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Research Professor

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**A. Education**

- 1998 Ph.D., Chemical Engineering, Rutgers University, New Brunswick, NJ  
1993 M.S., Chemical Engineering, Rutgers University, New Brunswick, NJ  
1989 B.Tech., Chemical Engineering, Anna University, Chennai, INDIA

**B. Professional Appointments**

- 2017-present Research Professor, University of North Carolina at Chapel Hill, NC  
2012-current Adjunct Assoc. Professor, Dept. of Environ. Sci. Engg., UNC Chapel Hill, NC  
2003 – 2017 Research Assoc. Professor, University of North Carolina at Chapel Hill, NC  
2003 – 2009 Research Asst. Professor, University of North Carolina at Chapel Hill, NC  
1999 – 2002 Research Scientist, MCNC Environmental Programs, RTP, NC  
1998 – 1999 Research Scientist, Bureau of Air Quality Planning, NJDEP, Trenton, NJ  
1997 – 1998 Post-doctoral Research Fellow, Rutgers University, Piscataway, NJ  
1992 – 1997 Graduate Research Assistant, Rutgers University, Piscataway, NJ  
1990 – 1991 Production Engineer, Century Enka Ltd, Pune, INDIA  
1989 – 1989 Project Engineer, Krebs Engineering Ltd, Chennai, INDIA

**C. Honors and Awards**

UNC Duke Energy Foundation Faculty Fellow (2016)

U.S. EPA Scientific and Technological Achievement Award (2014) for “Advancements in Near-Road Dispersion Modeling”

U.S. EPA Blue Ribbon Paper Award (2013) for Contributions in Improving the Simulation of Air Pollution Near Roadways “Estimating near-road pollutant dispersion: a model inter-comparison”

Faculty of the Year (2008), FAA Partnership for Air Transportation Noise and Emissions Reduction (PARTNER) Centers of Excellence

Read Citation at: <http://web.mit.edu/aeroastro/partner/news/2009/08coefaculty-of-yr.html> and

[http://www.faa.gov/about/office\\_org/headquarters\\_offices/ang/offices/managemnt/coe/recognition/](http://www.faa.gov/about/office_org/headquarters_offices/ang/offices/managemnt/coe/recognition/)

U.S. EPA Certificate of Appreciation (1996), (for Contributions to the Evaluation of the Draft Guidance for Using Models to Demonstrate Attainment of the O<sub>3</sub> NAAQS), OAQPS

Ozone Transport and Assessment Group (OTAG), Certificate of Appreciation (1996) (for Contribution to Modeling performed for OTAG), Chair, OTAG Policy Decisions Group

**D. Peer-Reviewed Publications [\*indicates student jointly advised by Arunachalam with another ESE faculty, \*\* indicates student jointly advised by Arunachalam with non-ESE faculty]**

- 1) Isakov, V., T. Barzyk, E. Smith, S. Arunachalam, B. Naess and A. Venkatram (2017). A Web-based Modeling System for Near-Port Air Quality Assessments, *Environ. Model. Software*, 98:21-34.
- 2) Chang, S.-Y.\*, W. Vizuete, M. Serre, L.P. Vennam, M. Omary, V. Isakov, M. Breen, S. Arunachalam (2017). Finely Resolved On-Road PM<sub>2.5</sub> and Estimated Premature Mortality in Central North Carolina, *Risk Analysis*, DOI: 10.1111/risa.12775.
- 3) Penn SL\*\*, Boone, S.T., Harvey, B.C., Heiger-Bernays W, Tripodis Y, Arunachalam, S., Levy JI. (2017) Modeling variability in air pollution-related health damages from individual airport emissions, *Environ. Res.*, 156 (2017) 791–800  
<https://doi.org/10.1016/j.envres.2017.04.031>
- 4) Penn, S. \*\*, S. Arunachalam, M. Woody, Y. Tripodis, W. Heiger-Bernays, JI Levy (2017). Estimating state-specific contributions to PM<sub>2.5</sub>- and O<sub>3</sub>-related health burden from residential combustion and electricity generating unit emissions in the United States, *Environ. Health Perspectives*, 125:324–332, [DOI:10.1289/EHP550](https://doi.org/10.1289/EHP550)
- 5) Vennam, L.P.\*, W. Vizuete, B.H. Baek, M. Omary, K. Talgo, J. Xing, R. Mathur, S. Arunachalam (2017). A Multiscale Modeling Study to Assess Impacts of Full-Flight Aircraft Emissions on Upper Troposphere and Surface Air Quality, *In Review*.
- 6) Vennam, L.P.\*, W. Vizuete, S. Arunachalam (2017). Tracer Study to Estimate the Transport of Cruise Altitude Aviation Emissions in the Northern Hemisphere. *In Review*.
- 7) Valencia, A.\*, S. Arunachalam, V. Isakov, D. Heist, D. Carruthers, and A. Venkatram (2017). Development and Evaluation of the R-LINE Model Algorithms to Account for Chemical Transformation in the Near-road Environment, *In Review*.
- 8) Boone, S.\*, M. Omary, J.H. Bowden, S. Napelenok, J.I. Levy, and S. Arunachalam, (2017). Sensitivity analysis of individual airport emissions in the U.S. using CMAQ DDM-3D, *In Review*.
- 9) Wolfe, M. \*\*, N. McDonald, S. Arunachalam, R. Baldauf, A. Valencia (2017). The Impact of School Location and Commuting Choice on Children’s Air Pollution Exposures, *In Review*.
- 10) Woody, M. \*, H.-W. Wong, J.J. West, S. Arunachalam, (2016). Multiscale predictions of aviation-attributable PM<sub>2.5</sub> for U.S. airports modeled using CMAQ with plume-in-grid and an aircraft-specific 1-D emission model, *Atmos. Environ.*, 147, 384 – 394.  
<http://dx.doi.org/10.1016/j.atmosenv.2016.10.016> .
- 11) Levy, J.I., M.K. Woo, S.L. Penn, M. Omary, Y. Tambouret, S. Chung and S. Arunachalam (2016). Carbon Reductions and Health Co-Benefits from U.S. Residential Energy Efficiency Measures, *Environ. Res. Lett.* 11 (2016) 034017, doi:10.1088/1748-9326/11/3/034017.
- 12) Isakov, Vlad, Saravanan Arunachalam, Stuart Batterman, Sarah Bereznicki, Janet Burke, Kathie Dionisio, Val Garcia, David Heist, Steve Perry, Michelle Snyder, and Alan Vette (2016). "Chapter 11 Air Quality Modeling in Support of the Near-Road Exposures and Effects of Urban Air Pollutants Study (NEXUS)." In *Air Quality: Monitoring, Measuring, and Modeling Environmental Hazards*, pp. 219-242. Apple Academic Press Inc., 2016.
- 13) Chang, S.-Y. \*, W. Vizuete, , V. Isakov, M. Breen, S. Arunachalam (2015). Comparison of Highly Resolved Model-based Exposure Metrics for Traffic-Related Air Pollutants to

