

## RESEARCH INTEREST

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Experimental aerosol science, atmospheric aerosols, unipolar and bipolar particle charging, aerosol instrumentation, viscosity determination with DCIC method of secondary organic aerosols, ice nucleation

## AEROSOL INSTRUMENTS EXPERIENCE

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Differential Mobility Analyzer (DMA)/Scanning Mobility Particle Sizer (SMPS), Condensation Particle Counter (CPC), Humidified Tandem Differential Mobility Analyzer (HTDMA), Portable Optical Particle Counter (POPS), Continuous Flow Diffusion Chamber (CFDC), Electrostatic Precipitator, Unipolar Diffusion Aerosol Charger (UDAC), Electrospray Aerosol Generator, Single Particle Soot Photometer (SP2), Thermo-Gravimetric Analysis (TGA) & Differential Scanning Calorimetry (DSC), Fourier Transform Infrared Spectroscopy (FTIR).

## EDUCATION

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**North Carolina State University** August 2018 – Present\*

**PhD** in Atmospheric Sciences \*Defended on October 12, 2022

Thesis: Experimental determination and prediction of the physicochemical properties of secondary organic aerosols.

Advisor: Prof. Markus D. Petters

**Istanbul Technical University** June 2013 – June 2017

**MSc** in Atmospheric Sciences

Thesis: Spatial and temporal variation of O<sub>3</sub>, NO and NO<sub>2</sub> concentrations at rural and urban sites in Marmara region of Turkey.

Advisor: Prof. Selahattin Incecik

**Istanbul Technical University** September 2009 – June 2013

**BSc** in Chemical Engineering

Thesis: Benzene, toluene, ethylbenzene, xylene (BTEX) measurements in Istanbul Kagithane district.

Advisor: Prof. Hasancan Okutan

## FIELD EXPERIENCE

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Recently, I was involved with the DOE TRacking Aerosol Convection interactions ExpeRiment (TRACER-PFM) and stationed at the main site La Porte, TX where I was responsible for data collection, measurements of aerosol hygroscopic growth factors, black carbon, particle size distributions, and particle fluxes using the eddy-covariance technique.

## RESEARCH AND WORK EXPERIENCE

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**North Carolina State University** August 2018 – present

Postdoctoral Research Associate (10/2022-09/2023)

- Data analysis of TRACER campaign to constrain the smallest size of particles that may interact with clouds during a deep convection. The process would help to understand new particle formation that influences the cloud properties over polluted areas.

Graduate Research Assistant (08/2018-10/2022)

- Explored in-situ measurement of viscosity and ice nucleation ability for sub-200 nm size particles in colder temperatures.
- Identified viscosity, glass transition, and fragility features of the secondary organic compounds at tropospheric conditions by performing aerosol research experiments at extreme dry and cold temperature conditions.
- Assembled and improved the experimental setup of Dimer, Coagulation, Isolation and Coalescence (DCIC) technique for colder temperature for sub 100 nm particles to measure the viscosity of aerosol (sucrose and citric acid).
- Serial data communication to instrument experience with temperature sensors with Julia language. control temperature.
- Performed aerosol size distribution measurement using Scanning Mobility Particle Sizer.
- Designed, produced, and characterized an open-source hardware of low-cost compact electrostatic precipitator.
- Wrote numerous Julia scripts to automate the instrument control and to post process large experimental datasets; to model aerosol size distribution and viscosity measurements (all published studies have open access to Julia scripts).

**University of Colorado Boulder**

September 2019

Visiting Graduate Student

- Conducted part of experiments of my PhD dissertation study.
- Expended volatility experiments to the variety of secondary organic aerosol precursors produced in environmental chamber line of the University of Colorado Boulder laboratory.
- Explored the deposition mode ice nucleation behavior of the secondary organic aerosol precursors through Continuous Flow Diffusion Chamber (CFDC) instrument of Colorado State University.

