

Curriculum Vitae

Biswadev (Dev) Roy, Ph.D.

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M.S. Electrical Eng.	University of Central Florida, Orlando, FL. U.S.A. Department of electrical & computer engineering
Ph.D. (science)	Jadavpur University, Calcutta, India Department of physics
M.Sc.	University of Roorkee (now Indian Institute of Technology, Roorkee), India Department of physics
B.Sc.	Ranchi University, India University departments of physics, chemistry & mathematics

RECENT PROJECTS

- *National Science Foundation* Catalyst Project: Age and temperature dependent millimeter-wave charge carrier dynamics in hybrid perovskite films” **principal-investigator**, awarded (2022-2024)
- *Army Research Office (ARO)* STIR grant “Structure-property relationships for novel electronic functional materials using contactless probing” **principal-investigator**, awarded (2022-2023)
- *U.S. Department of Energy (DOE) national nuclear security administration (NNSA)* “Consortium for nuclear security advanced manufacturing enhanced by machine learning (NSAM-ML)” **Investigator** (with P.I. A. Karoui, and B. Vlahovic) (2020-2022).
- *National Science Foundation (NSF)* project on partnership with NCSU/ORaCEL for studies on dielectric properties of organic solar materials, **Investigator** (with B. Vlahovic and P.I., Marvin H. Wu) (2018)
- *UNC General Administration* Research Opportunities Initiative (ROI) “Time Resolved Millimeter Wave Conductivity (TRMMWC) and applications for characterization of Perovskite based solar materials” **Investigator**, (With P.I. M.H. Wu) (2015-2020)
- *National Science Foundation (NSF)* CREST project on development of millimeter wave conductance pump-probe apparatus, and revitalization of NCCU electron-accelerator facility (EAF) **Participant** (with P.I., B. Vlahovic) (2011-2015)

WORK EXPERIENCE

- Research Professor *North Carolina Central University* 2011-present
- *Funded project as PI:* National Science Foundation (NSF) CREST center project on material characterization in millimeter wave domain July 2020-June 2022; NSF RIA/Catalyst project on studying age and external temperature dependent charge carrier dynamics for hybrid perovskite, age prediction model development and student training (Aug 2022 to July 2024).
 - *Funded project as PI:* Army Research Office (ARO) project on establishment of structure-millimeter wave property relationships for strong organic, inorganic and hybrid novel field effect transistor (FET) functional materials.
 - *Funded project participation:* University of North Carolina Research Opportunity Initiative (UNC-ROI) development of “time-resolved millimeter wave conductivity apparatus for Inorganic/organic/hybrid materials” From July 2015-June 2020.
 - Modeled perovskite aging transients using time-resolved mm wave apparatus
 - Studied Gallium arsenide direct current and radiofrequency response to 532 nm light assuming 100% internal *quantum-efficiency* using transmission and reflection of millimeter wave probe-beam in 107.35-170 GHz response using very fast detectors in quasi-optical setup.
 - Modeled the effect of material absorption coefficient on *quantum yield* of photodetector using relationships between surface recombination velocity and diffusion coefficient, surface states.
 - Explored possibility of using **IBM Q** for optimizing sampling periods of the time-resolved millimeter wave conductance system which is used for ascertainment of charge dynamical properties of organic-, inorganic and hybrid photoconductors.

- Calculated structural defect related charge dynamical property changes in silicon wafers due to high energy ionizing radiation gamma, beta, H⁺, and Chlorine ions
- National Science Foundation (NSF) Project for collaboration on organic, 2D, and WBG such as Gallium Nitride (GaN) material characterization transmission/reflection using sub-THz frequency domains with ORaCEL/NC State University.
- Wrote DHS project on THz biological applications; NIH THz biology proposal with BBRI personnel
- Wrote up to date review of biological effects of non-ionizing radiation from mobile communication point of view, communicated to Int. J. radiation biology.
- Generated preliminary cancer cell exposure data using 10.5 GHz microwave radiation with Julius L. Chambers Biomedical/Biotechnology Research Institute, NCCU
- Developed Labview 2017 automation code for TR-mmWC
- Wrote U.S. Nuclear Regulatory Commission (NRC) proposal titled “NCCU electron accelerator beam characterization and THz source generation using metal foil transition radiation technique for materials research, education, and training” (with Dr. B. Vlahovic)
- revitalized NCCU RF linear electron accelerator system, automation, introduced PID control for laser heating
- planned for nano-scale deposition and measure conductivity
- planned to introduce time-resolved spectroscopy to study charge dynamics and conductivity in organic photovoltaic materials using micro-, millimeter, and THz waves from backward wave oscillators
- performed electric field integral equation modeling to study coherent transition radiation from NCCU radiofrequency electron accelerator
- wrote proposal for federal funding on use of satellite soil moisture to improve wildfire emissions processing
- obtained state operator’s license for NCCU electron accelerator system and radiation protection limited to system and shielding evaluations
- participating in NSF targeted infusion project on engineering physics at NCCU
- taught high school physics students in 2012-2018 CREST summer schools

Independent Consultant *Baron Advanced Meteorological Systems* 2009-2010

- applied high resolution retrieved aerosols data profiles from satellite to assimilate into Eulerian regional transport model in near real time for better aerosol forecast to improve human health and air quality

Independent Consultant *Data & Image Processing Consultants, LLC* 2009-2014

- applied synthetic aperture radar (SAR) microwave signatures to look through hurricane clouds for forensic meteorology applications – hurricane Katrina (2005)
- analyzed hydrodynamic modeling outputs for studying water bodies during hurricane Katrina environment, studied waves, impacts and wandering of floating structures
- used data fusion techniques to perform combined assessment of hurricane impacts on human dwelling (radar, satellite, surface, buoys, and Lagrangian models)
- wrote 3-dimensional complex radio refractivity processing proposal for USAF funding announcement using EPA CMAQ photochemical model coupled with relevant wave propagation model while employing HITRAN database for microwave and free space optical domain (1 GHz to 400 THz)
- Developed radiative transfer scheme for aerosol Mie and Rayleigh class scattering for calculation of extinctions at 532 nm CMAQ model derived aerosol optical depth (AOD) for satellite comparison

Physical Scientist GS-13 *U.S. Environmental Protection Agency/RTP, NC* 2003-2007

- USEPA CMAQ photochemical model evaluation & validation using 550 nm aerosol extinction, radiative transfer schemes for aerosol scattering extinction
- participated in wildfire emissions refinements to NEI using satellite infra-red (IR) imagery

Physical Scientist GS-13
photochemical air modeler

U.S. Environmental Protection Agency/Dallas, TX. 2007-2009

- performed Dallas Fort Worth (DFW) ozone SIP mid-course review attainment demonstration modeling (CMAQ on high-performance supercomputer for 20 y air quality projection of DFW region), emissions sensitivity for 8-hr ozone air planning for DFW using monitors and modeling platforms resulting in diesel emissions reduction credits and wrote technical support documentation leading to \$500M diesel emissions reduction funds.
- performed meteorological data analysis for ozone non-designation areas, prepared 6-hour composite plots of meteorological fields over region-6 urban areas for ozone seasons 2004-2008
- performed NOAA Lagrangian Hysplit model backward trajectory analysis (based on EDAS-40km product) for monitor performance evaluation (using wind residence time statistic)
- produced and analyzed OMI, GPS, MODIS, GOES, TOMS total column nitrogen dioxide, water vapor, ground temperature, optical depth and ozone for studying spatiotemporal gradients for NM-CO-UT-AZ 4-corners area
- produced preliminary statistical analysis of Texas electric generating unit's NO_x, SO₂ emissions using EPA CAMD and CEMS data and statistical distribution for hourly and monthly basis, correlate ozone exceedance by county, SID and ORISPL and total time series plots
- reviewed Houston, TX, Baton-Rouge, LA, 8-hour ozone photochemical modeling documents and protocol
- produced GIS maps showing monitored and state assessed new standards 75 ppb ozone designation with MSAs
- designed, wrote and tested Python-Fortran long-term wind residence statistics software for 8 hours, and 1-hour ozone designation potential culpability analysis tool (named NEXGRID v1.0)
- produced GIS maps showing 5-year wind residence hours and conditional probability in 80 km, 4 km, and 1 km grid using Hysplit derived wind back trajectory end points for EPA region-6 PAMS monitoring sites
- provided help in reviewing winds backward trajectory analysis done by Oklahoma DEQ
- attended Houston advanced research center and Texas commission meetings and reviewed Houston SIP and protocol for 8-hour ozone non-attainment
- reviewed Texas energy efficiency modeling with CAMD

NASA Contractor Scientist

NASA/Goddard Space Flight Center

1999-2003

- supported calibration of NASA TRMM satellite microwave precipitation radar
- improved the NASA TRMM satellite ground-validation algorithm incorporating radar base scan geometry
- quality controlled very high resolution rawinsonde datasets using modified NCAR algorithm for latent heat budget analysis and lightning energetic studies
- measured hurricane dynamics and thermodynamics using NASA DC-8 and NASA ER-2 aircrafts (CAMEX-4) – first in-flight test for the extremely successful hurricane track prediction technology using DC-8 dropsonde and NCAR developed AVAPS
- worked briefly on retrieval of aerosol concentrations based on UV- and visible satellite data for NASA/OMI instrument
- wrote **USA fact sheet** introducing world's first satellite rain products for use in development sector radiowave propagation models (united nations International Telecommunication Union, Geneva, Switzerland, 2002)

Graduate Research Assistant

School of Electrical Eng. & Computer Science, UCF 1998-1999

- succeeded in NASA/TRMM field campaign and NASA/Texas-FL under-flights phase B
- succeeded in NASA/CAMEX-3 field campaign, thermodynamics, mobile PVT/LOS sondes
- quality-controlled Nexrad electrical reflectivity anomalous propagation signatures for rain accumulation for NASA TRMM precipitation radar ground-truth applications
- reported groundbreaking satellite-ground radar rain map comparisons for NASA/TRMM radar validation during Intl. Radar Conference, Montreal, Canada 12-16 July 1999.
- led team of students for deploying atmospheric instruments, performed measurements at NASA/Kennedy Space Center (KSC), and other Florida validation sites

Research Associate

FHWA project on wind flow simulation at UCF/CEED

1996-1998

- generated boundary element method (BEM) wind simulation codes for use with engineering workstations
- wrote FHWA proposal on evaluation of weathered steel structures using positron annihilation spectroscopy and succeeded in a grant application, was awarded *Eisenhower Grants for Research* (GRF) 1997 (not availed).

Associate Engineer *Electrodynamics Associates, Oviedo, FL* 1996-1997

- participated in design, simulation for all operating points for a 1500 hp high torque-density brushless DC motor using IGBT source
- helped in proportional-integral (PI) controller design, cooling, inverter
- generated LabVIEW dynamometer test codes for the motor system

Post-doctoral fellow *Jadavpur University, India* 1994-1995

- compared theoretical/modeled PBL mixing depths with 3D Doppler acoustic soundings data over Indian sub-continent

Junior Scientific Officer *Jadavpur University, India* 1992-1994

- quality controlled Doppler 3D monostatic acoustic sounder data from MONTBLEX experiment and case studies
- performed modeling results and compared with data, focused on mean turbulent PBL flows -Indian summer monsoon
- performed non-dimensional kinematic and thermodynamic analyses using sodar and slow/fast flux tower data
- computed heat, momentum and mass turbulence flux using mixing length theory and PBL similarities.
- characterized acoustic return power for monsoon planetary boundary layers
- review of Very low/Extremely low frequency (VLF/ELF) atmospherics for lightning studies and cloud physics

Junior/Senior Research Fellow *Calcutta University Institute of Radiophysics & Electronics, and Jadavpur University, physics department* 1987-1992

- radiative-convective modeling for paleo-climatic mean air temperature
- acquired and quality controlled planetary boundary layer data from 30m flux tower, 3D monostatic Doppler acoustic sounding system, slow and fast ascent rawinsonde, and tethersonde, continuous data acquisition, receiver and processing instrumentation
- team-lead for IIT Kharagpur MONTBLEX station supporting full scale experiment using measurements from flux-tower instruments, rawinsonde, kytoon, 3D acoustic sounding system and other measurement systems during 1989, 1990 and 1991
- taught general physics and optics laboratory courses to engineering student

PROFESSIONAL ACTIVITIES

- **Judge**, Sigma-Xi annual Research Conference, Raleigh, N.C. November 2017
- **Session Chair**, IEEE SouteastCon, Electromagnetics & Microwaves section, 2015, 2017, 2018
- **Over 30 talks** at international conferences/symposia and science team workshops since 1992 including invited talk on comparing TRMM satellite PR rainfall with ground-based radars at international radar conference held in Montreal, Quebec, Canada, 1998.
- **Assisting extreme science and engineering** discovery environment program at NCCU for introduction of high-end high-performance supercomputing resources to students and researchers.
- **Science team member** and experimental co-Investigator during extremely successful NASA 4th convection and moisture experiments held in 2001.
- **Participating in NCCU electron linear accelerator** facility upgrade and reconditioning efforts through contributions in automation, control, and modeling, **qualified radiation monitoring staff** and e-gun operator
- **Investigator**, European Space Agency project on use of microwave synthetic aperture radar products for post hurricane land damage assessments (2011-2012).
- American Geophysical Union journal **reviewer** (2005 to 2009).
- **Key player** in US National Emissions Inventory (NEI) fire emissions development utilizing NASA satellites(2006-2007).

SYNERGISTIC ACTIVITIES

- participating in University of North Carolina research opportunities initiative (ROI) proposal from NCCU for setup of millimeter wave/THz material characterization user facility (with NCSU)
- participating with Fayetteville State University on applications of physics-based machine learning algorithms to infer material dielectric properties using time-resolved conductivity and photoluminescence data
- participating in NCCU targeted infusion project on development of an engineering physics program concentration at the department of physics
- participating in teaching students in NCCU/CREST center summer ventures program
- taught as guest lecturer in North Carolina State University School of Marine Earth & Atmospheric Science (MEAS) on following areas:
 - Data Assimilation in Eulerian air quality model for aerosol forecasting.
 - Wildfire emissions and CMAQ modeling.
 - Satellite detection of air quality.
 - Aerosol optical depth predicted by photochemical models, radiative transfer theory.
- Reviewer, IEEE 2015 SoutheastCon, (Region-3, Broward section) electromagnetics and microwaves technical area
- Reviewer, IEEE 2016 SoutheastCon, Norfolk, VA., electromagnetics and microwaves technical area
- Reviewer, IEEE 2017 SoutheastCon, Charlotte, NC, electromagnetics and microwaves technical area
- Reviewer, IEEE 2018 SoutheastCon, St. Petersburg, FL., electromagnetics and microwaves technical area
- Reviewer, Journal of Applied Physics, since 2020
- Reviewer, International Journal of Infrared, Millimeter, and Terahertz Waves, since 2020
- Reviewer, International Joint Conferences on Artificial Intelligence-PRICAI, 2020

PEER REVIEWED AND CONFERENCE PUBLICATIONS

- Biswadev Roy, A. Karoui, M.H. Wu and B. Vlahovic, Machine learning for age prediction of perovskite sample using high-dimensional microwave transient absorption datasets, *Journal TBD (in preparation)* (2022).
- Biswadev Roy, B. Vlahovic, and M.H. Wu, “AC and DC characteristics of variable laser fluence activated cadmium selenide thin film with and without external magnetic field” 2023 IEEE MTT-S International Microwave Symposium, 11-16 June, San Diego, CA. (*to be submitted*) (2022).
- Biswadev Roy, B. Pivac, M.H. Wu, and B. Vlahovic, “Relationship between decay coefficients and trap parameters in SiO₂ with Ge nanocrystals when probed using CW millimeter wave probe beam” 2023 IEEE MTT-S International Microwave Symposium, 11-16 June, San Diego, CA. (*to be submitted*) (2022).
- B. Roy, B. Vlahovic, M.H. Wu and C.R. Jones, “Charge dynamical properties of photo-responsive and novel semiconductors using time-resolved millimeter-wave apparatus”, book chapter for *Spectroscopy and Characterization of Nanomaterials and Novel Materials. Experiment, Modeling, Simulations, and Applications* (Ed. P. Misra) Wiley published, 2021
- Biswadev Roy, and Marvin H. Wu, Characteristics of room temperature bipolar photoconductance in 150 GHz probe transients obtained from normal and irradiated silicon illuminated by 532 nm laser, *arXiv:2109.13326 [cond-mat.mtrl-sci]* (2021)
- B. Roy, S. Niture, and M.H. Wu, Biological effects of low power nonionizing radiation-A narrative review, *J. Radiation Research and Imaging* (2021), 1(1):1-23 (2021)
- B. Roy, B. Pivac, B. Vlahovic, and M.H. Wu, Millimeter wave photoresponse of low-dose radiation damaged silicon, *Nuclear Instruments and Methods in Physics Research, B* 476 (2020).
- B. Roy, S. Niture, M.H. Wu, and D. Kumar, Effects of 10.5 GHz radiofrequency exposure on normal and prostate cancer cell morphology, *IEEE Southeastcon, March 12-15, Raleigh, North Carolina* (2020).
- B. Roy, B. Pivac, B. Vlahovic, and M. Wu, Sub-mm wave transmission and reflection response in low dose radiation damaged silicon, *IEEE Southeastcon, March 12-15, Raleigh, North Carolina* (2020).
- B. Roy, S. Niture, M.H. Wu, and D. Kumar, Bioeffect studies with low power nonionizing radiation, *Review for a Journal article (in preparation)*
- B. Roy, B. Vlahovic and M. Wu, Millimeter Wave Reflection Data for Semi-Insulating Gallium Nitride on Sapphire Wafer, *Mendeley Data*, DOI: 10.17632/892sn9w7g4.2 (2019).
- B. Roy, M. Wu, and B. Vlahovic, Comparison of millimeter wave dc reflections for GaN, GaAs and 4H-SiC, *Small* (in preparation) (2020)

- B. Roy, B. Pivac, M. Wu and B. Vlahovic, Study of millimeter wave intrinsic mode functions for perovskite and SiGe (nanocrystal) transmission datasets, *Materials Today* (in preparation) (2020).
- B. Roy, Taylor Knapp, Corinne Miller, A. Dinku, Harald.W. Ade, Marvin H. Wu and Branislav Vlahovic Millimeter wave transmission and reflection responses of organic semiconductor materials, *Data in Brief*, Vol. 28, 104996, 8 pages (2020).
- B. Roy, Franky So, Stephen Amoah, M. Wu and B. Vlahovic, Study of perovskite (MaPbI₃) aging process through analysis of millimeter wave reflection spectra, *Mendeley Data*, doi: 10.17632/p65yxhdxkm.2 (2019).
- B. Roy, Charles R. Jones, B. Vlahovic, Harald W. Ade, and Marvin H. Wu , A Time-Resolved Millimeter Wave Conductivity Apparatus (TR-mmWC) for Charge Dynamical Properties of Semiconductors, *Review of Scientific Instruments*, <https://doi.org/10.1063/1.5026848>, 89 (10), 104704 (2018).
- B. Roy, Albert Tsui, and B. Vlahovic, BWO and IMPATT Millimeter Wave Probing of c-Si, and Perovskite, *IEEE Southeastcon (electromagnetics & microwaves)*, IEEE Xplore, 19-22 April, St. Petersburg, FL., DOI: 10.1109/SECON.2018.8478969 (2018).
- B. Roy, Charles R. Jones, and M. Wu, *U.S. Patent Application* title “SYSTEM AND METHOD FOR MEASURING PHOTOCONDUCTIVITY USING QUASI-OPTICAL TIME-RESOLVED MILLIMETER WAVE”. (2018)
- B. Roy et al., Inter-relation between laser induced photoconductance and millimeter wave absorption using c-Si intrinsic resistivity, *J. Lasers & Photonics*, Vol. 5, Issue 1 (2018).
- Biswadev Roy, Charles R. Jones, S.V. Benson, Marvin Wu, Amit Kesar, T. Patterson, M. Dukic and Branislav Vlahovic, NCCU Electron Accelerator Facility-current state (poster), NASA URC meeting, NCCU, Durham, NC, April 14. (2014)
- Biswadev Roy, Charles R. Jones, Marvin Wu, and Branislav Vlahovic, Material characterization using micro-, mm-, and THz radiation (poster), NASA URC meeting, NCCU, Durham, NC, April 14 (2014)
- B. Roy, C.R. Jones, T. Patterson and B. Vlahovic, A single-cell 1.2 MeV RF electron accelerator System – A status update, *Internal document*, NCCU CREST Center/Mathematics & Physics department, 15 pages (2013).
- J.N. McHenry, C. Coats, J. Vukovich, D. Olerud, T. Smith, R. Husar, C. Hsu, M.J. Jeong, J. Warner, C. Salustro, B. Do, and B. Roy, Domestic and International advances in numerical air quality prediction at Baron advanced meteorological systems, 2010 National air quality conference: Air quality forecast modeling, March 17, Raleigh, N.C. (2010).
- Amber J. Soja, et al., Assessing satellite-based fire data for use in the National Emissions Inventory, *Journal of Applied Remote Sensing*. (2009)
- George Pouliot, Tom Pace, B. Roy, Thomas Pierce, and David Mobley, Development of a biomass burning emissions inventory by combining satellite and ground-based information, *Journal of Applied Remote Sensing*, Vol. 2, 021501 (16 May 2008).
- Roy, B., R. Mathur, and A. Gilliland, CMAQ derived aerosol properties: Comparison with IMPROVE, MODIS and AERONET data, *J. Geophys. Res.* Vol. 112, D14301, doi:10.1029/2006JD008085, (2007).
- Roy, B., G. Pouliot, A. Gilliland, T. Pierce, S. Howard, and W. Benjey, Refining fire emissions for air quality modeling with remotely sensed fire counts: A wildfire case study, *Atmospheric Environment*, 41, 655-665 (2007).
- Roy, B., Jeffrey B. Halverson, and Junhong Wang, The influence of radiosonde “age” on TRMM field campaign soundings humidity correction”, *J. Atmos. Oceanic Technol.*, Vol. 21, 470-480 ((2003).
- Datta, S., W.L. Jones, B. Roy, and A. Tokay, Spatial variability of surface rainfall as observed from TRMM field campaign data. *J. Appl. Meteorol.* Vol. 42, No. 5, 598-610 (2003).
- Halverson, J.B., T. Rickenbach, B. Roy, H. Pierce, and E. Williams, Environmental characteristics of convective systems during TRMM-LBA, *Mon Wea. Rev.*, Vol. 130, No. 6, 1493-1509 (2002).
- Williams, E., et al., Contrasting convective regimes over the Amazon: Implications for cloud electrification. *J. Geophys. Res.*, 107 (D20), 50-1 to 50-19 (2002).
- Oneyemelukwe, O.U., B. Roy, and Harold Bosch, Coupling of the finite-difference method and the BEM-dual reciprocity method for wind flow simulation, *Journal of Wind Engineering and Industrial Aerodynamics*, Vol. 77 & 78, p631-641 (1998).
- Szykman, James, B. Roy, G. Pouliot, J. Godowitch, C. Kittaka, and Bradley Pierce, Use of MOPITT Carbon Monoxide to assess reallocation of wildfire emissions in CMAQ, *Second EastFIRE Conference (2007 EastFIRE Conference)* June 5-8, George Mason University, Fairfax, VA (2007).

- Pouliot, G., T. Pierce, D. Mobley, B. Roy, and T. Pace, Development of a Biomass Burning Emissions Inventory by Combining Satellite and Ground Based Information, *Second EastFIRE Conference (2007 EastFIRE Conference)* June 5-8, George Mason University, Fairfax, VA. (2007).
- Soja, Amber, J. Al-Saadi, B. Pierce, C. Kittaka, J. Szykman, L. Giglio, D. Randall, S. Raffuse, B. Roy, D.J. Williams, T. Pace, J. Kordzi, T. Pierce, T. Moore, A methodology for estimating area burned using satellite data in near-real-time in Oregon and Arizona, *16th Annual International Emissions Inventory Conference – “Emission Inventories: Integration, Analysis, Communication”*, Raleigh, NC, May 14-17 (2007).
- Roy, B., George A. Pouliot, J. David Mobley, Thompson G. Pace, Thomas E. Pierce, Amber J. Soja, James J. Szykman, and J. Al-Saadi, Development of an Inventory of Fire Emissions Using Satellite Data, *NATO/International Technical Meeting on Air Pollution Modeling and its Application*, 24-28 September, Aveiro, Portugal (2007).
- Ching, Jason, S. Burian, S. Dupont, B. Roy, Advanced meteorological modeling with urban canopy parameters for air quality and dispersion applications in urban areas, *International Conference on Urban Climatology*, June 12-16 Gothenburg, Sweden (2006).
- Rao, S.T., R. Mathur, R. Pinder, J. Pleim, S. Roselle and B. Roy, Use of remote sensing air quality information in regional scale air pollution modeling: Current use and requirements, *Community Workshop on Air Quality Remote Sensing From Space: Defining an optimum observing strategy*, February 21-23, 2006, National Center for Atmospheric Research, Boulder, CO. (2006).
- Roy, B. R. Mathur, A. Gilliland, J. Szykman, and C. Kittaka, A comparison of aerosol optical depth simulated using CMAQ with satellite estimates, presented during the *98th Annual Conference of the Air & Waste Management Association (AWMA)*, June 21-25, Minneapolis, MN. (2005).
- Mathur, R., Kenneth L. Schere, Jonathan Pleim, Daiwen Kang, Shaocai Yu, Pius Lee, and B. Roy, Assessment of Eta-CMAQ Forecasts of particulate matter distributions through comparisons with surface network and specialized measurements, *7th Conference of Atmospheric Chemistry*, San Diego, CA., January 10-14 (2005).
- Roy, B. and A. Gilliland, Comparison of Models-3 community multi-scale air quality model and MODIS/Terra aerosol optical depth. *Workshop on Air Quality Applications of Satellite Data: Using Satellite Data to Monitor and Improve Air Quality Forecast*, NOAA/NESDIS/Center for Satellite Applications and Research, May 2004, Camp Springs, MD. (2004).
- Roy, B., Space based rain radar data might be useful for radio-communication study groups, EOS, Transactions of the American Geophysical Union, Vol. 84, No. 3, Jan.21, p23 (2003).
- Roy, B., U.S.A. Fact Sheet for International Telecommunications Union (ITU-R), Geneva, Switzerland: “On use of Tropical Rainfall Measuring Mission (TRMM) precipitation radar standard products for improvement of ITU-R fade statistic models for radiowave propagation” (2003).

