Robert C. Rhew

PROFESSIONAL APPOINTMENTS

2017 – 2022	**Faculty Director, Central Sierra Field Stations**	University of California, Berkeley
2012 – present	**Associate Professor, Dept. Envt. Science, Policy & Mgt.**	University of California, Berkeley
2009 – present	**Associate Professor, Department of Geography** Department Chair (2018-2021)	University of California, Berkeley
2006 – present	**Geological Scientist Faculty, Earth Sciences Division**	Lawrence Berkeley National Labs, CA
2013 – 2014	**NCAR Visiting Faculty Fellow**	National Center for Atmospheric Research, Boulder, CO
2013 – 2014	**CIRES Visiting Fellow, NOAA/ CIRES**	University of Colorado, Boulder
2003 – 2009	**Assistant Professor, Department of Geography**	University of California, Berkeley
2001 – 2003	**Postdoctoral Researcher, Earth System Science**	University of California, Irvine

EDUCATION

1992	**B.A. Earth & Planetary Sciences (Atmospheres and Oceans)** Magna cum laude with highest honors	Harvard University *Cambridge, MA*
1994	**Graduate Diploma. Resource & Env't Management** Graduate Diploma with Distinction, Rotary International Ambassadorial Scholar	Australian National University *Canberra, ACT*
2001	**Ph.D. Earth Sciences (Geochemistry)**	Scripps Institution of Oceanography, UCSD *La Jolla, CA*

PEER-REVIEWED PUBLICATIONS (advisees: §post-doctoral, graduate student, undergraduate student; last author indicates senior advising role on paper. ⁼authors contributed equally to this work)
Google Scholar: https://scholar.google.com/citations?user=Z920pqQAAAAJ&hl=en
ORCID ID# 0000-0001-6358-2050: http://orcid.org/0000-0001-6358-2050

(38) Jiao, Y., W. Zhang, J.Y. Kim, M.J. Deventer§, J. Vollering, and R.C. Rhew, Application of copper(II)-based chemicals induces CH_3Cl and CH_3Br emissions from soil and seawater, ***Nature Communications***, 13, 47, https://doi.org/10.1038/s41467-021-27779-3 (2022).

(37) ⁼Zhang, W., ⁼Y. Jiao, R. Zhu, R.C. Rhew, B. Sun, and H. Dai, Chloroform ($CHCl_3$) emissions from coastal Antarctic tundra, ***Geophysical Research Letters***, 48, e2021GL093811, doi: 10.1029/2021GL093811 (2021)

(36) Jiao, Y., J. Acdan, R. Xu, M.J. Deventer§, W. Zhang and R.C. Rhew. Global methyl halide emissions from rapeseed (*Brassica napus*) using life cycle measurements. ***Geophysical Research Letters***, 47, e2020GL089373. https://doi. org/10.1029/2020GL089373 (2020).

(35) Zhang, W., Y. Jiao, R. Zhu, and R.C. Rhew. Methyl chloride and methyl bromide production and consumption in coastal Antarctic tundra soils subject to sea animal colonies. ***Environmental Science & Technology***, 54, 13354-13363, https://dx.doi.org/10.1021/acs.est.0c04257 (2020).

(34) Shechner, M., A. Guenther, R. Rhew, A. Wishkerman, Q. Li, D. Blake, G. Lerner, and E. Tas, Emission of volatile halogenated organic compounds over various Dead Sea landscapes, ***Atmos. Chem. Phys.***, 19, 7667-7690, https://doi.org/10.5194/acp-19-7667-2019 (2019).

(33) Jiao, Y., A. Ruecker, M.J. Deventer§, A. Chow and R.C. Rhew, Halocarbon emissions from a degraded forested wetland in coastal South Carolina impacted by sea level rise, ***ACS Earth and Space Chemistry***, 2 (10), 955–967, doi: 10.1021/acsearthspacechem.8b00033 (2018).

(32) §Deventer, M.J., Y. Jiao, S.H. Knox, F. Anderson, M.C. Ferner, J.A. Lewis, and R.C. Rhew, Ecosystem scale measurements of methyl halide fluxes from a brackish tidal marsh invaded with perennial pepperweed (*Lepidium latifolium*), ***J. Geophysical Research: Biogeosciences***, 123, https://doi.org/10.1029/2018JG004536 (2018) [cover story].

(31) ⁼Rhew, R.C., ⁼M. J. Deventer§, A.A. Turnipseed, C. Warneke, J. Ortega, S. Shen, L. Martinez, A. Koss, B.M. Lerner, J.B. Gilman, J.N. Smith, A.B. Guenther and J.A. de Gouw, Ethene, propene, butene and isoprene emissions from a ponderosa pine forest measured by Relaxed Eddy Accumulation, ***Atmos. Chem. Phys.***, 17, 13417-13438, https://doi.org/10.5194/acp-17-13417-2017 (2017).

