

# Megan Louise Melamed

IGAC Executive Officer  
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## Research Interests:

- The effects of air pollution on climate change and climate change on air pollution
- The local, regional, and global impacts of urbanization on air pollution and climate
- Air pollution and climate change policy
- International and interdisciplinary scientific research and management

## Education:

- **University of Colorado** (2006)  
*Doctorate of Philosophy in Environmental Engineering*  
Advisor: Susan Solomon  
Thesis Title: *Aircraft-based ultraviolet spectroscopy measurements of sulfur dioxide emissions from point sources*
- **University of Colorado** (2002)  
*Masters of Arts in Environmental Engineering*  
Advisor: Susan Solomon  
Thesis Title: *Measuring reactive nitrogen emissions from point sources using visible spectroscopy from aircraft*
- **Colby College** (2000)  
*Bachelor of Arts in Chemistry and Spanish, Cum Laude*

## Relevant Experience:

- **Executive Officer** (2011-Present)  
International Global Atmospheric Chemistry (IGAC) Project  
CIRES, University of Colorado, Boulder, CO USA  
located at JISAO, University of Washington, Seattle, WA USA 2011-2012  
  
Leads and manages the IGAC International Project Office.  
  
Works with an international scientific steering committee to determine the organizations priorities in coordinating and facilitating atmospheric chemistry research towards a sustainable world.  
  
Engages the international atmospheric chemistry community to implement the priorities of the organization.  
  
Provides scientific expertise by leading or contributing to major IGAC activities.

Successfully manages a \$900K grant from NSF, NOAA, and NASA that funds the IGAC International Project Office and also provides travel support to young and developing country scientists to attend workshops and conferences.

● **AAAS Science and Technology Policy Fellow** (2009 - 2010)

Office of Research and Development

U.S. Environmental Protection Agency, Washington, D.C. USA

Served as the atmospheric science expert for the Global Research Program in the National Center for Environmental Research.

Significantly contributed to an agency Report to Congress on black carbon and short-lived climate forcers.

Learned the intricacies of grant funding process by assisting in the review process of U.S. EPA Science to Achieve Results (STAR) grant program.

Synthesized and analyzed literature on climate change and air quality to identify research needs of both the science and policy communities.

Formulated Request for Applications (RFA) for the Science to Achieve Results (STAR) Global Change Research Program.

Engaged international science and policy communities in an initiative to bring transparency and accessibility to air pollution and greenhouse gases emissions data.

Investigated and summarized how global climate and regional chemistry models are used to study the interaction between climate change and air quality. Expanded upon this interest by learning how to use the Community Multi-scale Air Quality (CMAQ) model.

Briefed the Under Secretary of State for Diplomacy and Global Affairs on climate change in the Arctic.

● **National Science Foundation International Post Doctorate Fellow** (2007 - 2009)

Centro de Ciencias de la Atmósfera

Universidad Nacional Autónoma de México, Mexico City, Mexico

Analyzed ground-based UV/visible zenith sky spectra taken during Megacity Initiative: Local and Global Research Observations (MILAGRO) 2006 using the differential optical absorption spectroscopy (DOAS) method to retrieve differential slant column densities of nitrogen dioxide (NO<sub>2</sub>) from the Tenango del Aire and Alzomoni research sites.

Integrated the NO<sub>2</sub> differential slant column density data set with ceilometer mixing layer height data and *in situ* NO<sub>2</sub> data.

Used the integrated data set to study pollution transport events to the southeast of Mexico City and to study the development of the mixing layer throughout the morning. This information is critical to understand pollution transport during the MILAGRO 2006 campaign as the Tenango del Aire research site was the only site

located to the south of the city. Results of the MILAGRO campaign will aid in implementing air pollution policy in Mexico City.

Installed permanent DOAS instruments to continuously measure NO<sub>2</sub> and sulfur dioxide (SO<sub>2</sub>) differential slant column densities in Mexico City. The continuous measurements will provide unique information on the development of the mixing layer in Mexico City as well as be able to identify when SO<sub>2</sub> emissions from Popocatepetl volcano may be influencing air pollution within Mexico City.

Mentored graduate students on the DOAS method and its use in urban air pollution studies.

• **Research Scientist** (2007)

Chemical Sciences Division

National Oceanic and Atmospheric Administration, Boulder, CO USA

Developed a new method to use oxygen dimer (O<sub>4</sub>) slant column density measurements to calculate the photon path length, or air mass factor (AMF), for pollutants, such as sulfur dioxide (SO<sub>2</sub>), residing solely in the planetary boundary layer.

Used the new AMF method in conjunction with sulfur dioxide (SO<sub>2</sub>) slant column densities measurement from aircraft to calculate SO<sub>2</sub> emission fluxes from power plants in the Ohio River Valley as part of the International Consortium for Atmospheric Research on Transport and Transformation (ICARRT) 2004 field campaign.

Successfully published the results of this research in a peer-reviewed journal.

• **Graduate Research Assistant** with Susan Solomon (2000 - 2006)

Chemical Sciences Division

National Oceanic and Atmospheric Administration, Boulder, CO USA

Analyzed visible spectra taken aboard an aircraft during the Texas Air Quality Study (TexAQS) 2000 to retrieve nitrogen dioxide (NO<sub>2</sub>) differential slant column densities.

Assisted in the development and deployment of an ultraviolet spectrometer optimized to measure sulfur dioxide (SO<sub>2</sub>) from a NOAA WP-3D aircraft for the New England Air Quality Study (NEAQS) 2004.

Participated in NEAQS, which was part of the International Consortium for Atmospheric Research on Transport and Transformation (ICARRT) 2004 field campaign, which involved pre-flight instrument calibration, monitoring of instrumentation during flights, post-flight instrument maintenance, and data collection.

Developed an IDL-based data analysis program to analyze ultraviolet spectra using the differential optical absorption spectroscopy (DOAS) method to retrieve SO<sub>2</sub> and oxygen dimer (O<sub>4</sub>) differential slant column densities.

Measured the photon path length, or air mass factor, for SO<sub>2</sub> slant column densities from aircraft using the information given by O<sub>4</sub> slant column densities.

Used sulfur dioxide (SO<sub>2</sub>) and oxygen dimer (O<sub>4</sub>) slant column densities measured from aircraft to calculate SO<sub>2</sub> emission fluxes from power plants in the Ohio River Valley.

### Selected Publications:

1. Abbatt, J., C. George, **M. Melamed**, P. Monks, S. Pandis, S., and Rudich, Y., (2013) New Directions: Fundamentals of atmospheric chemistry: Keeping a three-legged stool balanced. *Atmospheric Environment*, <http://dx.doi.org/10.1016/j.atmosenv.2013.10.025>.
2. Zhu, T., **M.L. Melamed**, D. Parrish, M. Gauss, L. Gallardo Klenner, M. Lawrence, A. Konare, and C. Liousse), (2012) WMO/IGAC Impacts of Megacities on Air Pollution and Climate, ISBN: 978-0-9882867-0-2, 309 pp.
3. IGBP/IGAC (2012). Time To Act: The Opportunity to Simultaneously Mitigate Air Pollution and Climate Change. International Geosphere-Biosphere Programme (IGBP) and International Global Atmospheric Chemistry (IGAC) Project, 6pp.
4. Frost, G.J., S.R. Falk, C. Granier, T. Keating, J.F. Lamarque, **Melamed, M.L.**, P. Middleton, G. Petron, S.J. Smith (2012), New Directions: Toward a Community Emissions Approach. *Atmospheric Environment*, doi: 10.1016/j.atmosenv.2012.01.055
5. **Melamed, M.L.**, R. Basaldud, R. Steinbrecher, S. Emis, L.G. Ruíz-Suárez, and M. Grutter (2009), Detection of pollution transport events southeast of Mexico City using ground-based visible spectroscopy measurements of nitrogen dioxide. *Atmos. Chem. and Phys.*, 9, 4827-4840
6. **Melamed, M.L.**, A.O. Langford, J. S. Daniel, R. W. Portmann, H. L. Miller, C. S. Eubank, R. Schofield, J. Holloway, and S. Solomon (2008), Sulfur dioxide emission flux measurements from point sources using airborne near ultraviolet spectroscopy during the New England Air Quality Study 2004, *J. Geophys. Res.*, 113, D02305, doi:10.1029/2007JD008923
7. Schofield, R., J.S. Daniel, R.W. Portmann, H.L. Miller, S. Solomon, C.S. Eubank, **M.L. Melamed**, A.O. Langford, M.D. Shupe, and D.D. Turner (2007), Retrieval of effective radius and liquid water path from ground-based instruments: A Case Study in Barrow, Alaska, *J. Geophys. Res.*, 112, D21203, doi:10.1029/2007JD008737
8. Langford, A.O., R. Schofield, J.S. Daniel, **M.L. Melamed**, R.W. Portmann, and S. Solomon (2007), On the variability of the Ring effect in the near ultraviolet: understanding the role of aerosol and multiple scattering. *Atmos. Chem. and Phys.*, 7, 575-586
9. King, D.W., W.J. Cooper, S.A. Rusak, B.M. Peake, J.J. Kiddle, D.W. OSullivan, **M.L. Melamed**, C.R. Morgan, and S.M. Theberge (2007), Flow injection analysis of H<sub>2</sub>O<sub>2</sub> in natural waters using acridinium ester-chemiluminescence: Method development and optimization using a kinetic model. *Analytical Chemistry*, 79(11), 4169-4176

10. **Melamed, M.L.**, S. Solomon, J.S. Daniel, A.O. Langford, R.W. Portmann, T.B. Ryerson, D.K. Nicks Jr., and S.A. McKeen (2003), Measuring reactive nitrogen emissions from point sources using visible spectroscopy from aircraft. *J. Environ. Monit.*, 5(1), 29-34, doi: 10.1039/b204220g

#### **Select Oral Presentations:**

1. **Invited** Analytical Chemistry, University of Colorado, Boulder, CO. *The Impact of Megacities on Air Pollution and Climate*. March 2013.
2. **Invited** Center for Environmental Research, Education and Outreach, Washington State University, Pullman, WA. *Atmospheric Chemistry in Megacities*. November 2011
3. **Invited** Centro Nacional de Investigación y Capacitación Ambiental, Instituto Nacional de Ecología, Mexico City, Mexico. *El Cambio Climático: Qué Significa para la Contaminación del Aire?* November, 2009
4. **Invited** Casa de la Universidad de California, University of California, Mexico City, Mexico. *An overview of air pollution in the Mexico City metropolitan area*. June, 2009
5. Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México. *Una vista más comprensivo de la contaminación del aire en la área metropolitana de la ciudad de México usando mediciones de NO<sub>2</sub> con el método DOAS*. January 2009
6. **Invited** School of Engineering and Applied Sciences, Harvard University, Cambridge, MA. *A more comprehensive view of air pollution in the Mexico City metropolitan area using ground-based visible spectroscopy measurements of NO<sub>2</sub>*. January 2009
7. Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México. *Aircraft-based ultraviolet spectroscopy measurements of sulfur dioxide emissions from point sources*. September 2007
8. **Invited** ACCESS IX Colloquium; Big Sky, MT. *The differential optical absorption spectroscopy (DOAS) method: An overview and its application in urban air pollution studies*. August 2007

#### **Honors and Awards:**

- *Fellow* of American Association for the Advancement of Science (2009-2010) (AAAS) Science and Technology Policy Fellowship Program
- *Selected Scholar* for Dissertation Initiative for the Advancement of Climate Change Research Symposium (DISCCRS) (2008)
- *Fellow* of National Science Foundation International Research (2007-2009) Fellowship Program
- *Selected Scholar* for Atmospheric Chemistry Colloquium for Emerging Senior Scientist (ACCESS) IX (2007)

**Service and Leadership:**

- *Volunteer* at Denver Green School, Denver, CO, (2012-2013)
- *Volunteer* at Lafayette Elementary, Lafayette, CO, (2005-2011)
- *Volunteer* for Conservación Patagonica, Patagonia, Chile (2010)
- *Mentor* for Spark Club, Sacred Heart School, Washington, DC (2010)
- *Volunteer* at Emergency Family Assistance Association, Boulder, CO, (2003-2004)
- *Member* of American Meteorological Society, American Geophysical Union, and American Association for the Advancement of Science (2008-Present)
- *Peer reviewer* for international scientific journals and grant programs (2006 - Present)

**Skills:**

- International science management
- Strong knowledge of science policy
- Fluent in oral and written Spanish
- Programming knowledge in IDL, LaTeX, and IGOR Pro
- Expertise in the differential optical absorption spectroscopy (DOAS) method

**Field Campaign Experience:**

- Megacity Initiative: Local and Global Research Observations (MILAGRO) (2006)
- New England Air Quality Study (NEAQS) as part of the International Consortium for Atmospheric Research on Transport and Transformation (ICARTT) (2004)
- Texas Air Quality Study (TexAQS) (2000)

**References available upon request**