**Istanbul Technical University**

September 2013 – June 2017

Graduate Research Assistant

M.Sc. Thesis (2013-2017):

- Analyzed the temporal and spatial variations of O<sub>3</sub>, NO and NO<sub>2</sub> concentrations identifying urban and rural regions of the Marmara Region, Turkey (Population: over 20 million).
- Identified the correlation between the weather conditions and the air pollutants produced by atmospheric chemical reactions by using AOT40 indices of forestry regions.
- Performed HYSPLIT modeling of backward air-mass trajectories for the ozone and ozone precursors.

**Ideal Polymer Chemistry R&D Inc. Company**

October 2015 – June 2018

Research and Development Engineer (experimental expert)

- Designed-performed experiments to produce first inherently flame-retardant water-based polyurethane.
- Determined Limited Oxygen Index (LOI) of various polyurethane by combustion experiments.
- Composed first halogen-free flame retardant polyurethane and artificial leather from PVC.

**Eczacıbaşı Baxter Hospital Supply Inc. Company**

June 2012 – July 2012

Operational Assistant Engineer Intern

- Production statistics of the manufacturing production line and process control.

**Novartis Health Food and Agriculture Products**

June 2011 – July 2011

Laboratory Intern

- Tested the quality control of the solid dosage forms according to good manufacturing practices (GMP).

- Translated from Turkish-French, French – Turkish during FOTEG Istanbul 2013 International Special Trade Fair for Food Processing Technologies in Expo Center, Istanbul.

## TEACHING EXPERIENCE

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**North Carolina State University**  
Graduate Teaching Assistant:

August 2019 – May 2021

Introduction to Computing in the Geosciences (MEA 217) - in person delivery in Fall 2019, online delivery in Fall 2020

- Served as a teaching assistant for Introduction to Computing in the Geosciences for mostly sciences disciplines including Marine, Earth, and Atmospheric Sciences and some Computer Engineering including ~25 students.
- Assisted with preparation of course materials, homework and exam problems.
- Graded weekly homework and quiz.

Earth System Science (MEA 100) - in person delivery in Spring 2020, online delivery in Spring 2021

- Led weekly laboratory sections for MEA 100 Earth System Science and graded weekly materials in Spring 2020 and Spring 2021 both in person and online version including ~25 students.
- Graded weekly assignments.

## PUBLICATIONS

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### Published Journal Papers:

- 1) **Sabin Kasparoglu**, Mohammad Maksimul Islam, Nicholas Meskhidze, Markus D. Petters “Characterization of a modified printed optical particle spectrometer for high-frequency and high-precision laboratory and field measurements.” *Atmos. Meas. Tech.*, **15**, 5007–5018, <https://doi.org/10.5194/amt-15-5007-2022> (2022).
- 2) **Sabin Kasparoglu**, Russell Perkins, Paul J. Ziemann, Paul J. DeMott, Sonia M. Kreidenweis, Zachary Finewax, Benjamin L. Deming, Marla P. DeVault, Markus D. Petters “Experimental determination of the relationship between organic aerosol viscosity and ice nucleation at upper free tropospheric conditions.” *Journal of Geophysical Research: Atmospheres*, **127**, e2021JD036296, <https://doi.org/10.1029/2021JD036296> (2022).
- 3) **Sabin Kasparoglu**, Timothy P. Wright, and Markus D. Petters “Open-hardware design and characterization of an electrostatic aerosol precipitator”, *HardwareX*, **11**, e00266, <https://doi.org/10.1016/j.ohx.2022.e00266> (2022)
- 4) **Sabin Kasparoglu**, Ying Li, Manabu Shiraiwa, and Markus D. Petters “Toward closure between predicted and observed particle viscosity over a wide range temperature and relative humidity”. *Atmos. Chem. Phys.*, **21**, 1127–1141, <https://doi.org/10.5194/acp-21-1127-2021> (2021).
- 5) Markus D. Petters and **Sabin Kasparoglu** “Predicting the influence of particle size on the glass transition temperature and viscosity of secondary organic material”. *Sci. Rep.*, **10**, 15170, <https://doi.org/10.1038/s41598-020-71490-0> (2020).
- 6) **Sabin Kasparoglu**, Selahattin Incecik, and Sema Topcu, “Spatial and temporal variation of O<sub>3</sub>, NO and NO<sub>2</sub> concentrations at rural and urban sites in Marmara region of Turkey”. *Atmospheric Pollution Research*, **9**(6), 1009–1020, <https://doi.org/10.1016/j.apr.2018.03.005> (2018).

