Laura C. Slivinski

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RESEARCH INTERESTS

Lagrangian data assimilation in a dynamical systems context, with a focus on ensemble methods and applications to geophysical fluid flows

EMPLOYMENT

Postdoctoral Investigator Sept 2014 – present
Department of Physical Oceanography, Woods Hole Oceanographic Institution
Woods Hole, MA 02543

Postdoctoral Fellow June 2014 – July 2014
Division of Applied Mathematics, Brown University
Providence, RI 02912

EDUCATION

PhD, Applied Mathematics May 2014
Brown University, Providence, RI
Thesis: "Lagrangian Data Assimilation and its Applications to Geophysical Fluid Flows"

ScM, Applied Mathematics May 2010
Brown University, Providence, RI
Coursework: real analysis, probability theory, information theory, statistical inference, dynamical systems, manifolds, numerical solutions of PDEs, atmospheric dynamics

BS, Mathematics, *cum laude* May 2009
University of Maryland, College Park, MD
Honors Program, Gemstone Program

PUBLICATIONS

Slivinski, L.C., and Snyder, C. Practical Estimates of the Ensemble Size Necessary for Particle Filters. (submitted)

Slivinski, L.C., Spiller, E.T., and Apte, A. A Hybrid Particle-Ensemble Kalman Filter for High-Dimensional Lagrangian Data Assimilation. *Proceedings of the Dynamic Data-driven Environmental Systems Science Conference.* Cambridge, MA, Nov 2014.

Slivinski, L.C., Spiller, E.T., Apte, A., and Sandstede, B. A Hybrid Particle-Ensemble Kalman Filter for Lagrangian Data Assimilation. *Monthly Weather Review.* (accepted)

Slivinski, L.C., Margetts, A.R., and Bliss, D.W. Sparse Space-Time Equalization with $l1$ Norm. *Asilomar Conference on Signals, Systems, and Computers.* Pacific Grove, CA (2011)

Slivinski, L.C. et al. *Specializing Pedestrian Maps to Address the Needs of People Using Wheelchairs: A Case Study in Community-Sustainable Information Systems* (Gemstone Thesis.) Retrieved from the Digital Repository at the University of Maryland (http://hdl.handle.net/1903/9076) on Sept 19, 2014.

PRESENTATIONS

An Application of Lagrangian Data Assimilation to Katama Bay Using Ensemble Methods. MURI 3D+1 Workshop, Miami, FL, Nov 2014.

A Hybrid Particle-Ensemble Kalman Filter Scheme for Lagrangian Data Assimilation. SIAM Conference on Uncertainty Quantification, Savannah, GA, April 2014.

Particle Filtering for Nonlinear Systems: Proposals and Scalability. IMA Hot Topics Workshop: Predictability in Earth Systems Processes, University of Minnesota, MN, Nov 2013.

Lagrangian Data Assimilation and Its Applications to Geophysical Fluid Flows (poster.) Sixth WMO Symposium on Data Assimilation, College Park, MD, Oct 2013.

Lagrangian Data Assimilation and Its Applications to Geophysical Fluid Flows (poster.) SIAM Annual Meeting, San Diego, CA, July 2013.

Lagrangian Data Assimilation and Its Applications to Geophysical Fluid Flows. SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2013.

Lagrangian Data Assimilation and Its Applications to Geophysical Fluid Flows. Colloquium, TIFR-CAM, Bangalore, India, Nov 2012.

Lagrangian Data Assimilation and Its Applications to Geophysical Fluid Flows. Brown-BU PDE Seminar, Boston University, Boston, MA, May 2012.

Lagrangian Data Assimilation and Its Applications to Geophysical Fluid Flows. RPI Applied Math Days, Rensselaer Polytechnic Institute, Troy, NY, Mar 2012.

Sparse Space-Time Equalization with $l1$ norm (poster.) IEEE Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, Nov 2012.

CONFERENCES & WORKSHOPS ATTENDED

Dynamic Data-driven Environmental Systems Science Conference, Cambridge, MA, Nov 2014.

SIAM Conference on Uncertainty Quantification, Savannah, GA, Apr 2014. *(Co-organizer of minisymposium.)*

IMA Hot Topics Workshop: Predictability in Earth Systems Processes, University of Minnesota, Nov 2013.

SIAM Annual Meeting and AWM Workshop, San Diego, CA, July 2013.