- Support Environmental Health Studies, *Int. J. Environ. Res. Public Health*, 12, 15605–15625; doi:10.3390/ijerph121215007.
- 14) Chang, S.-Y. \*, W. Vizuete, , A. Valencia, B. Naess, V. Isakov, T. Palma, M. Breen, S. Arunachalam (2015). A Modeling Framework for Characterizing Near-Road Air Pollutant Concentration at Community Scales, *Sci. Total Environ.*, 538:905-921, <http://dx.doi.org/10.1016/j.scitotenv.2015.06.139>
  - 15) Vennam, L.P. \*, W. Vizuete, S. Arunachalam, (2015). Evaluation of model-predicted Hazardous Air Pollutants (HAPs) near a mid-sized U.S. airport, *Atmos. Environ.*, 119:107-117, <http://dx.doi.org/10.1016/j.atmosenv.2015.08.015>
  - 16) Penn, S. \*\*, S. Arunachalam, Y. Tripodis, W. Heiger-Bernays, JI Levy (2015). A comparison between monitoring and dispersion modeling approaches to assess the impact of aviation on concentrations of black carbon and nitrogen oxides at Los Angeles International Airport, *Sci. Total. Environ*, 527-528:47-55, <http://dx.doi.org/10.1016/j.scitotenv.2015.03.147>
  - 17) Arunachalam, S., H. Brantley, T. Barzyk, G. Hagler, V. Isakov, S. Kimbrough, B. Naess, N. Rice, M. Snyder, K. Talgo, A. Venkatram (2015). Assessment of Port-Related Air Quality Impacts: Geographic Analysis of Population, *Int. J. Environ. Poll.*, 58(4):231-250.
  - 18) Woody, M. C. \*, West, J. J., Jathar, S. H., Robinson, A. L., and Arunachalam, S. (2015): Estimates of non-traditional secondary organic aerosols from aircraft SVOC and IVOC emissions using CMAQ, *Atmos. Chem. Phys.*, 15, 6929-6942.
  - 19) Barzyk, T.M., V. Isakov, S. Arunachalam, A. Venkatram, R. Cook, B. Naess (2015). A Near-Road Modeling System for Community-Scale Assessments of Mobile-Source Air Toxics: The Community Line Source (C-LINE) Modeling System, *Environ. Model. Software*, 66:46-56.
  - 20) Batterman S, Ganguly R, Isakov V, Burke, J., Arunachalam, S., Snyder, M., Robins, T., and Lewis, T. (2014). Dispersion Modeling of Traffic-Related Air Pollutant Exposures and Health Effects Among Children with Asthma in Detroit, Michigan. *Transportation Research Record*. 2014; 2452: 105–112. doi:10.3141/2452-13.
  - 21) Snyder, M.; Arunachalam, S.; Isakov, V.; Talgo, K.; Naess, B.; Valencia, A.; Omary, M.; Davis, N.; Cook, R.; Hanna, A. (2014). Creating Locally Resolved Mobile-Source Emissions Inputs for Air Quality Modeling in Support of an Exposure Study in Detroit, Michigan, USA. *Int. J. Environ. Res. Public Health*, 11, 12739-12766, doi:10.3390/ijerph111212739.
  - 22) Arunachalam, S.; Valencia, A.; Akita, Y.; Serre, M.; Omary, M., Garcia, V.; Isakov, V. (2014). Estimating Regional Background Air Quality using Space/Time Ordinary Kriging to Support Exposure Studies. *Int. J. Environ. Res. Public Health*, 11(10), 10518-10536; doi:10.3390/ijerph111010518.
  - 23) Isakov, V.; Arunachalam, S.; Batterman, S.; Bereznicki, S.; Burke, J.; Dionisio, K.; Garcia, V.; Heist, D.; Perry, S.; Snyder, M.; Vette, A. (2014). Air Quality Modeling in Support of the Near-Road Exposures and Effects of Urban Air Pollutants Study (NEXUS) *Int., J. Environ. Res. Public Health*, 11(9), 8777-8793; doi:10.3390/ijerph110908777.
  - 24) Brunelle-Yeung E, T Masek, JJ Rojo, JI Levy, S Arunachalam, SM Miller, SE Barrett, S Kuhn, IA Waitz (2014) Methods for Assessing the Impacts of Aviation Environmental Policies on Public Health, *Transport Policy*, 34:21-28, DOI: [10.1016/j.tranpol.2014.02.015](http://dx.doi.org/10.1016/j.tranpol.2014.02.015).
  - 25) Rissman, J. \*, S. Arunachalam, T. Bendor and J.J. West (2013). Equity and Health Impacts of Aircraft Emissions at the Hartsfield-Jackson Atlanta International Airport, *Landscape and Urban Planning*, 120, 234-247.

- 26) Rissman, J. \*, Arunachalam, S., Woody, M., West, J. J., BenDor, T., and Binkowski, F. S. (2013). A plume-in-grid approach to characterize air quality impacts of aircraft emissions at the Hartsfield-Jackson Atlanta International Airport, *Atmos. Chem. Phys.*, 13, 9285-9302.
- 27) Woody, M. \*, and S. Arunachalam (2013). Secondary organic aerosol produced from aircraft emissions at the Atlanta Airport: An advanced diagnostic investigation using process analysis, *Atmos. Environ.*, 76:101-109, <http://dx.doi.org/10.1016/j.atmosenv.2013.06.007>
- 28) Ashok, A., I.H. Lee, S. Arunachalam, I. A. Waitz, S.H.L. Yim, R.H. Barrett, (2013). Development of a response surface model of aviation's air quality impacts in the U.S. *Atmos. Environ.*, 77:445-452, <http://dx.doi.org/10.1016/j.atmosenv.2013.05.023>
- 29) Heist, D., V. Isakov, S. Perry, M. Snyder, A. Venkatram, C. Hood, J. Stocker, D. Carruthers, S. Arunachalam and C. Owen (2013). Estimating near-road pollutant dispersion: a model inter-comparison *Transportation Research, Part D.*, 25:93-105
- 30) Levy, J. I., Woody, M., Baek, B. H., Shankar, U. and Arunachalam, S. (2012), Current and Future Particulate-Matter-Related Mortality Risks in the United States from Aviation Emissions During Landing and Takeoff, *Risk Analysis*, 32(2):237-249.
- 31) Barrett, S., S. Yim, C. Gilmore, L.T. Murray, S. Kuhn, A. Tai, R. Yantosca, D. Byun, F. Ngan, X. Li, J. Levy, A. Ashok, J. Koo, H.M. Wong, O. Dessens, S. Balasubramanian, G. Fleming, M. Pearson, C. Wollersheim, R. Malina, S. Arunachalam, F. Binkowski, E. Leibensperger, D. J. Jacob, J. Hileman, and I. Waitz (2012). Public Health, Climate and Economic Impacts of Desulfurizing Jet Fuel. *Environ. Sci. & Tech.*, 46, 4275-4282, <http://dx.doi.org/10.1021/es203325a>
- 32) Aneja, V. P., A. Aiyyer, A. Hanna, U. Shankar, Z. Adelman, S. Arunachalam, S. T. Rao, R. Mathur, J.D. Mobley, V. Ramaswamy, V.M. Krishna, V. Manickam, M.P. Singh, J. Biswas and E. Upadhyay, (2012). U.S.-India Collaboration on Air Quality and Climate Research and Education. *Environmental Manager*, Publication Date (Web): 01 Mar 2012
- 33) Arunachalam, S., Wang, B., Davis, N., Baek, B.H., Levy, JI, (2011). Effect of Chemistry-Transport Model Scale and Resolution on Population Exposure to PM<sub>2.5</sub> from Aircraft Emissions during Landing and Takeoff, *Atmos. Environ.*, 45(19):3294-3300.
- 34) Anenberg, S. C., Talgo, K., Arunachalam, S., Dolwick, P., Jang, C., and West, J. J. (2011). Impacts of global, regional, and sectoral black carbon emission reductions on surface AQ and human mortality, *Atmos. Chem. Phys.*, 11, 7253-7267, DOI:10.5194/acp-11-7253-2011.
- 35) Woody, M. \*, B.H. Baek, Z. Adelman, M. Omary, Y.-F. Lam, J. West and S. Arunachalam (2011). An Assessment of Aviation Contribution to Current and Future Fine Particulate Matter in the United States, *Atmos. Environ.*, 45 (20):3424-3433, DOI: 10.1016/j.atmosenv.2011.03.041
- 36) De Nazelle, A., S. Arunachalam and M. Serre (2010) Bayesian Maximum Entropy Integration of Ozone Observations and Model Predictions in a Spatiotemporal Regulatory Context: An Application for Attainment Demonstration in NC, *Environ. Sci. & Tech.*, 44, 5707-5713.
- 37) Binkowski, F., S. Arunachalam, Z. Adelman and J.P. Pinto (2007) Examining Photolysis Rates with a Prototype On-line Photolysis Module in CMAQ, *J. Applied Meteorol. Clim.*, 2007, 46:1252-1256.
- 38) Arunachalam, S., A. Holland, B. Do, and M. Abraczinskas (2006) A Quantitative Assessment of the Influence of Grid Resolution on Predictions of Future-Year Air Quality in North Carolina, USA, *Atmos. Environ.*, 40(26):5010-5016

