

# Daniel S. Cooley

Assistant Professor, Department of Statistics  
Colorado State University, Fort Collins, CO 80523-1877  
cooleyd@stat.colostate.edu (970) 491-5721 www.stat.colostate.edu/~cooleyd  
February 1, 2010

## Education

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Ph.D. Applied Mathematics, University of Colorado at Boulder, October 2005

Advisors: Philippe Naveau and Douglas Nychka

Thesis title: *Statistical Analysis of Extremes Motivated by Weather and Climate Studies: Applied and Theoretical Advances*

M.S. Applied Mathematics, University of Colorado at Boulder, May 2002

B.A. Mathematics, University of Colorado at Boulder, May 1994

Honors: Graduate with Distinction

Minor: Geology

## Research Interests

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Extreme value theory, modeling multivariate extremes, heavy tailed phenomena, spatial statistics, Bayesian modeling, meteorological/environmental and ecological applications.

## Academic and Professional Experience

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August 2007-present: Colorado State University; Department of Statistics; *Assistant Professor*

October 2005-July 2007: Colorado State University; Department of Statistics; *PRIMES Postdoctoral Researcher (joint appointment)*

October 2005-June 2007: National Center for Atmospheric Research, Geophysical Statistics Project; *Postdoctoral Researcher (joint appointment)*

July 2003-October 2005: National Center for Atmospheric Research, Geophysical Statistics Project; *Research Assistant*

August 2002-October 2005: University of Colorado at Boulder, Department of Applied Mathematics; *VIGRE Research Assistant*

August 2000-May 2002: University of Colorado at Boulder, Department of Applied Mathematics; *Teaching Assistant*

August 1995-June 2000: Glenwood Springs High School, Glenwood Springs, CO; *Mathematics Teacher*

## Visiting Appointments

June 2008: Institut de Recherche Mathématique Avancée, Université Louis Pasteur Strasbourg, France

## Publications

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### Refereed Publications

- Cooley D., Sain S.R. (2010). Spatial Hierarchical Modeling of Precipitation Extremes from a Regional Climate Model. *Journal of Agricultural, Biological, and Environmental Sciences*, 15:381-402.
- Cooley D., Davis R.A., Naveau P. (2010). The Pairwise Beta Distribution: A Flexible Parametric Multivariate Model for Extremes. *Journal of Multivariate Analysis*, 101:2103-2117.
- Shamseldin E.C., Smith, R.L., Sain S.R., Mearns L., Cooley D. (2010). Downscaling Extremes: A Comparison of Extreme Value Distributions in Point-Source and Gridded Precipitation Data. *Annals of Applied Statistics*, 4:484-502.
- Schliep E., Cooley D., Sain, S.R., Hoeting, J.A. (2010). A Comparison Study of Extreme Precipitation from Six Different Regional Climate Models via Spatial Hierarchical Modeling. *Extremes*, 13:219-239.
- Fowler H.J., Cooley D., Sain, S.R., Thurston, M. (2010). Detecting change in UK extreme precipitation using results from the climateprediction.net BBC Climate Change Experiment. *Extremes* 13:241-267.
- Cooley D. (2009). Extreme Value Analysis and the Study of Climate Change, Commentary on Wigley 1988. *Climatic Change*, 97:77-83.
- Naveau P., Guillou A., Cooley D., and Diebolt J. (2009). Modeling Pairwise Dependence of Maxima in Space. *Biometrika*, 96:1-17.
- Cooley D., Nychka D., Naveau P. (2007). Bayesian Spatial Modeling of Extreme Precipitation Return Levels. *Journal of the American Statistical Association*, 102:824-840.
- Naveau P., Jomelli V., Cooley D., Grancher D., Rabatel A. (2007). Modeling Uncertainties in Lichenometry Studies. *Arctic, Antarctic, and Alpine Research*, 39:277-285.
- Jomelli, V., Grancher, D., Naveau, P., Cooley, D. and Brunstein, D. (2007). Assessment study of lichenometric methods for dating surface. *Geomorphology* 86:131-143.
- Cooley D., Naveau P., Jomelli V., Rabatel A., Grancher D. (2006). A Bayesian Hierarchical Extreme Value Model for Lichenometry. *Environmetrics*, 17:555-574.
- Cooley D., Naveau P., Poncet, P. (2006). Variograms for spatial max-stable random fields. In *Dependence in Probability and Statistics*, edited by Bertail P., Doukhan P., Soulier, P.; Springer, New York, pp. 373-390.
- Naveau P., Nogaj M., Ammann C., Yiou P., Cooley D. and Jomelli V. (2005). Statistical Analysis of Climate Extremes. *Comptes Rendus de l'Academie des Sciences*, 337:1013-1022.

### Conference Proceedings, Refereed

- Cooley D., Jomelli V., Naveau P. (2004). Spatio-temporal Analysis of Extreme Values from Lichenometric Studies and their Relationships to Climate. In *Proceedings of The International Environmetrics Society Conference 2004*, Portland, Maine.

### Other Publications

Jomelli, V., Naveau, P., Cooley D., Grancher, D., Rabatel, A. (2010). A Response to Bradwell's Commentary on Recent Statistical Studies in Lichenometry. *Geografiska Annaler: Series A, Physical Geography*, 92:485-487.

### Technical Reports

Cooley D., Davis R., Naveau P. (2007). Prediction for Max-Stable Processes via an Approximated Conditional Density. *CSU Department of Statistics Technical Report 2007/3*.

### Forthcoming Publications

Ribatet M., Cooley D., Davison A.C. (2009). Bayesian Inference from Composite Likelihoods, with an Application to Spatial Extremes Submitted.

Cooley D., Davis R.A., Naveau P. (2009). Prediction for Threshold Exceedances via an Approximated Conditional Density. In preparation.

### Presentations

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#### Invited Talks

Climate Change and Extremes; *ASA Section on Statistics and the Environment Workshop on Environmetrics, Oct. 14-16, 2010, National Center for Atmospheric Research, Boulder CO, October 15, 2010.*

Models for Spatial Extremes; *Extreme Events in Climate and Weather: An Interdisciplinary Workshop, Banff, Alberta, Canada, August 25, 2010.*

A Comparison Study of Extreme Precipitation from Six Regional Climate Models via Spatial Hierarchical Modeling; *11th International Meeting on Statistical Climatology; Edinburgh, Scotland, July 14, 2010.*

Spatial Hierarchical Models for Extremes: Modeling Both Climate and Weather Effects; *University of Georgia, February 11, 2010.*

Modeling Precipitation Extremes from Regional Climate Models; *Program on Space-time Analysis for Environmental Mapping, Epidemiology and Climate Change, opening workshop; SAMSI, Research Triangle Park, NC; September 15, 2009.*

Modeling Precipitation Extremes from Regional Climate Models; *Joint Statistical Meetings; Washington DC; Invited Session: From Climate to Weather: Regionalizing Climate Models; August 2009.*

Spatial Hierarchical Models for Extremes; *Spatial Extremes and Applications Workshop, Lausanne Switzerland; July 13-17, 2009.*

Prediction for Extremes via an Approximated Conditional Density; *IMS Asia-Pacific Rim Meetings; Seoul, Korea, June 28-July 1, 2009.*

Spatial Hierarchical Modeling of Precipitation Extremes from a Regional Climate Model; *University of Colorado Health Sciences Center, May 6, 2009.*

Spatial Hierarchical Modeling of Precipitation Extremes from a Regional Climate Model; *Spatial Extremes-Theory and Applications, Lisbon Portugal; April 6-9, 2009.*

Spatial Hierarchical Modeling of Precipitation Extremes from a Regional Climate Model; *University of Northern Colorado, April 1, 2009.*

A New Parametric Model for Multivariate Extremes and Prediction via an Angular Density Model; *University of Colorado at Boulder, Applied Math Colloquium; February 27, 2009.*

Spatial Hierarchical Modeling of Precipitation Extremes from a Regional Climate Model; *EXTREMES meeting, Davos Switzerland; January 22, 2009.*

