William C. Vicars

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EDUCATION

Doctor of Philosophy, Earth and Environmental Sciences, expected April 2013 *Université Joseph Fourier*, Grenoble, France *Doctoral Thesis*: Constraining the propagation of the oxygen isotope anomaly (Δ^{17} O) in the atmosphere: Towards interpretation of the polar ice core record Thesis Committee: Joël Savarino (Chair), Thomas Röckmann, Jan Kaiser

Master of Science, Soil and Water Science, December 2009 University of California, Riverside, California, U. S. Masters Thesis: Atmospheric phosphorus transport to the southern Sierra Nevada, California: Size distribution, dry deposition, and source apportionment Thesis Committee: James O. Sickman (Chair), Paul J. Ziemann, Michael A. Anderson

Bachelor of Science, summa cum laude in Environmental Science, December 2006 University of Florida, Gainesville, Florida, U. S.
Minor: Soil and Water Science
Honors Thesis: Dissolved carbon flux from a sub-arctic tundra catchment Thesis Advisor: James O. Sickman

RELATED COURSEWORK

- European Research Course on Atmospheres (9 January 10 February 2012), Grenoble, France
- INTRAMIF (INitial TRAining network in Mass Independent Fractionation) Summer School, "Mass Independent Isotope Fractionation" (23 August 3 September 2010), Norwich, U. K.
- Thermo-Fisher Isotope-Ratio Mass Spectrometry Operator Training (9 12 May 2010), Bremen, Germany
- Graduate coursework: Chemistry and Physics of Aerosols, Isotope Methods, Chemical Fate and Transport
- Undergraduate coursework: Physical and Geographic Hydrology, Biogeochemistry, Limnology, Soil and Wetland Science, Water Chemistry and Analysis, Meteorology, Oceanography, Environmental Microbiology

AFFILIATIONS/HONORS

- Invited lecturer: American Geophysical Fall Meeting (2012)
- Peer reviewer: Atmospheric Environment, Environmental Science and Technology
- Professional memberships: American Geophysical Union, European Geosciences Union, Society of Environmental Toxicology and Chemistry, American Chemical Society
- European Union Marie Curie INTRAMIF Ph.D. Fellowship
- University of California Chancellor's Graduate Fellowship
- Americorps National Civilian Community Corps Education Award

RESEARCH INTERESTS

- Application of stable and radioisotopes to the environmental and earth sciences
- Atmospheric reactive nitrogen cycling and ozone
- Hydrology and biogeochemistry of arctic and alpine environments
- Paleoclimate and the composition and chemistry of ancient atmospheres
- Aerosol geochemistry and ecological effects of atmospheric deposition (N, P, Fe, etc.)

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TEACHING INTERESTS

- Environmental science and global change for non-majors
- Undergraduate earth science courses including atmospheric chemistry, biogeoscience, and hydrology
- Graduate courses in earth chemistry and isotope methods

RELATED EXPERIENCE

Research

<u>Graduate Student Researcher</u>, Laboratoire de Glaciologie et Géophysique de l'Environnement, Université Joseph Fourier, St. Martin d'Hères, France, *March 2010 - present*

- Developed and implemented a method for the acquisition and isotopic analysis of ambient surface ozone.
- Analyzed the isotopic composition of nitrate in ice core, water, snow, and aerosol samples using the bacterial denitrifier method in combination with isotope-ratio mass spectrometry (IRMS).
- Participated in collaborative laboratory experiments on isotope transfers and fractionations associated with reactive nitrogen cycling and nitrate photolysis.
- Independently planned and executed an atmospheric sampling campaign onboard the German research vessel *Polarstern* during a cruise from Chile to Germany (10 April 15 May, 2012).

<u>Graduate Student Researcher</u>, Watershed Biogeochemistry Laboratory, University of California, Riverside, Riverside, California, U. S., *January 2007 - March 2010*

- Independently designed and conducted an atmospheric aerosol sampling project at a high-elevation site.
- Developed and performed a digestion-extraction procedure for the measurement of phosphorus and other trace atmospheric species in aerosol and snow samples via inductively coupled plasma mass spectrometry (ICP-MS) and inductively coupled plasma atomic emission spectroscopy (ICP-AES).
- Analyzed and synthesized large amounts of chemical and atmospheric data using spreadsheet, graphing, and statistical computer software (Excel, MATLAB, GraphPad, GMT, and others).
- Participated in water, snow, and sediment sampling campaigns in remote alpine areas of the Sierra Nevada.

<u>Research Assistant</u>, Wetland Biogeochemistry Laboratory, University of Florida, Gainesville, Florida, U. S., *September 2005 - January 2007*

- Independently executed a watershed-scale sampling project in a remote region of interior Alaska.
- Analyzed water samples for particulate and dissolved carbon species. Interpreted results for contributions to collaborative presentations and publications.
- Maintained, calibrated, and operated laboratory equipment. Ordered supplies and monitored inventory.
- Participated in biological surveys and water and sediment sampling in Florida springs.

Teaching and Mentoring

Laboratory Supervisor, Laboratoire de Glaciologie et Géophysique de l'Environnement, Université Joseph Fourier, St. Martin d'Hères, France, *May 2012 - present*

• Trained and directed undergraduate and graduate students in wet laboratory techniques and IRMS.

