

Marco A. Rodriguez

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Education	Ph. D., Mechanical and Aerospace Engineering University of California, Irvine	2004
	M. S., Mechanical and Aerospace Engineering University of California, Irvine	2001
	B. S., Physics Universidad Autónoma Metropolitana Iztapalapa, México	1997
Thesis Title	Aerosol Dynamics in the Global Troposphere	
Advisor	Prof. Donald Dabdub	
Awards and Honors	UC Mexus Fellowship	2000-2004
	Fulbright Fellowship	1997-1999
	Academic prowess medal, U. Autónoma Metropolitana Iztapalapa	1997
	Saint Louis University Award	1995
Professional Interests	<p>Atmospheric Sciences: Use of urban, regional and global three-dimensional chemical transport models to understand the physical and chemical interactions of aerosols in the atmosphere.</p> <p>Applied Mathematics: Uncertainty and sensitivity analysis of air quality models to evaluate and improve their numerical predictions.</p> <p>Regional Modeling: Assessment of regional haze in the Western US National Parks using state-of-the-art models such as the Comprehensive Air quality Model with extensions (CAMx). Source apportionment of atmospheric nitrogen deposition in natural ecosystems.</p>	
Research Experience	Research Scientist Cooperative Institute for Research in the Atmosphere Colorado State University Air quality modeler for the National Park Service Research unit in CIRA. Current research focuses on regional modeling efforts to understand the fate and origin of pollutants that	2005-present

adversely affect the visibility of National Parks and the determination of the relative contributions of long range transport versus local emissions.

Postgraduate Researcher 2004

Advanced Power and Energy Program

University of California, Irvine

Performed sensitivity and uncertainty analysis of a three-dimensional air quality model using Monte Carlo methodologies. Determined the effects of changing boundary conditions, emission rates and reactions rate constants on simulated concentrations. Analyzed the air quality impacts caused by the implementation of distributed power generation (DG) in the South Coast Air Basin of California (SoCAB). Developed a methodology to investigate the spatial effects of placing DG in specific regions of the SoCAB.

Research Assistant 2002-2004

Advanced Power and Energy Program

University of California, Irvine

Performed sensitivity and uncertainty analysis of the Caltech Atmospheric Chemistry Mechanism (CACM) through box model simulations for different summer cases. Characterized the uncertainties of gas-phase precursors of secondary organic aerosol. Examined the effects on simulated key pollutants to simultaneous changes in the nominal values of chemical reactions rate constants.

Research Assistant 1997-2004

Environmental and Computational Sciences Laboratory

University of California, Irvine

Implemented a comprehensive size- and chemically resolved aerosol thermodynamics module in the IMAGES three-dimensional global chemical transport model. Analyzed and compared model output with observational data sets, such as CASTNET and EMEP. Calculated the equilibrium concentrations among modeled aerosol inorganics and their gas-phase precursors. Established the profile and composition of tropospheric aerosol mass size distributions including their water content.

Teaching Experience **Teaching Assistant** 1999-2001

Department of Mechanical and Aerospace Engineering

University of California, Irvine

Homework grading, lecture presentations, and preparation of discussion sections for the following disciplines:

- Introduction to Engineering Computations (Fall 2001)
- Numerical Analysis in Mechanical Engineering (Spring 2001)
- Introduction to Fluid Mechanics (Fall 2000, 1999)
- Air Pollution and Control (Spring 2000)

	Teaching Assistant	1996-1997
	Department of Physics Universidad Autónoma Metropolitana Iztapalapa, México Homework grading, lecture presentations, and individual tutoring for the following disciplines:	
	<ul style="list-style-type: none">• Principles of Classical Mechanics• Thermodynamics• Electromagnetism	
Other Experience	System Administrator	2005-present
	Cooperative Institute for Research in the Atmosphere Colorado State University Responsible for the installation, networking, maintenance, and administration of a high-performance Gentoo linux cluster that consists of twelve 64-bit Opteron CPUs with 24 GB of RAM, and storage hardware that contains 7 TB of disk space configured as RAID-5. Extensive experience in FORTRAN, IDL, Perl, Bash and Matlab programming.	
	System Administrator	1999-2004
	Environmental and Computational Sciences Laboratory University of California, Irvine Responsible for the installation, maintenance, backup and administration of networked Linux (Redhat, Gentoo) and Windows (2000, XP) workstations.	
Invited Talks	<ul style="list-style-type: none">• “Simulaciones numéricas de la calidad del aire usando el modelo regional CAMx y una aplicación directa a los parques de los USA,” Rodriguez, M. A, Barna, M. G., Gebhart, K., Schichtel, B., Moore, T., and Malm, W. Presented at VI Simposio sobre Contaminación Atmosférica. Mexico City, Mexico, 2007.• “Estudio de incertidumbres en un modelo urbano de la calidad del aire,” Rodriguez, M. A., and Dabdub, D. Presented at Universidad Autónoma Metropolitana-Iztapalapa Physics Seminar. Mexico City, Mexico, 2007.	
Journal Papers	<ul style="list-style-type: none">• “Monte Carlo uncertainty and sensitivity analysis of the CACM chemical mechanism”, Rodriguez, M. A., and Dabdub, D. <i>J. Geophys. Res.</i> 108, (D15), 4443, doi:10.1029/2002JD003281, 2003.• “IMAGES-SCAPE2: A modeling study of tropospheric size and chemically resolved aerosol thermodynamics in a global chemical transport model”, Rodriguez, M. A., and Dabdub, D. <i>J. Geophys. Res.</i> 109, D02203, doi:10.1029/2003JD003639, 2004.• “Air Quality Modeling in the South Coast Air Basin of California: What Do the Numbers Really Mean?”, Carreras-Sospedra, M., Dabdub, D., Rodriguez, M., and Brouwer, J. <i>Journal of the Air & Waste Management Association</i> 56, 1184–1195, 2006.	

- “Air Quality Impacts of Distributed Power Generation in the South Coast Air Basin of California 1: Scenario Development and Modeling Analysis”, Rodriguez, M. A., Carreras-Sospedra, M., Medrano, M., Brouwer, J., Samuelsen, G. S., and Dabdub, D. *Atmos. Environ* 40, 5508–5521, 2006.
 - “A Methodology for Developing Distributed Generation Scenarios in Urban Areas using Geographical Information Systems”, Medrano, M., Brouwer, J., Carreras, M., Rodriguez, M. A., Dabdub, D., and Samuelsen, G. S. accepted *International Journal of Energy Technology and Policy*, 2006.
 - “Air Quality Impacts of Distributed Power Generation in the South Coast Air Basin of California 2: Model Uncertainty and sensitivity analysis”, Rodriguez, M. A., Brouwer, J., Samuelsen, G. S., and Dabdub, D. *Atmos. Environ* 41,5618–5635, 2007.
- Other Publications**
- “Air Quality Impacts of Distributed Generation”, Samuelsen, G. S., Dabdub, D., Brouwer, J., Medrano, M., Rodriguez, M. A., and Carreras, M., California Energy Commission Report CEC-500-2005-069, 2005.
 - “Aerosoles Atmosféricos: modelos computacionales a escala global”, Rodriguez, M. A. in *Contaminación Atmosférica V.* Leopoldo García-Colín and Juan Rubén Varela editors, Mexico City: El Colegio Nacional, 2006.
- Reviewed Proceedings**
- “Urban air quality impacts of distributed generation”, Carreras, M., Medrano, M., Samuelsen, G. S., Brouwer, J., Rodriguez, M. A., and Dabdub, D., presented at the ASME Turbo Expo, Vienna, Austria, 2004.
- Abstracts**
- “Modelo para la difusión turbulenta,” Rodriguez, M. A., and Velasco, R. M. Presented at the 2nd Congreso de la División de Dinámica de Fluidos, Oaxaca, México, 1996.
 - “Size-Resolved and Chemically Resolved Aerosol-Chemical Transport Model of the Global Troposphere,” Rodriguez, M. A., and Dabdub, D. Presented at the Second Conference on Atmospheric Chemistry, Long Beach, CA, 2000.
 - “Size and chemically resolved Aerosol-Chemical Transport Model of the global troposphere,” Rodriguez, M. A., and Dabdub, D. Presented at the 21st Annual American Association for Aerosol Research, Charlotte, NC, 2002.
 - “Sulfate-Nitrate-Ammonium-Water system study of the global troposphere with a size and chemically resolved Aerosol-Chemical Transport Model,” Rodriguez, M. A., and Dabdub, D. Presented at the Fifth Conference on Atmospheric Chemistry, Long Beach, CA, 2003.
 - “IMAGES-SCAPE2: A modeling study of tropospheric size and chemically resolved aerosol thermodynamics in a global chemical transport model,” Rodriguez, M. A., and Dabdub, D. Presented at the 22nd Annual American Association for Aerosol Research, Anaheim, CA, 2003.
 - “Air quality impacts of distributed generation: Model uncertainty and sensitivity analysis of PM2.5 aerosol,” Rodriguez, M. A. and Dabdub, D. Presented at the 23d Annual American Association for Aerosol Research, Atlanta, GA, 2004.