A New Parametric Model for Multivariate Extremes and Prediction via an Angular Density Model; *EPFL, Lausanne, Switzerland; January 15, 2009.*

Spatial Hierarchical Modeling of Precipitation Extremes from a Regional Climate Model; *American Geophysical Union Fall Meeting; Session: Understanding and Modeling Hydrologic Extremes and Mathematical Representation of the Rainfall Phenomenon I; San Francisco, CA, December 15, 2008.*

Spatial Hierarchical Modeling of Precipitation Extremes from a Regional Climate Model; *University of Wyoming, October 3, 2008.*

Bayesian Hierarchical Modeling of Extremes from Regional Climate Model Simulations; *Statistical Modeling of Extremes in Data Assimilation and Filtering Approaches; Strasbourg, France, June 25, 2008.*

Estimating Dependence and Performing Prediction for Max-stable Processes; *Institut de Recherche Mathématique Avancée, Université Louis Pasteur Strasbourg, France, June 10, 2008.*

Prediction for Max-Stable Processes via an Approximated Conditional Density; *Interface 2008, Durham NC, May 22, 2008.*

Bayesian Hierarchical Modeling of Precipitation Extremes from a Regional Climate Model; *Risk Revisited, SAMSI, Durham NC, May 21, 2008.*

Estimating Dependence and Performing Prediction for Max-stable Processes; *University of Wyoming, November 9, 2007.*

Estimating Dependence and Performing Prediction for Max-stable Processes; *Brigham Young University, November 1, 2007.*

Prediction for Max-Stable Processes via an Approximated Conditional Density; *Program on Risk Analysis, Extreme Events, and Decision Theory, Kickoff Workshop, SAMSI, Durham NC; September 17, 2007.*

Spatial Characterization of Extreme Meteorological Events; Climate and Weather Effects; *10th International Meeting on Statistical Climatology; Beijing China; August 24, 2007.*

Spatial Dependence Estimation and Prediction for Max-stable Random Fields;

- *Texas A&M University, College Station TX; January 26, 2007.*
- *Colorado State University; Fort Collins, CO; January 30, 2007.*
- *Montana State University; Bozeman MT; February 1, 2007.*
- *University of Missouri; Columbia MO; February 8, 2007.*
- *University of New Mexico; Albuquerque, NM; February 15, 2007.*

Toward Spatial Prediction in Max-stable Random Fields; *Colorado School of Mines, Golden CO; November 17, 2006.*

Bayesian Modeling of Extreme Precipitation Return Levels; *Texas A&M University, College Station, TX; September 21, 2006.*

Dependence and Spatial Prediction in Max-stable Random Fields; *2006 International Workshop on Applied Probability; Storrs CT; May 15, 2006.*

Bayesian Modeling of Extreme Precipitation Return Levels; *IMS session on Spatio Temporal Statistics; ENAR, Tampa FL; March 27, 2006.*

Spatial Analysis of Return Levels for Extreme Precipitation; *Institute for the Study of Society and Environment, NCAR, Boulder; November 22, 2005.*

Modeling Extreme Precipitation for Colorado's Front Range; *Faculty/Student Seminar, Colorado College, Colo Spgs; April 29, 2005.*

Modeling Spatial Extremes for both Climate and Weather;

– *SAMSI; Research Triangle Park, NC; March 21, 2005.*

– *Johns Hopkins University; Baltimore, MD; March 28, 2005.*

– *Colorado State University; Fort Collins, CO; April 25, 2005.*

## Conference Presentations

Comparing, Attributing, and Reconciling Differences Between Inventory and Inversion Estimates for the MCI Region; *North American Carbon Program Investigators Meeting; New Orleans LA; February 2, 2011.*

Modeling Both Climate and Weather Spatial Effects for Extreme Precipitation; *Joint Statistical Meetings, Vancouver, BC, Canada, Topic Contributed Session: Climate Extremes and Paleoclimate; August 3, 2010.*

Spatial Hierarchical Modeling of Precipitation Extremes from a Regional Climate Model (Poster); *Workshop on Environmetrics, Boulder CO, October 23, 2008.*

