Xin Lan -- Ph.D.
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Education

University of Houston	Ph.D in Atmospheric Science	2011-2014
University of New Hampshire	Study in Earth and Environmental Science	2010
Sun Yet-sen University	B.S. in Applied Meteorology	2006-2010

Skills

Language: English (proficient), Cantonese (native), Mandarin (native).
Computer: proficient in MS Office, IDL, MATLAB, Igor, Sigma Plot, JMP, AERMOD View for Air Dispersion Modeling; experience in ENVI for remote sensing data processing.

Peer-reviewed Publications

Lan, X, Tans, P., Sweeney, C., Andrews, A., Jacobson, A., Crotwell, M., Dlugokencky, E., Kofler, J., Lang, P., Thoning, K., Wotler, S., Gradients of Column CO_2 across North America from the NOAA Global Greenhouse Gas Reference Network, *Atmos. Chem. Phys*., doi: 10.5194/acp-17-15151-2017, 2017.

Zavala_Araiza, D., Lyon, D. R., Alvarez, R. A., Davis, K. J., Harriss, R., Herndon, S. C., Karion, A., Kort, E. A., Lamb, B. K., **Lan, X.**, Marchese, A. J., Pacala, S. W., Robinson, A. L., Shepson, P. B., Sweeney, C., Talbot, R., Townsend-Small, A., Yacovitch, T. I., Zimmerle ,D. J., Hamburg, S. P., Reconciling Divergent Estimates of Oil and Gas Methane Emissions, *Proc. Natl. Acad. Sci. U. S. A*. doi: 10.1073/pnas.1522126112, 2015.

Lan, X., Talbot, R., Laine, P., Lefer, B., and Flynn, J., Atmospheric Mercury Measurements in the Barnett Shale Area, Texas: Implications for Emissions from Oil and Gas Processing, *Environ. Sci. Technol.*, doi: 10.1021/acs.est.5b02287, 2015.

Lan, X., Talbot, R., Laine, P., Torres A., Characterizing Methane Fugitive Emissions in the Barnett Shale Area Using a Mobile Laboratory, *Environ. Sci. Technol*., 49,doi: 10.1021/es5063055, 2015.

Lavoie, T., Shepson, P., Cambaliza1, M., Karion, A., Sweeney, C., Kort, C., Hirst, B., Yacovitch, T., **Lan, X.**, Lyon, D., Alvarez, R., Harriss, R.: Aircraft-based Measurements of Point Source Methane Emissions in the Barnett Shale Basin, *Environ. Sci. Technol*., 49, doi:10.1021/acs.est.5b00410, 2015.

Zavala-Araiza, D., Lyon, D., Alvarez, R. A., Palacios, V., **Lan, X.,** Talbot, R., Allen, D. T., and Hamburg, S. P.: Towards a Functional Definition of Methane Super-Emitters: Application to Natural Gas Production Sites, *Environ. Sci. Technol*., 49, doi: 10.1021/acs.est.5b00133, 2015.

Lyon, D. R., Zavala-Araiza, D., Alvarez, R., Harriss, R., Palacios, V., **Lan, X**., Talbot, R., Lavoie, T., Shepson, P., Mitchell, A., Yacovitch, T. I., Herndon, S. C., Hamburg, S.: Constructing a Spatially Resolved Methane Emission Inventory for the Barnett Shale Region, *Environ. Sci. Technol*., 49, doi: 10.1021/es506359c, 2015.

Liu L., Talbot, R., **Lan, X.:** Influence of Climate Change and Meteorological Factors on Houston's Air Pollution: Ozone A Case Study, Atmos., 6, 623-640, doi: 10.3390/atmos6050623, 2015.

Lan, X., Talbot, R., Laine, P., Lefer, B., Flynn, J., and Torres, A.: Seasonal and Diurnal Variations of Total Gaseous Mercury in Urban Houston, Texas (U.S.A.), *Atmos*., *5*, doi:10.3390/atmos5020399, 2014.

Lan, X., Talbot, R., Castro, M., Perry, K., and Luke, W.: Seasonal and Diurnal Variations of Atmospheric Mercury across the US Determined from Amnet Monitoring Data, *Atmos. Chem. Phys*., *12*, 10569-10582, doi:10.5194/acp-12-10569-2012, 2012.

Journal Reviewed:

Environmental Science & Technology (American Chemical Society Publications).

Environmental Research (Elsevier Publications).

Journal of Environmental Quality (American Society of Agronomy, Crop Science Society of America and Soil Science Society of America Publications).

