-set Method: Application to Jakobshavn Isbræ, West Greenland
Johannes H. Bondzio, University of California, Irvine, USA; Helene Seroussi, Jet Propulsion Laboratory, California Institute of Technology, USA; Mathieu Morlighem, University of California, Irvine, USA; Thomas Kleiner and Martin Rückamp, Alfred-Wegener-Institute for Polar and Marine Research, Germany; Eric Larour, Jet Propulsion Laboratory, California Institute of Technology, USA; Angelika Humbert, University of Bremen, Germany

2:45-3:10 Coupling Between Ice Sheets Movement and Subglacial Hydrology
Luca Bertagna and Max Gunzburger, Florida State University, USA; Mauro Perego, Sandia National Laboratories, USA

3:15-3:40 Modeling Hydraulic Fracture of Glaciers Using Continuum Damage Mechanics
Mostafa E. Mobasher and *Haim Waisman*, Columbia University, USA; Ravindra Duddu, Vanderbilt University, USA; Jeremy Bassis, University of Michigan, USA

3:45-4:10 Topographic Controls of Subglacial Water Flow Under Ice Streams
Olga Sergienko, Princeton University, USA

Friday, September 30

CP1

Ecological and Economic Modeling

2:15 PM-3:55 PM

Room:Aria A - 3rd Floor

Chair: Abdul-Aziz Yakubu, Howard University, USA

2:15-2:30 Risk Analysis and Spatio-Temporal Modeling of Wildfires in Belgium

Jan M. Baetens, Arthur Depicker, and Bernard De Baets, Ghent University, Belgium

2:35-2:50 Optimal Regulations for Effectiveness of Carbon Market

Arash Fahim, Florida State University, USA; Nizar Touzi, Ecole Polytechnique, France

2:55-3:10 Mentoring Undergraduates In Measuring Vegetation Dynamics in the Horn of Africa

Sarah Iams, Harvard University, USA; Yuxin Chen and Karna V. Gowda, Northwestern University, USA; Mary Silber, University of Chicago, USA; Chad Higdon-Topaz, Macalester College, USA; Andrew J. Bernoff, Harvey Mudd College, USA

3:15-3:30 Large Ecosystems in Transition: Interactions and Feedbacks

Ivan Sudakov, University of Dayton, USA

3:35-3:50 The Role of Spatial Structure and Landscape Heterogeneity in Driving Metapopulation Dynamics

Easton R. White, University of California, Davis, USA; John D. Nagy, Scottsdale Community College and Arizona State University, USA

Intermission

4:15 PM-4:30 PM

MPE16

Friday, September 30

IP2

The Problem of Translating Climate Change into Impacts

4:30 PM-5:15 PM

Room:Ormandy Ballroom West - Lobby Level

Chair: Catherine Roberts, College of the Holy Cross, USA

The talk reviews the analytical, conceptual, and empirical problems of translating projections of future climate change into assessments of impacts that are meaningful for policy-makers, whether their focus is mitigation or adaptation policy. The most profound challenge is the mismatch between the spatial and temporal scales used for modeling climate change and the scales at which impacts occur and economic data are collected. Overcoming this challenge will require innovations in computational and modeling practices. Another profound challenge is how to incorporate uncertainty – about models, about the occurrence of physical events and about human behavior – in a meaningful way into impact assessments: how should one think of uncertainty, and to what extent should one attempt to account for it? It turns out that, for next four or five decades, the vast majority of the economic and social impacts of climate change are likely to be associated with local extreme events; the third issue addressed is how to deal with these in an assessment of climate impacts.

Michael Hanemann

Arizona State University and University of California, Berkeley, USA

Intermission

5:15 PM-5:30 PM

Friday, September 30

PD1 Forward Looking Panel on Emerging Topics

5:30 PM-6:30 PM

Room:Ormandy Ballroom West - Lobby Level

Chair: Hans G. Kaper, Argonne National Laboratory and Georgetown University, USA

The SIAM Activity Group on Mathematics of Planet Earth (SIAG/MPE) focuses on mathematical and computational issues related to planet Earth, with particular emphasis on the effects of human activities on Earth's physical environment and its life-supporting capabilities. The panel on "Shaping the Future of MPE" will identify and discuss relevant and important directions for future activities of the SIAG and its members. Six internationally known panelists will give their perspective on issues of climate, sustainability, ecology, socio-economic systems, and the environment, and will discuss how these issues can be related to mathematical activities. Anyone interested in the state of our planet and the future of MPE is invited to join the discussion.

Panelists to be announced.

Dinner Break

6:30 PM-8:00 PM

Attendees on their own

Friday, September 30

PP1

Poster Session (being held jointly with ED16)

8:00 PM-10:00 PM

Room:Symphony Ballroom - 3rd Floor

Lagrangian Transport in a Dynamic Stratified Quadrupole Ocean Model

Henry Chang, Helga S. Huntley, and A. D. Kirwan, University of Delaware, USA

Validation of Oceanic Transport Markov Models

Kirsten N. Failing and Hans-Werner Van Wyk, Auburn University, USA

Undergraduate Sustainability Experiences in Mathematics (Use Math)

Benjamin J. Galluzzo, Shippensburg University, USA; Corrine Taylor, Wellesley College, USA

A Bond-Topology Approach to Ice As Solar Panel Material

Daniel S. Helman, Prescott College, USA; Matthew Retallack, Carleton University, Canada

Simulation of Coastal Inundation Using Adaptive Mesh Refinement and Novel Bottom Friction Parametrization

Marc Kjerland and Nobuhito Mori, Kyoto University, Japan

A Numerical Study of Biofilm Growth in a Microgravity Environment

Nectarios C. Papanicolaou, University of Nicosia, Cyprus; *Andreas Aristotelous*, West Chester University, USA

Heuristic and Eulerian Interface Capturing Approaches for Shallow Water Type Flows

Abani K. Patra, State University of New York at Buffalo, USA

A Minimalistic Model for Phytoplankton Blooms

Sofia Piltz and Poul G. Hjorth, Technical University of Denmark, Denmark; Oystein Varpe, University Centre in Svalbard, Norway

An Optimal Multirate Method for Climate Applications

Jean Sexton and Daniel R. Reynolds, Southern Methodist University, USA

Cross-Scale Feedback Interaction in a Reaction-Diffusion Model of Tropical Vegetation

Bert Wuyts, Alan Champneys, and Joanna House, University of Bristol, United Kingdom

Saturday, October 1

Registration

7:45 AM-5:00 PM

Room:Aria B - 3rd Floor

Coffee Break

9:00 AM-9:30 AM

Room:Symphony Ballroom - 3rd Floor

MT2

Mathematical Issues in Food Systems and Food Security

9:30 AM-11:30 AM

Room:Ormandy Ballroom West - Lobby Level

Chair: Mary Lou Zeeman, Bowdoin College, USA

Chair: Hans G. Kaper, Argonne National Laboratory and Georgetown University, USA

Modern society depends on interconnected food systems that are global in reach and designed to harness a multiplicity of complex supply chains. These systems have delivered significant benefits, but they also face major threats to their sustainability. In this minitutorial we will discuss some mathematical modeling issues in connection with food systems and food security.

Speakers:

Hans G. Kaper, Argonne National Laboratory and Georgetown University, USA

Mary Lou Zeeman, Bowdoin College, USA

MPE16

Saturday, October 1

MS11

Recent Theoretical and Computational Advances in Prediction of Rare and Extreme Events - Part I of II

9:30 AM-11:30 AM

Room:Aria A - 3rd Floor

For Part 2 see MS17

The goal of this session is to showcase recent progress in prediction and quantification of rare events, and new advances in data assimilation techniques. This two-part session aims to bring together researchers who have made various contributions on the development of theoretical and computational strategies for accurate modeling and prediction of nonlinear complex systems.

Organizer: Evelyn Lunasin
United States Naval Academy, USA

Organizer: Reza Malek-Madani
U. S. Naval Academy, USA

9:30-9:55 Variational Homogenization Estimates for the Rheological Properties of Ice and other Geo-materials Materials with Extreme Heterogeneity Contrast
Pedro Ponte Castañeda, and Dawei Song, University of Pennsylvania, USA

10:00-10:25 A Stochastic Model for Tropical Rainfall
Scott Hottovy, University of Arizona, USA; Samuel Stechmann, University of Wisconsin, Madison, USA

10:30-10:55 Space-time Information Metrics for Improved Averaging of Multi Scale Non-gaussian Systems with Rare Intermittent Instabilities
Michal Branicki, University of Edinburgh, United Kingdom

11:00-11:25 Rare Event Extinction and Control in Heterogeneous Networks
Ira B. Schwartz, Naval Research Laboratory, USA

Saturday, October 1

MS12

Mathematical Advances in Hydrology: Non-stationarity and Data Assimilation - Part II of II

9:30 AM-11:30 AM

Room:Concerto A - 3rd Floor

For Part 1 see MS7

Many spatiotemporal analysis techniques used in hydrology heavily rely on the assumption of stationarity of the underlying physical processes. While evidence exists to support this assumption in certain settings, scientists begin to question its validity in other areas such as drought and flood modeling. Often new mathematical and statistical measures are needed in order to come up with a justifiable answer and develop new methods suitable for non-stationary problems. Similar need is felt in the data assimilation field. This minisymposium will bring together scientists and mathematicians to stimulate discussion on these issues and foster closer collaboration between the two communities.

Organizer: Harbir Antil
George Mason University, USA

Organizer: Maria Emelianenko
George Mason University, USA

Organizer: Paul Houser
George Mason University, USA

Organizer: Viviana Maggioni
George Mason University, USA

Organizer: Timothy Sauer
George Mason University, USA

9:30-9:55 Advances in Precipitation Error Modeling and Analysis
Viviana Maggioni, George Mason University, USA

10:00-10:25 Changes in the Frequency, Duration, Magnitude and Volume of Flood Events Across the United States Over the Past 70 Years
Stacey Archfield and Robert Hirsch, U.S. Geological Survey, USA

10:30-10:55 Dynamical Data-Driven Assessment of Long-term Flood Hazards in a Changing Environment
Daniel B. Wright, University of Wisconsin, Madison, USA

11:00-11:25 Using SVD and CVT to Study Precipitation Patterns in U.S.
Maria Emelianenko, George Mason University, USA; Zichao Di, Argonne National Laboratory, USA; Paul Houser and Marilyn Vazquez, George Mason University, USA

Saturday, October 1
MS13
Mathematics and Conceptual Climate Modeling

9:30 AM-11:30 AM

Room:Concerto B - 3rd Floor

Conceptual climate models, while lying on the low-order end of the modeling spectrum, nonetheless play an important role in the study of climate. Existing mathematical tools have been increasingly and successfully brought to bear in the analysis of conceptual climate models. In addition, the study of such models has generated new and interesting problems of a mathematical nature. In this minisymposium we highlight recent advances in the development and analysis of conceptual climate models while recognizing that mathematics both enriches and is enriched by the study of such models.

Organizer: James Walsh
Oberlin College, USA

Organizer: Esther Widiasih
University of Hawaii, West Oahu, USA

9:30-9:55 Conceptual Models: Understanding Past Climate Through Mathematics
Esther Widiasih, University of Hawaii, West Oahu, USA

10:00-10:25 Peatlands, Agriculture, and the Carbon Budget: A Conceptual Model for 15kyr Bp to the Present
Alice Nadeau, Richard McGehee, and Clarence Lehman, University of Minnesota, USA; Elise Reed, University of Colorado, Denver, USA

10:30-10:55 Palaeoclimate Dynamics Modelled with Delay Equations
Courtney Quinn, University of Exeter, United Kingdom

11:00-11:25 Improved Validation of Conceptual Climate Models Using Data Analysis Techniques
Charles D. Camp, California Polytechnic State University, USA

Saturday, October 1
MS14
Theoretical and Computational Geophysical Flows: Many Challenges are Still Left - Part II of II

9:30 AM-11:30 AM

Room:Maestro A - 4th Floor

For Part 1 see MS9

Since geophysical flows in atmosphere and ocean have high impact on economic and environmental outcomes, it is essential to make their fair predictions. This challenge has been tackled from both theoretical and numerical angles: statistical equilibrium theories have been developed, parameterisations to mimic critical transitions have been introduced. However, it is still unclear whether these statistical theories hold in the real life and how to overcome drawbacks of existing parameterisations. The purpose of this symposium is to highlight recent developments in theoretical and computational geophysical fluid dynamics such as statistical equilibrium theories, critical transitions and data assimilation.

