Anna Karion
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Education

- Ph.D. Mechanical Engineering, California Institute of Technology June 2000
  (Subject emphasis: Multi-phase and particulate flows, heat transfer, fluid mechanics)
- M.S. Mechanical Engineering, California Institute of Technology June 1995
- B.S. Mechanical Engineering, Yale University May 1994

Research projects

- National Oceanic and Atmospheric Administration (NOAA) Carbon Cycle Greenhouse Gas Aircraft Network (http://www.esrl.noaa.gov/gmd/ccgg/aircraft/index.html): Team member for network of 14 greenhouse gas aircraft profiling sites across the US.
- Co-Investigator on several studies using aircraft and ground observations to determine methane emissions from oil and gas production basins (Uintah Basin, Utah; Denver-Julesburg Basin, Colorado; Barnett Shale, Texas).
- Science Team Member for NASA's Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE), using aircraft and tower-based observations of greenhouse gases in Alaska to investigate permafrost and ecosystem variability.
- Science Team Member for the Indianapolis Flux experiment (INFLUX); ongoing effort to quantify fossil-fuel CO_2 fluxes using tower measurements, aircraft observations, and regional modeling.
- Science Team Member for OCO-2: AirCore validation of OCO-2 CO_2 measurements by conducting balloon-borne air sampling at Southern Great Plains, OK.

Experience

University of Colorado, Boulder, CO and NOAA Earth System Research Laboratory
Cooperative Institute for Research in Environmental Sciences (CIRES), Research Scientist II July 2007 – Present

Naval Surface Warfare Center, US Navy, Carderock, MD
Research Engineer: Hydrodynamics, fluid mechanics, field measurements. Oct. 2001 – Nov. 2005
Contract Research Scientist, Computer Sciences Corporation June 2006 – June 2007

The Aerospace Corporation, Fluid Mechanics Department, El Segundo, CA
Member of the Technical Staff Sep. 1999 – Sep. 2000
Senior Member of the Technical Staff Sep. 2000 – Sep. 2001

Awards

CIRES Science and Engineering Outstanding Performance Award ***April 2012***
With Tim Newberger and Colm Sweeney, for developing a new atmospheric sampling instrument, the AirCore, which can profile altitude gradients of greenhouse gases. The low-cost, lightweight tool also can be used to validate satellite profiles and may yield new discoveries in stratospheric composition and circulation trends.

Publications

Karion, A., C. Sweeney, G. Pétron, G. Frost, R. Michael Hardesty, J. Kofler, B. R. Miller, T. Newberger, S. Wolter, R. Banta, A. Brewer, E. Dlugokencky, P. Lang, S. A. Montzka, R. Schnell, P. Tans, M. Trainer, R. Zamora and S. Conley (2013). "Methane emissions estimate from airborne measurements over a western United States natural gas field." Geophysical Research Letters **40**(16): 4393-4397.

Karion, A., C. Sweeney, S. Wolter, T. Newberger, H. Chen, A. Andrews, J. Kofler, D. Neff and P. Tans (2013). "Long-term greenhouse gas measurements from aircraft." Atmos. Meas. Tech. **6**(3): 511-526.

Chen, H., A. Karion, C. W. Rella, J. Winderlich, C. Gerbig, A. Filges, T. Newberger, C. Sweeney and P. P. Tans (2013). "Accurate measurements of carbon monoxide in humid air using the cavity ring-down spectroscopy (CRDS) technique." Atmos. Meas. Tech. **6**(4): 1031-1040.

Rella, C. W., H. Chen, A. E. Andrews, A. Filges, C. Gerbig, J. Hatakka, A. Karion, N. L. Miles, S. J. Richardson, M. Steinbacher, C. Sweeney, B. Wastine and C. Zellweger (2013). "High accuracy measurements of dry mole fractions of carbon dioxide and methane in humid air." Atmos. Meas. Tech. **6**(3): 837-860.

