
DANIEL S. COHAN

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Dept. of Civil & Environmental Engineering
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EDUCATION

- 2004 Ph.D., Atmospheric Sciences
Georgia Institute of Technology, Atlanta, GA
Thesis: "Photochemical formation and cost-efficient abatement of ozone: High-order sensitivity analysis"
Minor: Transportation Policy and Economics
- 1998 B.A., Applied Mathematics
Harvard University, Cambridge, MA

EMPLOYMENT

- 2006 – Assistant Professor of Environmental Engineering, Rice University
- 2004 – 2006 Environmental Specialist, Georgia Environmental Protection Division
- 1999 – 2004 Graduate Research Assistant, Georgia Institute of Technology
- 1998 – 1999 Fulbright Scholar to Australia, CRC - Southern Hemisphere Meteorology
- 1997 – 1997 Research Intern, Northeast States for Coordinated Air Use Management
- 1995 – 1998 Teaching Fellow and Research Assistant, Harvard University

SPONSORED RESEARCH

Grants funded as Principal Investigator:

- "NASA Air Quality Applied Sciences Team." National Aeronautics and Space Administration. 10/2011 – 9/2016. \$749,650. (plus supplement of \$50,827 in 2012).
- "Application of Satellite Observations to Ozone Attainment Planning in Texas." National Aeronautics and Space Administration. Co-Investigator: A. Pour-Biazar. 8/2010 – 7/2013. \$397,161.
- "CAREER: Ground-truthing Ozone and Particulate Matter Sensitivities to Emissions Trends." National Science Foundation. 7/2009 – 6/2014. \$497,770.
- "Factors Influencing Ozone-Precursor Response in Texas Attainment Modeling." Texas Air Quality Research Program. Co-Investigators: B. Koo, G. Yarwood, and X. Xiao. 10/2010 – 8/2011. \$128,851.
- "Incorporating Uncertainty Analysis into Integrated Air Quality Planning." U.S. Environmental Protection Agency STAR Grant. Co-Investigators: D. Cox, M. Bell, J. Boylan, A. Marmur, M. Bergin. 10/2007 – 4/2010. \$299,770.
- "Integrated Economic, Environmental, and Reliability Modeling of Power System Growth." Shell Center for Sustainability. Co-Investigators: L. Duenas-Osorio, P. Hartley, and K. Medlock. 1/2008 – 1/2009. \$32,000.

- “Sustainable Production and Deployment of Biodiesel in Texas.” Shell Center for Sustainability. Co-Investigators: K. Zygourakis and R. Gonzalez. 1/2008 – 1/2009. \$50,600.
- “A Roadmap to Clean Air and Sustainable Energy in Texas.” Texas Business for Clean Air. Co-Investigator: Birnur Buzcu-Guven. 6/2008 – 8/2008. \$41,494.
- “Exploratory Study of Power Systems Options in Texas.” Rice University Energy and Environmental Systems Institute. 7/2007 – 8/2008. \$5,000.

Grants funded as Co-P.I.:

Camille and Henry Dreyfus Foundation, funding to support Dreyfus Postdoctoral Fellow in Environmental Chemistry. P.I.: R. Griffin. 11/2009 – 10/2011. \$120,000.

Subawards:

- “Clean Air Benefits Estimation Project.” Houston Endowment. 8/2008 – 8/2009. (Subcontract from University of Texas School of Public Health, \$65,000).
- “Air Quality Modeling of TexAQS-II Episode with Data Assimilation.” Texas Environmental Research Consortium. 4/2008 – 8/2009. (Subcontract from University of Houston, \$33,700).
- “Incorporation of High-Order Decoupled Direct Method (HDDM) Sensitivity Analysis into CAMx.” Texas Commission on Environmental Quality. 6/2007 – 8/2007. (Subcontract from ENVIRON International Corp., \$18,878).
- “A Seasonal Perspective on Regional Air Quality in Central California.” U.S. Department of Energy. 7/2006 – 6/2007. (Subcontract from Lawrence Berkeley National Laboratory, \$25,000).
- “Regional Transport Modeling for East Texas.” Houston Advanced Research Center. 1/2006 – 6/2006. (Subcontract from University of Houston, \$3,500).