- 39) Mathur, R., U. Shankar, A.F. Hanna, M.T. Odman, J.N. McHenry, C.J. Coats, K. Alapaty, A. Xiu, S. Arunachalam, D. Olerud, D.W. Byun, K.L. Schere, F.S. Binkowski, J. K. Ching, R.L. Dennis, T.E. Pierce, J.E. Pleim, S.J. Roselle, and J.O. Young, (2005). The Multiscale Air Quality Simulation Platform (MAQSIP): Initial Applications and Performance for Tropospheric O<sub>3</sub> and Particulate Matter, *J. Geophys. Res.*, 110, D13308, doi:10.1029/2004JD004918.
- 40) McHenry, J.N., W.F. Ryan, N.L. Seaman, C.J. Coats, J. Pudykiewicz, S. Arunachalam, and J.M. Vukovich, (2004). A Real-time Eulerian Photochemical Model Forecast System: Overview and Initial O<sub>3</sub> Forecast Performance in the Northeastern U.S. corridor, *Bull. Amer. Meteor. Soc.*, 85, pp. 525-548.
- 41) Hanna, S. R., Z. Lu, C.H. Frey, N. Wheeler, J. Vukovich, S. Arunachalam, M. Fernau, and A.D. Hansen, (2001). Uncertainties in Predicted O<sub>3</sub> Concentrations due to Input Uncertainties for the UAM-V Photochemical Grid Model Applied to the July 1995 OTAG Domain, *Atmos. Environ.* 35 (5), pp. 891-903.
- 42) Arunachalam, S., V. Purushothaman, and P.G. Georgopoulos, (1999). Air Quality Benefits from Mandated Emissions Reductions in the Northeastern United States: Is Population Exposure to Ozone Reduced? *Epidemiology*, 10 (4), 1999.
- 43) Georgopoulos, P.G., S. Arunachalam, and S. Wang, (1997). Alternative metrics for the relative effectiveness of NO<sub>x</sub> and VOC emission reductions in controlling ground level ozone, *J. A&WMA*, 47, pp. 837-932.

#### **E. Conference Proceedings Published as a Book**

- 1) Arunachalam, S., A. Valencia, R. A. Silva, J. Huang, M. Omary and L.P. Vennam (2017). A Global-scale Multi-resolution Study of Surface Air Quality Impacts from Commercial Aircraft Emissions, *Air Pollution Modeling and its Application XXV*, C. Mensink and G. Kallos (eds.), ISBN: 978-3-319-57645-9, DOI: 10.1007/978-3-319-57645-9, Springer Proceedings in Complexity, 609 pp.
- 2) Isakov, V., T. Barzyk, S. Arunachalam and A. Venkatram (2017). Web-based models for exposure assessment on a community scale, *Air Pollution Modeling and its Application XXV*, C. Mensink and G. Kallos (eds.), ISBN: 978-3-319-57645-9, DOI: 10.1007/978-3-319-57645-9, Springer Proceedings in Complexity, 609 pp.
- 3) Pachon, J.E., S. Constanza, P.P. Maria, B.R. Galvis, S. Arunachalam (2016). Exposure assessment to high-traffic corridors in Bogota using a near-road air quality model, *Air Pollution Modeling and its Application XXIV*, D.G. Steyn and N Chaumerliac (eds.), ISBN: 978-3-319-24478-5 (Online) [http://dx.doi.org/10.1007/978-3-319-24478-5\\_66](http://dx.doi.org/10.1007/978-3-319-24478-5_66), Springer Proceedings in Complexity, pp. 403 – 407.
- 4) Boone, S. S. Penn, J. Levy and S. Arunachalam (2016). Calculation of sensitivity coefficients for individual airport emissions in the continental United States using CMAQ-DDM3D/PM, *Air Pollution Modeling and its Application XXIV*, D.G. Steyn and N Chaumerliac (eds.), ISBN: 978-3-319-24478-5 (Online), 10.1007/978-3-319-24478-5\_41, Springer Proceedings in Complexity, pp. 251 – 257.
- 5) Arunachalam, S., M.C. Woody, M. Omary, S. Penn, S. Chung, M. Woo, Y. Tambouret and J. Levy (2016). Modeling the Air Quality and Public Health Benefits of Increased Residential Insulation in the United States, *Air Pollution Modeling and its Application XXIV*, D.G. Steyn and N Chaumerliac (eds.), ISBN: 978-3-319-24478-5 (Online), [https://dx.doi.org/10.1007/978-3-319-24478-5\\_22](https://dx.doi.org/10.1007/978-3-319-24478-5_22), Springer Proceedings in Complexity, pp. 135 - 140.
- 6) Isakov, V., Barzyk, T., Arunachalam, S., Snyder, M. & Venkatram, A. (2016). A Community-Scale Modeling System to Assess Port-Related Air Quality Impacts. *Air Pollution Modeling and its Application XXIV*, , *Air Pollution Modeling and its Application*