- “Evaluating the linearity of sulfate formation in response to change in sulfur dioxide emissions within a regional air quality model,” Barna, M. G., Schichtel, B. A., Gebhart, K. A., and Rodriguez, M. A. Presented at the NOAA/EPA Golden Jubilee Symposium on Air Quality Modeling and Its Applications, Durham, NC, 2005.
- “Proposed FLAG Level II and III Visibility Assessment,” Schichtel, B., Molenaar, J., Malm, W. C., Barna, M. G., and Rodriguez, M. A. Presented at the AWMA Specialty Conference - Guideline on Air Quality Models: Applications and FLAG Developments, Denver, CO, 2006.
- “Using CAMx to model the potential impacts of a proposed power plant in the Four Corners region,” Rodriguez, M. A., Barna, M. G., and Schichtel, B. Presented at the 99th A&WMA Annual Conference and Exhibition, New Orleans, LA, 2006.
- “Simulating Sulfur and Nitrogen Deposition at Western National Parks,” Barna, M. G., Rodriguez, M. A., Gebhart, K. G., and Schichtel, B. Presented at the 99th A&WMA Annual Conference and Exhibition, New Orleans, LA, 2006.
- “Investigation of Potential Impacts of Sources in the Four Corners Region to Wintertime Haze on the Colorado Plateau,” Schichtel, B., Malm, W. C., Barna, M. G., Gebhart, K. A. and Rodriguez M. A. Presented at the 99th A&WMA Annual Conference and Exhibition, New Orleans, LA, 2006.
- “Assessment of the air quality in the Western US National Parks: Model Performance Evaluation,” Rodriguez, M. A., Barna, M. G., and Schichtel, B. Presented at 2006 International Aerosol Conference, St. Paul, MN, 2006.
- “CAMx-simulated tracers of NO_x and NH₃ for ROMANS: Impact of Colorado Sources,” Barna, M. G., Rodriguez, M. A., Gebhart K. G., Schichtel, B., Malm, B. and Collett, J. Presented at the 100th A&WMA Annual Conference and Exhibition, Pittsburgh, PA, 2007.
- “Representativeness of the ROMANS Spring and Summer Monitoring Campaigns,” Schichtel, B., Gebhart, K., Hand, J., Day, D., Collet, J., Barna, M., Rodriguez, M. A., Carrico, C. M., Lee, T., Raja, S., McMeeking, G., Sullivan, A., Kreidenweis, S. and Malm, B. Presented at the 100th A&WMA Annual Conference and Exhibition, Pittsburgh, PA, 2007.
- “Meteorological Issues Associated with Nitrogen and Sulfur Deposition at Rocky Mountain National Park, Colorado,” Gebhart, K., Barna, M., Schichtel, B., Rodriguez, M. A. and Hand, J. Presented at the 100th A&WMA Annual Conference and Exhibition, Pittsburgh, PA, 2007.

**Poster
Presentations**

- “Implementación computacional del modelo de latices de gases de Lorentz,” Rodriguez, M. A., Escalona, A. and Figueroa, J. Presented at the 34th Congreso Nacional de Física, Mexico City, México, 1991.
- “Descripción experimental de solitones en medio viscoso,” Carriles, R., Peña, E., and Rodriguez, M. A. Presented at the 36th Congreso Nacional de Física, Acapulco, México, 1993.

- “Plasma polymerization using a simple device at undergraduate level,” Cruz, G. J., Carriles, R., Peña, F., and Rodriguez, M. A. Presented at the CAM 94 Physics Meeting, Cancún, México, 1994.
- “Monte Carlo Uncertainty and Sensitivity Analysis of the CACM Chemical Mechanism,” Rodriguez, M. A., and Dabdub, D. Presented at the 20th Informal Symposium on Kinetics and Photochemical Processes in the Atmosphere, Riverside, CA, 2003.
- “Regional Modeling using CAMx: Evaluation of the Air Quality in the Western National Parks,” Rodriguez, M. A., Barna, M. G., Schichtel, B. and Gebhart, K. A. Presented at the 25th Anniversary CIRA and CGAR Spring Science Symposium, Fort Collins, CO, 2006.
- “Integrating air quality data and modeling results to refine source apportionment estimates,” Schichtel, B. A., Barna, M. G., Gebhart, K. A. and Rodriguez, M. A. Presented at the 25th Anniversary CIRA and CGAR Spring Science Symposium, Fort Collins, CO, 2006.
- “CAMx simulations of wet and dry deposition of particulate nitrate, nitric acid and ammonia along Colorado’s Front Range,” Barna, M. G., Gebhart, K., Schichtel, B. and Rodriguez, M. A. Presented at 2006 International Aerosol Conference, St. Paul, MN, 2006.

Professional Affiliations American Geophysical Union
American Association for Aerosol Research

Professional Services

- Provided assistance to promote the collaboration of Mexican colleges with the Department of Mechanical and Aerospace Engineering at UCI. This two-day event in June 2003, was organized by the Government of the state of Zacatecas and consisted in a series of visits to various higher education institutions to evaluate their research infrastructure.
- Served as member of panel for judging projects in the Environmental Science Division at the 53th annual California State Science Fair May 25th, 2004.

Funding

- Faculty Early Career Development (CAREER) Program awarded to Prof. Donald Dabdub. Collaborated actively in the write-up of this research proposal that secured funding for my doctoral studies. This project received a four-year grant from the National Science Foundation.