

Alejandro M. Valencia

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Summary

Environmental modeler with over 10+ years of experience specializing in the operation, development and evaluation of atmospheric dispersion and chemical transport models. Innovative thinker and problem solver with expertise in developing applications to manipulate, visualize, and interpret environmental data.

Education

Master of Science in Environmental Engineering *Fall '17 - Present*
University of North Carolina, Chapel Hill, NC

Master of Science in Environmental Engineering *Fall '07 - Summer '09*
University of North Carolina, Chapel Hill, NC

Bachelor of Science in Chemical Engineering *Spring '02 - Spring '06*
Florida State University, Tallahassee, FL *Cum Laude*

Professional Experience

Environmental Sciences and Engineering Dept. - UNC

Research Assistant

Fall '17 – Present

- Combine traditional high performance computational atmospheric chemistry models and geospatial statistical tools to obtain faster, more accurate predictions of local and regional air quality.

Center for Environmental Modeling for Policy Development - UNC

Research Associate

Oct. '09 – Jul. '17

- Conducted research for complex, deadline-driven, multi-year, multi-million dollar contracts with private and federal government agencies (EPA, NASA, FAA, ACRP, etc.).
 - Compared air quality predictions of black carbon (BC) from a dispersion model (AERMOD), a photochemical model (CMAQ) and a privately developed regression model to account for the contribution of pollutants originating from the Providence, RI airport on the surrounding regional air quality (FAA).
 - Used AERMOD to assess particulate matter (PM) and hazardous air pollutants (HAPs) from aviation emissions at the Los Angeles Airport (FAA).
 - Contrasted different emission reduction scenarios in the Denver area through the use of alternate fuels and predicting the local air quality using CAMx to comply with the Clean Air Act (EPA).
 - Supported EPA's NERL (National Exposure Research Laboratory) efforts for environmental health impact assessments by evaluating a combination of CMAQ, AERMOD, and a Bayesian statistical model to assess air quality and exposure to near road areas in Detroit.
 - Provided guidance for airport practitioners in selecting and utilizing dispersion models (AERMOD, CALPUFF, SCICHEM, and ADMS-airport) to address local air quality. This involved conducting a case study to run and compare all models. (TRB/ACRP).
 - Analyzed emission impacts from to aircraft operations in and around Dallas-Fort Worth Airport using CMAQ APT (NASA). Evaluated model results with measurements. Conducted sub-grid analysis of plumes using CMAQ APT (CMAQ + Plume Model).
 - Developed a FORTRAN chemistry module for RLINE (EPA).
- Operated, developed, and evaluated air quality dispersion, chemical transport, and statically based models.
- Developed and implemented technical approaches to evaluate atmospheric models.

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- Devised and utilized Python, R, and MATLAB post-processing applications/tools for dynamical and statistical evaluation of air quality models, i.e.: data management and manipulation applications, qa/qc applications, and visualization applications.
- Prepared technical reports and presentations that convey the atmospheric modeling results to upper management and scientific experts.
- Provided instruction on the basics of air quality modeling focusing on photochemical modeling and the various components of the CMAQ model to a broad audience (e.g., Hong Kong University of Science & Technology, Connecticut Department of Energy and Environmental Protection, etc.). This included hands-on laboratories on how to run the model and evaluate its results.

Environmental Sciences and Engineering Dept. - UNC

Research Assistant

Fall '07 – Summer '09

- Operated and evaluated atmospheric photochemical models.
- Analyzed ozone attainment standards for Houston, TX.
- Created python-based air quality model post-processing applications for evaluation of CAMx and CMAQ outputs.
- Aided in writing technical reports for Houston Advanced Research Center.

Skills and Training

Programming	Python, R, FORTRAN, Java, MATLAB, Linux Shell Script, LaTeX, C, Perl, HTML, CSS, JavaScript, AppleScript
Software	ChemCAD, COMSOL, Pro-E, MathCAD, LINDO, Analytica
Database systems	MySQL, Access
Air Quality Models	Comprehensive Air quality Model with extensions (CAMx), Community Multiscale Air Quality model (CMAQ), AMS/EPA Regulatory Model (AERMOD), California PUFF model, (CALPUFF), Research Line Source Model (RLINE) Motor Vehicles Emission Simulator (MOVES), Sparse Matrix Operator Kernel Emissions (SMOKE), Model for Ozone and Related chemical Tracers (MOZART), Second-order Closure Integrated PUFF with Chemistry (SCICHEM), Environmental Benefits Mapping and Analysis Program (BenMAP)
Visualization Tools	Visualization Environment for Rich Data Interpretation (VERDI), Package for Analysis and Visualization of Environmental (PAVE) data, matplotlib, ggplot
Model Evaluation Techniques	Process Analysis, Ozone Source Apportionment Technology, Reactive Tracer, Direct Decoupled Method, Adjoint
GIS Systems	ArcGIS, GoogleEarth, Fiona, Shapely
Operating Systems	Windows, Mac OS X, Linux (Red Hat, Ubuntu)
Languages	Fluent in English and Spanish

Journal Publications / Technical Reports / Conference Proceedings

Isakov, V., Arunachalam, S., Baldauf, R., Breen, M., Deshmukh, P., Hawkins, A., Kimbrough, S., Krabbe, S., Naess, B., Serre, M. and **Valencia, A.**, 2019. Combining Dispersion Modeling and Monitoring Data for Community-Scale Air Quality Characterization. *Atmosphere*, 10(10), p.610.