TECHNICAL REPORTS

1. On beam quality, system performance and reliability of the NCCU relativistic electron accelerator system, NSF/CREST center NCCU, *Internal Document*, prepared with Charles R. Jones, Thomas Patterson, and B. Vlahovic, 2013.
2. A single-cell 1.2 MeV RF electron accelerator system- efforts to revitalize existing system, NSF/CREST center annual progress report, October 2013.
3. A brief survey of engineering physics curricula in the US universities and job prospects – prepared for NSF proposal on development of engineering physics curriculum at NCCU, 2011.
4. Technical Specification Document Modeling and Other Analysis Attainment Demonstration for Dallas-Ft. worth State Implementation Plan on Ozone Air Quality for Federal Register, July 2008.
5. Remote Sensing and Air Quality Modeling: Fire Emission Estimates, Section 2.3.9, page 26-29, National Oceanic & Atmospheric Administration Technical Memorandum OAR-ARL-256, Fiscal year 2005.
6. Summary Report of the NOAA Atmospheric Sciences Modeling Division to the U.S. Environmental Protection Agency, Evelyn M. Poole-Kober (Ed.), Air Resources Laboratory, Silver Springs, Maryland, June 2006.
7. Remote Sensing and Air Quality Modeling: Aerosol Optical Depth, Section 2.3.10, page 29-30, National Oceanic & Atmospheric Administration Technical Memorandum OAR-ARL-256, Fiscal year 2005
8. Summary Report of the NOAA Atmospheric Sciences Modeling Division to the U.S. Environmental Protection Agency, Evelyn M. Poole-Kober (Ed.), Air Resources Laboratory, Silver Springs, Maryland, June 2006.

9. Contributions to NASA Benchmark Report: Biomass Burning Emissions Enhancements for Air Quality Planning. NASA Earth Science Applied Science Program, National Application to Air Quality, October 2007.

ADDITIONAL TRAINING

License	NC State DHHS – Radiation protection, 1.2 MeV accelerator operation 032-0371-A1	2012
Certificate	Stanford University Energy conversion & storage	2011
Coursework	University of California, Irvine Embedded systems engineering	2011
Training	UNC Center for Environment Smart Matrix Operator Kernel Emissions model	2005
Training	UNC center for Environment Community Multiscale Air Quality modeling system	2004
Training	NASA Armstrong Center, Mojave, CA. NASA Flying Laboratory DC-8 Instrumentation and Flight Safety	2001
Training	NASA Goddard Space Flight Center, Greenbelt, MD Reliability Training	2000
Training	University of Central Florida SPIE/OSA Optical propagation in turbulent media	1997

COMPUTER EXPERIENCE

Programming: MATLAB, Python with numPy, pandas, matplotlib, ScikitLearn, Seaborn, R, MySQL, familiarity with IBM Q programming, LabVIEW 2017, Octave, IDL, assembly, Perl, Python, Awk, C-shell, C, Fortran 77/90 on high performance computing (HPC) platform

Calculation tool: PVL, Excel, NIST dataplot, Matlab, Mathcad (manipulator), R, Deep Learning and Machine Learning software

Modeler: Google TensorFlow 2.0, R (data analysis), Igor, P-SPICE, Tecplot, ESMF tools, FreeCAD, Stopping Range of Ions in Matter (SRIM), Screened Relativistic Non-ionizing Energy Loss (stopping power calculator) SR-NIEL, Electric Field Integral Equation (EFIE) model, CAMx air quality modeling framework, EPA Community Multiscale Air Quality (CMAQ) photochemical modeling framework

Quantum Computing: Familiar with quantum gates, Composer, Iso familiar with the instruction sets, programming languages used in quantum computing, SDK with processor (Qiskit), and general knowledge about the functional programming languages used in quantum computing.