Interdisciplinary Summer School: Data Assimilation in the Geosciences, University of Maryland, College Park, June 2013.

SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 2013.

Research visit to TIFR-CAM, Bangalore, India, Fall 2012 and Mar 2013.

Research visit and MCRN Graduate Student/Postdoc Workshop, Chapel Hill,

NC, Sept 2012.

IUGG Conference on Mathematical Geophysics, Edinburgh, Scotland, June 2012.

International Summer School on Advanced Data Assimilation for Geosciences, Les Houches, France, Summer 2012.

IEEE Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, Nov 2011.

Workshop on Dynamics of Differential Equations, Brown University, Providence, RI, May 2012.

Conference on Geometric Methods for Infinite-Dimensional Dynamical Systems, Brown University, Providence, RI, Nov 2011.

INTERNSHIPS & LONG TERM VISITS

Graduate Student Visitor Program June 2013 – Sept 2013
National Center for Atmospheric Research

- Collaborated with NCAR staff member on a project extending previous results regarding particle filters in high-dimensional linear systems to nonlinear systems
- Numerically justified predictions about the necessary number of ensemble members needed in a particle filter applied to a nonlinear model
- Applied the optimal proposal method to this system and showed that it provides a gain in performance over the standard proposal

Graduate Intern Summer 2010
MIT Lincoln Laboratory

- Proposed novel, space-time, multiple-input multiple-output (MIMO), communications receiver algorithm based on compressive sensing concepts to increase equalizer sparsity
- Compared performance and sparsity levels of the novel receiver algorithm with traditional approaches
- Summarized final results in a technical paper and presented results to supervisors and coworkers
- Presented work at a peer-reviewed IEEE conference

Mathematics Summer Employment Program Summer 2008
National Security Agency

- Analyzed metadata files associated with a widely-used technology of interest to NSA
- Developed Perl programs to extract this information. These tools were installed into the Agency's SIGINT automatic processing system
- Coordinated project tasks with team member and project mentor
- Documented final results in technical paper and presented results to peers, supervisors, mentors, and other interested parties

Undergraduate Intern Summer 2006 & 2007, Winter 2008
Orbital Sciences Corporation

- Edited documents, including system and subsystem requirements, and reviewed documents for consistency and completeness
- Gathered, proofread, and edited slides for a Critical Design Review of four spacecraft carriers for a Hubble Space Telescope Servicing Mission
- Assisted engineers and technicians in preparing and running electrical tests on a spacecraft carrier. Reviewed and checked test results against schematics for accuracy
- Assisted mechanical and electrical engineers on various tasks pertaining to the Hubble Space Telescope Servicing Mission

TEACHING EXPERIENCE

Brown University Teaching Assistant Aug 2010 – Dec 2011

- Held office hours and recitation sessions for APMA1210 (Operations Research: Deterministic Models), APMA1200 (Operations Research: Probabilistic Models), and APMA1650 (Statistical Inference I)
- Graded students' homework and exams

University of Maryland Teaching Assistant Aug 2007 – May 2008

- Assisted students with Algebra I and II (Math003) coursework
- Graded students' homework and assisted with overall organization of the course

ACTIVITIES & MEMBERSHIPS

WHOI Postdoctoral Association — Oct 2014 – present
Secretary, Department Representative

Joint Data Assimilation Seminar — Feb 2014 – present
co-organizer since Sept 2014

Mathematics and Climate Research Network (MCRN) — July 2012 – present
Collaborator

SIAM — May 2012 – present

Rose Whelan Society of Brown — Sept 2011 – May 2014

Women in Math — May 2008 – May 2009
Secretary & Undergraduate Representative

Tutor for Algebra student — May 2008 – May 2009

Junior Class Council — Aug 2007 – May 2008

Tutor for Calculus I, II students — Jan 2007 – May 2008

HONORS, AWARDS, & SKILLS

- Recipient of the 2014 Stella Dafermos Price from the Division of Applied Mathematics at Brown University
- University of Maryland Presidential Scholarship, Distinguished Scholar, Orbital Science's Kelly H. Burke Scholarship, National Merit Scholarship Semi-Finalist
- National Society of Collegiate Scholars, Mortar Board Honor Society (Historian/Alumni Chair)

- Participated in three-year interdisciplinary undergraduate team research project (Gemstone Program), culminating in a thesis defense
- Experience with Linux, MATLAB, Perl, and Python
- US Citizen
- Held Top Secret clearance