CHIRANJIVI BHATTARAI

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Google scholar link

EDUCATION

University of Nevada, Reno *August, 2018 - December 2021*

Ph.D in Atmospheric Science

Dissertation title: "Volatility properties of the ambient and laboratory generated aerosols"

Dissertation Advisor: Dr. Andrey Khlystov

University of Nevada, Reno *August 2014 - August 2018*

Master's Degree in Atmospheric Science & Meterology G

Thesis title: "Physical and Chemical Characterization of Fresh and Aged Biomass Burning Emissions"

Thesis Advisor: Dr. Andrey Khlystov

International Center for Theoretical Physics, Trieste, Italy *September 2012 - August 2013*

Post graduate diploma in Earth System Physics

Thesis title : "Secular vs.Transient Deformation in a Rate-and State-Dependent Friction Model"

Thesis Advisor: Dr. Abdelkrim Aoudia

Tribhuvan University, Kathmandu, Nepal *August 2007 - September 2011*

Master's Degree in Science

Thesis title: " First-Principles Study of Adsorption of Lithium Atom on Hydrogen Pasivated Graphene"

Advisor : Dr. Narayan Prasad Adhikari

Tribhuvan University, Kathmandu, Nepal *January 2004 - December 2007*

Bachelor's Degree in Science

EXPERIENCE

Desert Research Institute, Reno February 2022 - Present

Research Scientist

The core research focused on thermodynamic proprieties of the laboratory and ambient aerosols using tendam differential mobility analyzer and gas and particles phase chemical composition measurements of the emissions.

- NIH biomass burning: I have designed and conducted a chamber biomass burning emission experiment for chemical specification of the emissions. Analyzed the samples using GC-MS. In addition, I also performed volatility tendam differential mobility analyzer experiments to study thermodynamic properties of emission.
- Experienced in sample analysis for chemical specifications of organic compounds using GC-MS and LC-VUS/MS to understand emission factors from different sources.

- Experience with mentoring students (mentored three graduate students) and colleagues (two staffs) for general lab procedures. Also, teaches for ambient/laboratory air quality sample collection, extraction, and analysis of the samples.

Desert Research Institute, Reno, NV August 2014 - December 2021
Graduate Research Assistant

NSF biomass burning: Design experimental setup, Oxidation flow reactor calibration, conduction of experiments, sample collection, extraction, quantification and analysis

E-Cigarette project: Conducting experiment, sampling, extraction, quantification and analysis of the emissions

NIH biomass burning emissions: data collection, quantification and analysis of the samples

University of Nevada, Reno January 2019 - May 2021
Graduate Teaching Assistant

Taught undergraduate level physics laboratory classes: Physics 180L, Physics 152L, and instructed physics 180.

TECHNICAL STRENGTHS AND SKILLS

General skills: I have general skill on research and development, collaboration, and communication.
Specific technical skills

- Strong working knowledge of different analytical instruments (UV spectrometry, TD/GC/MS, HPLC/UV, UPLC/MS) for analyzing both targeted and unknown compounds.
- Excellent skill for experimental design, sample collection, extraction, and analysis
- Strong expertise in essential sample extraction using an accelerated solvent extractor (ASE)
- Excellent experience in aerosols thermodynamics studies using tandem thermodenunder SMPS technique
- Excellent experience with online instruments used for air quality measurements (Scanning Mobility Particle Sizer (SMPS), photo-acoustic soot spectrometer (PASS), Single Particle soot photometer (SP_2), $CO/CO_2/NO_x$/Ozone analyzers)
- Strong expertise in analytical and air quality instruments maintenance and troubleshooting
- Strong expertise in analyzing, drafting, and reporting results from the experiments in a timely manner
- Excellent knowledge and working experience in the organization for the evaluation and data analysis
- Experience with the collaborative work environment
- Strong expertise in programming languages (python, Matlab, excel) for scientific analysis and platforms like git for collaborative work
- Solid skills working with working environments like Vim, Emacs, LaTeX, Unix/Linux, Windows, Generic Mapping Tools (GMT)

- Experience working independently for noble research work.
- Fluent in academic written and oral English

PUBLICATIONS

Peer-reviewed Journal Articles

[12] Deep Sengupta, Vera Samburova, **Chiranjivi Bhattarai**, Hans Moosmüller, and Andrey Khlystov. "Emission factors for polycyclic aromatic hydrocarbons from laboratory biomass-burning and their chemical transformations during aging in an oxidation flow reactor". In: *Science of The Total Environment* 870 (2023), p. 161857.

[11] Michealene Iaukea-Lum, **Chiranjivi Bhattarai**, Deep Sengupta, Vera Samburova, Andrey Y Khlystov, Adam C Watts, William P Arnott, and Hans Moosmüller. "Optical Characterization of Fresh and Photochemically Aged Aerosols Emitted from Laboratory Siberian Peat Burning". In: *Atmosphere* 13.3 (2022), p. 386.

[10] **Chiranjivi Bhattarai** and Andrey Khlystov. "Derivation of particle-size changes from polydisperse size distribution measurements: numerical and experimental verification". In: *Aerosol Science and Engineering* (2021), pp. 1–9.

[9] Ting Zhang, **Chiranjivi Bhattarai**, Yeongkwon Son, Vera Samburova, Andrey Khlystov, and Sergey A Varganov. "Reaction Mechanisms of Anisole Pyrolysis at Different Temperatures: Experimental and Theoretical Studies". In: *Energy & Fuels* (2021). DOI: doi:10.1021/acs.energyfuels.1c00858.

[8] Megan Rennie, Vera Samburova, Deep Sengupta, **Chiranjivi Bhattarai**, W Patrick Arnott, Andrey Khlystov, and Hans Moosmüller. "Emissions from the Open Laboratory Combustion of Cheatgrass (Bromus Tectorum)". In: *Atmosphere* 11.4 (2020), p. 406.

[7] Deep Sengupta, Vera Samburova, **Chiranjivi Bhattarai**, Adam C Watts, Hans Moosmüller, and Andrey Y Khlystov. "Polar semivolatile organic compounds in biomass-burning emissions and their chemical transformations during aging in an oxidation flow reactor". In: *Atmospheric Chemistry and Physics* 20.13 (2020), pp. 8227–8250.

[6] Yeongkwon Son, **Chiranjivi Bhattarai**, Vera Samburova, and Andrey Khlystov. "Carbonyls and carbon monoxide emissions from electronic cigarettes affected by device type and use patterns". In: *International journal of environmental research and public health* 17.8 (2020), p. 2767.

[5] Kellen N Nelson, Jayne M Boehmler, Andrey Y Khlystov, Hans Moosmüller, Vera Samburova, **Chiranjivi Bhattarai**, Eric M Wilcox, and Adam C Watts. "A multipollutant smoke emissions sensing and sampling instrument package for unmanned aircraft systems: development and testing". In: *Fire* 2.2 (2019), p. 32.

[4] **Chiranjivi Bhattarai**, Vera Samburova, Deep Sengupta, Michealene Iaukea-Lum, Adam C Watts, Hans Moosmüller, and Andrey Y Khlystov. "Physical and chemical characterization of aerosol in fresh and aged emissions from open combustion of biomass fuels". In: *Aerosol Science and Technology* 52.11 (2018), pp. 1266–1282. DOI: doi:10.1080/02786826.2018.1498585.

[3] Vera Samburova, **Chiranjivi Bhattarai**, Matthew Strickland, Lyndsey Darrow, Jeff Angermann, Yeongkwon Son, and Andrey Khlystov. "Aldehydes in Exhaled Breath during E-Cigarette Vaping: Pilot Study Results". In: *Toxics* 6.3 (2018), p. 46.

[2] Deep Sengupta, Vera Samburova, **Chiranjivi Bhattarai**, Elena Kirillova, Lynn Mazzoleni, Micheal-ene Iaukea-Lum, Adam Watts, Hans Moosmüller, and Andrey Khlystov. "Light absorption by polar and non-polar aerosol compounds from laboratory biomass combustion". In: *Atmospheric Chemistry and Physics* 18.15 (2018), pp. 10849–10867.

[1] Basu Dev Oli, **Chiranjivi Bhattarai**, Bhuwan Nepal, and Narayan P. Adhikari. "First-Principles study of adsorption of alkali metals (Li, Na, K) on graphene". In: *Advanced Nanomaterials and Nanotechnology*. Springer, 2013, pp. 515–529.

Manuscript under preparation

[3] Sying Lu, **Chiranjivi Bhattarai**, and Andrey Khlystov. "Aerosol size distribution measurement during major fires events during year 2018- 2020 at Reno using an machine learning algorithms". Submitted. 2022.

[2] **Chiranjivi Bhattarai** and Andrey Khlystov. "Aerosol Mixing State Based on Volatility Measurements at an Urban Background Site in the Western United States." drafting. 2021.

[1] **Chiranjivi Bhattarai** and Andrey Khlystov. "Improvement on Differential Mobility Analyzer Method for Determination of the Latent Heat of Vaporization". drafting. 2021.

Invited talks

- Measurement of the particles size to understand volatility properties of the ambient aerosols, Division of Atmospheric Science, University of Nevada, Reno, NV, 2023-03-07
- Air pollution and chemistry of the atmosphere, Division of Atmospheric Science, University of Nevada, Reno, NV, 2021-03-22

Conference Proceedings

[29] **Chiranjivi Bhattarai** and Andrey Y Khlystov. "Improvment on Differential Mobility ANalyzer Method for Estimation of the Enthalpy of Vaporization Using an Algorithm to Derive Particle size Changes from Full-Size Distribution". In: *2020 AAAR Annual Conference Abstracts (Virtual)*. American Association for Aerosol Research. Raleigh, NC: AAAR, 2020.

[28] Watts Adam C, Vera Samburova, Hans Moosmüller, Andrey Y Khlystov, Deep Sengupta, and **Chiranjivi Bhattarai**. "Selecting important fuels for biomass emissions research". In: 8th International Fire Ecology and Management Congress. Tucson, AZ: Fire Ecology and Management Congress, 2019.

[27] **Chiranjivi Bhattarai** and Andrey Y Khlystov. "Volatility-Based Measurements of Aerosol Mixing State at an Urban Background SIte in the Western United States". In: *2019 AAAR Annual Conference Abstracts*. American Association for Aerosol Research. Portland, OR: AAAR, 2019.

[26] Andrei Khlystov, Yeongkwon Son, Vera Samburova, and **Chiranjivi Bhattarai**. "Characterization of nicotine, carbonyl, and carbon monoxide emissions from four types of electronic cigarette devices". In: *ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY*. Vol. 257. AMER CHEMICAL SOC 1155 16TH ST, NW, WASHINGTON, DC 20036 USA. 2019.

[25] Andrey Y Khlystov, Vera Samburova, Deep Sengupta, **Chiranjivi Bhattarai**, Adam C Watts, and Hans Moosmüller. "Emission Fractors and Chemical Composition of Laboratory-Generated Fresh and Aged Biomass Burning Aerosols". In: *12th International Conference on Carbonaceous Particles in the Atmosphere ICCPA*. Ed. by ICCPA. ICCPA. Vienna, Austria: ICCPA, 2019.

[24] Vera Samburova, Deep Sengupta, **Chiranjivi Bhattarai**, Watts Adam C, Hans Moosmüller, and Andrey Y Khlystov. "Analysis of Unidentified Organic Species in Fresh and Aged Biomass-Burning Emissions Generated under Controlled Conditions". In: *2019 AAAR Annual Conference Abstracts*. American Association for Aerosol Research. Portland, OR: AAAR, 2019.

[23] Deep Sengupta, Vera Samburova, **Chiranjivi Bhattarai**, Watts Adam C, Hans Moosmüller, and Andrey Y Khlystov. "Polar fraction of semi-volatile organic compounds in biom ass burning emissions and their chemical transformations during aging with an oxidation flow reactor". In: *2019 AAAR Annual Conference Abstracts*. American Association for Aerosol Research. Portland, OR: AAAR, 2019.

[22] Andrey Y Khlystov, Vera Samburova, J Pearson, Matthew Strickland, Jeff Angermann, L Darrow, and **Chiranjivi Bhattarai**. "Dangerous flavors: the effect of flavoring additives on emissions of toxic compounds during e-cigarette use". In: *PitCon Annual Meeting*. Orlando, FL: PitCon, 2018.

[21] Andrey Y Khlystov, Vera Samburova, J Pearson, Matthew Strickland, Jeff Angermann, L Darrow, and **Chiranjivi Bhattarai**. "The Effect of Puff Topography and Power Settings on Aldehyde and Carbon Monoxide in E-cigarette Aerosols". In: *SRNT Annual Meeting*. Baltimore, MD: SRNT, 2018.

[20] Lynn Mazzoleni, Elena Kirillova, S Schum, M Khaksari, Deep Sengupta, **Chiranjivi Bhattarai**, Vera Samburova, Adam C Watts, Hans Moosmüller, and Andrey Y Khlystov. "Water-Soluble Aerosol Organic Matter from Wildland Fire Emissions as Observed using Ultrahigh Resolution Orbitrap Elite Mass Spectrometry." In: Boston, MA: Goldschmidt, 2018.

[19] Kevin Nelson, Adam C Watts, Vera Samburova, Andrey Y Khlystov, **Chiranjivi Bhattarai**, Hans Moosmüller, Eric Wilcox, and Marko Giordano. "An emissions sampling payload for use with small Unmanned Aircraft Systems (sUAS)". In: *International Society for Atmospheric Research Using Remotely Piloted Aircraft Annual Conference*. Ed. by International Society for Atmospheric Research Using Remotely Piloted Aircraft Annual Conference. International Society for Atmospheric Research Using Remotely Piloted Aircraft Annual Conference. Boulder, CO: International Society for Atmospheric Research Using Remotely Piloted Aircraft Annual Conference, 2018.

[18] Vera Samburova, Yeongkwon Son, **Chiranjivi Bhattarai**, Matthew Strickland, Lyndsey Darrow, Jeff Angermann, and Andrey Y Khlystov. "Aldehydes in Exhaled Breath during E-cigarette Vaping: Results of a Pilot Study". In: *Nevada Tobacco Prevention Coalation Regular Meeting*. Ed. by Nevada Tobacco Prevention Coalation Regular Meeting. Nevada Tobacco Prevention Coalation Regular Meeting. Reno, NV: Nevada Tobacco Prevention Coalation Regular Meeting, 2018.

[17] Deep Sengupta, Lan Gao, Nic Beres, **Chiranjivi Bhattarai**, Eric Wilcox, Vera Samburova, Adam C Watts, Andrey Y Khlystov, and Hans Moosmüller. "Estimation of Snow Albedo Reduction by Light Absorbing Impurities Using a Monte Carlo Radiative Transfer Model." In: *Joint Meeting of 17th Electromagnetic and Light Scattering Conference (ELS-XVII) and 11th Conference on Laser-Light and Interactions with Particles (LIP2018)*. Ed. by Joint Meeting of 17th Electromagnetic, Light Scattering Conference (ELS-XVII), 11th Conference on Laser-Light, and Interactions with Particles (LIP2018). Joint Meeting of 17th Electromagnetic et al. College Station, TX: Joint Meeting of 17th Electromagnetic et al., 2018.

