Alejandro M. Valencia, PhD

Air Quality Emissions Modeler

Dr. Valencia joined Sonoma Technology in 2021 to support the continued growth of the company's modeling, emissions, and transportation business areas. As a member of the Atmospheric and Emissions Modeling Group, Dr. Valencia assists with emissions and air quality modeling evaluations and environmental data analysis projects. He also conducts modeling analyses to address complex environmental problems to address clients' research, regulatory, and litigation needs. Additionally, he builds, processes, and assesses emissions inventories to support regional-scale and near-field air quality assessments. Dr. Valencia develops applications to manipulate, visualize, analyze, and interpret observed and modeled environmental data. He is responsible for preparing technical reports and communicating results to clients and other scientific researchers.

Before joining Sonoma Technology, Dr. Valencia was a Research Associate at the University of North Carolina Institute for the Environment's Center for Environmental Modeling for Policy Development (CEMPD), where he worked on the development, operation, and analysis of photochemical transport (CAMx and CMAQ) and dispersion models (AERMOD, SCICHEM, CALPUFF, ADMS, and R-LINE) to support sound policymaking. He worked on the development of new air quality models (e.g., an aircraft-specific dispersion model) as well as existing models (e.g., added a chemistry module to R-LINE, updated barrier algorithms in AERMOD's R-LINE implementation). Dr. Valencia helped create a guidance document that assessed best practices for using varying dispersion models to evaluate sources of air pollution at airports. This document included emission input development, model operation, and inter-comparison analysis of AERMOD, ADMS, CALPUFF, and SCICHEM at the Los Angeles International (LAX) airport. While at CEMPD, Dr. Valencia also provided instruction on the basics of air quality modeling focusing on photochemical modeling through the CMAQ modeling system to a broad audience that spanned multiple countries, including Hong Kong University of Science & Technology, Connecticut Department of Energy and Environmental Protection, and more.

Education

- PhD, Environmental Science and Engineering, University of North Carolina at Chapel Hill
- MS, Environmental Engineering, University of North Carolina at Chapel Hill
- BS, Chemical Engineering, Florida State University

For a list of publications, see sonomatech.com/ResPub/AMVpub.pdf

Dr. Valencia earned his PhD in Environmental Science and Engineering while at CEMPD. His focus was on the development and application of geostatistical data fusion methods to characterize air quality at high spatiotemporal resolution in complex transportation environments. He developed and applied a framework that combined CMAQ, R-LINE, and U.S. EPA's AQS measurements through geostatistical methods to assess traffic-related air pollutant exposure and estimate premature mortality at census block resolution across the continental U.S. Dr. Valencia also developed and applied an inverse modeling technique to improve dispersion modeling emissions inputs using stationary and mobile measurements. He fused models and observed data using the Bayesian Maximization Entropy Geostatistical library to create highly resolved air quality characterization of a multimodal transportation environment in Kansas City, Kansas.

In addition to air quality modeling, Dr. Valencia is fluent in Spanish and enjoys coding. He is fluent in a breadth of programming languages, such as Python, R, Fortran, MATLAB, JAVA, and Linux scripting. He also has extensive experience working with Linux cluster environments.