

DR. GREGORY J. FROST**RESEARCH CHEMIST**

Chemical Sciences Division (CSD), Earth System Research Laboratory (ESRL), National Oceanic & Atmospheric Administration (NOAA), Boulder, Colorado, USA

Summary of Professional Achievements

Dr. Gregory Frost conducts research using atmospheric observations and modeling to understand emissions and tropospheric chemistry and their impacts on air quality and climate change. Dr. Frost co-chairs the Global Emissions Initiative (GEIA), the Emissions/Processes Working Group of NASA's Geostationary Coastal and Air Pollution Events (GEO-CAPE) Science Team, and the Inverse Modeling of Emissions Assessment. He is Modeling and Satellites Liaison on the Fire Influence on Regional and Global Environments Experiment (FIREX) science team, and serves on the Community Emissions Data System (CEDS) Steering Committee and the Emissions of Atmospheric Compounds and Compilation of Ancillary Data (ECCAD) project's Advisory Board. He is an Associate Editor for the *Journal of Geophysical Research – Atmospheres* and an Editor for the journal *Atmospheric Chemistry and Physics*.

Education

Doctor of Philosophy, Physical Chemistry, University of Colorado, Boulder, CO, 1995

Bachelor of Science, Chemistry, University of California, Berkeley, CA, 1989

Professional Employment History

2014 – Present, Research Chemist, NOAA ESRL CSD

1997 – 2014, Research Scientist, University of Colorado, CIRES; Affiliate Scientist, NOAA ESRL CSD

1995 – 1997, NRC Postdoctoral Associate, NOAA Aeronomy Laboratory

1989 – 1995, Graduate Research Assistant, University of Colorado

Selected Publications (*85 peer reviewed articles, 10 first-authored, H-index = 33*)

Kim, S.-W., [...], G. J. Frost, et al., **2016**: Modeling the weekly cycle of NO_x and CO emissions and their impacts on O₃ in the Los Angeles-South Coast Air Basin during the CalNex 2010 field campaign. *J. Geophys. Res. Atmos.*, 121, 1340–1360, doi: 10.1002/2015JD024292.

Cui, Y. Y., [...], G. J. Frost, et al., **2015**: Top-down estimate of methane emissions in California using a mesoscale inverse modeling technique: The South Coast Air Basin. *J. Geophys. Res. Atmos.*, 120, 6698–6711, doi: 10.1002/2014JD023002.

Ahmadov, R., [...], G.J. Frost, et al., **2015**: Understanding high wintertime ozone pollution events in an oil and natural gas producing region of the western US, *Atmos. Chem. Phys.*, 15, 411-429, doi:10.5194/acp-15-411-2015.

Pétron, G., [...], G. J. Frost, et al., **2014**: A new look at methane and non-methane hydrocarbon emissions from oil and natural gas operations in the Colorado Denver-Julesburg Basin. *J. Geophys. Res. Atmos.*, 119, 6836-6852, doi:10.1002/2013JD021272.

de Gouw, J. A., [...], G. J. Frost, et al., **2014**: Reduced emissions of CO₂, NO_x and SO₂ from U.S. power plants owing to the switch from coal to natural gas with combined cycle technology. *Earth's Future*, 2, 75-82, doi:10.1002/2014EF000196.

Frost, G. J., et al., **2013**: New Directions: GEIA's 2020 vision for better air emissions information, *Atmos. Environ.*, doi:10.1016/j.atmosenv.2013.08.063.

Brioude, J., [...], G.J. Frost, et al., **2013**: Top-down estimate of surface flux in the Los Angeles Basin using a mesoscale inverse modeling technique: assessing anthropogenic emissions of CO, NO_x and CO₂ and their impacts. *Atmos. Chem. Phys.*, 13, 3661–3677, doi:10.5194/acp-13-3661-2013.

Karion, A., [...], G. Frost, et al., **2013**: Methane emissions estimate from airborne measurements over a western United States natural gas field. *Geophys. Res. Lett.*, 40, 4393-4397, doi:10.1002/grl.50811.

Brioude, J., [...], G.J. Frost, et al., **2013**: Top-down estimate of surface flux in the Los Angeles Basin using a mesoscale inverse modeling technique: assessing anthropogenic emissions of CO, NO_x and CO₂ and their impacts. *Atmos. Chem. Phys.*, 13, 3661–3677, doi:10.5194/acp-13-3661-2013

Pollack, I. B., [...], G. J. Frost, et al., **2012**: Airborne and ground-based observations of a weekend effect in ozone, precursors, and oxidation products in the California South Coast Air Basin. *J. Geophys. Res.*, 117, D00V05, doi:10.1029/2011JD016772.

Frost, G. J., et al., **2012**: New Directions - Toward a community emissions approach. *Atmos. Environ.*, 51, 333–334, doi:10.1016/j.atmosenv.2012.01.055.

Brioude, J., [...], G. J. Frost, et al., **2012**: A new inversion method to calculate emission inventories without a prior

at mesoscale: Application to the anthropogenic CO₂ emission from Houston, Texas. *J. Geophys. Res.*, 117, D05312, doi:10.1029/2011JD016918.

Pétron, G., G. J. Frost, et al., **2012**: Hydrocarbon emissions characterization in the Colorado Front Range - A pilot study. *J. Geophys. Res.*, 117, D04304, doi:10.1029/2011JD016360.

