

Rebecca E. Morss

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EDUCATION

- Feb 1999 Ph.D., Atmospheric Science, Massachusetts Institute of Technology
 Advisor: K. Emanuel
- Jun 1993 B.A. with General and Departmental Honors, Chemistry, The University of Chicago
 Graduate level coursework in Public Policy and related areas at Harvard University,
 Massachusetts Institute of Technology, University of Chicago, and University of
 Colorado at Boulder

PROFESSIONAL EXPERIENCE

- 2005– Scientist II
2002–2005 Scientist I
 Mesoscale and Microscale Meteorology Division & Institute for the Study of Society
 and Environment; National Center for Atmospheric Research (NCAR)
- 2000–2001 Post-doctoral Fellow
 Advanced Study Program; NCAR
- Jan–Feb 2000 Post-doctoral Associate
 Joint Institute for the Study of Atmospheres and Oceans; University of Washington
- 1999 Post-doctoral Associate
1994–1998 Graduate Research Assistant
 Program in Atmospheres, Oceans, and Climate; Massachusetts Institute of Technology
 Visiting Scientist at NOAA National Centers for Environmental Prediction (1997, 1998,
 1999) and NCAR Mesoscale and Microscale Meteorology Division (1995, 1996)
- 1994 Research Intern
 Science, Space, and Technology Committee; U.S. House of Representatives
- 1991–1993 Undergraduate Research Assistant
 Department of Chemistry; The University of Chicago
- 1992 Undergraduate Research Assistant
 High Altitude Observatory; NCAR

PUBLICATIONS — Refereed

- Morss, R. E., and E. Wahl, 2007: An ethical analysis of prediction and decision making: The case of the Red River flood of 1997. *Sci., Tech., and Human Values*, submitted.
- Morss, R. E., and F. Zhang, 2007: Linking meteorological education to reality: A prototype undergraduate research study of public response to Hurricane Rita forecasts. *Bull. Amer. Meteor. Soc.*, submitted.
- Morss, R. E., J. K. Lazo, B. G. Brown, H. E. Brooks, P. T. Ganderton, and B. N. Mills, 2007: Societal and economic research and applications priorities for the North American THORPEX program. *Bull. Amer. Meteor. Soc.*, submitted.
- Zhang, F., R. E. Morss, J. A. Sippel, T. K. Beckman, N. C. Clements, N. L. Hampshire, J. N. Harvey, J.