Organizer: Svetlana Dubinkina
CWI, Amsterdam, Netherlands

9:30-9:55 Noise-Induced Transitions Between Meta-Stable Atmospheric Jet Configurations
Tobias Grafke and Eric Vanden-Eijnden, Courant Institute of Mathematical Sciences, New York University, USA; Freddy Bouchet, ENS Lyon, France

10:00-10:25 The Late-Time Behavior of a Bounded, Inviscid Two-Dimensional Flow
David Dritschel, University of St. Andrews, United Kingdom

10:30-10:55 Assimilation of Images for Geophysical Fluids
Francois-Xavier Le Dimet, Universite Joseph Fourier and Inria, France; Li Long and Jianwei Ma, Harbin Institute of Technology, China

11:00-11:25 Evolution of Clusters at the Ocean Surface in Models and Observations
Helga S. Huntley, University of Delaware, USA; Gregg Jacobs, US Naval Research Laboratory, USA; A.D. Kirwan and Henry Chang, University of Delaware, USA

Saturday, October 1
MS15
Numerical Methods for Geosciences Applications- Part I of III

9:30 AM-11:30 AM

Room:Maestro B - 4th Floor

For Part 2 see MS20

Large-scale geoscience applications require advanced spatial discretization schemes, temporal integration methods, and algebraic solvers, all deployed on high performance parallel systems. This minisymposium brings together researchers from the mathematical and geoscience communities to present state of the art methods in each of these areas applied within the context of subsurface flow and climate applications. It also focuses on real-world challenges and opportunities encountered while implementing these schemes on current and future computers that contain accelerators, long vector units, and complex memory hierarchies. This minisymposium is sponsored by the SIAM Activity Group on Geosciences.

Organizer: Carol S. Woodward
Lawrence Livermore National Laboratory, USA

Organizer: David J. Gardner
Lawrence Livermore National Laboratory, USA

Organizer: Katherine J. Evans
Oak Ridge National Laboratory, USA

Organizer: Richard Archibald
Oak Ridge National Laboratory, USA

Organizer: Matthew R. Norman
Oak Ridge National Laboratory, USA

9:30-9:55 Exploring the Computational Performance of Implicit Methods for a Large Scale Climate Application
Katherine J. Evans, Richard Archibald, Patrick H. Worley, and Matthew R. Norman, Oak Ridge National Laboratory, USA; Carol S. Woodward and David J. Gardner, Lawrence Livermore National Laboratory, USA

MPE16

MPE16

Saturday, October 1

MS15

Numerical Methods for Geosciences Applications- Part I of III

9:30 AM-11:30 AM

Room:Maestro B - 4th Floor

continued

10:00-10:25 Increasing the Multiscale/multiphysics Capability of Cam-Se Using Implicit Time Integration and Gpu Accelerators

Rick Archibald and Katherine J. Evans, Oak Ridge National Laboratory, USA; David J. Gardner and Carol S. Woodward, Lawrence Livermore National Laboratory, USA

10:30-10:55 Iterative Solution of Coupled Implicit Subsurface and Overland Flow Simulations

Carol S. Woodward and Daniel Osei-Kuffuor, Lawrence Livermore National Laboratory, USA; Reed M. Maxwell, Colorado School of Mines, USA; Steven Smith, Lawrence Livermore National Laboratory, USA

11:00-11:25 Algebraic Multigrid Solvers for Coupled Linear Systems from Subsurface Flow Models

Daniel Osei-Kuffuor, Lu Wang, and Robert D. Falgout, Lawrence Livermore National Laboratory, USA; Ilya D. Mishev, ExxonMobil Upstream Research Company, USA; Quan Bui, University of Maryland, USA

Lunch Break

11:30 AM-12:55 PM

Attendees on their own

Remarks

12:55 PM-1:00 PM

Room:Ormandy Ballroom West - Lobby Level

Saturday, October 1

IP3

Public Lecture - Assessing Risks to Global Food Systems: Mathematicians, Food System Experts and Insurance

1:00 PM-1:45 PM

Room:Ormandy Ballroom West - Lobby Level

Chair: Hans G. Kaper, Argonne National Laboratory and Georgetown University, USA

Current estimates that the world's food production will have to double by 2050 to feed the growing world population depend on a number of assumptions about technology, infrastructure, dietary demand, conflict and population that may not hold. At the same time, the global food system is impacted by, and impacts, climate change, political instability, and environmental degradation, to name only a few key dynamics. Various powerful stakeholders are interested in developing improved methods to reflect risk and uncertainty that originate in, or amplify through, our global food systems. The speaker will report on work, commissioned by Lloyd's of London, to characterize potential business risks that reside in the global food system, and the wider implications and opportunities defined by current data and analytical gaps. Food system experts, decision-makers, mathematicians and statisticians have collaborated to generate results and recommendations that are relevant and understandable for all. Intensifying demand for probabilistic reflections of these risks and threats for humanitarian concerns and capital define important opportunities for new collaborations.

Molly Jahn
University of Wisconsin, Madison, USA

Coffee Break

1:45 PM-2:15 PM

Room:Symphony Ballroom - 3rd Floor

Saturday, October 1

MS16

Doctoral Training in Mathematics of Planet Earth (MPE CDT)

2:15 PM-4:15 PM

Room:Ormandy Ballroom West - Lobby Level

The range and diversity of the opportunities for applications of Mathematics of Planet Earth is illustrated by the plethora of research advances showcased at MPE16. This particular minisymposium highlights some of the research activities in the EPSRC Centre for Doctoral Training in Mathematics of Planet Earth (MPE CDT), which is run jointly at Imperial College London and the University of Reading. The MPE CDT will train about seventy (!) new PhDs in Mathematics of Planet Earth during the next five years. More information about MPE CDT is available at http://mpecdt.org/.

Organizer: Darryl D. Holm
Imperial College of London, United Kingdom

2:15-2:40 An Introduction to Multilevel Monte Carlo Methods for Uncertainty Quantification in Earth Science

Tobias Schwedes, Imperial College, United Kingdom

2:45-3:10 Forward-Backward Stochastic Differential Equations: Applications to Carbon Emissions Markets

Hinesh Chotai, Imperial College, United Kingdom

3:15-3:40 Stochastic and Statistical Modelling of Extreme Meteorological Events: Tropical Cyclones

Thomas P. Leahy, Imperial College, United Kingdom

3:45-4:10 Mimetic Discontinuous Galerkin Methods for Simulation of Nonlinear Wave Interactions

James Jackman, University of Reading, United Kingdom

Saturday, October 1

MS17

Recent Theoretical and Computational Advances in Prediction of Rare and Extreme Events - Part II of II

2:15 PM-4:15 PM

Room:Aria A - 3rd Floor

For Part 1 see MS11

The goal of this session is to showcase recent progress in prediction and quantification of rare events, and new advances in data assimilation techniques. This two-part session aims to bring together researchers who have made various contributions on the development of theoretical and computational strategies for accurate modeling and prediction of nonlinear complex systems.

Organizer: Evelyn Lunasin
United States Naval Academy, USA

Organizer: Reza Malek-Madani
U. S. Naval Academy, USA

2:15-2:40 Jet Stream Variabilities and Weather Extremes: A Linear Response Function Perspective
Pedram Hassanzadeh, Harvard University and Rice University, USA; Zhiming Kuang and Ding Ma, Harvard University, USA

2:45-3:10 Extraction and Prediction Of Coherent Patterns In Incompressible Flows Through Space-Time Koopman Analysis
Dimitrios Giannakis, Courant Institute of Mathematical Sciences, New York University, USA

3:15-3:40 Trajectory Stratification of Markov Processes for Rare Event Simulation
Jonathan Weare, University of Chicago, USA

3:45-4:10 Capturing Rare Events with the Heterogeneous Multiscale Method
David Kelly and Eric Vanden-Eijnden, Courant Institute of Mathematical Sciences, New York University, USA

Saturday, October 1

MS18

Multi-Scale Modeling of Natural Disasters - Part II of II

2:15 PM-4:15 PM

Room:Concerto A - 3rd Floor

For Part 1 see MS2

The socioeconomic impact of natural disasters such as tsunamis, volcanic eruptions, earthquakes can be major, especially so for communities that have limited resources to face their damage. As they often happen on a large range of space-time scales, specialized mathematical modeling technologies become necessary for understanding the underlying processes and, hence, the development of mitigation strategies. This minisymposium wants to bring together applied mathematicians to report on the modeling and numerical solution of these events. The minisymposium is organized in the following two sessions: 1) coastal flows, tsunami-triggered flooding, and storm surges, 2) volcanic eruptions, volcanic ash transport, and earthquakes.

Organizer: Stefan Vater
University of Hamburg, Germany

Organizer: Simone Marras
Stanford University, USA

Organizer: Jenny Suckale
Stanford University, USA

2:15-2:40 Shallow Flow Models for Natural Hazards Due to Gravity-Driven Mass Movements - Potential and Limitations
Julia Kowalski, RWTH-Aachen, Germany

2:45-3:10 Large-scale Simulation of the 2004 M 9.1 Sumatra Earthquake with SeisSol
Elizabeth Madden, Thomas Ulrich, and Alice A. Gabriel, Ludwig-Maximilians-Universität München, Germany

3:15-3:40 Fluid Mechanics of Pyroclastic Density Currents
Josef Dufek, Georgia Institute of Technology, USA

3:45-4:10 Assessing Hazard Related to Atmospheric Dispersion of Dense Gas Using High-Resolution Wind Fields: Application to Limnic Eruptions
Arnau Folch, Barcelona Supercomputing Center, Spain; Antonio Costa, Istituto Nazionale di Geofisica e Vulcanologia, Italy; Jordi Barcons, Barcelona Supercomputing Center, Spain

Saturday, October 1

MS19

Data Driven Infectious Disease Models and Applications - Part II of II

2:15 PM-4:15 PM

Room:Concerto B - 3rd Floor

For Part 1 see MS3

Data–driven models of infectious diseases can illustrate mechanisms of transmission routes and strategies for outbreak management. The indirect transmission of pathogens through the environment will be a key feature in some of the talks, including work on cholera. Others talks will discuss diseases involving vectors or parasites, like malaria or leishmaniasis. The effect of changes in human behavior on disease spread will be presented in the cases of HIV and Ebola.

Organizer: Suzanne M. Lenhart
University of Tennessee, USA

Organizer: Abdul-Aziz Yakubu
Howard University, USA

2:15-2:40 Influence of Concurrency, Partner Choice, and Viral Suppression on Racial Disparity in the Prevalence of HIV Infected Women
Katharine Gurski, Howard University, USA; Kathleen A. Hoffman, University of Maryland, Baltimore County, USA

2:45-3:10 Malaria Incidence and Anopheles Mosquito Density in Irrigated and Adjacent Non-Irrigated Villages of Niono in Mali
Moussa Doumbia, Howard University, USA

3:15-3:40 Demographic Allee Effects and Fatal S-I Disease Dynamics
Abdul-Aziz Yakubu, Howard University, USA

3:45-4:10 Qualitative Assessment of the Role of Temperature Variations on Malaria Transmission Dynamics
Folashade Agusto, University of Kansas, USA

Saturday, October 1

MS20

Numerical Methods for Geosciences Applications- Part II of III

2:15 PM-4:15 PM

Room:Maestro B - 4th Floor

For Part 1 see MS15
For Part 3 see MS23

Large-scale geoscience applications require advanced spatial discretization schemes, temporal integration methods, and algebraic solvers, all deployed on high performance parallel systems. This minisymposium brings together researchers from the mathematical and geoscience communities to present state of the art methods in each of these areas applied within the context of subsurface flow and climate applications. It also focuses on real-world challenges and opportunities encountered while implementing these schemes on current and future computers that contain accelerators, long vector units, and complex memory hierarchies. This minisymposium is sponsored by the SIAM Activity Group on Geosciences.