Granier, C., [...], G. Frost, et al., **2011**: Evolution of anthropogenic and biomass burning emissions at global and regional scales during the 1980-2010 period. *Clim. Change*, 109, 163–190, doi:10.1007/s10584-011-0154-1.

Kim, S.-W., S. A. McKeen, G. J. Frost, et al., **2011**: Evaluations of NO_x and highly reactive VOC emission inventories in Texas and their implications for ozone plume simulations during the Texas Air Quality Study 2006. *Atmos. Chem. Phys.*, 11, 11361-11386, doi:10.5194/acp-11-11361-2011.

Brioude, J., [...], G. J. Frost, et al., **2011**: Top-down estimate of anthropogenic emission inventories and interannual variability in Houston using a mesoscale inverse modeling technique. *J. Geophys. Res.*, 116, D20305, doi:10.1029/2011JD016215.

Brioude, J., [...], G. J. Frost, et al., **2010**: Variations in ozone depletion potentials of very short-lived substances with season and emission region. *Geophys. Res. Lett.*, 37, L19804, doi: 10.1029/2010GL044856.

Washenfelder, R. A., [...], G. J. Frost, et al., **2010**: Characterization of NO_x, SO₂, ethene, and propene from industrial emission sources in Houston. Texas. *J. Geophys. Res.*, 115, D16311, doi:10.1029/2009JD013645

Kim, S.-W., [...], G. J. Frost, et al., **2009**: NO₂ columns in the western U.S. observed from space and simulated by a regional chemistry model and their implications for NO_x emissions. *J. Geophys. Res.*, 114, D11301, doi: 10.1029/2008JD011343.

Monks, P. S., [...], G. Frost, et al., **2009**: Atmospheric composition change – global and regional air quality. *Atmos. Environ.*, 43, 5268–5350.

Murphy, D. M., [...], G. J. Frost, et al., **2008**: Weekly patterns of aerosol in the United States. *Atmos. Chem. Phys.*, 8, 2729-2739.

Kim, S.-W., [...], G. J. Frost, et al., **2006**: Satellite-observed US power plant NO_x emission reductions and their impact on air quality. *Geophys. Res. Lett.*, 33, L22812, doi:10.1029/2006GL027749.

Frost, G. J., et al., **2006**: Effects of changing power plant NO_x emissions on ozone in the eastern United States: Proof-of-concept. *J. Geophys. Res.*, 111, D12306, doi:10.1029/2005JD006354.

Grell, G. A., [...], G. Frost, et al., **2005**: Fully coupled “online” chemistry within the WRF model. *Atmos. Environ.*, 39, 6957-6975.

Ervens, B., [...], G. J. Frost, et al., **2004**: A modeling study of aqueous production of dicarboxylic acids 1. Chemical pathways and speciated organic mass production. *J. Geophys. Res.*, 109, D15205, doi:10.1029/2003JD004387.

Ryerson, T. B., [...], G. J. Frost, et al., **2003**: Effect of petrochemical industrial emissions of reactive alkenes and NO_x on tropospheric ozone formation in Houston, Texas. *J. Geophys. Res.*, 108, 4249, doi:10.1029/2002JD003070.

Martinez, M., [...], G. J. Frost, et al., **2003**: OH and HO₂ concentrations, sources and loss rates during the Southern Oxidants Study in Nashville, Tennessee, summer 1999. *J. Geophys. Res.*, 108, 4617, doi:10.1029/2003JD003551.

Frost, G. J., et al., **2002**: Comparisons of box model calculations and measurements of formaldehyde from the 1997 North Atlantic Regional Experiment. *J. Geophys. Res.*, 107, doi:10.1029/2001JD000896.

Ryerson, T. B., [...], G. J. Frost, et al., **2001**: Observations of ozone formation in power plant plumes and implications for ozone control strategies. *Science*, 292, 719-723.

Thomas, E., G. J. Frost, and Y. Rudich, **2001**: Reactive uptake of ozone by proxies for organic aerosols: Surface-bound and gas phase products. *J. Geophys. Res.*, 106, 3045-3056.

Frost, G. J., G. B. Ellison, and V. Vaida, **1999**: Organic peroxy radical photolysis in the near-infrared: Effects on tropospheric chemistry. *J. Phys. Chem. A*, 103, 10,169-10,178

Mauldin, R. L., G. J. Frost, et al., **1998**: OH measurements during the First Aerosol Characterization Experiment (ACE-1): Observations and model comparisons. *J. Geophys. Res.*, 103, 16,713-16,729.

Frost, G. J., et al., **1998**: Photochemical ozone production in the rural southeastern United States during the 1990 ROSE program. *J. Geophys. Res.*, 103, 22,491-22,508.

Donaldson, D. J., G. J. Frost, et al., **1997**: Atmospheric radical production by excitation of vibrational overtones via absorption of visible light. *Geophys. Res. Lett.*, 24, 2651-2654.

Frost, G. J., L. M. Goss, and V. Vaida, **1996**: Measurements of high resolution ultraviolet-visible absorption cross sections at stratospheric temperatures: 2. Chlorine dioxide. *J. Geophys. Res.*, 101, 3879-3884

Frost, G. J., L. M. Goss, and V. Vaida, **1996**: Measurements of high resolution ultraviolet-visible absorption cross sections at stratospheric temperatures: 1. Nitrogen dioxide. *J. Geophys. Res.*, 101, 3869-3877.

Frost, G. J., and V. Vaida, **1995**: Atmospheric implications of the photolysis of the ozone-water weakly bound complex. *J. Geophys. Res.*, 100, 18803-18809.