**Google Scholar Link:** <https://scholar.google.com/citations?user=z63GvKAAAAAJ&hl=en>

## CONFERENCES

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### Conference Abstracts (only first authors once are listed):

- 1) **Sabin Kasparoglu**, Mohammad Maksimul Islam, Nicholas Meskhidze, Markus D. Petters “Characterization of an augmented version of the printed optical particle spectrometer for integration

- into multi-instrument aerosol sampling systems.” American Association for Aerosol Research (AAAR), Raleigh, NC (October 2022). - Oral
- 2) **Sabin Kasparoglu**, Timothy P. Wright, Markus D. Petters “Open-hardware design and characterization of an electrostatic aerosol precipitator”, American Association for Aerosol Research (AAAR), Albuquerque, NM (October 2021). – Oral (virtual)
  - 3) **Sabin Kasparoglu**, Timothy Wright, Sonia Kreidenweis, Paul J. DeMott, Paul J Ziemann, Markus D. Petters “Open-hardware design and characterization of an electrostatic aerosol precipitator”, Atmospheric Radiation Measurement (ARM)/Atmospheric System Research (ASR) Joint User Facility and Principal Investigator meeting, virtual, (June 2021).
  - 4) **Sabin Kasparoglu**, Ying Li, Manabu Shiraiwa, and Markus D. Petters “Measurements and modeling of the temperature and humidity dependent viscosity between –30 and 30 degree celsius”, American Association for Aerosol Research (AAAR), Raleigh (virtual), NC (October 2020). – Oral (virtual)
  - 5) **Sabin Kasparoglu**, Russel Perkins, Paul DeMott, Sonia Kreidenweis, and Markus D. Petters “Experimental determination of the relationship between organic aerosol viscosity and deposition mode ice nucleation at upper free tropospheric conditions”, American Association for Aerosol Research (AAAR), Portland, OR (October 2019). - Poster
  - 6) **Sabin Kasparoglu**, Selahattin Incecik, and Sema Topcu “Variability of ozone, OX and NO<sub>x</sub> in rural and urban areas in marmara region of turkey”, 7<sup>th</sup> Symposium on Air Pollution and Control, HKK2017, Antalya, Turkey (November 2017). - Poster
  - 7) **Sabin Kasparoglu**, Selahattin Incecik, and Sema Topcu “Variability of ozone, OX and NO<sub>x</sub> in rural and urban areas in marmara region of turkey”, European Geosciences Union (EGU) General Assembly, Vienna, Austria (April 2017). - Poster
  - 8) **Sabin Kasparoglu**, Selahattin Incecik, and S., and Betul Ozer “Variations in O<sub>3</sub> and NO<sub>x</sub> at coastal suburban, and urban sites in istanbul”, 5<sup>th</sup> International Workshop and Conference, Particulate Matter: Research and Management, WeBIOPATR-2015, Belgrade, Serbia (October 2015). - Oral
  - 9) **Sabin Kasparoglu**, Selahattin Incecik, and Betul Ozer “Investigation into relationships among NO, NO<sub>2</sub>, and O<sub>3</sub>, at urban and rural sites in istanbul”, 7<sup>th</sup> Atmospheric Sciences Symposium, Istanbul, Turkey (April 2015). - Poster
  - 10) **Sabin Kasparoglu**, Kardelen Kaya, Hüseyin Toros, Hasancan Okutan, Ali Deniz, and Ali Öztürk “Benzene, toluene, ethylbenzene, xylene (BTEX) measurements in istanbul kagithane district”, 5<sup>th</sup> International Symposium on Air Pollution and Control, Eskisehir, Turkey (September 2013). - Poster