Organizer: Carol S. Woodward
Lawrence Livermore National Laboratory, USA

Organizer: David J. Gardner
Lawrence Livermore National Laboratory, USA

Organizer: Katherine J. Evans
Oak Ridge National Laboratory, USA

Organizer: Richard Archibald
Oak Ridge National Laboratory, USA

Organizer: Matthew R. Norman
Oak Ridge National Laboratory, USA

2:15-2:40 Hybrid Upwinding for the Implicit Simulation of Three-Phase Flow in Porous Media
Francois P. Hamon and Hamdi Tchelepi, Stanford University, USA

2:45-3:10 Advances in Nonlinear Solvers For Coupled Systems in Watershed Modeling
David Moulton, Daniil Svyatskiy, Konstantin Lipnikov, Ethan T. Coon, and Eugene Kikinzon, Los Alamos National Laboratory, USA

3:15-3:40 Addressing Adaptive Mesh Refinement Challenges in Non-Hydrostatic Atmosphere Simulations
Hans Johansen and Elijah Goodfriend, Lawrence Berkeley National Laboratory, USA; Paul Ullrich, University of California, Davis, USA

3:45-4:10 Bisicles -- Adaptive Mesh Refinement for Ice Sheets
Daniel Martin, Lawrence Berkeley National Laboratory, USA; Stepen Cornford, University of Bristol, United Kingdom; Esmond G. Ng, Lawrence Berkeley National Laboratory, USA

Saturday, October 1

CP2

Physical Modeling

2:15 PM-3:55 PM

Room:Maestro A - 4th Floor

Chair: Erik Van Vleck, University of Kansas, USA

2:15-2:30 Robust Spatial Optimization for the Invasive Species/Plants Management

Nahid Jafari, University of Florida, USA

2:35-2:50 On the Boundary Dependent Vortex Invariants in Magneto-Hydrodynamics

Anatolij Prykarpatski, AGH University of Science and Technology, Poland; Denis Blackmore, New Jersey Institute of Technology, USA; Natalia Prykarpatska, AGH University of Science and Technology, Poland

2:55-3:10 Circulations Within a Curved Stratified Channel of the Changjiang River Estuary, China: A Vorticity Approach

John Z. Shi, Shanghai Jiaotong University, China

3:15-3:30 G-Type Wave in a Viscoelastic Layer Over a Fibre Reinforced Half Space

Smita Smita, Indian School of Mines, India

3:35-3:50 Design of Random Rough Interfaces for Optimal Light Absorption in Thin Film Solar Cells

Hans-Werner Van Wyk, Auburn University, USA

Intermission

4:15 PM-4:30 PM

Saturday, October 1

IP4

Feedbacks Between Soil Engineers and Vegetation can Increase Ecosystem Robustness

4:30 PM-5:15 PM

Room:Ormandy Ballroom West - Lobby Level

Chair: Carol S. Woodward, Lawrence Livermore National Laboratory, USA

Regular self-organized spatial patterning in plants, mussels, corals, and other sessile organisms is globally widespread and thought to play a key role in mediating important ecosystem functions such as productivity, resilience and robustness in the face of perturbations. Therefore, understanding the mechanisms underlying such patterns is paramount. Self-organized spatial vegetation patterning has been described using models of scale-dependent feedback between plants and water on homogeneous substrates. As rainfall decreases, these models yield a characteristic sequence of patterns with increasingly sparse vegetation, followed by sudden collapse to desert. Thus, the succession of patterns may act as early warning indicators for such catastrophic shifts. In many arid ecosystems, however, termiteengineering imparts substrate heterogeneity by altering soil properties and plant growth. I will use models and data to show (i) how termite nests self-organize in regular, overdispersed patterns and (ii) how termite self-organization and induced soil heterogeneity interact with scale-dependent plant-water feedbacks to produce vegetation patterns at different spatial grains and enhance the robustness (resilience) of the ecosystem in the face of climate change.

Corina Tarnita
Princeton University, USA

Intermission
5:15 PM-5:30 PM

Saturday, October 1

SIAG/MPE Business Meeting
(open to SIAG/MPE members)

5:30 PM-6:30 PM

Room:Ormandy Ballroom West - Lobby Level

Complimentary beer and wine will be served.

Sunday, October 2

Registration
7:45 AM-1:30 PM

Room:Aria B - 3rd Floor

Closing Remarks
8:10 AM-8:15 AM

Room:Ormandy Ballroom West - Lobby Level

IP5
Smarter Planet 2.0
8:15 AM-9:00 AM

Room:Ormandy Ballroom West - Lobby Level

Chair: Darryl D. Holm, Imperial College of London, United Kingdom

The Smarter Planet initiative began as an effort to take advantage of increasingly instrumented and interconnected systems for more efficient and sustainable use of resources. Since then, significant gains have been made towards these goals, but considerable challenges remain. This presentation will explore progress to date in applying Big Data and analytic tools to improved operation of infrastructure systems and resource allocation with a focus on water and energy. Examples of improved predictive models, combining physics models with machine learning and optimization approaches to make better decisions and improve sustainability will be covered

Sean McKenna
IBM Research, Ireland

Coffee Break
9:00 AM-9:30 AM

Room:Symphony Ballroom - 3rd Floor

Sunday, October 2

MS21
Rare Event Simulation and Extreme Events in Climate
9:30 AM-11:30 AM

Room:Ormandy Ballroom West - Lobby Level

Extreme climate events such as hurricanes and floodings, or transitions to other climate regimes, can have major impact, despite their low probability of occurring. Because they are rare events, it is highly challenging to simulate them with models. Straightforward Monte Carlo simulation is known to be very inefficient for rare events. This minisymposium is focused on novel methods for studying and simulating climate extremes, such as multilevel splitting and other rare event simulation techniques.

Organizer: Daan Crommelin
Centrum voor Wiskunde en Informatica (CWI), Netherlands

Organizer: Freddy Bouchet
ENS Lyon, France

9:30-9:55 Algorithms Dedicated to Rare Event Simulations in Turbulent Flows and Climate Dynamics
Freddy Bouchet and Francesco Ragone, ENS Lyon, France; Eric Simonnet, Institut Non Linéaire de Nice and Centre national de la recherche scientifique, France; Jeroen Wouters, University of Sydney, Australia

10:00-10:25 Predictability of Extremes in Stochastic-Dynamic Climate Models
Christian Franzke, University of Hamburg, Germany

10:30-10:55 Sampling Rare Events in Chaotic Climate Models Through Genealogical Particle Analysis
Jeroen Wouters, University of Sydney, Australia; Freddy Bouchet and Francesco Ragone, ENS Lyon, France

11:00-11:25 Multilevel Splitting and Steady State Simulation for Extreme Events
Daan Crommelin, Centrum voor Wiskunde en Informatica (CWI), Netherlands

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Sunday, October 2

MS22
Methodologies for Probabilistic Hazard Assessment - Part II of II
9:30 AM-11:30 AM

Room:Concerto A - 3rd Floor

For Part 1 see MS4

Probabilistic hazard assessment is a topic of increasing interest to scientists and policy makers who study natural hazards, such as earthquakes, tsunamis, tropical storms, landslides, and volcanic hazards. A number of challenges transcend the specific hazard, including the need to define a probability space of potential future events in spite of inadequate data, efficient methodologies for sampling this space when individual model runs can be very expensive, and the need for better approaches to communicating probabilistic assessments of hazards (and the associated risks) to the public or emergency managers. This minisymposium will explore several of these issues.

Organizer: Randall LeVeque
University of Washington, USA

Organizer: Clint Dawson
University of Texas at Austin, USA

9:30-9:55 Probabilistic Assessment for Volcanic Hazards Using Model Ensembles and Large Data
Abani K. Patra and E. Bruce Pitman, State University of New York at Buffalo, USA; Elaine Spiller, Marquette University, USA; Robert L. Wolpert and James Berger, Duke University, USA; Marcus Bursik, State University of New York, Buffalo, USA; Eliza Calder, University of Edinburgh, United Kingdom

10:00-10:25 Robust Forecasts of Volcanic Ash Clouds
Roger Denlinger, USGS Cascade Volcano Observatory, USA

10:30-10:55 Modeling Debris Flows Given Uncertainty, Sensitivity and Mobility Bifurcation
David George, USGS Cascades Volcano Observatory, USA

11:00-11:25 Simulating Storm Surge in a Future Climate Condition Using Adaptive Mesh Refinement
Marc Kjerland and Nobuhito Mori, Kyoto University, Japan

Sunday, October 2

MS23

Numerical Methods for Geosciences Applications- Part III of III

9:30 AM-11:30 AM

Room:Concerto B - 3rd Floor

For Part 2 see MS20

Large-scale geoscience applications require advanced spatial discretization schemes, temporal integration methods, and algebraic solvers, all deployed on high performance parallel systems. This minisymposium brings together researchers from the mathematical and geoscience communities to present state of the art methods in each of these areas applied within the context of subsurface flow and climate applications. It also focuses on real-world challenges and opportunities encountered while implementing these schemes on current and future computers that contain accelerators, long vector units, and complex memory hierarchies. This minisymposium is sponsored by the SIAM Activity Group on Geosciences.

Organizer: Carol S. Woodward
Lawrence Livermore National Laboratory, USA

Organizer: David J. Gardner
Lawrence Livermore National Laboratory, USA

Organizer: Katherine J. Evans
Oak Ridge National Laboratory, USA

Organizer: Richard Archibald
Oak Ridge National Laboratory, USA

Organizer: Matthew R. Norman
Oak Ridge National Laboratory, USA

9:30-9:55 Tempest: Tools for Addressing the Needs of Next-Generation Climate Models
Paul Ullrich and Jorge E. Guerra, University of California, Davis, USA

10:00-10:25 Implicit-Explicit Time Integration Methods for Nonhydrostatic Atmospheric Models
David J. Gardner, Lawrence Livermore National Laboratory, USA; Jorge E. Guerra, University of California, Davis, USA; Daniel R. Reynolds, Southern Methodist University, USA; Paul Ullrich, University of California, Davis, USA; Carol S. Woodward, Lawrence Livermore National Laboratory, USA

10:30-10:55 Efficient, Large Time Step, Multi-Moment Methods for Time-Explicit Climate Simulations
Matthew R. Norman, Oak Ridge National Laboratory, USA

11:00-11:25 Improving Model Throughput by Parallel-Splitting Atmospheric Physics and Dynamics
Peter Caldwell, Lawrence Livermore National Laboratory, USA

Sunday, October 2

MS24

Computation and Dynamics in Climate Models - Part II of II

9:30 AM-11:30 AM

Room:Maestro B - 4th Floor

For Part 1 see MS5

The threat posed by climate change highlights the importance of mathematical models in climate and the geosciences. Dynamical systems theory provides a general framework for analyzing the dynamics of these models. However, the analysis is often extremely challenging and so robust numerical techniques and computer simulations have become indispensable tools for studying their dynamics. In this minisymposium we discuss applications of computational mathematics and numerical analysis in climate and related models.

Organizer: Andrew J. Steyer
University of Kansas, USA

Organizer: Erik Van Vleck
University of Kansas, USA

9:30-9:55 Parameter Identification and Bias Correction in Data Assimilation
Eric J. Kostelich, Arizona State University, USA

10:00-10:25 A Well-balanced Operator Splitting Based Stochastic Galerkin Method for the Saint-Venant System with Uncertainty
Alina Chertock, North Carolina State University, USA

10:30-10:55 A Discrete-time Approach to Data-Driven Stochastic Model Reduction
Fei Lu and Alexandre Chorin, University of California, Berkeley, USA; Kevin Lin, University of Arizona, USA

11:00-11:25 A Method for Computing Rate-Induced Tipping Points Based on Lyapunov Exponent Theory
Andrew J. Steyer, University of Kansas, USA

Sunday, October 2

CP3

Computational Approaches

9:30 AM-11:10 AM

Room:Aria A - 3rd Floor

Chair: Mauro Perego, Sandia National Laboratories, USA

9:30-9:45 Unbiased Factor for the Entropy Estimator in Information Theory: A New Suggested Estimation and Application to Rainfall Network

Qurat-Ul-An Sabir, Dalhousie University, Canada; Abdul Basit and Zafar Iqbal, National College of Business Administration & Economics, Pakistan; Tri Nguyen Quang, Dalhousie University, Canada

9:50-10:05 Toward Improved Ocean-Atmosphere Coupling Algorithms

Eric Blayo, Université de Grenoble I, France; Florian Lemarié and Charles Pelletier, INRIA Paris, France

10:10-10:25 Automatic Generation of Cvt-Based Multi-Dimensional Mesh

Zichao Di and Cheng Wang, Argonne National Laboratory, USA

10:30-10:45 Invisible H2O: Tracking the Water We Cannot See

Morgan R. Fonley, Alma College, USA; Rodica Curtu, Ricardo Mantilla, and Scott Small, University of Iowa, USA

10:50-11:05 A High Accuracy Surface Modeling Method and Its Applications in Climate Change Research

Na Zhao and Tiaxiang Yue, Institute of Geographic Sciences and Natural Resources, China

Sunday, October 2

CP4

Simulation and Analysis

9:30 AM-11:30 AM

Room:Maestro A - 4th Floor

Chair: Eric Kostelich, Arizona State University, USA

9:30-9:45 A Partial Differential Equation Model for Fire Resource Allocation

Alex T. Masarie and Yu Wei, Colorado State University, USA; Mike Bevers, Rocky Mountain Research Station, USA; Iuliana Oprea, Colorado State University, USA; Matt Thompson, Rocky Mountain Research Station, USA

9:50-10:05 Empirical Evaluated SDE Modelling for Dimensionality-reduced Systems and its Predictability Estimates

Naoto Nakano and Masaru Inatsu, Hokkaido University, Japan; Seiichiro Kusuoka, Okayama University, Japan; Yoshitaka Saiki, Hitotsubashi University, Japan

10:10-10:25 Bayesian Inference for Expensive Simulators

Paulina Rowinska, University of Reading and Imperial College, United Kingdom

10:30-10:45 Energy-Optimal Control of Temperature for Wine Fermentation

Christina Schenk and Volker H. Schulz, University of Trier, Germany

10:50-11:05 Generalizing the Modified Buckley-Leverett Equation with TCAT Capillary Pressure

Kimberly Spayd, Gettysburg College, USA

11:10-11:25 A Reaction-Diffusion Model of Tropical Vegetation and the Effect of Deforestation

Bert Wuyts, Alan Champneys, and Joanna House, University of Bristol, United Kingdom