PEER-REVIEWED PUBLICATIONS

- Zhou, W., D.S. Cohan, and S.L. Napelenok (2013). Factors affecting CMAQ predictions of ozone improvements following the NO_x SIP Call. *Atmospheric Environment*, 70, 236-244. doi: 10.1016/j.atmosenv.2012.12.038.
- Digar, A., D.S. Cohan, X. Xiao, K.M. Foley, B. Koo, and G. Yarwood (2013). Constraining ozone-precursor responsiveness using ambient measurements. *Journal of Geophysical Research*, 118(2), 1005-1019, doi:10.1029/2012JD018100.
- Zhou, W., D.S. Cohan, R.W. Pinder, J.A. Neuman, J.S. Holloway, J. Peischl, T.B. Ryerson, J.B. Nowak, F. Flocke, and W.G. Zheng (2012). Observation and modeling of the evolution of Texas power plant plumes. *Atmospheric Chemistry and Physics*, 12, 455-468. doi: 10.5194/acp-12-455-2012.
- Pegues, A.H., D.S. Cohan, A. Digar, C. Douglass, and R.S. Wilson (2012). Efficacy of recent state implementation plans for 8-hour ozone. *Journal of the Air & Waste Management Association*, 62(2), 252-261. doi: 10.1080/10473289.2011.646049.
- Cohan, D.S., and S.L. Napelenok (2011). Atmospheric response modeling for decision support. *Atmosphere*, 2(3), 407-425. doi:10.3390/atmos2030407.

- Digar, A., D.S. Cohan, M.L. Bell, and W. Tang (2011). Uncertainties influencing health-based prioritization of ozone abatement strategies. *Environmental Science & Technology*, 45(1), 189-196. doi: 10.1021/es102581e.
- Ji, M., D.S. Cohan, and M.L. Bell (2011). Meta-analysis of the association between short-term exposure to ambient ozone and respiratory hospital admissions. *Environmental Research Letters*, 6, 11 pp., doi: 10.1088/1748-9326/6/2/024006. (selected by ERL as a Highlight of 2011).
- Cohan, D.S., and C. Douglass (2011). Potential emissions reductions from grandfathered coal power plants in the United States. *Energy Policy*, 39(9), 4816-4822, doi: 10.1016/j.enpol.2011.06.039.
- Tang, W., D.S. Cohan, G.A. Morris, D.W. Byun, W.T. Luke (2011). Influence of vertical mixing uncertainties on ozone simulation in CMAQ. *Atmospheric Environment*, 45(17), 2898-2909. doi: 10.1016/j.atmosenv.2011.01.057.
- Digar, A., D.S. Cohan, D.D. Cox, B.-Y. Kim, and J.W. Boylan (2011). Likelihood of achieving air quality targets under model uncertainties. *Environmental Science & Technology*, 45, 189-196, doi: 10.1021/es102581e.
- Wang, X., Y. Zhang, Y. Hu, W. Zhou, L. Zeng, M. Hu, D.S. Cohan, A.G. Russell (2011). Decoupled direct sensitivity analysis of regional ozone pollution over the Pearl River Delta during the PRIDE-PRD2004 campaign. *Atmospheric Environment*, 45(28), 4941-4949, doi:10.1016/j.atmosenv.2011.06.006.
- Cohan, D.S. (2011). An energy and environment undergraduate course emphasizing comparative metrics. *ASCE Journal of Professional Issues in Engineering Education & Practice*, 137(2), 64-68, doi:10.1061/(ASCE)EI.1943-5541.0000045.
- Xiao, X., D.S. Cohan, D.W. Byun, and F. Ngan. (2010). Highly nonlinear ozone formation in the Houston region and implications for emission controls. *Journal of Geophysical Research*, 115, D23309, doi:10.1029/2010JD014435.
- Digar, A., and D.S. Cohan (2010). Efficient characterization of pollutant-emission response under parametric uncertainty. *Environmental Science & Technology*, 44(17), 6724-6730, doi:10.1021/es903743t.
- Cohan, D.S., B. Koo, and G. Yarwood (2010). Influence of uncertain reaction rates on ozone sensitivity to emissions in Houston. *Atmospheric Environment*, 44, 3101-3109.
- Tian, D., M.S. Bergin, D.S. Cohan, S. Napelenok, Y. Hu, M. Chang, A.G. Russell (2010). Uncertainty analysis of ozone formation and response to emission controls using high-order sensitivities. *Journal of the Air & Waste Management Association*, 60, 797-804.
- Kim, S., D.W. Byun, and D. Cohan (2009). Contributions of inter- and intra-state emissions to ozone over Dallas-Fort Worth, Texas. *Civil Engineering and Environmental Systems*, 26, 103-116.
- Jin, L., S. Tonse, D.S. Cohan, X. Mao, R.A. Harley, and N.J. Brown (2008). Direct sensitivity analysis of ozone formation in California's San Joaquin Valley. *Environmental Science & Technology*, 42, 3683-3689.
- Bergin, M.S., A.G. Russell, M.T. Odman, D.S. Cohan, and W.L. Chameides (2008). Single-source impact analysis using 3D air quality models. *Journal of the Air & Waste Management Association*, 58, 1351-1359.