(30) Chipperfield, M.P., Q. Liang, M. Rigby, R. Hossaini, S.A. Montzka, S. Dhomse, W. Feng, R.G. Prinn, R.F. Weiss, C.M. Harth, P.K. Salameh, J. Mühle, S. O'Doherty, D. Young, P.G. Simmonds, P.B. Krummel, P.J. Fraser, L.P. Steele, J.D. Happell, R.C. Rhew, J. Butler, S.A. Yvon-Lewis, B. Hall, D. Nance, F. Moore, B.R. Miller, J.W.

Elkins, J.J. Harrison, C.D. Boone, E.L. Atlas, and E. Mahieu, Model sensitivity studies of the decrease in atmospheric carbon tetrachloride, ***Atmos. Chem. Phys***., 16, 15741-15754, doi:10.5194/acp-16-15741-2016, (2016).

(29) SPARC (46 authors inc. R.C. Rhew), **SPARC Report on the Mystery of Carbon Tetrachloride**. Q. Liang, P.A. Newman, S. Reimann (Eds.), SPARC Report No. 7, WCRP-13/2016. doi: http://dx.doi.org/10.3929/ethz-a-010690647. Available at: www.sparc-climate.org/publications/sparc-reports/sparc-report-no7 (2016)

(28) Whelan M.E. and R.C. Rhew, Reduced sulfur trace gas exchange between a seasonally dry grassland and the atmosphere, ***Biogeochemistry***, doi: 10.1007/s10533-016-0207-7 (2016).

(27) Rhew, R.C. and J. Happell, The atmospheric partial lifetime of carbon tetrachloride with respect to the global soil sink, ***Geophysical Research Letters***, 43, doi:10.1002/2016GL067839 (2016).

(26) Wang, J-J., Y. Jiao, R.C. Rhew and A. T. Chow, Haloform formation in coastal wetlands along a salinity gradient at South Carolina, United States, ***Environmental Chemistry***, doi: 10.1071/EN15145 (2016).

(25) Whelan M.E. and R.C. Rhew, Carbonyl sulfide produced by abiotic thermal and photo-degradation of soil organic matter from wheat field substrate, ***J. Geophysical Research: Biogeosciences***, 120, doi: 10.1002/2014JG002661 (2015).

(24) Rhew, R.C., M.E. Whelan and D.-H. Min, Large methyl halide emissions from south Texas salt marshes, ***Biogeosciences***, 11, 6427-6434, doi: 10.5194/bg-11-6427-2014 (2014).

(23) Khan, M.A.H.[§], R.C. Rhew, K. Zhou and M.E. Whelan, Halogen biogeochemistry of invasive perennial pepperweed (*Lepidium latifolium*) in a peatland pasture, ***J. Geophysical Research: Biogeosciences***. 118, 1–9, doi:10.1002/jgrg.20020 (2013).

(22) Whelan M.E., D.-H. Min and R.C. Rhew, Salt marsh vegetation: a carbonyl sulfide (COS) source to the atmosphere, ***Atmospheric Environment***, 73, p. 131-137, doi: 10.1016/j.atmosenv.2013.02.048 (2013).

(21) Khan, M.A.H.[§], M.E. Whelan and R.C. Rhew, Analysis of low concentration reduced sulfur compounds (RSCs) in air: storage issues and measurement by gas chromatography with sulfur chemiluminescence detection. ***Talanta*****,** 88, p. 581-586, doi: 10.1016/j.talanta.2011.11.038 (2012).

(20) Khan, M.A.H.[§], M.E. Whelan and R.C. Rhew, Effects of temperature and soil moisture on methyl halide and chloroform fluxes from drained peatland pasture. ***J. Environmental Monitoring***, 14, p. 241-249, doi:10.1039/c1em10639b (2012).

(19) Rhew, R.C., Sources and sinks of methyl bromide and methyl chloride in the tallgrass prairie: applying a stable isotope tracer technique over highly variable gross fluxes, ***J. Geophysical Research: Biogeosciences***, 116, G03026, doi:10.1029/2011JG001704 (2011).

(18) Montzka, S.A., S. Reimann, A. Engel, A., K. Kruger, S. O'Doherty, W.T. Sturges, D. Blake, M. Dorf, P. Fraser, L. Froidevaux, K. Jucks, K. Kreher, M. Kurylo, W. Mellouki, J. Miller, O.-J. Nielsen, V. Orkin, R. Prinn, R. Rhew, M. Santee, A. Stohl and D. Verdonik, **Scientific Assessment of Ozone Depletion: 2010**, Chapter 1. "Ozone-Depleting Substances (ODSs) and Related Chemicals", WMO Report No. 52 (2011).

(17) Khan, M.A.H.[§], R.C. Rhew, M.E. Whelan, K. Zhou & S. Deverel, Methyl halide and chloroform emissions from a subsiding Sacramento-San Joaquin Delta island recently converted to rice fields, ***Atmospheric Environment***, 45, p. 977-985, doi:10.1016/j.atmosenv.2010.10.053 (2011).

(16) Rhew, R.C. and O. Mazéas[§], Gross production exceeds gross consumption of methyl halides in northern California salt marshes, ***Geophysical Research Letters***, 37, L18813, doi: 10.1029/2010GL044341 (2010).