ED16 Program
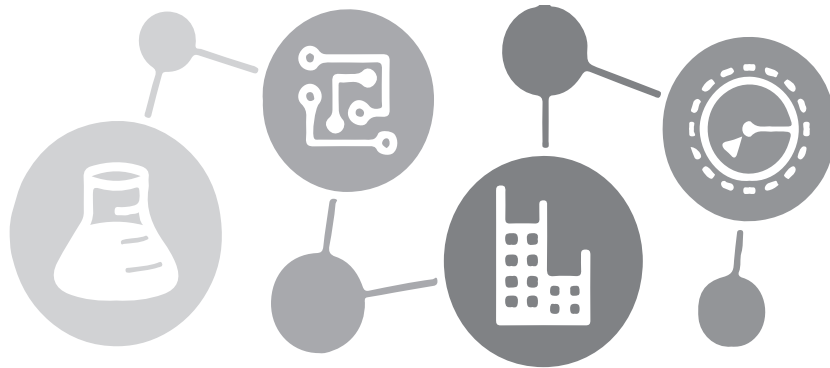
**SIAM Conference on
Applied Mathematics Education**
September 30–October 2, 2016
DoubleTree by Hilton Hotel,
Philadelphia Center City
Philadelphia, Pennsylvania, USA

Thursday, September 29

Registration
5:00 PM-8:00 PM

Room:Aria B - 3rd Floor

Welcome Reception
6:00 PM-8:00 PM

Room:Hotel Restaurant - Balcony

Friday, September 30

Registration
7:15 AM-5:00 PM

Room:Aria B - 3rd Floor

Welcome Remarks
8:00 AM-8:15 AM

Room:Ormandy Ballroom East - Lobby Level

IP1

Mathematical Modeling with Elementary School-Aged Students

8:15 AM-9:00 AM

Room:Ormandy Ballroom East - Lobby Level

Chair: To Be Determined

Modeling, a cyclic process by which mathematicians develop and use mathematical tools to represent, understand, and solve real-world problems, provides important learning opportunities for school students. Modeling opportunities in secondary schools are apparent, but what about in the younger grades? Two questions are critical in mathematical modeling in K-5 settings. (1) How should opportunities for modeling in K-5 settings be constructed and carried out? (2) What are the tasks of teaching when engaging elementary students in mathematical modeling? In this talk I will present a framework for teaching mathematical modeling in elementary classrooms and provide illustrations of its use by elementary grades teachers.

Elizabeth A. Burroughs
Montana State University, USA

Coffee Break
9:00 AM-9:30 AM

Room:Symphony Ballroom - 3rd Floor

Friday, September 30

MS1

Data-Driven Mathematics in the Undergraduate Classroom

9:30 AM-11:30 AM

Room:Ormandy Ballroom East - Lobby Level

The deluge of data surrounding us is inspiring many new areas of scientific and mathematical research, and giving rise to new mathematical techniques. These research areas are often largely left out of the undergraduate classroom. The talks in this minisymposium will highlight how some educators are creating entry-points to data-driven problems for students in their classes. The goal of this session is to inspire future collaborations and further integration of such data problems into the undergraduate classroom.

Organizer: Thomas Asaki
Washington State University, USA

9:30-9:55 Data-Driven Applications Inspiring Linear Algebra
Heather A. Moon, Lewis-Clark State College, USA

10:00-10:25 Stem Real World Applications of Mathematics
Darren Narayan, Rochester Institute of Technology, USA

10:30-10:55 Data-Driven Models of Plankton Ecosystems: Making a Case for Noise
Craig Jackson, Ohio Wesleyan University, USA

11:00-11:25 Fascinating Biological Images + Open-Inquiry + Student Collected Image Analysis Data = A Fun Way to Learn (and Teach!) Mathematics and Statistics
Jeremy Wojdak, Radford University, USA

Friday, September 30

CP1

Modeling Applications

9:30 AM-11:30 AM

Room:Assembly E - Fifth Level

Chair: To Be Determined

9:30-9:45 Extreme Risk, Value-at-Risk Modeling

Zijing Zhang, University of Massachusetts, Amherst, USA

9:50-10:05 Modelling Uncertainty Without An Assumed Distribution: Turbulent Cloud Microphysics

David Collins, University of Victoria, Canada

10:10-10:25 Regime Switching Models and the Mental Accounting Framework

Felix Andresen, d-fine GmbH, Germany

10:30-10:45 Educational Magic Tricks Based on Error-Detecting Codes

Ronald I. Greenberg, Loyola University of Chicago, USA

10:50-11:05 Cumulative Prospect Theory with Skewed Return Distribution

Traian A. Pirvu, McMaster University, Canada; Minsuk Kwak, Hankuk University of Foreign Studies, Korea

11:10-11:25 Online Games in the Calculus Classroom

Ivan Sudakov, University of Dayton, USA

Friday, September 30

PD1

Modeling across the Curriculum: How I use Math in my Job?

9:30 AM-11:30 AM

Room:Assembly C - Fifth Level

Chair: Peter R. Turner, Clarkson University, USA

Chair: Jeffrey Humpherys, Brigham Young University, USA

Chair: Benjamin J. Galluzzo, Shippensburg University, USA

In this moderated panel and audience discussion session we will hear from mathematicians currently employed in a variety of non-academic fields. Following a brief presentation in which each panelist describes how they use mathematics in their daily work life, the floor will be open for questions.

Lunch Break

11:30 AM-1:00 PM

Attendees on their own

Friday, September 30

IP2

Graduate Student Education in Computational Mathematics and Scientific Computing

1:00 PM-1:45 PM

Room:Ormandy Ballroom East - Lobby Level

Chair: To Be Determined

Abstract not available at time of publication.

Margot Gerritsen
Stanford University, USA

Coffee Break

1:45 PM-2:15 PM

Room:Symphony Ballroom - 3rd Floor

ED16

Friday, September 30

MS2

Examples from the National Science Foundation's Enriched Doctoral Training Program

2:15 PM-4:15 PM

Room:Rhapsody - Fourth Level

Traditionally Ph.D. programs in Mathematical Sciences have focused on training students to take jobs in academia. However, there are just not enough academic jobs for all students receiving Ph.D.'s in Mathematical Sciences in the US. Instead, students are taking jobs in business, industry and government. However, the way in which students are trained has largely remained stagnant. The National Science Foundation's Enriched Doctoral Training Program aims to transform this training to allow more employment flexibility for graduating students. This session will highlight the aims and scope of 4 of the 5 currently funded EDT projects.

Organizer: Susan Minkoff
University of Texas at Dallas, USA

2:15-2:40 UTD's EDT Program: Team Training Mathematical Scientists Through Industrial Collaborations
Susan Minkoff and John Zweck, University of Texas at Dallas, USA

2:45-3:10 The IMA Math-to-Industry Boot Camp
Fadil Santosa, University of Minnesota, USA

3:15-3:40 Framework: Front Range Applied Mathematics Exchanges and Workshops
Stephen Pankavich, Colorado School of Mines, USA

3:45-4:10 Edge@UB---Aspects and Motivation Behind NSF's EDT Program at the University at Buffalo
William Menasco, State University of New York at Buffalo, USA

Friday, September 30

MS3

Enhancing Mathematical Learning Experiences with 3D Printing - Part I of II

2:15 PM-4:15 PM

Room:Ormandy Ballroom East - Lobby Level

For Part 2 see MS6
Designing and playing with 3D-printed models of curves, surfaces, and solids provides a new modality for learning mathematics. This minisymposium features presentations by mathematicians who are exploring how to use 3D printing technology to enhance students' geometric imagination and design skills, and provide them with seminal experiences in computational mathematics. Speakers will discuss the use of 3D printed models in inquiry-based and active learning and in undergraduate research. The wide adoption of 3D printing technology, particularly in engineering, challenges mathematicians to examine not just how but also what we teach, and how to assess this new form of student learning.

Organizer: John Zweck
University of Texas at Dallas, USA

2:15-2:40 Developing Geometric Imagination With the Aid of 3D Printed Models
John Zweck, University of Texas at Dallas, USA

2:45-3:10 Calculus and 3D-Printing
Elizabeth Denne, Washington and Lee University, USA

3:15-3:40 3D Printing Experiments in Mathematics
Oliver Knill, Harvard University, USA

3:45-4:10 Course and Question Structures as Platform for Open-Ended Inquiry by Students
Theron J. Hitchman, University of Northern Iowa, USA

Friday, September 30

MS4

Modeling Across the Curriculum: Mathematics and Industry

2:15 PM-4:15 PM

Room:Assembly C - Fifth Level

In this session several investigators will report on their recent efforts, interactions and observations in the area of mathematical preparation for having careers in industry. The investigators are participants in the PIC-Math program, which has been supported primarily by the National Science Foundation, in collaboration with MAA and SIAM.

Organizer: Reza Malek-Madani
U. S. Naval Academy, USA

2:15-2:40 Overview of the PIC Math Program
Michael Dorff, Brigham Young University, USA

2:45-3:10 The "PIC Math Industrial Case Studies – Solving Real World Problems" Videos
Suzanne L. Weekes, Worcester Polytechnic Institute, USA

3:15-3:40 From Comfort Zone to Adventure Zone: Making Connections in BIG and Offering a PIC Math Course
Elin Farnell, Kenyon College, USA

3:45-4:10 Police Beats, Neighborhood Stability, and Cost/Benefit Analysis: PIC Math at Youngstown State
Thomas P. Wakefield, Youngstown State University, USA

Friday, September 30

MS5

Environmental Modeling in the Classroom, Across Curriculum

2:15 PM-4:15 PM

Room:Assembly E - Fifth Level

Mathematics plays a vital role in investigating and explaining the current environmental issues, including but not limited to pollution of different kinds, sustainability, hazardous materials and climate change. Incorporating environmental modeling modules in mathematics classes from calculus and above is the perfect opportunity to expose students both to the power of mathematics and the timely and important environmental issues of our time. In this session, we will provide undergraduate research projects, course material and course ideas for classes that focus on, or incorporate a module on environmental modeling.

Organizer: Ellen Swanson
Centre College, USA

Organizer: Emek Kose
St. Mary's College of Maryland, USA

Organizer: Angela Gallegos
Loyola Marymount University and Occidental College, USA

2:15-2:40 Modeling the Environment: From Modules to Classes
Emek Kose, St. Mary's College of Maryland, USA; Ellen Swanson, Centre College, USA

2:45-3:10 Triggering Mechanisms for Deglaciations
Richard McGehee, University of Minnesota, USA

3:15-3:40 Modeling the Environment with Statistics
Anna Bargagliotti, Loyola Marymount University, USA

3:45-4:10 Hunger Games - Modeling Global Food Production and Population Growth
Jessica M. Libertini, Virginia Military Institute, USA

Intermission
4:15 PM-4:30 PM

Friday, September 30

MS6

Enhancing Mathematical Learning Experiences with 3D Printing - Part II of II

4:30 PM-6:00 PM

Room:Ormandy Ballroom East - Lobby Level

For Part 1 see MS3

Designing and playing with 3D-printed models of curves, surfaces, and solids provides a new modality for learning mathematics. This minisymposium features presentations by mathematicians who are exploring how to use 3D printing technology to enhance students' geometric imagination and design skills, and provide them with seminal experiences in computational mathematics. Speakers will discuss the use of 3D printed models in inquiry-based and active learning and in undergraduate research. The wide adoption of 3D printing technology, particularly in engineering, challenges mathematicians to examine not just how but also what we teach, and how to assess this new form of student learning.

Organizer: John Zweck
University of Texas at Dallas, USA

4:30-4:55 Raising Calculus to the Surface
Jason Samuels, City University of New York, Borough of Manhattan Community College, USA

5:00-5:25 3D Printing Projects for Multivariate Calculus and College Geometry
Edward Aboufadel, Grand Valley State University, USA

5:30-5:55 Assessing Educational Interventions: Moving from ``Does It Work?" to "What Do They Know?"
Timothy Fukawa-Connelly, Temple University, USA

Friday, September 30

MS7

Modeling Across the Curriculum: Modeling Across, Through, & Beyond the Curriculum: One School's Story

4:30 PM-6:30 PM

Room:Assembly C - Fifth Level

At our institution, we are teaching modeling across the institution more holistically by leveraging our successes in established areas to grow in others. What began as application projects in calculus now includes modeling-based differential equations and a math modeling course. We're now developing new courses for non-STEM majors, which we envision as an implementation of the SIAM/COMAP GAIMME report. We've also expanded our involvement with COMAP's modeling competitions and launched our own regional competition. In this minisymposium, we will share our trials, successes, and plans for growth as we present how we teach mathematical modeling to non-STEM majors, STEM majors, and math majors.