Arunachalam, S., Naess, B., Seppanen, C., **Valencia, A.**, Brandmeyer, J.E., Venkatram, A., Weil, J., Isakov, V. and Barzyk, T., 2019. A new bottom-up emissions estimation approach for aircraft sources in support of air quality modelling for community-scale assessments around airports. *International journal of environment and pollution*, 65(123), p.43.

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Sorte, S., Arunachalam, S., Naess, B., Seppanen, C., Rodrigues, V., **Valencia, A.**, Borrego, C. and Monteiro, A., 2019. Assessment of source contribution to air quality in an urban area close to a harbor: Case-study in Porto, Portugal. *Science of The Total Environment*, 662, pp.347-360.

Valencia, A., Venkatram, A., Heist, D., Carruthers, D. and Arunachalam, S., 2018. Development and evaluation of the R-LINE model algorithms to account for chemical transformation in the near-road environment. *Transportation Research Part D: Transport and Environment*, 59, pp.464-477.

Arunachalam, S., **Valencia, A.**, Silva, R.A., Huang, J., Omary, M. and Vennam, L.P., 2016, December. A Global-Scale Multi-resolution Study of Surface Air Quality Impacts from Commercial Aircraft Emissions. In *International Technical Meeting on Air Pollution Modelling and its Application* (pp. 529-534). Springer, Cham.

Arunachalam, S., **Valencia, A.**, Woody, M.C., Snyder, M.G., Huang, J., Weil, J., Soucacos, P. and Webb, S., 2017. *Dispersion Modeling Guidance for Airports Addressing Local Air Quality Health Concerns* (No. Project 02-58).

Wolfe, M., McDonald, N., Arunachalam, S. and **Valencia, A.**, 2017. Air Pollution Exposure during School Commutes. *Journal of Transport & Health*, 5, pp.S48-S49.

Valencia, A., S. Arunachalam, M. Snyder, V. Isakov, and A. Venkatram. "Implementation and Evaluation of NO_x to NO₂ Conversion in R-LINE – a new dispersion model for road sources" *Keynote speaker at the Colombian Congress and International Conference on Air Quality and Public Health (CASAP) Bucaramanga, Colombia, Aug. 2015.*

Chang, S.Y., Vizuete, W., **Valencia, A.**, Naess, B., Isakov, V., Palma, T., Breen, M. and Arunachalam, S., 2015. A modeling framework for characterizing near-road air pollutant concentration at community scales. *Science of the Total Environment*, 538, pp.905-921.

Arunachalam, S., **Valencia, A.**, Akita, Y., Serre, M.L., Omary, M., Garcia, V. and Isakov, V., 2014. A method for estimating urban background concentrations in support of hybrid air pollution modeling for environmental health studies. *International journal of environmental research and public health*, 11(10), pp.10518-10536.

Snyder, M., Arunachalam, S., Isakov, V., Talgo, K., Naess, B., **Valencia, A.**, Omary, M., Davis, N., Cook, R. and Hanna, A., 2014. Creating locally-resolved mobile-source emissions inputs for air quality modeling in support of an exposure study in Detroit, Michigan, USA. *International journal of environmental research and public health*, 11(12), pp.12739-12766.

Valencia, A., S. Arunachalam, Y. Akita, M. Serre, V. Garcia, V. Isakov, Estimating Regional Background Air Quality using Space/Time Ordinary Kriging to Support Exposure Studies. In *Proceedings of the 12th Annual Models-3/CMAS Users Conference*, Chapel Hill, NC, Oct 2013.

LAX Air Quality and Source Apportionment Study (Tetra Tech 2013).

Arunachalam, S., **Valencia, A.**, Yang, D., Davis, N., Baek, B.H., Dodson, R.E., Houseman, A.E. and Levy, J.I., 2011. Comparing Monitoring-Based and Modeling-Based Approaches for Evaluating Black Carbon Contributions from a US Airport. In *Air Pollution Modeling and its Application XXI*(pp. 619-623). Springer, Dordrecht.

Vizuete, W., **A. Valencia**, B. Henderson, H. Jeffries (2009) Process Analysis Techniques to investigate ozone production in regulatory simulations of Houston, TX. In *Proceedings of the 8th Annual Models-3/CMAS Users Conference*, Chapel Hill, NC, Oct 2009.

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Vizuete, W., H. Jeffries, **A. Valencia**, E. Couzo, J. Wilkinson, E. Christoph, B. Henderson, H. Parikh, J. Kolling, "Multi-Model, Multi-Episode Process Analysis to Investigate Ozone Formation and Control Sensitivity in the 2000/2005/2006 Houston SIP Episode Models Project H97" Houston Advanced Research Center (HARC), 2009.

Honors and Activities

- Research Assistantship with tuition waiver, University of North Carolina at Chapel Hill
- Executive Board Member, Tau Beta Pi Engineer Honor Society, Florida State University