Remote Sensing (Multidisciplinary Digital Publishing Institute Publications)

Atmosphere (Multidisciplinary Digital Publishing Institute Publications)

Research Experience

Research Scientist – CIRES, University of Colorado/Global Monitoring Division, National Oceanic and Atmospheric Administration (NOAA) **2016-present**

● Evaluated atmospheric CH_4 trends across North America using in-situ measurements, and inferred trends of CH_4 emission from oil and gas industry by utilizing CH_4 vertical profiles and hydrocarbon data.

Post-Doctoral Researcher – Global Monitoring Division, National Oceanic and Atmospheric Administration (NOAA) **2015--2016**

● Studied the gradients of column CO_2 across North America using in-situ aircraft and tower measurements, which resulted in long-term averaged column CO_2 patterns that can serve as reference for remote sensing studies.

● Investigated global cycles of CO_2 using $\delta^{13}CO_2$ data and box modelling.

Post-Doctoral Researcher – University of Houston **2015**

● Participated in the development of an unmanned aerial vehicle (drone) system for oil and gas CH_4 monitoring, with focus on mathematical modeling for methane flux retrieval. This project was a cooperated project with the Physical Sciences Inc. and supported by the Department of Energy, U.S.

● Mentored graduate students on instrument calibration, data analysis, and field measurements using a mobile laboratory.

● Analyzed data from measurements and prepared scientific papers for publication.

Research Associate – University of Houston **2011--2014**

● Designed and conducted measurements of CH_4, $\delta^{13}CH_4$, and Hg in the Barnett Shale area using a mobile laboratory. Estimated emission rates of CH_4 and Hg from oil and gas infrastructure and landfill sources by employing Gaussian Plume Models.

● Measured CH_4, $\delta^{13}CH_4$, VOCs, NO_x, CO, CO_2, SO_2, O_3, and Hg during the NASA DISCOVER-AQ campaign in the Houston area by using a mobile laboratory. Characterized their spatial distributions and located significant emission sources.

● Characterized the diurnal and seasonal variations of Hg in the Houston area using continuous Hg measurements. Investigated Hg source signatures using measurements of NOx, CO, CO_2, CH_4, SO_2, O_3, and meteorological factors in a stationary site.

● Analyzed long-term Hg data from the U.S. Atmospheric Mercury Network for spatial distributions and temporal variations.

● Examined trace gases (especially mercury and VOCs) emissions from a controlled fire experiment and calculated Emission Ratios from burning grass field.

Research Associate – Sun Yat-sen University **2007--2010**

● Conducted multi-scale analysis (Wavelet Analysis) on long-term air pollutants (NO, CO, SO_2 and O_3) data from Hong Kong and Macao in the Pearl River Delta, China.

● Organized a campaign for PM 2.5 measurements in 3 provinces in South China. Conducted PM 2.5 measurements in the city of Guangzhou.

● Modelled sea-land breeze circulation; and simulated the effect of sea-land breeze on air quality in South China using a 4D model.

● Investigated the sources of VOCs in the Yangtze River Delta, China, by employing VOCs measurements at 4 different sites; this project was funded by the Ministry of Education of China.

Conference Presentations and Abstracts

Lan, X, Tans, P., Sweeney, C., Andrews, A., Jacobson, A., Crotwell, M., Dlugokencky, E., Kofler, J., Lang, P., Thoning, K., Wotler, S., Gradients of Column CO_2 across North America from the NOAA Global Greenhouse Gas Reference Network, 10th International Carbon Dioxide Conference, Bern, Switzerland, 2017

Lan X., Tans, P., Sweeney, C., Andrews, A., Crotwell, M., Dlugokencky, E., Lang, P., Miller, B.,R., Montzka, S., Kofler, J., Mckain, K., Wotler, S.: Little evidence for significant increases of CH_4 emission in the U.S. over the past decade, The 6th World Meteorological Organization-Global Atmosphere Watch Program expert workshop on Volatile Organic Compounds, Boulder, CO, May 2017.

Lan X., Tans, P., Sweeney, C., Andrews, A., Crotwell, M., Dlugokencky, E., Lang, P., Miller, B.,R., Montzka, S., Kofler, J., Mckain, K., Wotler, S.: Little evidence for significant increases of CH_4 emission in the U.S. over the past decade, Global Monitoring Annual Conference, Boulder, CO, May 2017.

Lan X., Tans, P., Sweeney, C., Andrews, A., Crotwell, M., Dlugokencky, E., Miller, B.,R., Montzka, S., Kofler, J., Lang, P., Wotler, S.: Little evidence for significant increases of CH_4 emission in the U.S. over the past decade, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, December 2016.

Lan X. (invited), Tans, P., Sweeney, C., Andrews, A., Crotwell, M., Dlugokencky, E., Miller, B.,R., Montzka, S., Kofler, J., Lang, P., Wotler, S.: Little evidence for significant increases of CH_4 emission in the U.S. over the past decade, Air Resources Division, National Park Service, Boulder, CO, December 2016.

Lan, X, Tans, P., Sweeney, C., Andrews, A., Jacobson, A., Crotwell, M., Dlugokencky, E., Kofler, J., Lang, P., Thoning, K., Wotler, S., Gradients of Column CO_2 across North America from Aircraft and Tall Tower Measurements in the NOAA/ESRL Global Greenhouse Gas Reference Network, Global Monitoring Annual Conference, Boulder, CO, May 2016.

Lyon, D.,R., Zavala-Araiza, D., Alvarez, R., Harriss, R., C., Palacios, V., **Lan, X.**, Talbot, R., W., Shepson, P., B., Lavoie, T., N., Yacovitch, T., I., Herndon, S.,C., Marchese, A., Zimmerle, D., Robinson, A., L., Hamburg, S.: Integrating Oil and Gas Measurement Data to Estimate Spatially-Gridded Methane Emissions in the Barnett Shale, AGU Fall Meeting, San Francisco, CA, December 2015.

Talbot, R., and **Lan X.** (Invited): Measuring Fugitive Methane Emissions in the Barnett Shale Area Using a Mobile Laboratory, Houston Advanced Research Center & Gas Technology Institute, Lone Star College, Woodlands, TX, September 2014.

Wallace,H., Leong, Y., J., Basak K., C., Lefer, B., L., Flynn, J., H., Laine, P.,L., Anderson, D., **Lan, X.,** Talbot, R., W., Camp, M., Griffin R., J.: Nighttime production of organic nitrate aerosol by nitrate-

radical initiated reactions near Houston, TX, American Chemical Society, Aug., 2014.

Lan, X., Laine, P., Talbot, R., Lefer, B., Flynn, J., and Sive, B.: Identifying Anthropogenic Emissions of Atmospheric Mercury and Methane in Urban Houston Using Measurements from A Mobile Laboratory, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA, December 2013.

Laine, P., **Lan, X**., Anderson, D., Talbot, R.: Result From Mobile Lab Measurements Obtained in Barnett Shale with Emphasis on Methane and Gaseous Mercury Emissions (Forth Worth, TX), AGU Fall Meeting, San Francisco, December 2013.

Lan, X., Talbot, R., Laine, P., Lefer, B., Flynn, J., Anderson, D., Wallace, W., Leong, Y., Cevik, B., Griffin, R.: Mobile Laboratory Measurements Of Atmospheric Mercury, Methane, and Carbon Dioxide in the Houston Area during the NASA DISCOVER-AQ Campaign, American Chemical Society Southwest Regional Meeting, Waco, TX, November 2013.

Lan, X., Laine, P., Torres, A., and Talbot, R.: Identification of Anthropogenic Emission Sources of Atmospheric Mercury in the Houston Area Using Continuous Measurements and a Mobile Lab, International Conference on Mercury as a Global Pollutant (ICMGP), Edinburgh, Scotland, July 2013.

Torres, A., **Lan, X.**, Laine, P., and Talbot, R.: Comparison of Speciated Mercury in Urban and Coastal Settings in the Broader Houston Area, ICMGP, Edinburgh, Scotland, July 2013.

Laine, P., **Lan**, X., Torres, A., and Talbot, R.: A Comparison Between Total Mercury and Speciated Mercury Measured in an Urban Environment (Houston, TX), ICMGP, Edinburgh, July 2013.

Lan, X., P. Laine, B. Lefer, and R. Talbot, Seasonal and Diurnal Variations of Atmospheric Mercury in Houston, Texas, AGU Fall Meeting, San Francisco, CA, December 2012.

Lan, X., R. Talbot, and the AMNet site operators, Seasonal and Annual Variations of Atmospheric Mercury Across the U.S. Determined from AMNet Monitoring Data, AGU Fall Meeting, San Francisco, CA, December 2011.

Lan, X., R. Talbot, and the AMNet site operators, Seasonal and Annual Variations of Atmospheric Mercury Across the U.S. Determined from AMNet Monitoring Data, ICMGP, Halifax, Canada, July 2011.

Awards

2015	The U.S. National Research Council (the National Academy of Science, U.S.A.) Research Associateship award.
2014	April Brown Scholar and Chevron Scholarship for Outstanding Achievement in Atmospheric Science.
2013	Friends of the College of Natural Sciences and Mathematics Fellowship, University of Houston.
2013	Graduate Research Day Oral Presentation 2nd Place, University of Houston.
2013	Hess Scholarship for Outstanding Achievement in Atmospheric Science, University of Houston.
2012	Brown Foundation Scholarship for Outstanding Achievement in Atmospheric Science, University of Houston.
2011	Outstanding Achievement in Atmospheric Science Scholarship, University of Houston.
2010	Natural Resources and Earth System Science Fellowship, University of New Hampshire.