

DR. CAROLINE A. MASIELLO

Assistant Professor
Department of Earth Science
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EDUCATION

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- Ph.D., 1999 Earth System Science, UC Irvine
thesis title: Radiocarbon Measurements of Black Carbon in Sediments and a Small River
advisor & committee: Ellen R.M. Druffel, Susan E. Trumbore, Bill. S. Reeburgh
- M.S., 1996 Physical Chemistry, UC Irvine
- M.S., 1993 Environmental Sciences (atmospheric chemistry) UNC-Chapel Hill
thesis title: Organic Acids in the Oxidation Products of Isoprene
advisor: Harvey E. Jeffries
- B.A., 1991 Mathematics and Physics, Earlham College
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APPOINTMENTS

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- July 2004- Assistant Professor, Rice University, Earth Science Department
- 2002-2004 postdoctoral researcher, UC Santa Barbara Geography Department
- 2001-2004 visitor, CalTech Division of Geology and Planetary Sciences
- Nov. 2003 visiting scientist, CSIRO Land and Water, Adelaide, Australia
Waite Solid State NMR facility
- 2002-2003 AAUW Postdoctoral Fellow, joint UCSB and USGS-Menlo Park
- 1999-2002 Postdoctoral Researcher, Center for Accelerator Mass Spectrometry, LLNL
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RESEARCH INTERESTS

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- Drivers of carbon oxidation state of the Earth system; connections of carbon oxidation state to ecological processes and global gas fluxes;
 - Effects of charcoal and soot (black carbon) production in the global carbon cycle;
 - Environmental processes which create slow-cycling carbon (biological production of refractory carbon, mineral control of soil carbon storage, biomass burning as a source of soil and sedimentary charcoal);
 - Isotopic (^{13}C and ^{14}C) and molecular tracers of microbial, soil, and plant processes to understand human influences on the environment;
 - Tracing hydrologic movement of refractory organic carbon from continents to oceans and within watersheds.
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SERVICE: JOURNAL REVIEWS

Science
Nature
Geochimica et Cosmochimica Acta
Global Biogeochemical Cycles
Continental Shelf Research

Geophysical Research Letters
Biogeochemistry
Radiocarbon
Environmental Science & Technology
Soil Biology and Biochemistry

Organic Geochemistry
Paleoceanography

JGR Atmospheres, Biogeochemistry
Global and Planetary Change

SERVICE: PROPOSAL REVIEWS

National Science Foundation
Civilian Research and Defense Foundation
National Institute for Climatic Change Research (DOE NICCR)
Netherlands Inovational Research Incentive Scheme (NWO VIDI)

Petroleum Research Foundation
LLNL minigrant fund

SERVICE RELATED TO RICE UNIVERSITY 50% EXPANSION

Faculty Hiring Committees:

- regular service on search committees for Earth Science (3), Civil and Environmental Engineering (3), and Ecology and Evolutionary Biology (1);
- development of best practices guidelines for searches as part of NSF ADVANCE recruitment committee.

Institutional Development:

- Created, fundraised, and currently co-direct the Rice International Visiting Fellows Program on Energy, the Environment, and Sustainibility (www.internationalfellows.rice.edu); this requires ongoing contact with the development office and donors in the Houston energy industry.

OTHER UNIVERSITY SERVICE

University committees (4): Shared Equipment Authority Advisory Committee, Presidential Ad Hoc Advisory Committee on the Status of Faculty Women; Childcare Committee, ADVANCE recruitment committee

School of Natural Sciences committees (2): Rice Energy Program, ADVANCE institutional transformation development committee

Department committees (5): Chair, seminar committee; senior search committee, junior search committee. Outside search committees: Civil and Environmental Engineering junior faculty search committee, Ecology and Evolutionary Biology junior search committee.

EXTERNAL SERVICE

2006	host and organizer of Rice-Texas A&M – Galveston joint symposium: <i>Charcoal and Nanocarbon: Shared Geochemistries of Rings in the Environment</i>
2004	NSF panel service
12-01	host and organizer of UC-wide symposium: <i>Mechanisms of Carbon Sequestration in Soils</i>
1999-present	Co-Chair, Intn'l Steering Committee for Black Carbon Reference Materials

PROFESSIONAL SOCIETIES

American Geophysical Union
American Association of University Women

CURRENT FIELD SITES AND CRUISE HISTORY

Katy Prairie Conservancy	greenhouse gas inventory
Big Thicket National Preserve	River carbon and C isotope biogeochemistry
Kellogg Biological Station	Ecosystem carbon oxidation state measurements
Santa Cruz, CA soil marine terraces 2001-2004	soil & solution sampling for C & ¹⁴ C analyses
Mattole River, CA soil marine terraces	soil sampling for C and ¹⁴ C analyses, May 2000
Santa Clara River (coastal CA)	1997-98 El Niño: river organic carbon sampling
BOREAS N. Manitoba site	soil sampling, August 1994.
<i>R/V Melville</i> 1996, 1999	68 days (2 cruises) in Cent. Pacific, Southern Ocean
<i>R/V Revelle</i> 1996	7 days in Santa Monica, Santa Barbara Basins
<i>R/V New Horizon</i> 1995, 96, 98	29 days (3 cruises) Station M (Northeastern Pacific)

TEACHING

2005-current: Rice University

ESCI/BIOS 340: Global Biogeochemical Cycles <i>elemental cycling through the atmosphere, hydrosphere, biosphere, pedosphere</i>	ESCI 102: Evolution of the Earth <i>introduction to Earth History for nonmajors</i>
ESCI/CHEM 425: Organic Geochemistry <i>organic chemistry of the Earth system</i>	ESCI 555: Carbon and Climate <i>feedbacks between the carbon cycle and climate in the Earth system</i>
ENST 113: Global Climate Change <i>Freshman seminar on the climate system</i>	ENST 113: Water Crisis <i>Freshman seminar on the hydrologic cycle</i>
1994-98: U.C. Irvine TA/lab instructor	
Quantum Chemistry	General Chemistry Introduction to Oceanography

AWARDS AND HONORS

2006-2007	Hamill Innovation Award, Hamill Foundation
2002-2003	AAUW American Postdoctoral Fellowship
1999:	Sigma Xi Grants In Aid of Research award
1998-99; 1994-95:	N.S.F. Graduate Research Traineeship, U.C. Irvine
1991-92:	School of Public Health Fellowship, Grad. school merit assistantship UNC
1990-91:	undergrad. math major award, physics research award, Earlham College

CURRENT STUDENTS AND POSTDOCS

Morgan Gallagher, PhD student, Rice University
Fanwei Zeng, PhD student, Rice University
Ray Dums, PhD student, Rice University
Bill Hockaday, postdoctoral researcher, Rice University
Jeremy Caves, undergraduate Earth Sciences major, Rice University
Lacey Pyle, undergraduate Environmental Studies major, Rice University
Joshua Ozer, undergraduate Century Scholar, Rice University
LaQuanti Calligan, undergraduate Chemistry Major, Texas Southern University

PREVIOUS STUDENTS AND STUDENT VISITORS

Rachel Deco, undergraduate Geology and Planetary Science major, CalTech
Alla Berberyan, Masters student, American University of Armenia
Nita Clark, undergraduate Coastal Studies Major, Louisiana State University

COLLABORATORS

Bill Hockaday, Rice University
Jennifer Rudgers, Rice University
Oliver Chadwick, UC Santa Barbara
Michael W.I. Schmidt, U. Zurich
Jennifer Harden, USGS-Menlo Park
Claudia Czimczik, UC Irvine
Jim Randerson, UC Irvine
Ellen R.M. Druffel, UC Irvine
Kathleen Treseder, UC Irvine
Susan E. Trumbore, UC Irvine
John Southon, UC Irvine
Tim Filley, Purdue U.
Margaret Torn, Lawrence Berkeley Labs

Johannes Lehmann, Cornell U.
Angela Dickens, Mt. Holyoke College
Tibisay Perez, IVIC, Caracas
Jeff Baldock, CSIRO-Adelaide
Ron Smernik, U. Adelaide
Yves Gelinias, Concordia U. (Montreal)
Isabelle Basile-Doelsch, U. Aix-Marseilles
Anthony Aufdenkampe, Stroud Water
Research Center
Emilio Mayorga, University of Washington
Stuart Wakeham, SkIO, U. Georgia
Tomoko Komada, San Francisco State

PUBLICATIONS

C.A. Masiello, M.E. Gallagher, JT Randerson, RM Deco, OA Chadwick (*accepted pending revisions to JGR-Biogeosciences*) Measuring the carbon oxidation state of the Earth's terrestrial biosphere.

C.A. Masiello (2007) Quick Burial At Sea. *Nature*, **450**, 360-361.