Spatial Hierarchical Modeling of Weather Extremes from a Regional Climate Model; *Joint Statistical Meetings, Denver CO; Topic Contributed Session: Statistics of Weather and Climate; August 5, 2008.*

Spatial Hierarchical Modeling of Weather Extremes from a Regional Climate Model; *Eleventh Meeting of New Researchers in Statistics and Probability; Boulder CO; July 30, 2008.*

Modeling Extremes from Regional Climate Model Simulations; *Joint Statistical Meetings, Salt Lake City UT; Topic Contributed Session: The role of statistics in ecological and climate modeling; July 23, 2007.*

Prediction for max-stable processes via an approximated conditional density; *EVA 2007; Bern, Switzerland, July 31, 2007.*

Toward Spatial Prediction for Max-stable Random Fields (Poster); *Multivariate Methods in Environmetrics; Chicago IL; October 27, 2006.*

Dependence and Spatial Prediction in Max-stable Random Fields; *Joint Statistical Meetings, Seattle WA; Topic Contributed Session: Statistics of Extremes; Aug 10, 2006.*

An Extreme Precipitation Atlas for Colorado's Front Range; *Hydrology Days, Colorado State University; March 20, 2006.*

A Spatial Bayesian Hierarchical Model to Compute a Precipitation Return Levels Map; *Fourth Conference on Extreme Value Analysis, Gothenburg, Sweden; August 17, 2005.*

Spatial Prediction of Extreme Value Return Levels; *Joint Statistical Meetings, Minneapolis, Minnesota; Topic Contributed Session: Experiments on the Earth: Statistics for Geophysical Models and Data; August 7, 2005.*

Estimating Dependence for Spatial Extremes (Poster); *Statdep 2005: Statistics for Dependent Data; Paris/Malakoff, France; Jan 26, 2005.*

A Spatio-Temporal Extreme Value Model for Lichenometry; *Conference of the International Environmetrics Society; Portland ME; June 29, 2004.*

Spatial Scaling of Extremes; *Graybill Conference; Ft. Collins CO; June 18, 2004.*

Extreme Values for Paleoclimate Data Sets with Application in Lichenometry (Poster); *American Geophysical Union 2003 Fall Meeting; San Francisco, CA; Dec 12, 2003.*

## Grants

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07/01/09-06/30/12, Models for extremes on a spatial lattice, NSF DMS-Statistics, \$169,990 (D. Cooley, PI)

01/01/08-12/31/10, Resolving net CO<sub>2</sub> exchange in the mid-continent region of North America by comparing and reconciling results from inverse modeling and inventory-based approaches, NASA Carbon Cycle Science \$1,094,526. (S. Ogle, PI) [two months per year of support]

## Teaching

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### Colorado State University

|             |   |                  |
|-------------|---|------------------|
| STAT 192    | First Year Seminar in Mathematical Sciences | S10              |
| STAT 740    | Extreme Value Analysis                      | S09              |
| STAT 525    | Analysis of Time Series I                   | F08, F10         |
| STAT/NR 523 | Quantitative Spatial Analysis               | S08, S09, S11    |
| MATH 495    | FEScUE Seminar                              | S08              |
| STAT 511    | Design and Data Analysis for Researchers I  | F07, F09(2), F10 |
| NCSI 610    | TREE/PRIMES – Team Research in Ecology      | S07              |

### Other

Graduate Instructor, Applied Mathematics, University of Colorado at Boulder, Fall 2004  
Instructor for APPM 1360: Calculus II for Engineers.

Teaching Assistant, Applied Mathematics, University of Colorado at Boulder, 2000-2002  
Lead recitations for Calculus I, II, & III, and Differential Equations.

Lead Teaching Assistant, Applied Mathematics, University of Colorado at Boulder, 2001-02  
Oversaw the department's new teaching assistants.

Mathematics Teacher, Glenwood Springs High School, Glenwood Springs Colorado, 1995-2000  
Instructor of high school mathematics including AP Calculus.

Co-Instructor, Department of Applied Mathematics Summer Institute, July 2001, July 2002  
Calculus instructor of a two-week course for high school teachers.

Instructor, Colorado Mountain College, Summer 1999  
Taught a summer-semester introductory statistics course.

## Advising

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### Primary Advisor

Grant Weller (PhD, In Progress)

George Weigt (MS, In Progress)

Atul Sharma (MS, 2009)

Fatima Anderson (MS, 2009)

Erin Schliep (MS, 2009)

Austin Lampros (MS, 2009)

## **Committee Member**

Wuliang Sun (PhD-Computer Science, in progress)  
Joseph Bowden (PhD-Horticulture, in progress)  
Jamie Fuller (MS-Forestry, Rangeland, and Watershed Science, in progress)  
Will Newton(PhD-Mathematics, in progress)  
Chad Martin (MS-Civil Engineering, in progress)  
Mike Coleman (PhD-Civil Engineering, in progress)  
Basil Conway IV (MS, 2010)  
Nick Klausner (MS-Civil Engineering, 2010; PhD Civil Engineering, in progress)  
David Teolis (MS, 2010)  
Mark Labovitz (PhD, 2009, University of Colorado at Denver)  
Joshua French (PhD, 2009)  
E. S. (MS-Environmental and Radiological Health, 2009)  
Megan Baburek (MS, 2009)  
Josh Horstman (MS, 2008)

## **Honors/Awards**

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ASA Section on Statistics and the Environment (ENVR) JSM Presentation Award for the paper  
“Spatial Prediction of Extreme Value Return Levels”, August 2005.  
Recipient of the Maurice Davies award from the Colorado/Wyoming chapter of the American  
Statistical Association, May 2005.  
One of five TA’s campus-wide recognized by the United Government of Graduate Students for  
outstanding work and innovation as a teaching assistant, May 2002.  
Twice recognized by the students Glenwood Springs High School as the school’s outstanding teacher  
in five years of service.

## **Associations**

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Member of the American Statistical Association (2003-)  
Member of the Institute for Mathematical Statistics (2009-)  
Member of the Statistics and Environment Section of the ASA (2003-)  
Member of AGU (American Geophysical Union) (2008-)

## **Service**

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### **Departmental**

- Distance compensation ad-hoc committee, Spring 2010
- Distance degree committee, 2009-2010, 2010-2011
- Undergraduate committee, 2009-2010, 2010-2011
- Graduate screening committee, 2008-2009
- Seminar organizer, 2007-08 & 2008-09
- Library liaison for statistics department, 2007-2008

### **College/University**

- Hiring committee for postdoc position for Climate Change Impacts to Hydropower Generation in

Pacific Northwest River Basins project; P.I. Stephanie Kampf, Watershed Science, CSU, Fall 2008.

### **Professional**

- Member, NSF DMS review panel statistics, Jan 2010.
- Associate Editor, *JRSSC*, 2009-2012.
- Local organizer/Program co-chair 6th Extreme Value Analysis Conference/8th Graybill conference; Fort Collins, Colorado June 2009.
- Member ENVR JSM Presentation Award Committee, Aug 2008, Aug 2009, Aug 2010 (Chair).
- Assisted organizing New Researchers Conference; Boulder, Colorado, July 2008.
- Organizer and Chair for the Session “Extremes: Methods for environmental and meteorological studies”, JSM Conference; Seattle, WA; August 2006.
- Referee for:
  - Journal of Computational and Graphical Statistics (2006)
  - Global and Planetary Change
  - Water Resources Research
  - Advances in Water Resources
  - Annals of Applied Probability (2007)
  - Environmental and Ecological Statistics
  - Water Resources Research
  - Grant Review for NERC (UK) Flood Risk from Extreme Events program
  - Grant Review for NSF-CMG
  - Journal of Statistical Planning and Inference
  - Extremes
  - Environmetrics
  - JRSSC(2008)
  - Water Resources Research
  - JRSSC
  - Journal of Geophysical Research - Atmospheres
  - JABES
  - Advances in Water Resources (2009)
  - Water Resources Research
  - Biometrika
  - JASA
  - Biometrika (2010)
  - JASA (2)
  - American Statistician
  - JRSSC