- XXIV, D.G. Steyn and N Chaumerliac (eds.), ISBN: 978-3-319-24478-5 (Online), [https://link.springer.com/chapter/10.1007/978-3-319-24478-5\\_63](https://link.springer.com/chapter/10.1007/978-3-319-24478-5_63), Springer Proceedings in Complexity, pp. 385 -390.
- 7) Arunachalam, S., M Woody, J. Rissman, F.S. Binkowski, H.-W. Wong, S. Jathar, A. Robinson (2014). An Enhanced Sub-grid Scale Approach to Characterize Air Quality Impacts of Aircraft Emissions, *Air Pollution Modeling and its Application XXIII*, D.G. Steyn and R. Mathur (eds.), ISBN: 978-3-319-04378-4 (Print) 978-3-319-04379-1 (Online), Springer, The Netherlands, 2014.
  - 8) Isakov, V., M. Snyder, D. Heist, S. Perry, J. Burke, S. Bereznicki, S. Arunachalam, S. Batterman, CAAA (2014). Development of Model-Based Air Pollution Exposure Metrics for Use in Epidemiologic Studies, *Air Pollution Modeling and its Application XXIII*, D.G. Steyn and R. Mathur (eds.), ISBN: 978-3-319-04378-4 (Print) 978-3-319-04379-1 (Online), Springer, The Netherlands, 2014.
  - 9) Vennam, L.P. \*, S. Arunachalam, B.H. Baek, M. Omary, F.S. Binkowski, S. Olsen, R. Mathur, W. Vizuete, G. Fleming (2014). A Multiscale Modeling Study to Assess Impacts of Full-Flight Aircraft Emissions on Upper Troposphere and Surface Air Quality, *Air Pollution Modeling and its Application XXIII*, D.G. Steyn and R. Mathur (eds.), ISBN: 978-3-319-04378-4 (Print) 978-3-319-04379-1 (Online), Springer, The Netherlands, 2014.
  - 10) Arunachalam, S., T. Barzyk, V. Isakov, A. Venkatram, M. Snyder, N. A. Rice, B. Naess and K. Talgo (2014). C-PORT: A Community - scale Near - Source Air Quality System to Assess Port - related Air Quality Impacts, In Proceedings of the 16<sup>th</sup> International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, September 2014, Varna, Bulgaria.
  - 11) Isakov, V., D. Heist, J. Burke, M. Snyder, S. Arunachalam and S. Batterman (2014). Hybrid Air Quality Modeling Approach for use in the Near - road Exposures to Urban air pollutant Study (NEXUS), In Proceedings of the 16<sup>th</sup> International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, September 2014, Varna, Bulgaria.
  - 12) Stocker, J., D. Heist, C. Hood, V. Isakov, D. Carruthers, S. Perry, M. Snyder, A. Venkatram, S. Arunachalam (2014). Road Source Model Intercomparison Study Using New and Existing Datasets, In Proceedings of the 16<sup>th</sup> International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, September 2014, Varna, Bulgaria.
  - 13) Boone, S., & Arunachalam, S. (2014). Calculation of sensitivity coefficients for individual airport emissions in the continental U.S. using CMAQ-DDM/PM. In *ACM International Conference Proceeding Series*. [10] Association for Computing Machinery. [10.1145/2616498.2616504](https://doi.org/10.1145/2616498.2616504)
  - 14) Li, Y., G. Puggioni, P. Jat, M. Hasan, M. Serre, K. G. Sexton, J. J. West , S. Arunachalam, U. Shankar, W. Vizuete, M. Z. Farooqui, and J. M. Gibson (2013) Burden of disease from outdoor air pollution, *Chapter 4 in Environmental Burden of Disease Assessment: A case study in the United Arab Emirates* , Environmental Science and Technology Library 24, Springer, p. 109 - 132, doi: 10.1007/978 - 94 - 007 - 5925 - 1\_2.
  - 15) Arunachalam, S., M. Woody, J. Rissman, F. S. Binkowski, H.-W. Wong, S. Jathar and A. Robinson (2013). An Enhanced Sub-grid Scale Approach to Characterize Air Quality Impacts of Aircraft Emissions, *Air Pollution Modeling and its Application XXII*, D. G. Steyn, P.J.H. Builtjes, R.M.A. Timmermans (eds.), ISBN: 978-94-007-5576-5 (Print) 978-94-007-5577-2 (Online), Springer, The Netherlands, 2013.
  - 16) Arunachalam, S., A. Valencia, D. Yang, N. Davis, BH Baek, R Dodson, EA Houseman and JI Levy, (2011). Comparing monitoring-based and modeling-based approaches for evaluating Black Carbon contributions from a U.S. airport. D.G. Steyn and S.T. Castelli

- (eds.), *Air Pollution Modeling and its Application XXI*, DOI 10.1007/978-94-007-1359-8\_102, Springer, The Netherlands, 2011.
- 17) Arunachalam, S., M. Woody, BH Baek, U Shankar and JI Levy, (2011). An Investigation of the Impacts of Aviation Emissions on Future Air Quality and Health, D.G. Steyn and S.T. Castelli (eds.), *Air Pollution Modeling and its Application XXI*, NATO Science for Peace and Security Series C: Environmental Security 4, DOI 10.1007/978-94-007-1359-8\_108, Springer, The Netherlands, 2011.
  - 18) Arunachalam, S., B.H. Baek, H.-H. Hsu, B. Wang, N. Davis, and J.I. Levy (2010). The Influence of Chemistry Transport Model Scale and Resolution on Population Exposure due to Aircraft Emissions from Three Airports in the United States, *Air Pollution Modeling and Its Application XX*. D.G. Steyn; Rao, S. T. (Eds.) 2010, XLVII, 592 p., ISBN 978-90-481-3811-1, Springer, The Netherlands, 2010.