Czimczik, C.I. and **C.A. Masiello** (2007) Controls on black carbon storage in soils, **21**, Art. No. GB3005.

Hammes, K., and 42 others including **C.A. Masiello** (2007) *Global Biogeochemical Cycles*, Comparison of quantification methods to measure fire-derived (black/elemental) carbon in soils and sediments using reference materials from soil, water, sediment and the atmosphere, **21**, Art. No. GB3016.

- J.T. Randerson, **C.A. Masiello**, C.J. Still, T. Rahn, C.B. Field (2006) Is carbon within the global terrestrial biosphere becoming more oxidized? Implications for trends in atmospheric O₂. *Global Change Biology*, **12**, 260-271.
- Treseder, K.K.; M.S. Torn, **C.A. Masiello** (2006) "An ecosystem-scale radiocarbon tracer to test use of litter carbon by ectomycorrhizal fungi." *Soil Biology and Biochemistry*. **38**, 1077-1082.
- Mayorga, E., A.K. Aufdenkampe, **C.A. Masiello**, A.V. Krusche, J.I. Hedges, P.D. Quay, J.E. Richey. (2005) Respiration of contemporary organic matter drives outgassing of CO₂ from Amazonian rivers. *Nature*. **436**, 538-540.
- I. Basile, R. Amundson, W. Stone, **C.A. Masiello**, J.-Y. Bottero, F. Colin, F. Masin, D. Borschneck, J.-D. Meunier. Mineralogical control of organic carbon dynamics in an allophanic soil (La Réunion) (2005) *European Journal of Soil Science*, **56**, 689-703.
- Masiello, C.A.**, (2004) New Directions in Black Carbon Organic Geochemistry. *Marine Chemistry*. **92**, 201-213.
- J.A. Baldock, **C.A. Masiello**, Y. Gélinas, J.I. Hedges (2004) Cycling and composition of natural organic material. *Marine Chemistry*. **92**, 39-64.
- Masiello, C.A.**, O.A. Chadwick, J. Southon, M.S. Torn, J.W. Harden (2004) Mechanisms of Carbon Storage in Grassland Soils. *Global Biogeochemical Cycles* **18**, Art. No. GB4023.
- Dickens, A.F., Gelinias, Y., **Masiello, C.A.**, and Hedges, J.I. (2004) Presence and distribution of graphitic carbon off the Washington Coast, *Nature*. **427**, 336-339.
- Treseder, K.K., **C.A. Masiello**, J. Lansing, M.F. Allen (2004). Isotopic and genetic assessments of turnover of ectomycorrhizal fungi under N-fertilization, *Oecologia*. **138**, 419-425.
- S. G. Wakeham, J. Forrest, **C. Masiello**, Y. Gélinas, C. Alexander, and P. Leavitt (2004) Hydrocarbons in Lake Washington sediments - a 25-year retrospective, *Environmental Science & Technology* **38**, 431-439.
- Schmidt, M.W.I., **C.A. Masiello**, and J.O. Skjemstad (2003) Final recommendations for reference materials for black carbon analysis, *EOS, Transactions of the, AGU*. **84**, 582.
- Masiello, C.A.**, E.R.M. Druffel (2003) Organic and black carbon ¹³C and ¹⁴C through the Santa Monica Basin sediment oxic-anoxic transition. *Geophysical Research Letters* **30**, Art. No. 1185.
- L.A. Currie, and 25 others including **C.A. Masiello** (2002). A critical evaluation of interlaboratory data on total, elemental, and isotopic carbon in the carbonaceous particle reference material NIST SRM 1649a. *Journal of Research of NIST*. **107**, 279-298.

Masiello, C.A., E.R.M. Druffel, and L.A. Currie (2002) Radiocarbon measurements of black carbon in aerosols and ocean sediments. *Geochimica et Cosmochimica Acta*, **66**, 1025-1036.

Masiello, C.A. and E.R.M. Druffel. (2001) Isotope geochemistry of the Santa Clara River. *Global Biogeochemical Cycles*, **15**, 407-416.

Masiello, C.A. and E.R.M. Druffel (1998) Black carbon in deep-sea sediments, *Science*, **280**, 1911-1913.

Masiello, C.A., E.R.M. Druffel, and J.E. Bauer (1998) Physical controls on dissolved inorganic radiocarbon variability in the California Current, *Deep-Sea Research Part II*. **45**, 617-642.