#### Conference Abstracts (co-authors):

- 11) Sunandan Mahant, Emil M. Iversen, **Sabin Kasparoglu**, Merete Bilde, Markus D. Petters “Direct measurement and modeling of the viscosity of ternary aerosol mixtures” American Meteorological Society Annual meeting (AMS), Denver, CO (January 2023).
- 12) Ajmal Rasheeda Satheesh, **Sabin Kasparoglu**, Bethany Sutherland, Nicholas Meskhidze, Markus Petter “Particle turbulent mass flux retrievals through novel remote sensing methodology.” American Association for Aerosol Research (AAAR), Raleigh, NC (October 2022).
- 13) Nicholas Meskhidze, Ajmal Rasheeda Satheesh, **Sabin Kasparoglu**, Mohammad Maksimul Islam, Bethany Sutherland, Markus Petters “Turbulent flux measurements and transfer velocity estimates of nucleation-sized particles.” American Association for Aerosol Research (AAAR), Raleigh, NC (October 2022).
- 14) Paul J. DeMott, **Sabin Kasparoglu**, Russell Perkins, Paul J. Ziemann, Sonia M. Kreidenweis, Markus D. Petters “Freezing of secondary organic aerosols at upper tropospheric cloud conditions”, American Geophysical Union Fall Meeting (AGU), New Orleans, LA & virtual (December 2021).
- 15) Markus Petters, Nicholas Rothfuss, **Sabin Kasparoglu**, Wyatt Champion, Andrew Grieshop, Paul Ziemann, Sonia Kreidenweis, Paul DeMott “Application of the dual tandem dma method to study the amorphous phase transition of organic aerosols” 2019 Joint ARM User Facility and ASR PI Meeting, Rockville, MD (June 2019).

## **AWARDS AND HONORS**

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- 1) Organization Committee Travel Award for Seventh air pollution control symposium-HKK2017-, Antalya, Turkey, 2017.
- 2) Presidential Travel Award for 5th International Workshop and Conference, Particulate Matter: Research and Management -WeBIOPATR2015, Belgrade, Serbia, 2015.
- 3) Secured Honor List in Chemical Eng. Department, Istanbul Technical University, 2009-13.

## **PROPOSALS AND GRANTS**

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- 4) Ilker Demiryol (PI) and Sabin Kasparoglu, "Halogen-free flame retardant polyurethane" project has been funded by "The scientific and technological research council of Turkey (TUBITAK)", the prestigious governmental institution in Turkey for scientific and technological research, 2016.
- 5) Ilker Demiryol (PI) and Sabin Kasparoglu, "Water-based polyurethane" project is awarded by jury's special award, Istanbul Technical University, Big-Bang Start-Up Challenge, 2016.

## **COMPUTATIONAL SKILLS**

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Programming language: Julia, MATLAB, R.

Software: LabVIEW, Glade Interface Designer, HYSPLIT, IDV, ChemCAD.

## **PROFESSIONAL AFFILIATIONS**

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American Association for Aerosol Research (AAAR)

European Geophysical Union (EGU)

American Physical Society (APS)

American Geophysical Union (AGU)

## **EXTRA-CURRICULAR**

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Armenian Engineers and Scientists of America (AESA): Served as a judge member in AESA Science Olympiad 2021 for Senior Physical Sciences (SPS) category.

Member of HAYCAR, Association of Architects and Engineers (In Armenian - Հայճար - ճարտարապետների և ճարտարագետների միություն) since 2012. I was an administrative board member between 2013-2015, then a disciplinary committee member until I moved to the US (2018).