- M. Hernandez, Z. C. Morgan, R. M. Mosier, S. Wang, and S. D. Winkley, 2007: An in-person survey investigating public perceptions of and response to Hurricane Rita forecasts along the Texas Coast. *Wea. Forecasting*, in press.
- Demuth, J. L., E. Gruntfest, R. E. Morss, S. Drobot, and J. K. Lazo, 2007: Weather and Society * Integrated Studies (WAS*IS): Building a community for integrating meteorology and social science. *Bull. Amer. Meteor. Soc.*, accepted.
- Morss, R. E., and F. M. Ralph, 2007: Use of information by National Weather Service forecasters and emergency managers during CALJET and PACJET-2001. *Wea. Forecasting*, in press.
- National Research Council (including R. E. Morss), 2006: *Completing the Forecast: Characterizing and Communicating Uncertainty for Better Decisions Using Weather and Climate Forecasts*. The National Academies Press, 124 pp.
- Downton, M. W., R. E. Morss, O. V. Wilhelmi, E. C. Gruntfest, and M. L. Higgins, 2005: Interactions between scientific uncertainty and flood management decisions: Two case studies in Colorado. *Env. Hazards*, **6**, 134-146.
- Hacker, J., J. Hansen, J. Berner, Y. Chen, G. Eshel, G. Hakim, S. Lazarus, S. Majumdar, R. Morss, A. Poje, V. Sheremet, Y. Tang, and C. Webb, 2005: Future scientific directions: Predictability. *Bull. Amer. Meteor. Soc.*, **86**, 1733–1737.
- Morss, R. E., O. V. Wilhelmi, M. W. Downton, and E. Gruntfest, 2005: Flood risk, uncertainty, and scientific information for decision-making: Lessons from an interdisciplinary project. *Bull. Amer. Meteor. Soc.*, **86**, 1593–1601.
- Morss, R. E., and W. H. Hooke, 2005: The outlook for U.S. meteorological research in a commercializing world: Fair early, but clouds moving in? *Bull. Amer. Meteor. Soc.*, **86**, 921–936.
- Morss, R. E., K. A. Miller, and M. S. Vasil, 2005: A systematic economic approach to evaluating public investment in observations for weather forecasting. *Mon. Wea. Rev.*, **133**, 374–388.
- Morss, R. E., 2005: Problem definition in atmospheric science public policy: The example of observing system design for weather prediction. *Bull. Amer. Meteor. Soc.*, **86**, 181–191.
- Morss, R. E., and D. S. Battisti, 2004: Designing efficient observing networks for ENSO prediction. *J. Clim.*, **17**, 3074–3089.
- Morss, R. E., and D. S. Battisti, 2004: Evaluating observing requirements for ENSO prediction: Experiments with an intermediate coupled model. *J. Clim.*, **17**, 3057–3073.
- Kim, H. M., M. C. Morgan, and R. E. Morss, 2004: Evolution of analysis error and adjoint-based sensitivities: Implications for adaptive observations. *J. Atm. Sci.*, **61**, 795–812.
- Corazza, M., E. Kalnay, D. J. Patil, S.-C. Yang, R. Morss, M. Cai, I. Szunyogh, B. R. Hunt, and J. A. Yorke, 2003: Use of the breeding technique to estimate the structure of the analysis “errors of the day”. *Nonlin. Proc. Geophys.*, **10**, 233–243.
- Pielke, Jr., R. A., et al. (including R. Morss), 2003: The USWRP workshop on the weather research needs of the private sector. *Bull. Amer. Meteor. Soc.*, **84**, ES53–ES67.
- Morss, R. E., and K. A. Emanuel, 2002: Influence of added observations on analysis and forecast errors: Results from idealized systems. *Quart. J. Roy. Meteor. Soc.*, **128**, 285–321.
- Hamill, T. M., C. Snyder, and R. E. Morss, 2002: Analysis-error statistics of a quasi-geostrophic model using 3-dimensional variational assimilation. *Mon. Wea. Rev.*, **130**, 2777–2790.
- Morss, R. E., K. A. Emanuel, and C. Snyder, 2001: Idealized adaptive observation strategies for improving numerical weather prediction. *J. Atm. Sci.*, **58**, 210–232.
- Szunyogh, I., Z. Toth, R. E. Morss, S. Majumdar, B. Etherton, and C. H. Bishop, 2000: The effect of targeted dropsonde observations during the 1999 Winter Storm Reconnaissance Program. *Mon.*

Wea. Rev., **128**, 3520–3537.

- Hamill, T. M., C. Snyder, and R. E. Morss, 2000: A comparison of probabilistic forecasts from bred, singular-vector, and perturbed observation ensembles. *Mon. Wea. Rev.*, **128**, 1835–1851.
- Langland, R. H., Z. Toth, R. Gelaro, I. Szunyogh, M. A. Shapiro, S. Majumdar, R. E. Morss, G. D. Rohaly, C. Velden, N. Bond, and C. Bishop, 1999: The North Pacific Experiment (NORPEX-98): Targeted observations for improved North American weather forecasts. *Bull. Amer. Meteor. Soc.*, **80**, 1363–1384.
- Szunyogh, I., Z. Toth, K. A. Emanuel, C. Bishop, J. Woolen, T. Marchok, R. E. Morss, and C. Snyder, 1999: Ensemble-based targeting experiments during FASTEX: The effect of dropsonde data from the Lear jet. *Quart. J. Roy. Meteor. Soc.*, **125**, 3189–3217.
- Kash, P. W., G. C. G. Waschewsky, R. E. Morss, L. J. Butler, and M. M. Francl, 1994: Competing C-Br and C-C bond fission following $^1[n(O), \pi^*(C:O)]$ excitation in bromoacetone: Conformation dependence of nonadiabaticity at a conical intersection. *J. Chem. Phys.*, **100**, 3463–3475.

PUBLICATIONS — Non-refereed Essays and Book Reviews

- Glantz, M. H., L. M. Cavanaugh, R. E. Morss, E. Gruntfest, and J. Tribbia, 2006: Will recent “super” storms lead to seasons of superstorms? *Bull. Amer. Meteor. Soc.*, **87**, 1173-1174.
- Morss, R. E., 2005: Science fiction, science fact, and society: Meteorology in recent popular film and fiction. *Bull. Amer. Meteor. Soc.*, **86**, 691-694.
- Morss, R. E., 2002: Review of “Living on the Edge of the Gulf: The West Florida and Alabama Coast” by D. M. Bush, W. J. Neal, O. H. Pilkey, *et al.*. *Bull. Amer. Meteor. Soc.*, **83**, 1505-1507.