(15) von Fischer, J., R. C. Rhew, G. Ames, B. K. Fosdick, and P. E. von Fischer, Vegetation height and other controls of spatial variability in methane emissions from the Arctic coastal tundra at Barrow, Alaska, ***J. Geophysical Research: Biogeosciences***, 115, G00I03, doi: 10.1029/2009JG001283 (2010).

(14) Rhew, R.C., C. Chen, Y.A. Teh[§], and D. Baldocchi, Gross fluxes of methyl chloride and methyl bromide in a California oak-savanna ecosystem. ***Atmospheric Environment***, 44, p. 2054-2061, doi: 10.1016/ j.atmosenv.2009.12.014 (2010).

(13) Mazéas, O.[§], J.C. von Fischer and R.C. Rhew, Impact of terrestrial carbon input on methane emissions from an Alaskan Arctic lake, ***Geophysical Research Letters***, 36, L18501, doi:10.1029/ 2009GL039861 (2009).

(12) Teh, Y.A.[§], O. Mazéas[§], A. Atwood, T. Abel and R.C. Rhew, Hydrologic regulation of methyl chloride and methyl bromide fluxes in Alaskan Arctic tundra. ***Global Change Biology***, 15, p 330-345, doi:10.1111/j.1365-2486.2008.01749.x (2009).

(11) Rhew, R.C., Y.A. Teh[§], T. Abel, A. Atwood and O. Mazéas[§], Chloroform emissions from the Alaskan Arctic tundra, ***Geophysical Research Letters***, 35, L21811, doi:10.1029/2008GL035762 (2008).

(10) Rhew, R.C., B.R. Miller, and R.F. Weiss, Chloroform, carbon tetrachloride and methyl chloroform fluxes in southern California ecosystems, ***Atmospheric Environment***, 42, p. 7135-7140, doi: 10.1016/j.atmosenv.2008/05/038 (2008).

(9) Teh, Y.A.[§], R.C. Rhew, A.R. Atwood, and T. Abel, Water, temperature, and vegetation regulation of methyl chloride and methyl bromide fluxes from a shortgrass steppe ecosystem. ***Global Change Biology***, 14, p. 77-91, doi: 10.1111/j.1365-2486.2007.01480.x (2008).

(8) Rhew, R.C., Y. A. Teh[§], and T. Abel, Methyl halide and methane fluxes in the northern Alaskan coastal tundra, ***J. Geophysical Research: Biogeosciences***, 112, G02009, doi:10.1029/2006JG000314 (2007).

(7) Rhew, R.C. and T. Abel. Measuring simultaneous production and consumption fluxes of methyl chloride and methyl bromide in annual temperate grasslands. ***Environmental Science & Technology***, 41, p. 7837-7843, doi: 10.1021/es0711011 (2007).

(6) [=]Rhew, R.C., [=]L. Østergaard, E.S. Saltzman, and M.F. Yanofsky, Genetic control of methyl halide production in Arabidopsis, ***Current Biology***, 13, 1809-1813 (2003).

(5) Rhew, R.C., M. Aydin, and E.S. Saltzman, Measuring terrestrial fluxes of methyl chloride and methyl bromide using a stable isotope tracer technique, ***Geophysical Research Letters***, 30 (21), 2103, doi: 10.1029/2003GL018160 (2003).

(4) Bill, M., R.C. Rhew, R.F. Weiss, and A.H. Goldstein, Carbon isotopic ratios of methyl bromide and methyl chloride emitted from a coastal salt marsh, ***Geophysical Research Letters***, 29, 10.1029/2001GL012946 (2002).

(3) Rhew, R.C., B.R. Miller, M. Bill, A.H. Goldstein, and R.F. Weiss, Environmental and biological controls on methyl halide emissions from southern California coastal salt marshes, ***Biogeochemistry***, 60, p. 141-161 (2002).

(2) Rhew, R.C., B.R. Miller, M.K. Vollmer, and R.F. Weiss, Shrubland fluxes of methyl bromide and methyl chloride, ***Journal of Geophysical Research – Atmospheres***, 106, p. 20,875-20,882 (2001).

(1) Rhew, R.C., B.R. Miller, and R.F. Weiss, Natural methyl bromide and methyl chloride emissions from coastal salt marshes, ***Nature***, 403, p. 292-295 (2000).

OTHER PUBLICATIONS AND RESOURCES

Rhew, R.C., The Saga of the Snow Lab's Data, ***Moonshine Ink***, published Jan 13, 2021, [LINK]. Reprinted by *Northwoods Tahoe*, Winter 2021, [LINK] (2021)

Pierrehumbert, N., Reed, R., Rhew, R., & Lichtenwalner, C. S., CO_2 Exchange Between Air and Sea. ***OOI Data Labs Collection*** [WIDGET] (2020)

COURSES AT UC BERKELEY (2003-2022)

Fa=Fall semester, Sp = Spring semester, created course, *co-taught course

Undergraduate courses :

Global Environmental Theme House, Freshman Seminar (NR24:2020-2021, 2021-2022)

Natural History of the East Bay Regional Parks, Freshman seminar (GEOG 24: Fa2017)

Introduction to Earth System Science (GEOG 40: Fa2003, Fa2004, Fa2005, Fa2006, