

# Hector Erik VELASCO SALDAÑA

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Citizenship: Mexican  
Residence: Singapore  
Languages: English &  
Spanish

## Professional summary

[5 minute self-introduction video](#)

Research scientist with over 20 years of experience doing applied research in atmospheric sciences, with a focus on the urban environment. Investigates the impact of urbanization and climate change on air quality, local climate and biogeochemical cycles, and their conjuncture with the construction of sustainable cities. Enjoys fieldwork and understands the need of experiencing problems firsthand to be able to propose practical solutions based on scientific information.

## Research interests

- Air quality
- Personal exposure
- Atmospheric chemistry
- Pollutants monitoring
- Urban climatology
- Micrometeorology
- Boundary layer meteorology
- Carbon sequestration
- Cities & climate change
- Sustainability
- Circular economy
- Participative science

## Education

### PhD in Civil and Environmental Engineering

Washington State University, Pullman, WA, USA

*Thesis:* Urban flux and concentration measurements of volatile organic compounds and CO<sub>2</sub> in Mexico City

*Advisors:* Prof. Halvor Westberg and Prof. Brian Lamb

### MSs (Hons) in Environmental Engineering

National Autonomous University of Mexico, Mexico City, Mexico

*Thesis:* Biogenic emissions inventory for the Valley of Mexico

*Advisor:* Dr. Juan Ruben Varela

### BSc (Hons) in Mechanical Engineering

National Autonomous University of Mexico, Mexico City, Mexico

*Thesis:* Design of a diffusive flame using liquid heptane as fuel

*Advisor:* Dr. Juan Ruben Varela

## Professional experience

### Research Associate

2020 - present

#### Molina Center for Energy and the Environment, Boston, MA

- Examined Southeast Asian and Mexican air quality management and research.
- Investigated how urban forestry impacts climate and carbon cycle.
- Analyzed heat fluxes and heat islands in (sub)tropical cities.
- Participated in international consortia evaluating different aspects of urban climatology.
- Contributed to atmospheric chemistry studies in Mexico City.
- Tested low-cost particle monitors to complement regulatory air quality monitoring.
- Assessed Singapore's circular economy model.
- Extensively published in scientific journals.

- Research Fellow** 2019 - 2020  
**Centre for Urban Greenery and Ecology, National Parks Board, Singapore**
- Led studies on urban carbon sequestration.
  - Developed the first set of allometric equations for tropical urban trees.
  - Improved urban soil respiration measurement methods.
  - Scientifically advised environmental authorities on greenery strategies.
- Research Scientist** 2010 - 2018  
**Singapore – MIT Alliance for Research and Technology, Singapore**
- Built a group of local and international scientists to investigate urban atmospheres.
  - Provided scientific information to authorities to improve air quality programs.
  - Assessed Singapore's air quality management.
  - Worked with mass media to inform on air pollution during two infamous smoke-haze episodes.
  - Ran the first eddy covariance flux tower in a tropical city for 7 years measuring fluxes of CO<sub>2</sub> and heat.
  - Installed two eddy covariance flux towers in Singapore and Mexico City simultaneously.
  - Investigated CO<sub>2</sub> emissions and sinks in urban landscapes.
  - Started carbon sequestration research in (sub)tropical cities.
  - Conducted Singapore's first street and public transport personal exposure studies.
  - Evaluated particle exposure on public transport in Mexico, Thailand, and Vietnam.
  - Mentored undergraduate and graduate students.
  - Supervised bachelor dissertations and master's theses.
- Postdoctoral Fellow** 2008 - 2010  
**Dept. of Geography, National University of Singapore, Singapore**
- Ran an urban canopy heat island monitoring network in Singapore.
  - Built an empirical model of Mexico City's energy balance partitioning.
  - Measured evaporation in an urban water reservoir with an eddy covariance flux system.
- Postdoctoral Associated** 2006 - 2008  
**Dept. of Earth, Atmospheric & Planetary Sciences, Massachusetts Institute of Technology, Boston, MA**
- Participated in MILAGRO, the largest air quality field campaign in Mexico until today.
  - Coordinated air pollution and flux measurements at the Escandon site during MILAGRO.
  - Communicated study results to Mexican authorities in multiple workshops and seminars.
- Research and Teaching Assistant** 2002 - 2005  
**Laboratory for Atmospheric Research, Washington State University, Pullman, WA**
- Participated in MCMA-2003 air quality field campaign coordinated by Mario Molina and Luisa Molina.
  - Evaluated volatile organic compounds (VOC) air pollution in Mexico City.
  - Installed the first urban eddy covariance flux tower to measure VOC fluxes.
  - Measured biogenic fluxes in a poplar plantation in Oregon, USA.
  - Assisted multiple courses related to environmental engineering.
  - Mentored undergraduate students.
- Junior Scientist** 2000 - 2002  
**National Institute of Ecology & Climate Change, Mexico City, Mexico**
- Collaborated with Japanese and Mexican scientists on air quality research.
  - Flew a tethered ballon to investigate Mexico City's vertical pollution distribution.
  - Set up an acid deposition monitoring network in forests around Mexico City.
  - Supervised agreements on mandatory vehicle emission tests.

## Publications

Seventy-seven publications, including 55 articles in referred journals with over half of them as main author, two books (one under peer-review) and chapters in three others, 12 articles in science magazines and newsletters, and 5 technical reports for funding agencies and environmental institutions. For a full list of my publications, please see the [Publications Page](#) on my Personal Website.

### Selected publications

#### Corresponding author, (impact factor)

**Velasco E**, Retama A, Stratoulas D. [Air quality management and research in Southeast Asia](#). Under review at *SpringerBriefs in Earth System Sciences Book series*, Apr 2024.

Wu S, Lin X, ..., **Velasco E**, 20 more coauthors. [Satellite observations reveal a decreasing albedo trend of global cities over the past 35 years](#). *Remote Sensing of Environment* (13.5), 303, 114003, 2024.

**Velasco E**, Segovia E, Roth M. [High-resolution maps of carbon dioxide and moisture fluxes over an urban neighborhood](#). *Environmental Science: Atmospheres* (3.4), 3, 1110-1123, 2023.

**Velasco E**, Hieu HH, Pham AD, Rastan S. [Effectiveness of wearing face masks against traffic particles on the streets of Ho Chi Minh City, Vietnam](#). *Environmental Science: Atmospheres* (3.4), 2, 1450-1468, 2022.

Retama A, Ramos-Céron M, Rivera-Hernández O, Allen G, **Velasco E**. [Aerosol optical properties and brown carbon in Mexico City](#). *Environmental Science: Atmospheres* (3.4), 2, 315-334, 2022.

Nicolini G, Antoniella G, ..., **Velasco E**, 31 more coauthors. [Direct observations of CO<sub>2</sub> emission reductions due to COVID-19 lockdown across European urban districts](#). *Science of the Total Environment* (9.8), 830, 154662, 2022.

Meili N, Manoli G, ..., **Velasco E**, 7 more coauthors. [Tree effects on urban microclimate: diurnal, seasonal and climatic temperature differences explained by separating radiation, evapotranspiration, and roughness effects](#). *Urban Forestry & Urban Greening* (6.4), 58, 126970, 2021.

**Velasco E**, Segovia E, Choong AMF, Lim BKY, Vargas R. [Carbon dioxide dynamics in a residential lawn of a tropical city](#). *Journal of Environmental Management* (8.7), 280, 11752, 2021.

Sánchez B, Roth M, Simón-Moral A, Martilli A, **Velasco E**. [Assessment of a meteorological mesoscale model's capability to simulate intra-urban thermal variability in a tropical city](#). *Urban Climate* (6.4), 40, 101006, 2021.

Molina LT, **Velasco E**, Retama A, Zavala M. [Experience from integrated air quality management in the Mexico City Metropolitan Area and Singapore](#). *Atmosphere* (2.9), 10, 512, 2019.

Retama A, Neria A, 4 more coauthors, **Velasco E**. [Fireworks: a major source of inorganic and organic aerosols during Christmas and New Year in Mexico City](#). *Atmospheric Environment X* (4.6), 2, 100013, 2019.

Tan SH, Roth M, **Velasco E**. [Particle exposure and inhaled dose during commuting in Singapore](#). *Atmospheric Environment* (5.0), 170, 245-258, 2017.

**Velasco E**, Roth M, Norford L, Molina LT. [Does urban vegetation enhance carbon sequestration?](#) *Landscape and Urban Planning* (9.1), 148, 99-107, 2016.

**Velasco E**, Roth M. [Cities as net sources of CO<sub>2</sub>: Review of atmospheric CO<sub>2</sub> exchange in urban environments measured by eddy covariance technique](#). *Geography Compass* (3.1), 4, 1238-1259, 2010.

**Velasco E**, Pressley S, ..., 10 more coauthors. [Eddy covariance flux measurements of pollutant gases in urban Mexico City](#). *Atmospheric Chemistry and Physics* (6.3), 9, 7325-7342, 2009.

**Velasco E**, Márquez C, ..., 9 more coauthors. [Vertical distribution of ozone and VOCs in the low boundary layer of Mexico City](#). *Atmospheric Chemistry and Physics* (6.3), 8, 3061-3079, 2008.