- Napelenok, S.L., D.S. Cohan, M.T. Odman, and S. Tonse (2008). Extension and evaluation of sensitivity analysis capabilities in a photochemical model. *Environmental Modelling & Software*, 23, 994-999.
- Cohan, D.S., J.W. Boylan, A. Marmur, and M.N. Khan (2007). An integrated framework for multi-pollutant air quality management and its application in Georgia. *Environmental Management*, 40, 545-554.
- Cohan, D.S., D. Tian, Y. Hu, and A.G. Russell (2006). Control strategy optimization for attainment and exposure mitigation: Case study for ozone in Macon, Georgia. *Environmental Management*, 38, 451-462.
- Cohan, D.S., Y. Hu, and A.G. Russell (2006). Dependence of ozone sensitivity analysis on grid resolution. *Atmospheric Environment*, 40, 126-135.
- Chestnut, L.G., D.S. Cohan, and D.M. Mills (2006). Cost-benefit analysis in the selection of efficient multipollutant strategies. *Journal of the Air & Waste Management Association*, 56, 530-536.
- Greenwald, R., M.H. Bergin, J. Xu, D. Cohan, G. Hoogenboom, and W.L. Chameides (2006). The influence of aerosols on crop production: A study using the CERES crop model. *Agricultural Systems*, 89, 390-413.
- Napelenok, S.L., D.S. Cohan, Y. Hu, and A.G. Russell (2006). Decoupled direct 3D sensitivity analysis for particulate matter. *Atmospheric Environment*, 40, 6112-6121.
- Cohan, D.S., A. Hakami, Y. Hu, and A.G. Russell (2005). Nonlinear response of ozone to emissions: Source apportionment and sensitivity analysis. *Environmental Science & Technology*, 39, 6739-6748.
- Cohan, D.S., G.A. Sturrock, A.P. Biazar, and P.J. Fraser (2003). Atmospheric methyl iodide at Cape Grim, Tasmania, from AGAGE observations. *Journal of Atmospheric Chemistry*, 44, 131-150.
- Cohan, D.S., J. Xu, R. Greenwald, M.H. Bergin, and W.L. Chameides (2002). Impact of atmospheric aerosol light scattering and absorption on C-uptake by terrestrial plants. *Global Biogeochemical Cycles*, doi:10.1029/2001GB001441.
- Cohan, D.S., M.G. Shultz, D.J. Jacob, B.G. Heikes, D.R. Blake (1999). Convective injection and photochemical decay of peroxides in the tropical upper troposphere: Methyl iodide as a tracer of marine convection. *Journal of Geophysical Research*, 104, 5717-5724.

BOOK CHAPTERS

- Zhou, W., D.S. Cohan (2010). Nonlinear formation of ozone in power plant plumes in Texas. *Air Pollution Modeling and Its Application XX*, Eds. D.G. Steyn and S.T. Rao, Springer Publishing, pp. 125-129.
- Cohan, D.S., A. Digar, M.L. Bell (2010). Influence of concentration-response temporal metrics on control strategy optimization. *Air Pollution Modeling and Its Application XX*, Eds. D.G. Steyn and S.T. Rao, Springer Publishing, pp. 421-425.
- Cohan, D., A. Russell (2007). Cost-optimized air pollution control using high-order sensitivity analysis. *Air Pollution Modeling and Its Application XVII*, Eds. C. Borrego and A.-L. Norman, Springer Publishing, pp. 48-58.