[16] Deep Sengupta, Lan Gao, Eric Wilcox, Nic Beres, **Chiranjivi Bhattarai**, Vera Samburova, Adam C Watts, Andrey Y Khlystov, and Hans Moosmüller. "Estimation of Snow Albedo Reduction by Light Absorbing Impurities Using a Monte Carlo Radiative Transfer Model". In: *10th International Aerosol Conferences*. Ed. by IAC. International Aerosol conference. St. Louis, MO: IAC 2018, 2018.

[15] Deep Sengupta, Vera Samburova, **Chiranjivi Bhattarai**, Michealene Iaukea-Lum, Adam C Watts, Hans Moosmüller, and Andrey Y Khlystov. "Chemical Composition of Semi-Volatile Organic Compounds from Fresh and Laboratory-Aged Biomass Burning Particles." In: *10th International Aerosol Conferences*. Ed. by IAC. Vol. 10. International Aerosol conference. St. Louis, MO: IAC 2018, 2018.

[14] **Chiranjivi Bhattarai**, Deep Sengupta, Michealene Iaukea-Lum, Vera Samburova, Adam C Watts, Hans Moosmüller, and Andrey Y Khlystov. "Physical and Chemical Characterization of Fresh and Aged Emissions from Open Combustion of Biomass Fuels". In: *2017 AAAR Annual Conference Abstracts*. Ed. by AAAR. American Association for Aerosol Research. Raleigh, NC: AAAR, 2017.

[13] **Chiranjivi Bhattarai**, Deep Sengupta, Vera Samburova, Adam C Watts, Hans Moosmüller, and Andrey Y Khlystov. "Physical and Chemical Characterization of Fresh and Aged Emissions from Open Combustion of Biomass Fuels". In: Desert Research Institute Graduate student poster compitition. Reno, NV: DRI, 2017.

[12] Kirillova Elina, Vera Samburova, **Chiranjivi Bhattarai**, Deep Sengupta, Hans Moosmüller, Andrey Y Khlystov, and Mazzoleni Lynn. "Molecular Characterization of Water-Soluble Organic Carbon (WSOC) from Biomass Burning Aerosol Using Ultrahigh Resolution Orbitrap Elite Mass Spectrometry". In: *65th ASMS Conferene on Mass Spectromentry and Allied Topics*. Mass Spectrometry and Allied Topics. Indianapolis, IN: MSAT, 2017.

[11] Michealene Iaukea-Lum, **Chiranjivi Bhattarai**, Deep Sengupta, Patricio Piedra, Connoly, Vera Samburova, Adam C Watts, Andrey Y Khlystov, and Hans Moosmüller. "Three-Wavelength Optical Characterization of Fresh and Photochemically-Aged Aerosols from Siberian Peat Burning". In: *2017 AAAR Annual Conference Abstracts*. Ed. by AAAR. American Association for Aerosol Research. Raleigh, NC: AAAR, 2017.

[10] Deep Sengupta, **Chiranjivi Bhattarai**, Michealene Iaukea-Lum, Vera Samburova, Adam C Watts, Hans Moosmüller, and Andrey Y Khlystov. "Light Absorption of Polar and Non-Polar Aerosols in Fresh and Aged Biomass-Burning Emissions, 36th Annual Conference of the American Association for Aerosol Research". In: *2017 AAAR Annual Conference Abstracts*. Ed. by AAAR. American Association for Aerosol Research. Raleigh, NC: AAAR, 2017.

[9] Deep Sengupta, Vera Samburova, **Chiranjivi Bhattarai**, Michealene Iaukea-Lum, Adam C Watts, Hans Moosmüller, and Andrey Y Khlystov. "Light Absorption of Polar and Non-Polar Aerosols in Fresh and Aged Biomass-Burning Emissions, 36th Annual Conference of the American Association for Aerosol Research". In: Desert Research Institute Graduate student poster compitition. Reno, NV: DRI, 2017.