LEADERSHIP, SERVICE, and AWARDS (selected)

- | | |
|--------------|--|
| 2006–2007 | American Meteorological Society Annual Partnership Topic Committee on Feasibility of Multi-Partner, Multifunctional Mesoscale Observing Networks |
| 2006 | Co-convener, American Geophysical Union sessions on Creating Usable Science in the 21 st Century: Strategies for More Effectively Connecting Science to Societal Needs |
| 2006 | Co-organizer, Workshop on North American THORPEX Societal and Economic Research and Applications |
| 2006 | Co-chair, UCAR/NCAR Junior Faculty Forum on Future Scientific Directions: The Science of Communicating Uncertainty in Weather and Climate |
| 2005–2006 | National Research Council Committee on Estimating and Communicating Uncertainty in Weather and Climate Forecasts |
| 2005–2006 | Invited co-organizer and co-chair, Disaster Simulation and Mitigation session, National Academies of Engineering First Indo-U.S. Frontiers of Engineering Symposium |
| 2005–2006 | Invited organizer and chair, Academic session, Symposium on the Public/Private Sector Partnership, 2006 American Meteorological Society annual meeting |
| 2005–2006 | Program Committee, NCAR / Inter-American Institute Colloquium on Policy Planning and Decision Making Involving Climate Change and Variability (received NCAR SERE Laboratory Significant Accomplishment Award) |
| 2005– | Weather and Society * Integrated Studies Workshops (nominated for UCAR Education and Outreach Outstanding Accomplishment Award) |
| 2005– | American Meteorological Society Board on Enterprise Communication |
| 2005– | Steering Committee, NCAR / Inter-American Institute Program |
| 2005 | NCAR Scientist / Research Engineer I Search Committee |
| 2004, 2005 | Science mentor, UCAR Significant Opportunities in Atmospheric Research and Science Program |
| Jan-Jun 2005 | NCAR/UCAR Leadership Academy |

2003–2005 Internal Advisory Committee, NCAR Initiative on Weather and Climate Impact Assessment Science

2003–2002–2005 NOAA THORPEX Science and Implementation Team
THORPEX International Science Steering Committee

2002–2005 Co-chair, International Societal and Economic Applications Subprogram, THORPEX: A Global Atmospheric Research Programme

2004 External Advisory Committee, NCAR Atmospheric Technology Division

2001–2003 UCAR Distinguished Achievement and Outstanding Accomplishments Awards Jury

Jul 2001 Moderator, U.S. Congressional Briefing: “Hurricanes: The Danger, The Impacts, The Outlook”

Jun 2001 American Meteorological Society Summer Policy Colloquium

2000–2001 NCAR Advanced Study Program Post-doctoral Fellowship

1995–1997 Graduate Student Representative, MIT Faculty Committee on Student Affairs

1994–1997 MIT Program in Atmospheres, Oceans, and Climate Charney Prize

1994–1995 MIT Clare Booth Luce Fellowship

1992–1993 University of Chicago Student Marshal

Jun 1992 inducted to Phi Beta Kappa

1991–1993 Goldwater Scholarship for Excellence in Science and Mathematics Education

1989–1993 University of Chicago / Argonne National Laboratory full tuition scholarship

ongoing Session chair, breakout group leader, and discussion panel member at multiple workshops and conferences

ongoing Reviewer for multiple journals (*Atm.-Oc.*, *Atm. Env.*, *Atm. Sci. Letters*, *Bull. Amer. Meteor. Soc.*, *EOS*, *Geoforum*, *J. Appl. Met.*, *J. Atm. Sci.*, *J. Clim.*, *Mon. Wea. Rev.*, *Nat. Haz.*, *Quart. J. Roy. Meteor. Soc.*, *Wea. Forecasting*) and funding agencies (U.K. National Environment Research Council, U.S. National Oceanic and Atmospheric Administration, U.S. National Science Foundation)

SUPERVISORY, ADVISING, and TEACHING EXPERIENCE

2006–2006 Supervisor, Julie Demuth, NCAR associate scientist
Co-developer and Guest Instructor, “Direct Studies for Undergraduate Research: Uncertainties and Societal Impacts of Hurricane Rita's Forecast,” Texas A&M University

2004–2006 Supervisor, Asim Zia, NCAR post-doctoral researcher

2004–2006 Supervisor, Liam Cavanaugh, undergraduate student at University of Colorado (Boulder) and NCAR student assistant

summer 2005 Science Co-Mentor, Braxton Edwards, NCAR SOARS protégé

summer 2004 Science Co-Mentor, Clarence Mann, NCAR SOARS protégé

2003 Supervisor, Maxine Cram Vasil, graduate student at University of Colorado (Boulder) and NCAR student assistant

2001 Guest Lecturer on Numerical Weather Prediction and Predictability, “The Earth Climate System,” University of Colorado at Boulder

1992–1993 Teaching Assistant, University of Chicago Department of Mathematics

INVITED MAJOR PRESENTATIONS

Jan 2007 Special Joint Session on Communicating Uncertainty, American Meteorological Society Annual Meeting; San Antonio, TX

Dec 2006 Public Policy Institute of California; San Francisco, CA

2005, 2006 Weather and Society * Integrated Studies Workshops; Boulder, CO and Norman, OK

Apr 2005 National Science Foundation; Arlington, VA

Feb 2005 Cooperative Institute for Research in the Atmosphere; Fort Collins, CO
 Nov 2004 Purdue University; West Lafayette, IN
 Oct 2004 Santa Fe Institute; Santa Fe, NM
 Aug 2004 USWRP Open Workshop on the Implementation of THORPEX; Boulder, CO
 Oct 2003 Texas A&M University; College Station, TX
 Sep 2003 Lamont-Doherty Earth Observatory; Palisades, NY
 Sep 2003 Columbia University; New York, NY
 Aug 2003 North American THORPEX Workshop; College Park, MD
 Dec 2002 THORPEX International Science Plan Workshop; Monterey, CA
 Oct 2002 Mesoscale Alpine Program Societal Impact Workshop; Bad Tolz, Germany
 Apr 2001 National Center for Atmospheric Research; Boulder, CO
 Nov 1999 University of Washington; Seattle, WA
 May 1999 University of Oklahoma; Norman, OK
 Mar 1999 University of Wisconsin; Madison, WI
 Jan 1999 National Centers for Environmental Prediction; Camp Springs, MD
 Nov 1998 Naval Research Laboratory; Monterey, CA

PUBLICATIONS — Non-refereed Conference Preprints

- Demuth, J., R. E. Morss, J. K. Lazo, and A. E. Stewart: Assessing how the U.S. public understands and uses weather forecast uncertainty information. Preprints, *16th AMS Conference on Applied Climatology*, Jan 2007, San Antonio, TX.
- Mills, B., R. Morss, J. Lazo, H. Brooks, B. Brown, and P. Ganderton: A societal and economic research and applications agenda for the North American THORPEX programme. Proceedings, *Second THORPEX International Science Symposium*, Dec 2006, Landshut, Germany.
- Mills, B., and R. Morss: What is a high impact weather forecast? Proceedings, *First THORPEX International Science Symposium*, Dec 2004, Montreal, Canada.
- Morss, R. E., and K. A. Miller: Evaluating the optimal level and mix of public investment in observations for weather prediction: An economic approach. Proceedings, *First THORPEX International Science Symposium*, Dec 2004, Montreal, Canada.
- Zia, A., R. Morss, and J. Lazo: Societal value of improved Quantitative Precipitation Forecasts: A synthesis. Proceedings, *First THORPEX International Science Symposium*, Dec 2004, Montreal, Canada.
- Davis, C., B. G. Brown, R. Bullock, M. Chapman, K. Manning, R. Morss, and A. Takacs: Verification techniques appropriate for cloud-resolving NWP models. Preprints, *20th AMS Conference on Weather Analysis and Forecasting / 16th Conference on Numerical Weather Prediction*, Jan 2004, Seattle, WA.
- Bullock, R., B. G. Brown, C. A. Davis, M. Chapman, K. W. Manning, and R. Morss: An object-oriented approach to the verification of Quantitative Precipitation Forecasts: Part I-Methodology. Preprints, *17th AMS Conference on Probability and Statistics in the Atmospheric Sciences*, Jan 2004, Seattle, WA.
- Chapman, M., R. Bullock, B. G. Brown, C. A. Davis, K. W. Manning, R. Morss, and A. Takacs: An object oriented approach to the verification of Quantitative Precipitation Forecasts: Part II-Examples. Preprints, *17th AMS Conference on Probability and Statistics in the Atmospheric Sciences*, Jan 2004, Seattle, WA.
- Morss, R. E.: Assessing the needs of users of warm season quantitative precipitation forecasts in Colorado. Preprints, *AMS Symposium on the Impacts of Water Variability: Benefits and Challenges*, Feb 2003, Long Beach, CA.