Bauer, J.E., E.R.M. Druffel, D.M. Wolgast, S. Griffin, and **C.A. Masiello** (1998) Distributions of dissolved organic and inorganic carbon and radiocarbon in the Eastern North Pacific continental margin, *Deep-Sea Research Part II* **45**, 689-714.

C.A. MASIELLO FUNDING HISTORY

Grants funded as P.I. (\$892,554):

The effects of land use change on the oxidative ratio of the terrestrial biosphere, P.I. C.A. Masiello. NSF DEB-0614524, October 1, 2006 – September 31, 2009, \$400,000.

The Rice International Visiting Fellows Program in Energy, the Environment, and Sustainability: Prototype Years 1&2, P.I.s C.A. Masiello and J.J. Silberg, Rice University, May 2007-April 2009, \$100,000.

Measuring the oxidative ratio of the terrestrial biosphere, NSF DEB-0445282, P.I. C.A. Masiello. April 1 2005 – September 30, 2006, \$100,000.

Physical and chemical controls on carbon storage in U.S. soils, P.I. C.A. Masiello. American Association of University Women (AAUW) 2002-2003 American Fellowship, \$30,000.

Soil organo-mineral complexes as a predictor of soil carbon sequestration potential, P.I. C.A. Masiello, Co-P.I.s: O.A. Chadwick and S.E. Trumbore, DOE CLE \$71,554, 2001-2002.

Stuffing carbon away: mechanisms of carbon sequestration in soils. P.I. C.A. Masiello. Co-P.I.s: John Southon, Margaret Torn, Oliver Chadwick, Jennifer Harden, Susan Trumbore. DOE LDRD \$120,000, 2001-2002.

Isotope geochemistry of the Santa Clara River, P.I. C.A. Masiello. Sigma Xi GIA award, \$1,000, 1999-2000.

Grants funded as Co-P.I. or collaborator (\$4.19 million):

ADVANCE Institutional Transformation: Rice University. P.I.s: K.S. Matthews, S. Keller-McNulty, M. Hebl, R. Kortum, K. Whitmire. collaborators include C.A. Masiello, \$3.3 million. Source: NSF. 8/1/06-7/31/11.

Isolating AM fungi as keystone regulators of carbon sequestration in dune ecosystems, co-PIs J. Rudgers, C.A. Masiello, S. Emery. Hamill Innovation Foundation. June 1, 2006- May 31, 2007. \$20,000.

The oxidation state of soil organic carbon: a new proxy for carbon storage mechanisms and land use change. P.I. Oliver Chadwick, co-P.I. C.A Masiello. collaborators Jim Randerson, Jeff Baldock. Kearney Foundation, \$70,000, 2003-2005.

Carbon cycle in soils: role of organic matter/noncrystalline interactions. P.I.s: Isabelle Basile (U. Aix-Marseille), Ronald Amundson (U.C. Berkeley). Co-investigators: Masiello, Armand Masion, Stefano Caldarelli, Daniel Borschneck, Jérôme Balesdent, Cristina Castanha. source: France-Berkeley Fund, \$10,000 2002-2003.

Effects of nitrogen deposition on sequestration of carbon in mycorrhizal fungi. P.I. Kathleen Treseder. collaborator: Masiello. \$681,885. NSF 2001-2004.

Stuffing carbon away: how do mineralogy and precipitation control long-term carbon sequestration in soils? P.I.: John Southon Co.I. Masiello, \$163,000. Source: LLNL LDRD 2000-2001.
collaborators: Oliver Chadwick, Julia Gaudinski, Jennifer Harden, Susan Trumbore, Margaret Torn, Stuart Wakeham.

Isotope and genetic studies to assess microbial carbon storage in natural and human-altered environments.
co-P.I.s: Kathleen Treseder, C.A. Masiello, Michael F. Allen. source: LLNL minigrant. \$12,510, 2000-2001.

Char and graphitic soot black carbon dynamics in marine sediments. P.I.: John Hedges, Co-I: Masiello. collaborators: Yves Gelin, Angela Dickens. source: LLNL minigrant. \$19,105, 2000-2001.

Radiocarbon constraints on organic matter turnover in the Amazon River Basin: Model conceptualization and validation. P.I.: John Hedges, Co-Is: Masiello, T. Brown. collaborators: Anthony Aufdenkampe, Emilio Mayorga. source: LLNL minigrant. \$3,654, 2000-2001.