<u>Teaching Assistant</u>, Department of Environmental Science, University of California, Riverside January 2009 - April 2009; September 2009 - May 2009

- Assisted in lectures, laboratories, discussion sections, and review sessions for undergraduate hydrology and environmental science courses.
- Advised undergraduate students during office hours.
- Graded exams, quizzes, and laboratory assignments.

<u>Math and Science Tutor</u>, Academic Success Center, Seminole State College of Florida *March 2004 - December 2004*

• Tutored diverse group of college students in various foundational undergraduate courses including algebra, calculus, biology, chemistry, and physics.

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PUBLICATIONS (* = Published, † = Submitted/in review, accepted, or in press, ‡ = In preparation)

‡Vicars, W. C. and Savarino, J. Quantitative constraints on the ¹⁷O-excess (Δ^{17} O) signature of surface ozone: Ambient measurements from 75°S to 50°N using the nitrite-coated filter technique. *Geochimica et Cosmochimica Acta*. (in prep)

†Vicars, W. C., Morin, S., Savarino, J., Wagner, N. L., Brown, S. S., Erbland, J., Vince, E., Martins, J. M. F., Lerner, B. M., and Williams, E. J. Spatial and diurnal variability in nocturnal nitrogen oxide chemistry as reflected in the isotopic composition of atmospheric nitrate: Results from the CalNex 2010 field study. *Journal of Geophysical Research: Atmospheres* (submitted).

†Savarino, J., Morin, S., Erbland, J., Grannec, F., Patey, M. D., **Vicars, W. C.**, Alexander, B., and Achterberg, E. P. Bromine chemistry in a tropical marine boundary layer (Cape Verde) revealed by the stable isotope ratios of atmospheric nitrate. *Proceedings of the National Academy of Sciences of the U. S. A.* (submitted).

†Erbland, J., Vicars, W. C., Savarino, J., Morin, S., Frosini, D., and Frey, M. M. 2012. Air-snow transfer of nitrate on the East Antarctic plateau – Part 1: Isotopic evidence for a photolytically driven dynamic equilibrium. *Atmospheric Chemistry and Physics Discussions*. 12: 28559-28608.

*Vicars, W. C., Bhattacharya, S. K., Erbland, J., and Savarino, J. 2012. Measurement of the ¹⁷O-excess (Δ^{17} O) of tropospheric ozone using a nitrite-coated filter. *Rapid Communications in Mass Spectrometry*. 26: 1219-1231.

*Berhanu, T. A., Savarino, J., Bhattacharya, S. K., and **Vicars, W. C. 2012**. ¹⁷O-excess transfer during the NO₂ + $O_3 \rightarrow NO_3 + O_2$ reaction. *Journal of Chemical Physics*. 136: 044311.

*Vicars, W. C. and Sickman, J. O. 2011. Mineral dust transport to the Sierra Nevada, California: Loading rates and potential source areas. *Journal of Geophysical Research: Biogeosciences*. 116: 1394-1408.

*Vicars, W. C., Sickman, J. O., and Ziemann, P. J. 2010. Atmospheric phosphorus deposition at a montane site: Size distribution, effects of wildfire, and ecological implications. *Atmospheric Environment*. 44: 2813-2821.

*Sickman, J. O., Von Kiparski, G., Lucero, D. M., Schuur, E., Vogel, J. G. and **Vicars, W. C. 2008**. The role of lakes in carbon transfers from permafrost to the atmosphere: Eight Mile Lake, Alaska. *International Permafrost Association 9th International Conference on Permafrost Extended Abstracts*: 289-290.

SELECTED CONFERENCE PROCEEDINGS (* = Platform Presentation, † = Poster)

*Vicars, W. C., Bhattacharya, S.K., Erbland, J., and Savarino, J. 2012. Spatial and temporal variability in the ¹⁷O-excess (Δ^{17} O) of surface ozone: Ambient measurements using the nitrite-coated filter method. 6th International Symposium on Isotopomers. Washington, D. C., U. S.

*Vicars, W.C., Erbland, J., and Savarino, J. 2011. Comprehensive isotopic composition of nitrate in the Antarctic atmosphere and surface snow: Towards interpretation of the polar ice core record. Comité National Français des Recherches Arctiques et Antarctiques. Paris, France.

*Vicars, W.C., Bhattacharya, S.K., Erbland, J., and Savarino, J. 2011. Measurement of the oxygen isotope anomaly ($\Delta^{17}O$) of tropospheric ozone using a nitrite-coated filter. European Geosciences Union General Assembly. Vienna, Austria.

†Vicars, W.C., Ziemann, P.J. and Sickman, J.O. 2009. Characterization and source apportionment of atmospheric phosphorus in the Sierra Nevada, California. Society for Environmental Toxicology and Chemistry Annual Meeting. New Orleans, Louisiana, U. S.

†Vicars, W.C., Cahill, T.A., Ziemann, P.J. and Sickman, J.O. 2008. Particle size distribution of atmospheric aerosols in Sequoia National Park: Effects of local and regional wildfires. American Geophysical Union Fall Meeting. San Francisco, California, U. S.