Visualization: Visio, Smartdraw, IDL, ENVI 4.2, Mathcad, R graphics, PAVE, VIS5D, ArcView, LabVIEW

Operating Systems: UNIX (high performance computing), LINUX, Windows

Application specific software: SRIM, PARMELA, EFIE, CMAQ, CAMx, SMOKE, EPS, CALPUFF, HYSPLIT, AERMOD, HDF View, HDF, Microsoft Office

Data Science skills: Advanced Statistical Analysis, Tableau, Machine Learning with stats models, Scikit-learn, Deep learning with TensorFlow 2.0, Keras API

PROFESSIONAL MEMBERSHIP

- Sigma-Xi (Member-at-Large)
- Institute of Electrical & Electronics Engineers (IEEE)
- American Physical Society (APS)

Specialized Training

- Digital, and analog electronics
- Data acquisition, analysis and modeling
- High vacuum production, control and components
- High voltage and very low voltage electronics, fundamentals of power electronics
- Digital signal processing, principles of adaptive signal processing
- Machine design/drawing using FreeCAD and OnShape, laser cutting, CNC milling, welding, and fabrication
- 3D printing software
- Optics, electron linear accelerator operation, maintenance, fundamentals and application
- Raman, XPS, TEM fundamentals, DLTS, CVD techniques, thin film deposition, characterization

HONORS & AWARDS

Outstanding Mentoring, North Carolina Central University June 2017

Institute of Electrical & Electronic Engineers (IEEE) Certificate of Appreciation April 2016

Institute of Electrical & Electronic Engineers (IEEE) Certificate of Appreciation April 2015

U.S. EPA 5 years' service citation

August 2009

United States EPA Administrator, Washington, D.C., citation

U.S. EPA superior accomplishment recognition award

April 2009

For computer modeling work in analyzing meteorology and satellite remote sensing data to evaluate the 2008 ozone season to depict progress in reducing NOx levels in Region 6 for progress in ozone programs

U.S. EPA environmental stewardship team award

February 2009

Air planning section EPA Region-6 HQ team award

U.S. EPA Office of Research & Development (ORD) exceptional/outstanding ORD technical assistance

Sep. 17, 2008

to the regions or program offices award, "For improving the National Emissions Inventory by developing and delivering a more accurate and cost-efficient method for estimating national emissions of biomass burning", National fire-emissions inventory team (computer modeling)

U.S. EPA Region-6 Administrator's Certificate of Appreciation

Mar. 05, 2008

"In recognition of work on development of Dallas Ft. Worth 8-hour ozone State Implementation Plan"

U.S. EPA superior accomplishment recognition award

For 3D photochemical computer modeling activity on Dallas Fort Worth ozone SIP leading to new regulation

U.S. EPA Atmospheric Modeling Division Recognition

Oct. 15, 2007

For "contributions towards clean air"

U.S. EPA Special Accomplishment Recognition Award for “contribution towards
Aug. 10, 2007

For advancing CMAQ photochemical model and its evaluation using space- and ground observation data-sets”
(analyses)

National Aeronautics & Space Administration (NASA) Group Achievement Award

June 25, 2002

For extremely successful airborne fourth Convection & Moisture Experiment (CAMEX-IV), May-Sep 2001, held at Jacksonville, Florida, Involved extreme weather DC-8 airborne data acquisition, instrument control, QA, and modeling (airborne science experimental)

U.S. Federal Highways Administration (FHWA) Dwight David Eisenhower Transportation Fellowship Program (DDETFP) Grants for Research Fellowship (GRF).”

June 1997

“Use of positron annihilation technique to study fatigue state of steel structures”

Council for Scientific & Industrial Research (CSIR, New Delhi, India), competitive post-doctoral award

1995

For assessment of Doppler sonic detection of PBL mixing height in deep convective monsoon trough region using computer models (field experimental, data quality, model development and comparison with theory)

Project Research Fellowship (DST, India)

1988-1995

For participating as team lead in monsoon trough boundary layer experiment and Doppler SODAR studies of planetary boundary layer (experimental-instrumentation, data acquisition and quality control)

West Bengal government (India) merit-means scholarship, for pursuing middle & high school

1972-1980

CURRENT JOURNAL REVIEWER

- Journal of Applied Physics (American Institute of Physics) 2020
- International Journal of Infrared, Millimeter and Terahertz Waves 2020
- 29th International Joint Conference on Artificial Intelligence and the 17th Pacific Rim International Conference on Artificial Intelligence, 2020

PAST JOURNAL REVIEWER

- Journal of Geophysical Research -Atmospheres (American Geophysical Union)
- Remote Sensing of Environment (Elsevier)
- Science of the Total Environment (European)
- Journal of Environmental Management (Elsevier)
- 2008 IEEE International Geoscience and Remote Sensing Symposium
- 2008 Texas Environmental Research Consortium (TERC) Science Synthesis Document
- 2006 American Institute of Aeronautics & Astronautics -Technical Judge for Region II Students Conference