#### F. Invited and/or Keynote Presentations

- 1) Arunachalam, S., (2017). *Assessing Air Quality Impacts of Airport Emissions from Local to Regional Scales*, presented at the New York City Metro Area Energy & Air Quality Data Gaps Workshop, organized by Northeast States for Coordinated Air Use Management (NESCAUM) and New York State Energy Research and Development Authority (NYSERDA), Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY, May 2017.
- 2) Arunachalam, S., (2017). *Ultrafine Particles and Aviation*. Aircraft Noise and Emissions Reduction Symposium, organized by the American Institute of Aeronautics and Astronautics (AIAA), Alexandria, VA, April 2017.
- 3) Arunachalam, S., (2016). *Advanced Air Quality Modeling Capabilities for Aviation Emissions - Current Status and Research Needs*, Invited panelist at the Aviation Emissions Characterization Roadmap – 14<sup>th</sup> Annual Meeting of the Primary Contributors”, sponsored by the FAA and National Academies, Washington D.C., May 2016.
- 4) Arunachalam, S., (2016). *Air Quality Impacts from Aviation Emissions*, Invited Talk at the FORUM-AE Air Quality Impacts Workshop, Netherlands Aerospace Center (NLR), Amsterdam, Netherlands, April 2016.
- 5) Arunachalam, S., (2015). *CMAQ-DDM Applications to Study Individual Source Sectors and Nexus between Energy, Air Quality, Climate, and Health*. Seminar Series at the University de La Salle, Bogota, Colombia, August 2015.
- 6) Arunachalam, S., (2015). *Modeling Tools for Air Quality Management supported by the CMAS Center*, Invited Talk at the II CMAS South America Conference and V Colombian Congress and International Conference on Air Quality and Public Health, Bucaramanga, Colombia, August 2015.
- 7) Arunachalam, S., (2015). *Air Quality and Health Research – What we know and what we don't know*, Invited panelist at the Aviation Emissions Characterization Roadmap – 13<sup>th</sup> Annual Meeting of the Primary Contributors”, sponsored by the FAA/NASA/DOD, Washington D.C., May 2015.
- 8) Arunachalam, S., (2015). *Policy Options for Transportation-related sources and their impacts on Air Quality*, Invited Presentation at the NC BREATHE Conference, Raleigh, NC, March 2015.
- 9) Arunachalam, S., (2015). *Air Quality Modeling – An Overview*, Invited Talk at the Workshop on Air Quality Modeling and Summer Course on Mathematical Modeling of Atmospheric Composition”, held at the University of Sao Paulo, Sao Paulo, Brazil, February 2015.

- 10) Arunachalam, S. (2015). *Aviation Impacts on Air Quality*, Invited Talk at the ICAO Committee on Aviation Environmental Protection's Impacts and Sciences Group" Washington, D.C., February 2015.
- 11) Isakov, V., V. Garcia and S. Arunachalam (2015). *Linking Meteorology, Air Quality Models and Observations to Characterize Human Exposures in Support of the Environmental Health Studies*, Invited Presentation at the 95<sup>th</sup> Annual Meeting of the American Meteorological Society's 6<sup>th</sup> Conference on Environment and Health, Phoenix, AZ, January 2015.
- 12) S. Arunachalam (2015). Web-based Community-scale Tools for Assessing Near-Source Air Quality, presented to the Carolina Transportation Program, Chapel Hill, NC, January 2015.
- 13) Arunachalam, S. (2014). *Frontiers and Challenges in Atmospheric Dispersion Modeling*, National Academies Board of Atmospheric Sciences and Climate, Washington D.C., December 2014.
- 14) Arunachalam, S. (2014). *Multi-scale Modeling of the Air Quality and Health Impacts of Aviation Emissions for Current and Future Scenarios*, Invited Talk at the Universidad de La Salle, Bogota, Colombia, June 2014.
- 15) Arunachalam, S. (2014). *High Resolution Air Quality Modeling for Traffic Sources in Bogota*, presented at the Secretaria Distrital de Ambiente / Universidad de La Salle, Bogota Colombia, June 2014
- 16) Arunachalam, S. (2014). *Future Year Air Quality and Health Impacts due to Aviation Growth under Changing Climate*, Invited Talk at the UC Davis Aviation Noise and Air Quality Symposium, Palm Springs, CA, February 24 – 26, 2014.
- 17) Bowden, J.H. and S. Arunachalam (2013): Urban modeling results of an air quality urban climate modeling study centered over Dallas-Fort Worth, Urban Landscapes and Climate Change Workshop, Argonne National Lab, IL.
- 18) Arunachalam, S. (2013). *Using Air Quality Models for Air Quality Management*, Keynote Speaker at the "Environmental Pollution, Restoration and Management" Conference, Anna University, Chennai, India, December 2013.
- 19) Arunachalam, S. (2013). *Modeling Tools (CMAQ, SMOKE, AMET, BenMAP) supported by the CMAS Center*, Presented at the Opening Session of the 1<sup>st</sup> CMAS South America Conference, Sao Paulo, Brazil, February 2013.
- 20) Arunachalam, S. (2011) *Estimating Benefits of Air Quality Regulations*, presented to the North Carolina Division of Public Health, Raleigh, July 2011.
- 21) Arunachalam, S. (2011) *Air Quality Management - Case studies for two separate regions of the world: Abu Dhabi and North Carolina, and the Aviation Sector*, Keynote talk presented at the KSR College of Engineering, Tiruchengode, India, March 2011.
- 22) Arunachalam, S. (2011) *The CMAQ Model and other modeling tools (i.e. VERDI, AMET, BENMAP) supported by the CMAS Center* presented at the Opening Session of the "Air Quality Modeling in Asia 2011" Conference, Seoul, Korea, January 24 – 25, 2011.
- 23) Arunachalam, S. (2009) *A Multiscale Approach to Modeling the Impacts of Aviation Emissions on Air Quality*, at the Meeting of the Primary Contributors – Aviation Emissions Characterization Roadmap Coordinating Committee, National Academies, Washington, D.C., June 2009.
- 24) Arunachalam, S. (2009). *"Modelers Perspectives – the North Carolina Case Study"*, at the Photochemical Modeling Workshop – Emerging O3 and PM Issues in Alberta, Calgary, Alberta, June 2009.