[8] **Chiranjivi Bhattarai** and Andrey Y Khlystov. "An Algorithm to Derive particle Size Changes from Full Size Distribution Measurements". In: *2016 AAAR Annual Conference Abstracts*. American Association for Aerosol Research. Portland, OR: AAAR, 2016.

[7] **Chiranjivi Bhattarai**, Vera Samburova, and Andrey Y Khlystov. "Characterization of Aerodyne Potential Aerosol Mass Oxidative Flow Reactor". In: *2016 AAAR Annual Conference Abstracts*. American Association for Aerosol Research. Portland, OR: AAAR, 2016.

[6] Andrey Y Khlystov, Champbel Dave, Mark Markdenial, and **Chiranjivi Bhattarai**. "Comprehensive Characterization of Vehicle Emissions in Ft. McHenry Tunnel". In: *2016 AAAR Annual Conference Abstracts*. American Association for Aerosol Research. Portland, OR: AAAR, 2016.

[5] Andrey Y Khlystov, Vera Samburova, Jessica Connolly, **Chiranjivi Bhattarai**, Deep Sengupta, Adam C Watts, and Hans Moosmüller. "Brown carbon Aerosol in Fresh and Aged Biomass-Burning

Emissions: Contribution of Individual Compounds". In: *2016 AAAR Annual Conference Abstracts*. American Association for Aerosol Research. Portland, OR: AAAR, 2016.

[4] Andrey Y Khlystov, Vera Samburova, Jessica Connolly, **Chiranjivi Bhattarai**, Deep Sengupta, Adam C Watts, and Hans Moosmüller. "Contribution of Different Chemical Species to Brown Carbon Aerosol in Biomass Burning Emissions". In: *Atmospheric Optics: Aerosols, Visibility, and the Radiative Balance*. A & WMA. Snow King Hotel, Jackson Hole, WY: A & WMA Visibility Specialty, 2016.

[3] Deep Sengupta, Jessica Connolly, **Chiranjivi Bhattarai**, Vera Samburova, Hans Moosmüller, and Andrey Y Khlystov. "Brown Carbon Emissions from Laboratory Biomass Bunring and Their Atmospheric Aging". In: *Nevada NASA EPSCoR and Space Grant Consortium Annula Meeting*. Nevada NASA EPSCoR. Reno, NV: Nevada NASA EPSCoR, 2016.

[2] Deep Sengupta, Vera Samburova, **Chiranjivi Bhattarai**, Iaukea-Lum Miki, Adam C Watts, Hans Moosmüller, and Andrey Y Khlystov. "Contribution of Water-soluble"Brown Carbon" Organic Species to Light Absorption by Biomass-Burning Aerosols". In: *2016 AAAR Annual Conference Abstracts*. American Association for Aerosol Research. Portland, OR: AAAR, 2016.

[1] Adam C Watts, Hans Moosmüller, Vera Samburova, Andrey Y Khlystov, Madhu Gyawali, Deep Sengupta, **Chiranjivi Bhattarai**, Reddy L. N. Yatavelli, Rajan K. Chakrabarty, Arnold Ian J., Zielinska Barbara, Knue Joe D., Chow Judith, Watson John G., Wang Xiaoliang, Chen L.-W. Anthony, Tsibart Anna, and Engling Guenter. "Detailed analyses of emissions from peat combustion across biomes". In: *Proceedings of the 15th International Peat Congress*. International Peatland Society (IPS). IPS, 2016.

PROFESSIONAL SOCIETY AFFILIATIONS

- Member of the American Association for Aerosol Research

REVIEWER

Science of Total Environment

Atmospheric Research

Indoor and Built Environment

Tobacco Induced Diseases

MDPI (Sustainability, Toxics, Atmosphere, Aerospace)

Aerosol Science and Engineering

Aerosol and Air Quality Research