Organizer: Jessica M. Libertini
Virginia Military Institute, USA

Organizer: John David
Virginia Military Institute, USA

4:30-4:55 Why Teach Mathematical Modeling to Non-Stem Majors - The Development of a New Course
Greg Hartman, Virginia Military Institute, USA

5:00-5:25 Calculus and Differential Equations - Mathematical Modeling for Stem Service Courses
Jessica M. Libertini, Virginia Military Institute, USA

5:30-5:55 Modeling Opportunities for Mathematics Majors, Inside and Beyond the Curriculum
John David, Virginia Military Institute, USA

6:00-6:25 Mathematical Modeling Competitions, from Regional to International
Karen Bliss, Virginia Military Institute, USA

ED16

Friday, September 30

MS8

Exploring Frameworks for the Teaching of Modeling

4:30 PM-6:30 PM

Room:Assembly E - Fifth Level

In this minisymposium, we explore frameworks for the teaching and learning of modeling. One nuance to the teaching of modeling that the way it is taught may depend greatly on the audience and their disciplinary training or expertise. Language differs, approaches differs, and modes of learning differ. Synthesizing existing work around modeling education and providing a common framework around which multidisciplinary discourse is centered, allows modeling education to move forward in productive ways.

Organizer: Carrie Diaz Eaton
Unity College, USA

Organizer: M. Drew LaMar
College of William & Mary, USA

4:30-4:55 A Framework for Modeling to Encourage Interdisciplinary Conversations
Carrie Diaz Eaton, Unity College, USA

5:00-5:25 A Framework for Teaching Modeling to Biologists
M. Drew LaMar, College of William & Mary, USA

5:30-5:55 A BioGraphy of Life: How Graph Theory Makes Mathematics Recognizable, Relevant, and Research-Rich in Biology Education
John Jungck, University of Delaware, USA

6:00-6:25 Training In-Service Teachers to Think Deeply About Modeling in the Common Core Movement
Talitha Washington, Howard University, USA

Friday, September 30

CP2

Communities and Initiatives in Applied Mathematics Education

4:30 PM-6:30 PM

Room:Rhapsody - Fourth Level

Chair: To Be Determined

4:30-4:45 Big Math Network: Best Practices for Undergraduate and Graduate Internships in the Mathematical Sciences
Rachel Levy, Harvey Mudd College, USA

4:50-5:05 Graduate Student Mentorship for Diverse Teams of Undergraduate Researchers in an REU Site
Jonathan Graf, University of Maryland, Baltimore County, USA

5:10-5:25 SIMIODE - A Community for Teaching Modeling First Differential Equations
Brian Winkel, SIMIODE, USA

5:30-5:45 Undergraduate Research and Curriculum Development in EXTREEMS-QED at NJIT
David J. Horntrop, New Jersey Institute of Technology, USA

5:50-6:05 Education for Simulation and HPC at JSC
Johannes Grotendorst, Forschungszentrum Jülich, Germany

6:10-6:25 Curriculum in Undergraduate Applied Mathematics: a Single Case
Margo Levine and Sarah Iams, Harvard University, USA

Dinner Break

6:30 PM-8:00 PM

Attendees on their own

Friday, September 30

PP1

Poster Session (being held jointly with MPE16)

8:00 PM-10:00 PM

Room:Symphony Ballroom - 3rd Floor

A "Flipped" Developmental Math Course Model for the Liberal Arts Institution
Justin R. Lawrence, Wilson College, USA

ED16

Saturday, October 1

Registration
7:45 AM-5:00 PM

Room:Aria B - 3rd Floor

Remarks
8:10 AM-8:15 AM

Room:Ormandy Ballroom East - Lobby Level

IP3

Mathematical Modeling: Changing the Landscape of the Mathematics Classroom
8:15 AM-9:00 AM

Room:Ormandy Ballroom East - Lobby Level

Chair: To Be Determined

As math modeling gains more attention in the K-12 curriculum, we consider the questions: How do we introduce students and teachers to modeling? What can students gain from engaging in modeling experiences? How do we teach modeling? In this session, I will share some of my mathematical modeling experiences working with students and teachers and solicit ideas on how we can work together to support the teaching and learning of mathematical modeling.

Maria Hernandez
North Carolina School of Science and Mathematics and Deerfield Academy, USA

Coffee Break
9:00 AM-9:30 AM

Room:Symphony Ballroom - 3rd Floor

Saturday, October 1

MS9

Approaches to Mentorship in Undergraduate Research
9:30 AM-11:30 AM

Room:Rhapsody - Fourth Level

Undergraduate research projects are collaborative efforts between the students and faculty involved. Often faculty learn just as much from their mentoring experiences as the students do during that time. Reflecting on the aspects that worked well and those that didn't come to fruition during a research experience allows us to improve our approach to mentoring students in undergraduate research programs. This session will focus on mentoring students in unfamiliar research fields, incorporating research into the classroom, and drawing upon personal experience as an undergraduate mentee to become an effective mentor.

Organizer: Pamela B. Pyzza
Ohio Wesleyan University, USA

9:30-9:55 From Student to Mentor: Applying Undergraduate Research Experiences to Mentorship
Katelyn J. Leisman, Rensselaer Polytechnic Institute, USA

10:00-10:25 How Student Interests Have Motivated and Driven Undergraduate Research
Alicia Prieto Langarica, Youngstown State University, USA

10:30-10:55 Merging Interests: Mentoring Undergraduate Research Outside of Your Research Area
Shelby Wilson, Morehouse College, USA

11:00-11:25 Variations in Mentorship at Dissimilar Institutions
Pamela B. Pyzza, Ohio Wesleyan University, USA

Saturday, October 1

MS10

Teaching at Small Colleges: Challenges and Opportunities
9:30 AM-11:30 AM

Room:Ormandy Ballroom East - Lobby Level

Liberal arts and other undergraduate-focused schools often offer close student/faculty interaction, a nurturing atmosphere, and less bureaucracy compared with research institutions. However, this idyllic atmosphere may be offset by challenges to applied math faculty in particular, due to isolation (from the lack of other applied mathematicians or an engineering school), limited course offerings (due to low student numbers or inertia following the pure math tradition), and the differences between undergraduate and graduate-level research. In this session, applied math faculty from a variety of small schools will address some of these issues, sharing their experiences and recommendations.

Organizer: Haley Yaple
Carthage College, USA

9:30-9:55 Leveraging Collaboration and Sustaining Research at a Teaching-Focused Institution
John Zobitz, Augsburg College, USA

10:00-10:25 Application Fridays Or: How Applied Students Learned to Stop Worrying and Love the Theory
Matthew A. Morena, Young Harris College, USA

10:30-10:55 Addition by Subtraction: Expanding Applied Math Education by Cutting to a Two Term Calculus Curriculum
Tyler Skorczewski, Cornell College, USA

11:00-11:25 Undergraduate Research as a Complement and Supplement to Coursework
Haley Yaple, Carthage College, USA

ED16

Saturday, October 1

MS11

Modeling Across the Curriculum: GAIMME: Addressing Mathematical Modeling Education Across the Curriculum

9:30 AM-11:30 AM

Room:Assembly C - Fifth Level

Recently, SIAM and COMAP have partnered together to address the emerging need for direction in mathematical modeling education at the K-16 levels. As a result, the GAIMME report (Guidelines for Assessment and Instruction in Mathematical Modeling Education) has been designed by a mix of professionals to define the modeling process and provide insight to student and teacher experiences. In this session we discuss the how the GAIMME report can enable mathematical modeling in the early grades, high school grades, and at the early undergraduate level. We also provide assessment information with an overarching theme in supporting teachers as they implement math modeling into their classrooms.

Organizer: Benjamin J. Galluzzo
Shippensburg University, USA

9:30-9:55 Mathematical Modeling in the Early Grades
Rachel Levy, Harvey Mudd College, USA

10:00-10:25 Mathematical Modeling in High School
Daniel Teague, North Carolina School of Science and Mathematics, USA

10:30-10:55 Mathematical Modeling at the Undergraduate Level
Karen Bliss, Virginia Military Institute, USA

11:00-11:25 Assessing Mathematical Modeling
Benjamin J. Galluzzo, Shippensburg University, USA

Saturday, October 1

MS12

Implementing Mathematical Modeling in the Elementary Grades and Beyond

9:30 AM-11:30 AM

Room:Assembly E - Fifth Level

Mathematical modeling is an important topic of study and mathematical practice in the newly adopted Common Core State Standards in grades K-12. This symposium will engage the SIAM audience in considering ways in which early introduction to mathematical modeling can promote computational thinking. Brief presentations from a team of mathematicians, math educators, teachers and undergraduate STEM scholars will demonstrate how they collaborated on Mathematical Modeling tasks in the early grades. They will share case studies of how MM enhanced the teaching and learning of mathematics by bringing in the real world context to students and enriched the learning environment.

Organizer: Jennifer M. Suh
George Mason University, USA

Organizer: Padmanabhan Seshaiyer
George Mason University, USA

9:30-9:55 Mathematical Modeling with Inservice Teacher Education
Spencer Jamieson, Fairfax County Public School, USA; Jennifer M. Suh and Padmanabkan Seshalyer, George Mason University, USA

10:00-10:25 Teachers Roles in Promoting Mathematical Modeling in the Classroom
MaryAnne Rossbach, Fairfax County Public School, USA; Kathleen Matson, George Mason University, USA

10:30-10:55 Undergraduate Stem Scholars Inspiring Young Math Modelers
Kathleen McClane, George Mason University, USA; Liz Taylor, Fairfax County Public School, USA

11:00-11:25 Mathematical Modeling to Promote 21st Century Skills and Computational Thinking
Jennifer M. Suh, and Padmanabkan Seshalyer, George Mason University, USA

Saturday, October 1

Lunch Break
11:30 AM-1:00 PM

Attendees on their own

IP4

Lean Out: Connecting Outside the Ivory Tower

1:00 PM-1:45 PM

Room:Ormandy Ballroom East - Lobby Level

Chair: To Be Determined

It is important that mathematics and statistics educators are well attuned to the research and employment opportunities that exist outside academia for people trained properly in the mathematical sciences. In particular, to increase the number of well-prepared students going into mathematical sciences careers, there is a need to better connect the work that is done in business, industry, and government with what is taught at universities, and to give students and faculty active exposure to the sort of interesting mathematical problems that are encountered. In this talk, the speaker will discuss some of the research and educational partnerships that she has been involved in that actively connect faculty, students, and teachers directly with industry and that has allowed them to engage in research on industrial problems. She will give examples of some industrial research problems that student teams have tackled, discuss some of the skills that are needed to be successful working with and in industry, discuss the challenges that one may face when working with corporate partners, and present a summary of some of the lessons that have been learned over the years in these collaborations.

Suzanne L. Weekes
Worcester Polytechnic Institute, USA

Coffee Break
1:45 PM-2:15 PM

Room:Symphony Ballroom - 3rd Floor

Saturday, October 1

MS13

Experience of REU Site Directors in Applied Mathematics

2:15 PM-4:15 PM

Room:Rhapsody - Fourth Level

An REU Site is a high-touch, intensive, typically residential, summer research experience for undergraduate students, intended to motivate them for graduate school and careers in research. Working with undergraduate students from all across the nation in an REU Site is one of the most rewarding experiences a faculty can have and can be one of the most career-changing experiences for the participants. The speakers in this minisymposium share their lessons on how to create and maintain REU Site programs in applied mathematics and related areas.

Organizer: Matthias K. Gobbert
University of Maryland, Baltimore County, USA

2:15-2:40 Reu Site: Interdisciplinary Program in High Performance Computing
Matthias K. Gobbert, Nagaraj Neerchal, Bradford E. Peercy, and Kofi Adragni, University of Maryland, Baltimore County, USA

2:45-3:10 Sumar Math REU, Undergraduate Research During the School Year, Accessibility in Math, and Preparation for Graduate School
Marianne Korten, Kansas State University, USA

3:15-3:40 Simulation and Analysis at South Dakota State University REU Site
Jung-Han Kimn and Stephen Gent, South Dakota State University, USA

3:45-4:10 Involving Undergraduate Students in Emerging Parallel Computing Research
Enyue Lu, Salisbury University, USA

Saturday, October 1

MS14

Game Theory in the Mathematics Curriculum

2:15 PM-4:15 PM

Room:Ormandy Ballroom East - Lobby Level

Although game theory was invented by mathematicians, it became more central to social and biological scientists, and is today usually taught in other departments. One can argue, however, that like calculus, game theory is at heart a collection of mathematical ideas with broad application, and hence has a natural home in mathematics departments. It is attractive, for example, as a general education course, where it provides an accessible way to introduce general principles of mathematical modeling, and as an elective course for mathematics majors, where it displays the surprising breadth of applicability of mathematics. The speakers in this minisymposium will discuss different types of game theory courses that they have introduced in their departments.

Organizer: Stephen Schecter
North Carolina State University, USA

2:15-2:40 A Game Theory Course for Mathematics Students
Stephen Schecter, North Carolina State University, USA

2:45-3:10 Game Theory as a Mathematics General Education Course
Erich Prisner, Franklin University, USA

3:15-3:40 An Evolving Introduction to Game Theory
Robert Root and Christopher Ruebeck, Lafayette College, USA

3:45-4:10 Game Theory and Evolution
Timothy Killingback, University of Massachusetts, Boston, USA

Saturday, October 1

MS15

Early Experiences in Mathematical Modeling for Undergraduates

2:15 PM-4:15 PM

Room:Assembly E - Fifth Level

As math modeling appears more frequently in the K12-curriculum, there is an opportunity to continue building more advanced modeling skills by providing students with early experiences in their undergraduate education. If students are challenged with tackling open-ended questions earlier, they will gain confidence and a deeper understanding of the role of mathematics in solving real-world problems. Modeling can help bridge the gap between mathematics and other courses. In this session, we describe efforts to provide modeling experiences for students in the first year of college including stand-alone courses, projects, and competitions.

Organizer: Kathleen Fowler
Clarkson University, USA

Organizer: Karen Bliss
Virginia Military Institute, USA

2:15-2:40 Training for Mathematical Modeling Competitions
Guangming Yao, Clarkson University, USA

2:45-3:10 Math Modeling for First-Year Non-Stem Majors -- Making Connections Across the Curriculum
Karen Bliss, Virginia Military Institute, USA

3:15-3:40 Teaching Math Modeling with Software; Teaching Computational Science Through Modeling: An Integrated Approach
Joe Skufca, Clarkson University, USA

3:45-4:10 A First Look at Getting Solutions: A Student's Perspective
Brandon Weiser, Shippensburg University, USA

ED16

Saturday, October 1

PD2

Modeling across the Curriculum:Teaching Math Modeling – Session I

2:15 PM-4:15 PM

Room:Assembly C - Fifth Level

Chair: Benjamin J. Galluzzo, Shippensburg University, USA

This mini-workshop will utilize a fishbowl presentation format to provide an interactive demonstration of math modeling in a classroom setting. Experienced instructors will facilitate a math modeling activity with a small group of teachers in a circle in the center of the room; observers (participants surrounding the center circle) will be encouraged to pose questions and comments throughout the presentation.

Panelists:

Benjamin Galluzzo
Shippensburg University, USA

Maria Hernandez
North Carolina School of Science and
  Mathematics and Deerfield Academy,
  USA

Katie Kavanagh
Clarkson University, USA

Daniel Teague
North Carolina School of Science and
  Mathematics, USA

Intermission

4:15 PM-4:30 PM

Saturday, October 1

MS16

Providing Undergraduate Research Opportunities

4:30 PM-6:30 PM

Room:Rhapsody - Fourth Level

Providing students with an undergraduate research experience in applied mathematics benefits not only the mentor by advancing the underlying project, but in particular the student. Often interdisciplinary in nature, students gain a deeper understanding of the role of mathematics in solving relevant problems while gaining invaluable workforce skills such as improved communication and how to work in collaborative groups. The talks in this session will highlight some successful undergraduate research programs with an emphasis on best-practices and how to get students involved whether it is through participation in summer research experiences or in projects during the regular academic year.

Organizer: Suzanne L. Weekes
Worcester Polytechnic Institute, USA

Organizer: Kathleen Fowler
Clarkson University, USA

4:30-4:55 Student Research Experiences with Applications to Geography, Economics, and Politics at Youngstown State
Thomas P. Wakefield, Youngstown State
  University, USA

5:00-5:25 Adventures in Mathematical Biology
Sarah D. Olson, Worcester Polytechnic
  Institute, USA

5:30-5:55 Undergraduates Helping You Get Strawberries
Kathleen Fowler, Clarkson University,
  USA

6:00-6:25 REU in Mathematics at NC State: Modeling and Industrial Mathematics
Hien T. Tran, North Carolina State
  University, USA

Saturday, October 1

MS17

Teaching Linear Algebra with Applications

4:30 PM-6:30 PM

Room:Ormandy Ballroom East - Lobby Level

Linear algebra has been gaining momentum in university curricula. It deserves a more prominent position, given its importance in today's science and technology. Undoubtedly, a second Linear Algebra course should become the rule rather than the exception. But what should a second undergraduate course focus on? More theory? Perhaps. Applications? Definitely! Computer implementation? Again, Yes! The speakers, who are known for their enthusiasm in teaching, will share their ideas on how the subject of Linear Algebra ought to be expanded at the undergraduate level.

Organizer: Gilbert Strang
Massachusetts Institute of Technology, USA

Organizer: Pavel Grinfeld
Drexel University, USA

4:30-4:55 Linear Algebra as a Template for Applied Mathematics
Pavel Grinfeld, Drexel University, USA

5:00-5:25 A Final Project Poster Presentation at a Science Festival
Rosalie Belanger-Rioux, Harvard
  University, USA

5:30-5:55 The Teaching of Linear Algebra from an Engineer's Point of View
Adam Fontecchio, Drexel University,
  USA

6:00-6:25 A Second Course in Applied Linear Algebra
Gil Strang, Massachusetts Institute of
  Technology, USA

Saturday, October 1

MS18

Varying Perspectives of a Mathematics Modeling Course

4:30 PM-6:30 PM

Room:Assembly E - Fifth Level

Modeling is an important component of applied mathematics, as it underlies many interdisciplinary mathematical collaborations and is a useful skill in industry. However, no standard upper-level undergraduate modeling course exists. Instead, across institutions modeling courses have a varied set of prerequisites, focus on different mathematical techniques, and apply the mathematics of the course in different settings. While uniformity is not necessary, it would be beneficial to learn what different institutions mean when they offer a "Math Modeling" course. In this minisymposium, we explore a variety of upper-level modeling courses from the perspective of course design, curriculum, pedagogy and/or implementation.

Organizer: Christina H. Lee
Oxford College of Emory University, USA

Organizer: Jana Gevertz
The College of New Jersey, USA

Organizer: Karen Clark
The College of New Jersey, USA

4:30-4:55 Musings on Mathematical Modeling: Reflections on an Upper-Level Undergraduate Course
Victor Barranca, Swarthmore College, USA

5:00-5:25 Case Studies: A Capstone Course in Modeling
Ethan Berkove, Lafayette College, USA

5:30-5:55 The Design and Implementation of a Project-Based Modeling Course at the Undergraduate Level: Lessons Learned
Leona Harris, The College of New Jersey, USA

6:00-6:25 Mathematical Modeling, at the Crossroad of Imagination, Equations and Real World Problems: Teaching Challenges
Alessandro Veneziani, Emory University, USA

Saturday, October 1

PD3

Modeling across the Curriculum:Teaching Math Modeling – Session II

4:30 PM-6:30 PM

Room:Assembly C - Fifth Level

Chair: Benjamin J. Galluzzo, Shippensburg University, USA

At this mini-workshop, participants will choose from one of five classroom-tested modeling projects to further develop for use in their classroom. Following the workshop, all projects, with accompanying materials, will be available for viewing and download online.

Panelists:

Victor Donnay
Bryn Mawr College, USA

Benjamin Galluzzo
Shippensburg University, USA

Maria Hernandez
North Carolina School of Science and Mathematics and Deerfield Academy, USA

Katie Kavanagh
Clarkson University, USA

Jessica Libertini
Virginia Military Institute, USA

Daniel Teague
North Carolina School of Science and Mathematics, USA
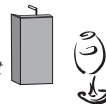
Dinner Break

6:30 PM-8:00 PM

Attendees on their own

SIAG/ED Business Meeting (open to SIAG/ED members)

8:00 PM-8:45 PM

Room:Ormandy Ballroom East - Lobby Level

Complimentary beer and wine will be served.

Sunday, October 2

Registration
7:45 AM-1:30 PM

Room:Aria B - 3rd Floor

Closing Remarks
8:10 AM-8:15 AM

Room:Ormandy Ballroom East - Lobby Level

IP5

Title Not Available at Time of Publication

8:15 AM-9:00 AM

Room:Ormandy Ballroom East - Lobby Level

Chair: To Be Determined

Abstract not available at time of publication.

Philip Uri Treisman
The University of Texas at Austin, USA

Coffee Break
9:00 AM-9:30 AM

Room:Symphony Ballroom - 3rd Floor

ED16

Sunday, October 2

MS19

Increasing Diversity and Inclusion in Mathematics: Some Inspiring Initiatives

9:30 AM-11:30 AM

Room:Rhapsody - Fourth Level

Increasing diversity in mathematics should be a priority for mathematicians, and this for many reasons: issues of equity; strenghtening the mathematics workforce in academia, government and industry; and the need for a more STEM-proficient workforce, to name a few. This minisymposium will present research findings and field efforts on increasing diversity in mathematics, in and out of the classroom, at various levels of the K-16 pipeline. Another purpose of this minisymposium is to encourage and inspire audience members to implement some of these ideas and projects at their home institution, or to start their own. Come and find out how!

Organizer: Rosalie Belanger-Rioux
Harvard University, USA

9:30-9:55 Supporting Underrepresented Groups at the Undergraduate Level
Rosalie Belanger-Rioux, Harvard University, USA

10:00-10:25 Instem (Inspiring Stem in Girls): a 3-Tiered Mentoring Approach
Nell Cobb, DePaul University, USA

10:30-10:55 Leveraging Students' Cultural Competencies Through Mathematical Modeling
Cynthia Anhalt, University of Arizona, USA; Ricardo Cortez, Tulane University, USA; Aliceson Smith, Desert Shadow Middle School, USA

11:00-11:25 Completing the Circle, Going Back to the Source: Indigenizing University Mathematics
Edward Doolittle, First Nations University of Canada, Canada

Sunday, October 2

MS20

Modeling Across the Curriculum: Computing Across the Curriculum

9:30 AM-11:30 AM

Room:Assembly C - Fifth Level

The world's fastest computer can perform 1017 operations per second, and our laptops 10^{12} operations per second. This computational power has transformed both the research and the practice of mathematics and disciplines that make use of mathematics. In education the computer has found many uses, e.g. for communication, as a pedagogical tool and as a calculator. However, the core content of the mathematics curriculum has changed surprisingly little at most universities over the past fifty years. Broadly speaking we may say that computers have dramatically changed the wrapping of education, but not the content. In the minisymposium 'Computing across the curriculum' we attempt to address this issue.

Organizer: Knut Mørken
University of Oslo, Norway

9:30-9:55 Reforming the Undergraduate Mathematics Curriculum with a Computational Perspective
Knut Mørken and Morten Hjorth-Jensen, University of Oslo, Norway; Hans Petter Langtangen, Simula Research Laboratory and University of Oslo, Norway; Anders Malthe-Sørenssen, University of Oslo, Norway

10:00-10:25 Using Programming to Promote Theory in First Semester Calculus
Jan-Fredrik Olsen, Lund University, Sweden

10:30-10:55 Integrating Computing in the Introductory Physics Education
Anders Malthe-Sørenssen and Knut Mørken, University of Oslo, Norway; Hans Petter Langtangen, Simula Research Laboratory and University of Oslo, Norway; Morten Hjorth-Jensen, University of Oslo, Norway

11:00-11:25 How Might Physics Education Research Facilitate the Computational Revolution
Marcos Caballero, Michigan State University, USA

Sunday, October 2

CP3

Simulation and Problem Solving in Applied Mathematics Education

9:30 AM-10:50 AM

Room:Ormandy Ballroom East - Lobby Level

Chair: To Be Determined

9:30-9:45 Aesthetics as a Means to Teaching Mathematics Through Problem Solving
Hartono Tjoe, Pennsylvania State University, USA

9:50-10:05 Simulation in Scratch
Patrick I. Honner, Brooklyn Technical High School, USA

10:10-10:25 Mathematical Modeling with Monte Carlo Methods - A Bates College Elective
Henry A. Boateng, Bates College, USA

10:30-10:45 Bifurcation Study of Parametric Diagramm of Predator-Prey Models with Saturation and Competition Affects
Tolibjon Buriyev, Vafokul Ergashev, and Yakhyo Mukhtarov, Samarkand State University, Uzbekistan

Lunch Break

11:30 AM-1:00 PM

Attendees on their own

Sunday, October 2

PD4

Modeling across the Curriculum: Planning Workshop

1:00 PM-3:00 PM

Room:Assembly C - Fifth Level

Chair: Peter R. Turner, Clarkson University, USA

Chair: Jeffrey Humpherys, Brigham Young University, USA

Chair: Benjamin Galluzzo, Shippensburg University, USA

The purpose of this session is a moderated panel and audience discussion of outcomes from the BIG-MaC strand of the conference and constructive planning for both the report on BIG-MaC and plans for future activity. Conference participants are encouraged to attend and help plan the next phases of the MaC initiative.

Benjamin Galluzzo
Shippensburg University, USA

Jeffrey Humpherys
Brigham Young University, USA

Katie Kavanagh
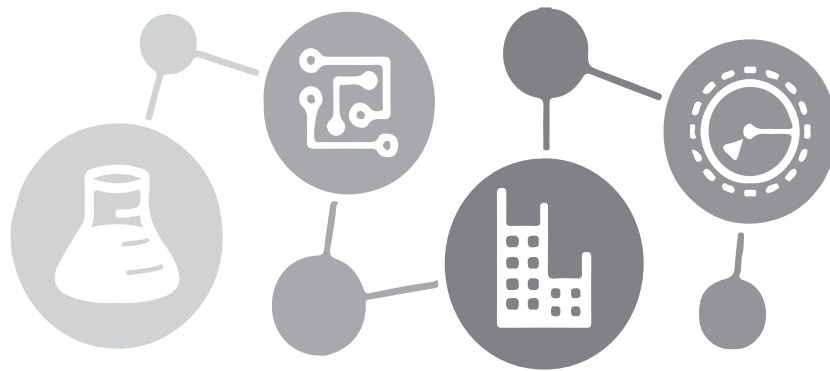Clarkson University, USA

Rachel Levy
Harvey Mudd College, USA

MPE16 Abstracts

SIAM Conference on Mathematics of Planet Earth

September 30 - October 2, 2016
DoubleTree by Hilton Hotel Philadelphia Center City
Philadelphia, Pennsylvania, USA

Abstracts are printed as submitted by the authors.

ED16 Abstracts

**SIAM Conference on
Applied Mathematics Education**
September 30–October 2, 2016
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Philadelphia, Pennsylvania, USA**

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SIAM Activity Group on Applied Mathematics Education (SIAG/ED)

www.siam.org/activity/ed

The purpose of the SIAM Activity Group on Applied Mathematics Education is to advance the development and practice of educational programs, courses, and resources in applied mathematics.

ACTIVITIES INCLUDE:
- Special sessions at SIAM Annual Meetings
- Biennial conference

BENEFITS OF SIAG/ED membership:
- Listing in the SIAG's online-only membership directory
- Additional $10 discount on registration for the SIAM Conference on Applied Mathematics Education (excludes student)
- Electronic communications about recent developments in your specialty
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- Participation in the selection

ELIGIBILITY:
- Be a current SIAM member

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- $15 per year
- Student members can join two activity groups for free!

**SIAM Conference on
Applied Mathematics Education**
**September 30–October 2, 2016
DoubleTree by Hilton Hotel,
Philadelphia Center City
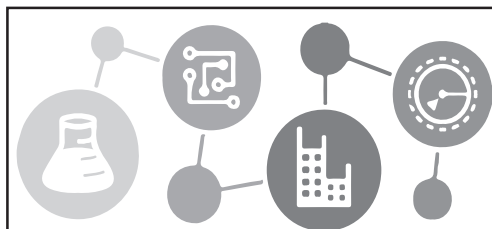Philadelphia, Pennsylvania, USA**

2014-16 SIAG/ED OFFICERS
- Chair: Peter Turner, Clarkson University
- Vice Chair: Jeff Humpherys, Brigham Young University
- Program Director: Padhu Seshaiyer, George Mason University
- Secretary: Ben Galluzzo, Shippensburg University

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MPE16 Speaker and Organizer Index

SIAM Conference on Mathematics of Planet Earth

September 30 - October 2, 2016
DoubleTree by Hilton Hotel Philadelphia Center City
Philadelphia, Pennsylvania, USA

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Hoffman, Matthew, MS1, 10:30 Fri
Hoffman, Matthew J., MS8, 3:45 Fri
Holm, Darryl D., MS16, 2:15 Sat
Hottovy, Scott, MS11, 10:00 Sat
Houser, Paul, MS7, 2:15 Fri
Houser, Paul, MS7, 2:15 Fri
Houser, Paul, MS12, 9:30 Sat
Huntley, Helga S., MS14, 11:00 Sat

I

Iams, Sarah, CP1, 2:55 Fri
Ide, Kayo, MS8, 2:45 Fri

J

Jackaman, James, MS16, 3:45 Sat
Jafari, Nahid, CP2, 2:15 Sat
Jahn, Molly, IP3, 1:00 Sat
Johansen, Hans, MS20, 3:15 Sat

K

Kaper, Hans G., MT2, 9:30 Sat
Kaper, Hans G., MT2, 9:30 Sat
Kelly, David, MS17, 3:45 Sat
Kelly, Michael R., MS3, 10:00 Fri
King, Sarah, MS9, 3:45 Fri
Kjerland, Marc, PP1, 8:00 Fri
Kjerland, Marc, MS22, 11:00 Sun
Kostelich, Eric J., MS24, 9:30 Sun
Kowalski, Julia, MS18, 2:15 Sat

L

Le Dimet, Francois-Xavier, MS14, 10:30 Sat
Leahy, Thomas P., MS16, 3:15 Sat
Lenhart, Suzanne M., MS3, 9:30 Fri
Lenhart, Suzanne M., MS19, 2:15 Sat
LeVeque, Randall, MS4, 9:30 Fri
LeVeque, Randall, MS22, 9:30 Sun
Levy, Benjamin, MS3, 11:00 Fri
Lin, Ning, MS4, 10:30 Fri
Lu, Fei, MS24, 10:30 Sun
Lunasin, Evelyn, MS11, 9:30 Sat
Lunasin, Evelyn, MS17, 2:15 Sat

M

Maclean, John, MS8, 2:15 Fri
Maclean, John, MS8, 2:15 Fri
Madden, Elizabeth, MS18, 2:45 Sat
Maggioni, Viviana, MS7, 2:15 Fri
Maggioni, Viviana, MS12, 9:30 Sat
Maggioni, Viviana, MS12, 9:30 Sat
Malek-Madani, Reza, MS11, 9:30 Sat

Italicized names indicate session organizers

Malek-Madani, Reza, MS17, 2:15 Sat
Mandli, Kyle T., MS2, 10:00 Fri
Marras, Simone, MS2, 9:30 Fri
Marras, Simone, MS2, 10:30 Fri
Marras, Simone, MS18, 2:15 Sat
Martin, Daniel, MS1, 9:30 Fri
Martin, Daniel, MS10, 2:15 Fri
Martin, Daniel, MS20, 3:45 Sat
Masarie, Alex T., CP4, 9:30 Sun
Mazzoleni, Michael J., MS6, 2:45 Fri
McKenna, Sean, IP5, 8:15 Sun
Melgar, Diego, MS2, 11:00 Fri
Menden-Deuer, Susanne, MS6, 3:15 Fri
Moulton, David, MS20, 2:45 Sat

N

Nadeau, Alice, MS13, 10:00 Fri
Nakano, Naoto, CP4, 9:50 Sun
Norman, Matthew R., MS15, 9:30 Sat
Norman, Matthew R., MS20, 2:15 Sat
Norman, Matthew R., MS23, 9:30 Sun
Norman, Matthew R., MS23, 10:30 Sun

O

Osei-Kuffuor, Daniel, MS15, 11:00 Sat

P

Patra, Abani K., PP1, 8:00 Fri
Patra, Abani K., MS22, 9:30 Sun
Perego, Mauro, MS1, 9:30 Fri
Perego, Mauro, MS1, 9:30 Fri
Perego, Mauro, MS10, 2:15 Fri
Petra, Noemi, MS1, 10:00 Fri
Piltz, Sofia, PP1, 8:00 Fri
Ponte Castañeda, Pedro, MS11, 9:30 Sat
Prykarpatski, Anatolij, CP2, 2:35 Sat

Q

Quinn, Courtney, MS13, 10:30 Fri

R

Rim, Donsub, MS4, 11:00 Fri
Rossi, Louis F., MS6, 2:15 Fri
Rothman, Daniel, IP1, 1:00 Fri
Rowinska, Paulina, CP4, 10:10 Sun

S

Sabir, Qurat-Ul-An, CP3, 9:30 Sun
Sauer, Tim, MS7, 2:15 Fri
Sauer, Timothy, MS12, 9:30 Sat
Schenk, Christina, CP4, 10:30 Sun
Schwartz, Ira B., MS11, 11:00 Sat
Schwedes, Tobias, MS16, 2:15 Sat
Sergienko, Olga, MS10, 3:45 Fri
Sexton, Jean, PP1, 8:00 Fri
Sheng, Jian, MS6, 2:15 Fri
Shi, John Z., CP2, 2:55 Sat
Siewe, Nourridine, MS3, 10:30 Fri
Smita, Smita, CP2, 3:15 Sat
Spayd, Kimberly, CP4, 10:50 Sun
Steyer, Andrew J., MS5, 9:30 Fri
Steyer, Andrew J., MS24, 9:30 Sun
Steyer, Andrew J., MS24, 11:00 Sun
Suckale, Jenny, MS2, 9:30 Fri
Suckale, Jenny, MS18, 2:15 Sat
Sudakov, Ivan, CP1, 3:15 Fri

T

Tarnita, Corina, IP4, 4:30 Sat
Tezaur, Irina K., MS1, 9:30 Fri
Tezaur, Irina K., MS1, 11:00 Fri
Tezaur, Irina K., MS10, 2:15 Fri
Tu, Xuemin, MS5, 11:00 Fri
Turkington, Bruce E., MS9, 2:45 Fri

U

Ullrich, Paul, MS23, 9:30 Sun

V

Van Vleck, Erik, MS5, 9:30 Fri
Van Vleck, Erik, MS5, 9:30 Fri
Van Vleck, Erik, MS24, 9:30 Sun
Van Wyk, Hans-Werner, CP2, 3:35 Sat
Vater, Stefan, MS2, 9:30 Fri
Vater, Stefan, MS2, 9:30 Fri
Vater, Stefan, MS18, 2:15 Sat
Venaille, Antoine, MS9, 2:15 Fri

W

Waisman, Haim, MS10, 3:15 Fri
Walsh, James, MT1, 9:30 Fri
Walsh, James, MT1, 9:30 Fri
Walsh, James, MS13, 9:30 Sat
Weare, Jonathan, MS17, 3:15 Sat
Westerink, Joannes, MS4, 10:00 Fri
White, Easton R., CP1, 3:35 Fri
Widiasih, Esther, MT1, 9:30 Fri
Widiasih, Esther, MT1, 9:30 Fri
Widiasih, Esther, MS13, 9:30 Sat
Widiasih, Esther, MS13, 9:30 Sat
Woodward, Carol S., MS15, 9:30 Sat
Woodward, Carol S., MS15, 10:30 Sat
Woodward, Carol S., MS20, 2:15 Sat
Woodward, Carol S., MS23, 9:30 Sun
Wouters, Jeroen, MS21, 10:30 Sun
Wright, Daniel B., MS12, 10:30 Sat
Wuyts, Bert, PP1, 8:00 Fri
Wuyts, Bert, CP4, 11:10 Sun

Y

Yakubu, Abdul-Aziz, MS3, 9:30 Fri
Yakubu, Abdul-Aziz, MS19, 2:15 Sat
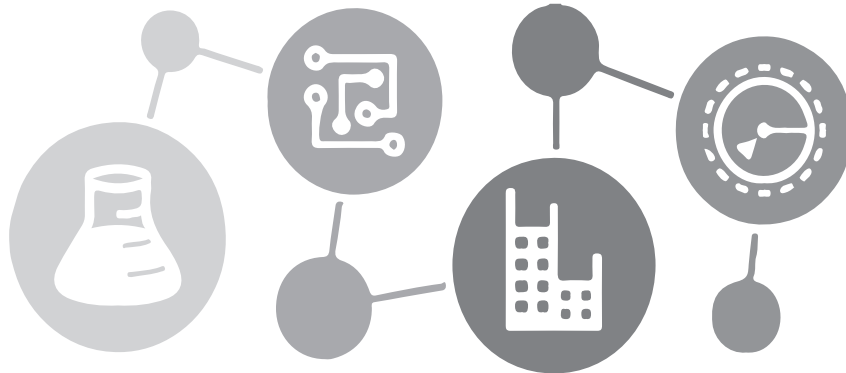Yakubu, Abdul-Aziz, MS19, 3:15 Sat
Yuan, Yuan, MS6, 3:45 Fri

Z

Zeeman, Mary Lou, MT2, 9:30 Sat
Zeeman, Mary Lou, MT2, 9:30 Sat
Zhao, Na, CP3, 10:50 Sun

Italicized names indicate session organizers

ED16 Speaker and Organizer Index

**SIAM Conference on
Applied Mathematics Education**
September 30–October 2, 2016
DoubleTree by Hilton Hotel,
Philadelphia Center City
Philadelphia, Pennsylvania, USA