- 25) Arunachalam, S. et al (2009) *Guidance for Quantifying the Contribution of Airport Emissions to Local Air Quality*, presented at the Revolution in Aviation - University of California Davis Symposium, Palm Springs, CA, March 2009.
- 26) Arunachalam, S. (2008). *Multiscale Simulations and Analyses of Impacts of Aviation Emissions on Ambient Air Quality*, Presented at the OMEGA International Conference on Airport Air Quality, Royal Aeronautical Society, London, October 2008
- 27) Arunachalam, S., (2008) “A Modeling Study to Assess Air Quality Impacts of Air Toxics from Aircraft and other Sources at an Urban Airport – Case Study for Providence – T.F. Green”, presented at the CRC Mobile Source Air Toxics Workshop, Dec 2008, Phoenix, AZ.
- 28) Arunachalam, S. (2007) “Investigation of Air Quality Impacts of Aviation using Regional Scale Models”, Presented at the “Assessing Current Scientific Knowledge, Uncertainties and Gaps in Quantifying Climate Change, Noise and Air Quality Aviation Impacts Workshop”, International Civil Aviation Organization – Committee on Aviation Environmental Protection, Montreal, Canada, October 2007.
- 29) Arunachalam, S. (2007) *Investigation of Air Quality Impacts of Aviation Emissions – Status and Ongoing Research*, presented at the 5<sup>th</sup> Aircraft PM National Roadmap Meeting, Federal Aviation Administration, Washington, D.C., June 2002
- 30) Arunachalam, S. (2002). *Investigation of VOC Reactivity Assessment with Comprehensive Air Quality Modeling*, presented at the Ozone Transport Commission Modeling Workgroup Meeting, Washington, D.C., May 2002
- 31) Arunachalam, S. and P.G. Georgopoulos, (1999). *Status of Emissions Inventories for Photochemical and Particulate Matter Modeling in the Northeastern US*, presented at the NARSTO-NEOPS Science Workshop, University Park, PA, April 1999
- 32) Arunachalam, S. (1995). *Technology, a closer look at modeling Ozone in the Delaware Valley area*, presented at the Symposium on Ozone and Smog Reduction in Delaware at the University of Delaware, DE, Oct 1999
- 33) Arunachalam, S. (1993). *State Implementation plan (SIP) Activities for Ozone Attainment and Plume Modeling*, presented at the First International Air Quality Symposium, Carnegie Melon University, Pittsburgh, PA, Aug 1993

**G. Other Conference Proceedings / Presentations (> 150, available on request)**

**H. Technical Reports (40, available on request)**

**I. Memberships in State, National, International Committees**

- |                |  |
|----------------|--|
| 2015 – 2018    | Member, AMS Committee on Meteorological Aspects of Air Pollution (CMAAP)   |
| 2015 – 2016    | Conference Committee, 19 <sup>th</sup> Conference on Applications of Air Pollution Meteorology with the A&WMA, at the 96 <sup>th</sup> Annual Meeting of the American Meteorology Society, New Orleans, LA |
| 2014 – 2015    | Planning Committee Member and Local Host Liaison, 108 <sup>th</sup> Annual Conference of the A&WMA, Raleigh, NC  |
| 2014 – 2015    | A&WMA Annual Conference Chair of Committee for Environmental Challenge International (ECi) – A Student Competition   |
| 2013 – Current | Impacts and Science Group (ISG) of the Committee for Aviation Environmental Protection (CAEP) of the International Civil Aviation Organization (ICAO) – a United Nations Specialized Agency                |

- 2007 – Current            Impact Assessment Lead, Aircraft Emissions Characterization (AEC)  
Roadmap Coordinating Council, Federal Aviation Administration
- 2007 – 2008            Chair, Air and Waste Management Association, RTP Chapter
- 2006 – 2008            Vice-Chair, Air and Waste Management Association, RTP Chapter
- 2005 – 2006            Board Member, Air and Waste Management Association, RTP Chapter
- 2003 – Current            Member, NARSTO Reactivity Research Working Group
- 1999 – 2005            Lead Air Quality Modeler, Charlotte Metropolitan Statistical Area and North  
Carolina Early Action Compact Areas Ozone Attainment State  
Implementation Plan Technical Modeling Committee
- 1999 – 2000            Lead Air Quality Modeler, Houston-Galveston Ozone Attainment State  
Implementation Plan Technical Modeling Committee
- 1995 – 1996            Member, U.S. EPA Attainment Demonstration Guidance Review WorkGroup
- 1992 – 1998            Lead Air Quality Modeler, Philadelphia Consolidated Metropolitan Statistical  
Area Ozone Attainment State Implementation Plan Technical Modeling  
Committee
- 1992 – 1998            Modeling Committee Member, New York Metropolitan Statistical Area Ozone  
Attainment State Implementation Plan Technical Modeling Committee
- 1993 – 1998            Modeling Committee Member, Northeast States for Coordinated Air Use and  
Management (NESCAUM)
- 1992 – 1994            National Modeling Committee Member, Regional Oxidant Modeling for  
Northeast Transport (ROMNET) Project