**Velasco E**, Lamb B, ..., 17 more coauthors. [Distributions, magnitudes and diurnal pattern of volatile organic compounds in the Valley of Mexico during the MCMA-2002 & MCMA-2003 field campaigns](#). *Atmospheric Chemistry and Physics* (7.197), 7, 329-353, 2007.

## Invited talks & presentations

Sixty-five invited talks and 118 presentations (talks and posters) at conferences and workshops. For a full list of my presentations, please see my complete CV on my [Personal Website](#).

### Selected presentations since 2022

\* Invited talk

Molina LT, Retama A, **Velasco E**, Li G, Bei N. [Air pollution: challenges and lessons learned](#). *Tenth International Symposium on Removal of Contaminants From Water, Atmosphere, and Soil, Faculty of Chemistry, National Autonomous University of Mexico, Mexico City, Mexico*, 3 Apr 2024.

\* [Particle exposure on the streets and public transport](#). *Royal Society of Chemistry Desktop Seminar, Cambridge, United Kingdom*, 6 Mar 2024.

\* [Urban warming, climate change and atmospheric pollution](#). *First Colloquium on Urban Climates, Institute of Geography, National Autonomous University of Mexico, Mexico City, Mexico*, 25 Aug 2023.

\* [Urban flux tower: applications & challenges](#). *Atmospheric Sciences Research Center, State University of New York at Albany, Albany NY, USA*, 14 Jun 2023.

Molina LT, Retama A, **Velasco E**, Rivera O, Jaimes-Palomera M. Oral. [Technical challenges and research needs of applying atmospheric modeling in air quality management of megacities: Experience from Mexico City](#). *3<sup>rd</sup> Street-in-Grid and Urban Air Quality Modeling Symposium, France, Paris*, 6-10 Mar 2023.

**Velasco E**. [Urban carbon sequestration: myth or fact](#). *iLEAPS-Oz Flux Conference 2023, Auckland, New Zealand*, 30 Jan - 4 Feb 2023.

\* [Air quality management and climate change monitoring in Singapore](#). *Asia Summit on Global Environment & Monitoring (GEMM Asia), National University of Singapore, Singapore*, 5-6 Dec 2022.

**Velasco E**. [Impact of Singapore's COVID-19 lockdown on atmospheric CO<sub>2</sub> fluxes at neighborhood scale](#). *Metrology for Climate Action, BIPM and WMO*, 26-30 Sep 2022.

\* [Smart & not so smart cities need clean air](#). *School of Business, Smart Cities, Singapore Management University, Singapore*, 5 Jul 2022.

\* [Services and limits of urban vegetation to mitigate climate change](#). *Dept. of Architecture, National University of Singapore, Singapore*, 14 Jan 2022.

## Teaching experience

### Teaching philosophy

I make students realize that the environment is not "out there", but that we are a part of it. I provide students with a solid understanding of environmental sciences and then engage them in fieldwork to boost their creativity and environmental consciousness. The most important aspect is to teach students how to think on their own, help them come up with their own ideas, and let them make a few mistakes. In the case of graduate students, they must learn to apply the scientific method while pursuing innovative and exacting research with a strong commitment to society.

### Instruction

<b>Ton Duc Thang University, Ho Chi Minh City, Vietnam</b>	2016
Course on air quality for undergraduate students (30 h). Lecturer.	
<b>Molina Center of Energy and the Environment, Mexico City, Mexico</b>	2006 - 2014
Educational program: Let's make a miracle for the air! Member of the evaluating committee and instructor for the students encounter.	
<b>Ministry of Foreign Affairs Singapore, Singapore</b>	2014
Course: How to improve air quality in your city: strategic framework for air quality management. (8 h, 2-3 Jun 2014). Instructor.	

**Dept. of Geography, National University of Singapore, Singapore** 2010 – 2012  
GE3230A: Southeast Asia Field Studies (Undergraduate course). Invited instructor.  
GE5211: Dynamic Environments (Graduate course). Lecturer.

**National Institute of Ecology and Climate Change, Mexico City, Mexico** 2011  
Workshop on eddy covariance flux measurements over urban surfaces (20 h). Instructor.

**Dept. of Civil & Environmental Engineering, Washington State University, Pullman, WA** 2004 – 2005  
C315: Fluid Mechanics. Teaching assistant.  
CE341: Introduction to Environmental Engineering. Teaching assistant.

**College of Education, University of Costa Rica, San Jose, Costa Rica** 2002  
Course on Methodologies and Strategies for Clean Air Education (30 h). Lecturer.

### Students mentoring and supervision

Olabosipo Oluyemisi Osibanjo. PhD committee. 2017 – 2021  
Dept. Earth & Atmospheric Sciences, University of Houston, TX.  
*Thesis:* Planetary boundary-layer properties and implications on air quality in Mexico City.