- Downton, M. W., H. Cullen, R. Morss, O. Wilhelmi, and B. Rajagopalan: Problems of climate variability and uncertainty in flood hazard planning for the Colorado Front Range. Preprints, *AMS Symposium on the Impacts of Water Variability: Benefits and Challenges*, Feb 2003, Long Beach, CA.
- Toth, Z., I. Szunyogh, C. Bishop, S. Majumdar, R. Morss, J. Moskaitis, D. Reynolds, D. Weinbrenner, D. Michaud, N. Surgi, M. Ralph, J. Parrish, J. Talbot, J. Pavone, and S. Lord: Adaptive observations at NCEP: Past, present, and future. Preprints, *AMS Symposium on Observations, Data Assimilation, and Probabilistic Prediction*, Jan 2002, Orlando, FL.
- Morss, R. E., and D. S. Battisti: Observing networks for ENSO prediction: Experiments with a simplified model. Preprints, *5th AMS Symposium on Integrated Observing Systems*, Jan 2001, Albuquerque, NM.
- Kim, H. M., M. C. Morgan, and R. E. Morss: Estimation of uncertainties in atmospheric data assimilation using singular vectors. Preprints, *14th AMS Conference on Numerical Weather Prediction*, Jan 2001, Albuquerque, NM.
- Toth, Z., I. Szunyogh, C. Bishop, S. Majumdar, R. Morss, and S. Lord: The use of targeted observations in operational numerical weather forecasting. Preprints, *5th AMS Symposium on Integrated Observing Systems*, Jan 2001, Albuquerque, NM.
- Toth, Z., I. Szunyogh, S. Majumdar, R. Morss, B. Etherton, C. Bishop, S. Lord, M. Ralph, O. Persson, and Z.-X. Pu: Targeted observations at NCEP: Toward an operational implementation. Preprints, *4th AMS Symposium on Integrated Observing Systems*, Jan 2000, Long Beach, CA.
- Toth, Z., I. Szunyogh, S. Majumdar, R. Morss, B. Etherton, C. Bishop, and S. Lord: The 1999 Winter Storm Reconnaissance program. Preprints, *13th AMS Conference on Numerical Weather Prediction*, Sep 1999, Denver, CO.
- Szunyogh, I., Z. Toth, S. Majumdar, R. Morss, C. Bishop, and S. Lord: Ensemble-based targeted observations during NORPEX. Preprints, *3rd AMS Symposium on Integrated Observing Systems*, Jan 1999, Dallas, TX.
- Morss, R. E., K. A. Emanuel, and C. Snyder: Adaptive observations in a quasi-geostrophic model. Preprints, *12th AMS Conference on Numerical Weather Prediction*, Jan 1998, Phoenix, AZ.
- Toth, Z., I. Szunyogh, K. Emanuel, C. Snyder, J. Woollen, W. Wu, T. Marchok, R. Morss and C. Bishop: Ensemble-based targeted observations during FASTEX. Preprints, *12th AMS Conference on Numerical Weather Prediction*, Jan 1998, Phoenix, AZ.
- Emanuel, K. A., E. N. Lorenz, and R. E. Morss: Adaptive observations. Preprints, *11th AMS Conference on Numerical Weather Prediction*, Aug 1996, Norfolk, VA.
- Numerous additional conference/workshop abstracts, posters, and presentations.

FUNDED PROPOSALS

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| 2005–2006 | “Towards a Focused NCAR-THORPEX Program.” Co-I (Lead PI: D. Parsons); funded by NCAR Opportunity Fund. |
| 2004– | “Collaborative Program on the Societal Impacts and Economic Benefits of Weather Information.” Co-PI; funded by U.S. Weather Research Program / National Oceanic and Atmospheric Administration / National Science Foundation. |
| 2003–2005 | “Superstorm 1993: A Case-Scenario Approach for Integrating Meteorological and Societal Research.” Co-PI (with M. Glantz, J. Tribbia); funded by NCAR Opportunity Fund and National Science Foundation. |
| 2001–2003 | “Development of Diagnostic Approaches for Verifying Quantitative Precipitation Forecasts.” Co-I (Lead PI: B. Brown); funded by U.S. Weather Research Program. |