Cohan, D., Y. Hu, A. Russell (2007). Alternative approaches to diagnosing ozone production regime. *Air Pollution Modeling and Its Application XVII*, Eds. C. Borrego and A.-L. Norman, Springer Publishing, pp. 140-148.

REPORTS

Cohan, D., B. Buzcu-Guven, D. Hodges-Copple, D. Bullock, and R. Tomlin (2009). Policy Options for Clean Air and Sustainable Energy in Texas. Prepared for Texas Business for Clean Air.

Koo, B., G. Yarwood, and D. Cohan (2007). Incorporation of High-order Decoupled Direct Method (HDDM) Sensitivity Analysis Capability into CAMx. Prepared for Texas Commission on Environmental Quality.

Cohan, D. (2004). Programmer's guide to the Decoupled Direct Method for the Community Multi-scale Air Quality Model.

SCIENTIFIC PRESENTATIONS

Invited:

"Air Quality Responses to Emissions Trends." University of Houston departmental seminar, Houston, TX, 2013.

"Uncertainties Influencing Health-Based Prioritization of Ozone Abatement Options." AAAS Annual Conference, Boston, MA, 2013.

"Characterizing ozone response to emissions and its uncertainty." Harvard University seminar, Cambridge, MA, 2012.

"State of the Air: Air Quality and Climate Change in Texas and Beyond." American Meteorological Society Houston Chapter, Houston, TX, 2012.

"Characterizing uncertainty in atmospheric response modeling." Texas A&M University departmental seminar, College Station, TX, 2011.

"Assessing the Uncertainties of SIP Strategy Modeling." Invited presentation to California Air Resources Board, Sacramento, CA, 2010.

"Uncertainty in pollutant-emission sensitivity modeling." University of North Carolina air group seminar, Chapel, NC, 2010.

"Uncertainty in integrated air quality planning." Georgia Air Policy Symposium, Atlanta, GA, 2009.

"Reaction rate uncertainty in the development of control strategies." International Conference on Atmospheric Chemical Mechanisms, Davis, CA, 2008.

"Air quality modeling to inform health impact analyses." University of Texas School of Public Health departmental seminar, Houston, TX, 2008.

"Photochemical sensitivity analysis and its application to policy." University of Houston Department of Civil & Environmental Engineering, Houston, TX, 2008.

"High-order sensitivity analysis of photochemical models." Nankai University College of Environmental Science and Engineering, Tianjin, China, 2008.

"Electric power generation and air quality." Carnegie Mellon University Electricity Center, Pittsburgh, PA, 2008.

"Photochemical sensitivity analysis and its application to policy." Texas A&M Department of Atmospheric Sciences seminar, College Station, TX, 2007.

"High order sensitivity analysis in an air quality model: Methods and applications." Air & Waste Management Association North Carolina Chapter, RTP, NC, 2006.

"An integrated approach to air quality management." Canadian Council of Ministers of the Environment Strategic Planning Workshop: Future Directions for Air Management, Toronto, Canada, 2005.

"Modeling the air quality impacts and health benefits of emissions reductions." EPA Air Innovations Conference, Chicago, IL, 2005.

"Decoupled direct method for atmospheric sensitivity analysis." EPA Regulatory Modeling Workshop, New Orleans, LA, 2005.

"CMAQ-DDM: Method, performance, and application." University of Houston Department of Geosciences seminar, Houston, TX, 2005.

Other:

"Retrospective evaluation of recent state implementation plans for ozone." American Meteorological Society Annual Meeting, Austin, TX, 2013.

"Interannual variability in biogenic emissions." NASA Air Quality Applied Sciences Team meeting, Sacramento, CA, 2012.

"Interannual variability in biogenic emissions driven by dynamic vegetation conditions." NASA Air Quality Applied Sciences Team meeting, Madison, WI, 2012.

"Kalman Filter Inversion of Regional NO_x Emissions based on OMI NO₂ Observations." American Geophysical Union Annual Meeting, San Francisco, CA, 2012.

"State of the Air: Air Quality and Climate Change in Texas and Beyond." American Meteorological Society Houston Chapter meeting, Houston, TX, 2012.

"The NASA Air Quality Applied Sciences Team." CenSARA Annual Business Meeting, Dallas, TX 2012.