Je-Woo Hong. PhD committee. 2016 – 2019  
Dept. of Atmospheric Sciences. Yonsei University, Seoul, Korea.  
*Thesis:* Characteristics of urban land atmosphere interactions in monsoon East Asia.

Zixuan Lee. Honours thesis supervisor. 2017 – 2018  
Dept. of Biological Sciences, National University of Singapore, Singapore.  
*Thesis:* Soil respiration: a parameter to consider when selecting plant species for green roofs.

Benjamin Lim Kang Yong. Honours thesis supervisor. 2015 – 2016  
Dept. of Biological Sciences, National University of Singapore, Singapore.  
*Thesis:* Soil characteristics and their influence on CO<sub>2</sub> efflux in a tropical urban lawn.

Sok Huang Tan. MS thesis supervisor. 2012 – 2015  
Dept. of Geography, National University of Singapore, Singapore.  
*Thesis:* Commuter exposure to aerosols pollution on public transport in Singapore.

Seth Nabarro. Summer internship supervisor. 2012  
Dept. of Physics, Imperial College London and National University of Singapore, Singapore

Sok Huang Tan. Honours thesis supervisor. 2010 – 2011  
Dept. of Geography, National University of Singapore, Singapore.  
*Thesis:* Personal exposure to aerosol pollution at bus stops in Singapore.

Edilson Jimmy Requena. Honours thesis supervisor. 2007 – 2008  
Forestry and Environmental Engineering, National University of Central Peru, Peru  
*Thesis:* Biogenic isoprene and monoterpene emission estimates from a montane tropical forest.

## Service & outreach

### Professional memberships

American Geophysical Union ([AGU](#))

International Association for Urban Climate ([IAUC](#))

Mexican Ecosystem-Atmosphere Fluxes Network ([MexFlux](#))

Carbon Dew Community of Practice ([CarbonDew](#))

Latin American and Caribbean Association for Aerosol Studies ([ALACEA](#), executive committee member)

### Reviewing of external grants & international assessments

United Nations Environment Program (3 times), USA National Science Foundation (3 times), United Kingdom Medical Research Council (1 time).

## Journal peer review

Over 140 reviews (10-15 per year) for 38 journals including Urban Climate, Atmospheric Environment, Atmospheric Chemistry and Physics, Science of the Total Environment, Environmental Pollution, Environmental Science & Technology, and Urban Forestry & Urban Greening, among others.

## Scientific advisory

<b>Air Quality Monitoring Network of Mexico City, Mexico</b> Advised on VOC and aerosol monitoring and chemical speciation.	2014 - 2024
<b>National Institute of Ecology &amp; Climate Change, Mexico</b> Advised on measuring fluxes of CO <sub>2</sub> and heat at neighborhood scale.	2011 - 2015
<b>Metropolitan Environmental Commission, Mexico</b> Member of the Weekend Vehicular Traffic Program advisory committee for Mexico City.	2008
<b>Health Ministry, Mexico</b> Member of the advisory committee to revise Mexico's air quality standards for particle pollution.	2000
<b>Mexico's Association of Non-governmental Environmental Organization, Mexico</b> Supported multiple initiatives and outreach activities to improve air quality.	1998 – 2000

## Consultancies

<b>Asian Disaster Preparedness Center, Bangkok, Thailand</b> Identified and examined sources of air quality data in Southeast Asia.	2022-2023
<b>Economic Research Institute for ASEAN and East Asia, Jakarta, Indonesia</b> Analyzed Singapore's circular economy policies and strategies.	2022
<b>National Institute of Ecology &amp; Climate Change, Mexico City, Mexico</b> Designed a network for measuring CO <sub>2</sub> fluxes in Mexico by eddy covariance.	2011
<b>Noranth Ventures Pte Ltd, Singapore</b> Measured evaporation rates from a Singapore's water reservoir	2009
<b>MCE2 &amp; Mexico-US Science Foundation, Mexico City, Mexico</b> Installed a long-term eddy covariance flux tower for measuring CO <sub>2</sub> and heat in Mexico City.	2008

## Communication

Over 30 interviews on TV & radio in Singapore (25), Mexico (4), Germany (2), and Sweden (1).

Over 140 interviews for newspapers, magazines, online newsletters, and blogs in Singapore (98), Mexico (19), Spain (7), Indonesia (6), USA (4), Malaysia (3), Germany (2), Canada (1), Hong Kong (1), Sweden (1), Thailand (1), and Brazil (1).

*For a complete overview of my publications and presentations, media coverage and interviews, public outreach, and professional activities, please consult the detailed version of my CV on my [Personal Website](#). Each of my research areas (Air quality, Urban micrometeorology, Personal exposure, and Urban carbon sequestration) is described in detail there.*