#### J.            Graduate Student Advisee Honors [All ESE Students]

- 1) Arter, C. (2017). Calculating 2<sup>nd</sup> Order Coefficients for Airport Emissions in the Continental U.S. using CMAQ-HDDM. **1<sup>st</sup> Place** in the Annual Hartman Student paper competition organized by the U.S. DOT's PARTNER Center of Excellence, 2017.
- 2) Chang, S.-Y. (2016). Finely Resolved On-Road PM<sub>2.5</sub> and Estimated Premature Mortality in Central North Carolina, *Presented at the NC-BREATHE Conference*, Charlotte, NC, April 2016. **Best Graduate Student Paper.**
- 3) Chang, S.-Y. (2015) Evaluation of model-based exposure metrics for multiple pollutants at fine resolution, *Presented at the Annual Meeting of the Air & Waste Management Association*, Raleigh NC, June 2015. **3<sup>rd</sup> Place** in Student Poster Competition.
- 4) Boone, S. **Koch Student Travel Award**, UNC Gillings School of Global Public Health, 2015.
- 5) Boone, S. (2014) Calculation of Sensitivity Coefficients for Individual Airport Emissions in the Continental U.S. using CMAQ-DDM/PM, In Proceedings of the Extreme Science and Engineering Discovery Environment (XSEDE) 2014 Conference, July 2014, Atlanta, GA. "**Best Student Paper of the 2014 Conference**"
- 6) Chang, S.-Y., **Koch Student Travel Award**, UNC Gillings School of Global Public Health, 2014.
- 7) Woody, M. (2013) Can Remote Sensing Products Detect the Air Quality Signal due to Aviation Emissions? **Joint 1<sup>st</sup> Place** in the Annual Hartman Student paper competition organized by the U.S. DOT's PARTNER Center of Excellence, 2013.
- 8) Vennam, L.P. (2013) An Observation and Model based-assessment of Hazardous Air Pollutants (HAPs) from a Medium-Sized U.S. Airport. **Joint 1<sup>st</sup> Place** in the Annual Hartman Student paper competition organized by the U.S. DOT's PARTNER Center of Excellence, 2013.
- 9) Woody, M. (2012) Aircraft Emissions' Contributions to Organic Aerosols in a Regional Air Quality Model using the Volatility Basis Set, **3<sup>rd</sup> Place** in the Annual Hartman Student

- paper competition organized by the U.S. DOT's PARTNER Center of Excellence, 2012.
- 10) Rissman, J., **Environmental Sciences and Engineering Achievement Award** (for top MS, MSPH, or MPH student), 2011
  - 11) Rissman, J. **Louise Venable Coker Award for Best Master's Project**, UNC Dept. of City and Regional Planning, 2011
  - 12) Woody, M. (2010) The Impacts of Aviation Emissions on Current and Future Particulate Matter: The Effects of the Speciated Model Attainment Test on the Community Multiscale Air Quality Model Results, **1<sup>st</sup> Place** in the Annual Hartman Student paper competition organized by the U.S. DOT's PARTNER Center of Excellence, 2010.
  - 13) Rissman, J. (2010) Evaluating the Impact of the U.S. EPA's Proposed Revisions to the SO<sub>2</sub>, NO<sub>2</sub>, and O<sub>3</sub> Primary Standards on the U.S. Aviation Sector, **2<sup>nd</sup> Place** in the Annual Hartman Student paper competition organized by the U.S. DOT's PARTNER Center of Excellence, 2010.
  - 14) Woody, M. (2009) Secondary Organic Aerosol produced from Aircraft Emissions at the Atlanta Airport - An Advanced Diagnostic Investigation using Process-based and Reaction-based approaches, **Special mention** in the Annual Hartman Student paper competition organized by the U.S. DOT's PARTNER Center of Excellence, 2009.

#### K. Professional Service Activities at UNC and External

##### Peer Reviewer

U.S. EPA STAR Program  
 NASA ROSES Decision Support Systems for Air Quality  
 National Oceanic and Atmospheric Administration (NOAA)  
 Natural Sciences and Engineering Research Council of Canada (NSERC)

##### Conference Committee

108<sup>th</sup> Annual Conference of the Air and Waste Management Association  
 19<sup>th</sup> Annual Conference of the Applications of Air Pollution Meteorology  
 Annual CMAS Conference at Chapel Hill (all 14 editions to date)

##### Peer Reviewer for 16 Journals including

Atmospheric Chemistry and Physics  
 Atmospheric Environment  
 Atmospheric Research  
 Atmospheric Pollution Research  
 Environmental Modeling and Software  
 Environmental Science and Technology  
 International Journal of Environmental Research and Public Health  
 International Journal of Environment and Pollution  
 Journal of Atmospheric Chemistry  
 Journal of the Air & Waste Management Association  
 Journal of Exposure Science & Environmental Epidemiology  
 Journal of Geophysical Research  
 Landscape and Urban Planning  
 Nature's Scientific Data  
 Transport Policy  
 Transport Research Part D – Transport and the Environment

2005-2007 UNC ITS Research Computing Advisory Committee

2003-Current UNC-IE Administrator for all Research Computing Services

Consulting services for U.S. DOJ, NC DOJ, and Colorado Public Utility Commission