"Observation-constrained probabilistic evaluation of modeled concentrations and sensitivities." CMAS Conference, Chapel Hill, NC, 2012.

"Inverse modeling of Texas NO_x emissions using OMI NO₂ observations." American Geophysical Union Fall Meeting, San Francisco, CA, 2011.

"Inquiry-based atmospheric science lessons for K-12 students." American Geophysical Union Fall Meeting, San Francisco, CA, 2011.

"Characterizing uncertainty in atmospheric response modeling." AEESP Research and Education Conference, Tampa, FL, 2011.

"An energy and environment course at Rice University." American Society for Engineering Education Gulf Southwest Conference, Houston, TX, 2011.

"Influence of reaction rate uncertainties on pollutant-emission sensitivities." Atmospheric Chemical Mechanisms Conference, Davis, CA, 2010.

"Uncertainties influencing health-based prioritization of ozone abatement options." CMAS Conference, Chapel Hill, NC, 2010.

"Accuracy of multi-parameter response surfaces generated from sensitivity coefficients." CMAS Conference, Chapel Hill, NC, 2009.

- "Photochemical modeling to inform environmental policy." Dissertations Initiative for the Advancement of Climate Change Research, Hilo, HI, 2007.
- "High order sensitivity analysis to inform control strategy development." A&WMA Specialty Conference on Integrated Control Strategies, Durham, NC, 2006.
- "Integrating atmospheric science into air quality planning: Challenges and opportunities." American Meteorological Society Annual Meeting, Atlanta, GA, 2006.
- "Air quality modeling for control strategy development." NOAA/EPA Golden Jubilee Symposium, Durham, NC, 2005.
- "Atmospheric modeling for abatement strategy formulation." Gordon Research Conference on Atmospheric Chemistry, Big Sky, MT, 2005.
- "Atmospheric science in the public realm." Atmospheric Chemistry Colloquium for Emerging Senior Scientists, Yellowstone National Park, WY, 2005.
- "An integrated approach to air quality attainment." American Association of Aerosol Research International Specialty Conference, Atlanta, GA, 2005.
- "Heterogeneity of ozone yield with location of NO_x emission origin." American Geophysical Union Fall Conference, San Francisco, CA, 2004.
- "Applicability of CMAQ-DDM to source apportionment and control strategy development." Models-3 Users Workshop, Durham, NC, 2004.
- "Impact of atmospheric particulate matter on plants." Southeast Ecology & Evolution Conference, Atlanta, GA, 2004.
- "Sensitivity analysis of O₃ in the Southeast." Models-3 Workshop, Durham, NC, 2003.
- "Implementation of a direct sensitivity analysis method into CMAQ." Models-3 Users Workshop, Durham, NC, 2002.
- "Impact of aerosol light attenuation on plant growth." American Geophysical Union Fall Conference, San Francisco, CA, 2000.
- "Emission of methyl iodide from the Southern Ocean." International Conference on Southern Hemisphere Meteorology and Oceanography, Santiago, Chile, 2000.
- "Low ozone episodes over southern Australia in summer 1999." American Geophysical Union Fall Conference, San Francisco, CA, 1999.
- "Methyl iodide at Cape Grim, Tasmania." SOAPEX II post-campaign meeting, Melbourne, Australia, 1999.
- "Methyl iodide as a tracer of marine convection." Cape Grim Annual Scientific Meeting, Melbourne, Australia, 1998.

HONORS AND AWARDS

Monetary Awards:

- National Science Foundation CAREER Award (2009-2014)
- NASA Air Quality Applied Sciences Team (2011-2016)
- Outstanding Faculty Associate Award, Will Rice College (2007, 2011)
- National Science Foundation Graduate Research Fellow (1999-2002)
- Georgia Tech Presidential Scholar (1999-2003)
- Georgia Air & Waste Management Association Scholarship (2003)
- Best Scientific Publication Award, Georgia Tech Earth & Atmospheric Sciences (2003)

Best Speaker, Georgia Tech EAS Graduate Student Symposium (2003)
American Meteorological Society Paul H. Kutschenreuter Scholar (1998)

Non-monetary Honors:

Distinguished Associate Award, Will Rice College (2009, 2010)
Doughtie Outstanding Associate Award, Will Rice College (2008)
Community Modeling & Analysis System Award of Appreciation (2004)
Chronicle of Higher Education Rising Star Nominee (2004)
Phi Beta Kappa (1998)

Invited Colloquia:

Dissertations Initiative for the Advancement of Climate Change Research (2007)
Atmospheric Chemistry Colloquium for Emerging Senior Scientists (2005)
American Meteorological Society Summer Policy Colloquium (2003)

PROFESSIONAL SERVICE

EXTERNAL

Independent Technical Advisory Committee, Texas Air Quality Research Program
(2010-2012)

Session Co-Chair: CMAQ atmospheric modeling conference (2012)

Session Co-Chair: American Society for Engineering Education regional conference
(2011)

Program Technical Committee and Session Co-Chair: Association of Environmental
Engineering and Science Professors Education and Research Conference (2011)

Session Co-Chair: American Meteorological Society Annual Meeting (2010)

CMAQ Model Review Committee (2007)

Georgia Air Policy Symposium: Founding chair (2006)

Session Chair: A&WMA Specialty Conference on Integrated Control Strategies (2006)

Professional Memberships: American Geophysical Union; American Meteorological
Society; Air & Waste Management Association; American Society for Engineering
Education; Association of Environmental Engineering and Science Professors;
American Academy for the Advancement of Science

Journal Peer Reviewer: Environmental Science & Technology; Atmospheric Chemistry
and Physics; Atmospheric Environment; Journal of Geophysical Research; Bulletin of
the American Meteorological Society; Environmental Management; Geophysical
Research Letters; Journal of Applied Meteorology; Journal of Environmental
Management; Geoscientific Model Development

Grant Peer Reviewer: National Science Foundation; Texas Air Quality Research
Program

UNIVERSITY

Faculty Associate: Will Rice College (2006-)

Engineering Divisional Advisor: Will Rice College (2008-)

University Committee on Teaching (2012-)
Faculty Search Committees: Engineering-wide search in Energy and Materials (2012);
Earth Sciences (2009); Statistics (2008)
Steering Committee, Environmental Analysis and Decision Making Professional M.S.
program (2007-)

DEPARTMENT

Faculty Search Committees (2007-2008)
Seminar Committee (2006-2011)
Graduate Studies Committee (2011-)

COURSES TAUGHT

CEVE/ESCI/ENST 307, "Energy and the Environment" (Spring 2007-2012)
CEVE 411/511, "Atmospheric Processes" (Fall 2008, 2009, 2011, 2012)
CEVE 611, "Advanced Topics in Air Pollution" (Fall 2007)

STUDENTS ADVISED

Graduate Students: Antara Digar, Ph.D. Student, 2007-2012
Wei Zhou, Ph.D. Student, 2007-2013
Wei Tang, Ph.D. Student, 2008-
Benjamin Lash, Ph.D. Student, 2011-
Erin Chavez-Figueroa, Ph.D. Student, 2011-
Post-doctoral Fellow: Dr. Xue Xiao, 2008-2011
Dr. Adetutu Aghedo, 2012-

Undergraduate Research: Raleigh Ricart, Carlos Rojo, Kirti Datla, Kyle Saari, Daniel Hodges-Copple, Oviea Akpotaire, Seoyeon Hong, Andrew Pegues, Catherine Douglass, Willie Xu, Lance Le, Kavita Venkateswar, Chris Chan, Rebecca Hyde, Komal Bansal, Shayak Sengupta, Ran Chen, Lun (Allen) Li

Thesis Committees: Shagun Bhat, Ph.D., 2007; Andrea Zimmer, M.S., 2007; Vinitha Chinnakani, M.S., 2007; Hilary Robinson, M.S., 2009; Yuling Jia, Ph.D., 2009; Wei Tang, M.S., 2009; Roque Sanchez, M.S., 2010; Marco Enriquez, Ph.D., 2010; Kabindra Shakya, Ph.D., 2011; Andrew Juan, M.S., 2011; Brandon Duncan, M.S., 2011; Merritt McKinney, Ph.D., 2011; Antara Digar, Ph.D., 2012; Carol Liu, M.S., 2012; Andrea Clements, Ph.D., 2012; Basak Cevik, M.S., 2012; Wei Zhou, Ph.D., 2013