A

Aboufadel, Edward, MS6, 5:00 Fri

Andresen, Felix, CP1, 10:10 Fri

Anhalt, Cynthia, MS19, 10:30 Sun

Asaki, Thomas, MS1, 9:30 Fri

B

Bargagliotti, Anna, MS5, 3:15 Fri

Barranca, Victor, MS18, 4:30 Sat

Belanger-Rioux, Rosalie, MS17, 5:00 Sat

Belanger-Rioux, Rosalie, MS19, 9:30 Sun

Belanger-Rioux, Rosalie, MS19, 9:30 Sun

Berkove, Ethan, MS18, 5:00 Sat

Bliss, Karen, MS7, 6:00 Fri

Bliss, Karen, MS11, 10:30 Sat

Bliss, Karen, MS15, 2:15 Sat

Bliss, Karen, MS15, 2:45 Sat

Boateng, Henry A., CP3, 10:10 Sun

Buriyev, Tolibjon, CP3, 10:30 Sun

Burroughs, Elizabeth A., IP1, 8:15 Fri

C

Caballero, Marcos, MS20, 11:00 Sun

Clark, Karen, MS18, 4:30 Sat

Cobb, Nell, MS19, 10:00 Sun

Collins, David, CP1, 9:50 Fri

D

David, John, MS7, 4:30 Fri

David, John, MS7, 5:30 Fri

Denne, Elizabeth, MS3, 2:45 Fri

Diaz Eaton, Carrie, MS8, 4:30 Fri

Diaz Eaton, Carrie, MS8, 4:30 Fri

Donnay, Victor, PD3, 4:30 Sat

Doolittle, Edward, MS19, 11:00 Sun

Dorff, Michael, MS4, 2:15 Fri

F

Farnell, Elin, MS4, 3:15 Fri

Fontecchio, Adam, MS17, 5:30 Sat

Fowler, Kathleen, MS15, 2:15 Sat

Fowler, Kathleen, MS16, 4:30 Sat

Fowler, Kathleen, MS16, 5:30 Sat

Fukawa-Connelly, Timothy, MS6, 5:30 Fri

G

Gallegos, Angela, MS5, 2:15 Fri

Galluzzo, Benjamin J., PD1, 9:30 Fri

Galluzzo, Benjamin J., MS11, 9:30 Sat

Galluzzo, Benjamin J., MS11, 11:00 Sat

Galluzzo, Benjamin J., PD2, 2:15 Sat

Galluzzo, Benjamin J., PD2, 2:15 Sat

Galluzzo, Benjamin J., PD3, 4:30 Sat

Galluzzo, Benjamin J., PD3, 4:30 Sat

Galluzzo, Benjamin J., PD4, 1:00 Sun

Gerritsen, Margot, IP2, 1:00 Fri

Gevertz, Jana, MS18, 4:30 Sat

Gobbert, Matthias K., MS13, 2:15 Sat

Gobbert, Matthias K., MS13, 2:15 Sat

Graf, Jonathan, CP2, 4:50 Fri

Greenberg, Ronald I., CP1, 10:30 Fri

Grinfeld, Pavel, MS17, 4:30 Sat

Grinfeld, Pavel, MS17, 4:30 Sat

Grotendorst, Johannes, CP2, 5:50 Fri

H

Harris, Leona, MS18, 5:30 Sat

Hartman, Greg, MS7, 4:30 Fri

Hernandez, Maria, IP3, 8:15 Sat

Hernandez, Maria, PD2, 2:15 Sat

Hernandez, Maria, PD3, 4:30 Sat

Hitchman, Theron J., MS3, 3:45 Fri

Honner, Patrick I., CP3, 9:50 Sun

Horntrop, David J., CP2, 5:30 Fri

Humpherys, Jeffrey, PD1, 9:30 Fri

Humpherys, Jeffrey, PD4, 1:00 Sun

Humpherys, Jeffrey, PD4, 1:00 Sun

J

Jackson, Craig, MS1, 10:30 Fri

Jamieson, Spencer, MS12, 9:30 Sat

Jungck, John, MS8, 5:30 Fri

K

Kavanagh, Katie, PD2, 2:15 Sat

Kavanagh, Katie, PD3, 4:30 Sat

Kavanagh, Katie, PD4, 1:00 Sun

Killingback, Timothy, MS14, 3:45 Sat

Kimn, Jung-Han, MS13, 3:15 Sat

Knill, Oliver, MS3, 3:15 Fri

Korten, Marianne, MS13, 2:45 Sat

Kose, Emek, MS5, 2:15 Fri

Kose, Emek, MS5, 2:15 Fri

L

LaMar, M. Drew, MS8, 4:30 Fri

LaMar, M. Drew, MS8, 5:00 Fri

Lawrence, Justin R., PP1, 8:00 Fri

Lee, Christina H., MS18, 4:30 Sat

Leisman, Katelyn J., MS9, 9:30 Sat

Levine, Margo, CP2, 6:10 Fri

Levy, Rachel, CP2, 4:30 Fri

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Levy, Rachel, PD4, 1:00 Sun

Libertini, Jessica M., MS5, 3:45 Fri

Libertini, Jessica M., MS7, 4:30 Fri

Libertini, Jessica M., MS7, 5:00 Fri

Libertini, Jessica M., PD3, 4:30 Sat

Lu, Enyue, MS13, 3:45 Sat

M

Malek-Madani, Reza, MS4, 2:15 Fri

Malthe-Sørenssen, Anders, MS20, 10:30 Sun

McClain, Kathleen, MS12, 10:30 Sat

McGehee, Richard, MS5, 2:45 Fri

Menasco, William, MS2, 3:45 Fri

Minkoff, Susan, MS2, 2:15 Fri

Minkoff, Susan, MS2, 2:15 Fri

Moon, Heather A., MS1, 9:30 Fri

Morena, Matthew A., MS10, 10:00 Sat

Mørken, Knut, MS20, 9:30 Sun

Mørken, Knut, MS20, 9:30 Sun

N

Narayan, Darren, MS1, 10:00 Fri

O

Olsen, Jan-Fredrik, MS20, 10:00 Sun

Olson, Sarah D., MS16, 5:00 Sat

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Italicized names indicate session organizers

P

Pankavich, Stephen, MS2, 3:15 Fri

Pirvu, Traian A., CP1, 10:50 Fri

Prieto Langarica, Alicia, MS9, 10:00 Sat

Prisner, Erich, MS14, 2:45 Sat

Pyzza, Pamela B., MS9, 9:30 Sat

Pyzza, Pamela B., MS9, 11:00 Sat

R

Root, Robert, MS14, 3:15 Sat

Rossbach, MaryAnne, MS12, 10:00 Sat

S

Samuels, Jason, MS6, 4:30 Fri

Santosa, Fadil, MS2, 2:45 Fri

Schecter, Stephen, MS14, 2:15 Sat

Schecter, Stephen, MS14, 2:15 Sat

Seshaiyer, Padmanabhan, MS12, 9:30 Sat

Skorczewski, Tyler, MS10, 10:30 Sat

Skufca, Joe, MS15, 3:15 Sat

Strang, Gil, MS17, 6:00 Sat

Strang, Gilbert, MS17, 4:30 Sat

Sudakov, Ivan, CP1, 11:10 Fri

Suh, Jennifer M., MS12, 9:30 Sat

Suh, Jennifer M., MS12, 11:00 Sat

Swanson, Ellen, MS5, 2:15 Fri

T

Teague, Daniel, MS11, 10:00 Sat

Teague, Daniel, PD2, 2:15 Sat

Teague, Daniel, PD3, 4:30 Sat

Tjoe, Hartono, CP3, 9:30 Sun

Tran, Hien T., MS16, 6:00 Sat

Treisman, Philip Uri, IP5, 8:15 Sun

Turner, Peter R., PD1, 9:30 Fri

Turner, Peter R., PD4, 1:00 Sun

V

Veneziani, Alessandro, MS18, 6:00 Sat

W

Wakefield, Thomas P., MS4, 3:45 Fri

Wakefield, Thomas P., MS16, 4:30 Sat

Washington, Talitha, MS8, 6:00 Fri

Weekes, Suzanne L., MS4, 2:45 Fri

Weekes, Suzanne L., IP4, 1:00 Sat

Weekes, Suzanne L., MS16, 4:30 Sat

Weiser, Brandon, MS15, 3:45 Sat

Wilson, Shelby, MS9, 10:30 Sat

Winkel, Brian, CP2, 5:10 Fri

Wojdak, Jeremy, MS1, 11:00 Fri

Y

Yao, Guangming, MS15, 2:15 Sat

Yaple, Haley, MS10, 9:30 Sat

Yaple, Haley, MS10, 11:00 Sat

Z

Zhang, Zijing, CP1, 9:30 Fri

Zobitz, John, MS10, 9:30 Sat

Zweck, John, MS3, 2:15 Fri

Zweck, John, MS3, 2:15 Fri

Zweck, John, MS6, 4:30 Fri

Italicized names indicate session organizers

MPE16 and ED16 Budget

Conference Budget
Conference on Mathematics of Planet Earth, joint with
Applied Mathematics Education
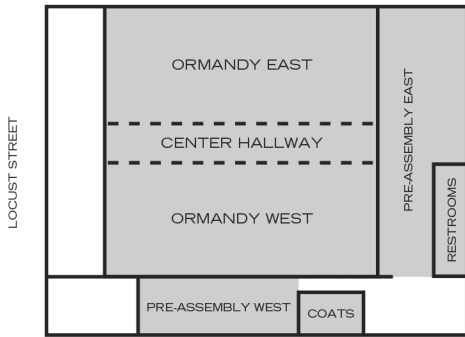**September 30 - October 2, 2016**
Philadelphia, PA

Expected Paid Attendance	300	
Revenue		
Registration Income		$93,975
	Total	$93,975
Expenses		
Printing		$700
Organizing Committee		$5,500
Invited Speakers		$14,625
Food and Beverage		$17,400
AV Equipment and Telecommunication		$27,120
Advertising		$7,000
Proceedings		$0
Conference Labor (including benefits)		$55,322
Other (supplies, staff travel, freight, misc.)		$6,250
Administrative		$15,204
Accounting/Distribution & Shipping		$8,158
Information Systems		$15,120
Customer Service		$5,504
Marketing		$8,598
Office Space (Building)		$5,591
Other SIAM Services		$5,685
	Total	$197,777
Net Conference Expense		-$103,802
Support Provided by SIAM		$103,802
		$0

Estimated Support for Travel Awards not included above:

Student and Early Career	15	$11,475

DoubleTree by Hilton Hotel, Philadelphia Center City
Hotel Floor Plan

LOBBY LEVEL
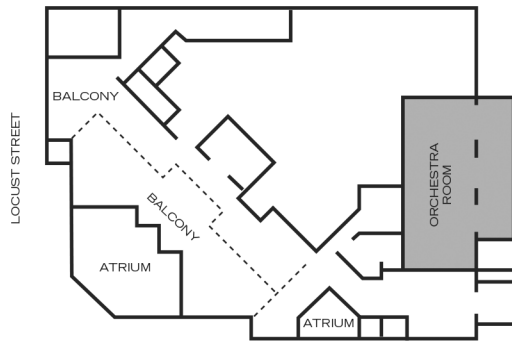
- LOCUST STREET
- ORMANDY EAST
- CENTER HALLWAY
- ORMANDY WEST
- PRE-ASSEMBLY EAST
- RESTROOMS
- PRE-ASSEMBLY WEST
- COATS
- BROAD STREET

MEZZANINE LEVEL
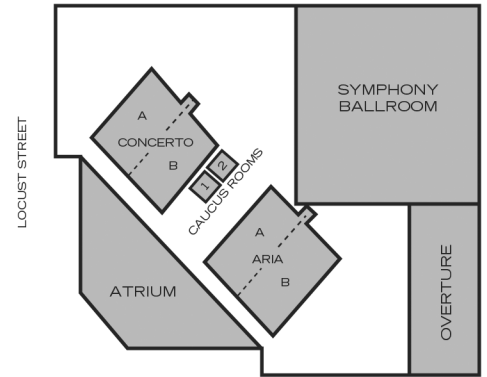
- LOCUST STREET
- BALCONY
- BALCONY
- ATRIUM
- ORCHESTRA ROOM
- ATRIUM
- BROAD STREET

THIRD FLOOR
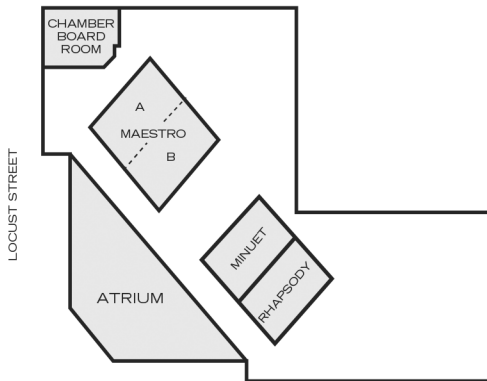
- LOCUST STREET
- SYMPHONY BALLROOM
- CONCERTO (A, B)
- CAUCUS ROOMS (1, 2)
- ARIA (A, B)
- ATRIUM
- OVERTURE
- BROAD STREET

FOURTH FLOOR
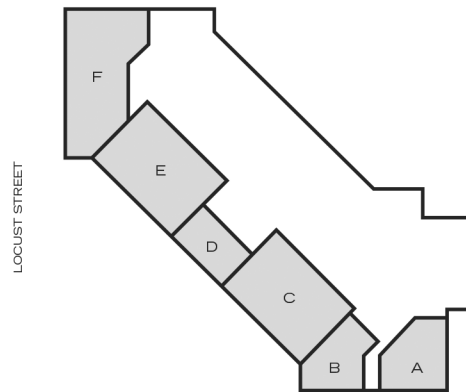
- CHAMBER BOARD ROOM
- LOCUST STREET
- MAESTRO (A, B)
- MINUET
- RHAPSODY
- ATRIUM
- BROAD STREET

**FIFTH FLOOR
ASSEMBLY ON FIVE**

- LOCUST STREET
- F
- E
- D
- C
- B
- A
- BROAD STREET