Turnbull, J., D. Guenther, A. Karion, C. Sweeney, E. Anderson, A. Andrews, J. Kofler, N. Miles, T. Newberger, S. Richardson and P. Tans (2012). "An integrated flask sample collection system for greenhouse gas measurements." Atmos. Meas. Tech. **5**(9): 2321-2327.

Pétron, G., G. Frost, B. R. Miller, A. I. Hirsch, S. A. Montzka, A. Karion, M. Trainer, C. Sweeney, A. E. Andrews, L. Miller, J. Kofler, A. Bar-Ilan, E. J. Dlugokencky, L. Patrick, C. T. Moore, T. B. Ryerson, C. Siso, W. Kolodzey, P. M. Lang, T. Conway, P. Novelli, K. Masarie, B. Hall, D. Guenther, D. Kitzis, J. Miller, D. Welsh, D. Wolfe, W. Neff and P. Tans (2012). "Hydrocarbon emissions characterization in the Colorado Front Range: A pilot study." Journal of Geophysical Research-Atmospheres **117**: 19.

Miller, J. B., S. J. Lehman, S. A. Montzka, C. Sweeney, B. R. Miller, A. Karion, C. Wolak, E. J. Dlugokencky, J. Southon, J. C. Turnbull and P. P. Tans (2012). "Linking emissions of fossil fuel CO2 and other anthropogenic trace gases using atmospheric (CO2)-C-14." Journal of Geophysical Research-Atmospheres **117**.

Turnbull, J. C., A. Karion, M. L. Fischer, I. Faloona, T. Guilderson, S. J. Lehman, B. R. Miller, J. B. Miller, S. Montzka, T. Sherwood, S. Saripalli, C. Sweeney and P. P. Tans (2011). "Assessment of fossil fuel carbon dioxide and other anthropogenic trace gas emissions from airborne measurements over Sacramento, California in spring 2009." Atmospheric Chemistry and Physics **11**(2): 705-721.

Karion, A., C. Sweeney, P. Tans and T. Newberger (2010). "AirCore: An Innovative Atmospheric Sampling System." Journal of Atmospheric and Oceanic Technology **27**(11): 1839-1853.

Mays, K. L., P. B. Shepson, B. H. Stirm, A. Karion, C. Sweeney and K. R. Gurney (2009). "Aircraft-based measurements of the carbon footprint of Indianapolis." Environ Sci Technol **43**(20): 7816-7823.

Karion, A., T. C. Fu, T.W. Sur, J.R. Rice, D.C. Walker and D.A. Furey (2004). "Experiment to Examine the Effect of Scale on a Breaking Bow Wave", Carderock Division, Naval Surface Warfare Center, Hydromechanics Research and Development report, NSWCCD-50-TR-2004/060.

Wassgren, C. R., J. A. Cordova, R. Zenit and A. Karion (2003). "Dilute granular flow around an immersed cylinder." Physics of Fluids **15**(11): 3318-3330.

Karion, A. and M. L. Hunt (2000). "Wall stresses in granular Couette flows of mono-sized particles and binary mixtures." Powder Technology **109**(1-3): 145-163.

Karion, A. and M. L. Hunt (1999). "Energy dissipation in sheared granular flows." Journal of Heat Transfer-Transactions of the ASME **121**(4): 984-991.

Kramer, M. J., A. Karion, K. W. Dennis, M. Park and R. W. McCallum (1994). "Enhanced Superconductivity in Nd1+XBa2-XCu3O7+delta by Low-oxygen Partial-Pressure Annealing." Journal of Electronic Materials 23(11): 1117-1120.

Other

Invited session speaker at the American Geophysical Union Annual Fall Meeting, December 2012, "Estimate of Methane Emissions in the Uintah Oil and Gas Basin".

Invited participant, IPCC Expert Meeting: Fugitive Emissions of Greenhouse Gases from Oil and Natural Gas Systems (including shale gas, coal bed methane, etc), Washington, D.C., USA (20-22 August 2013).

US EPA Stakeholder Workshop on GHG Inventory of Emissions from Natural Gas Systems, Washington, D.C., September 2013.

Expert Reviewer, US EPA National GHG Inventory, 2013.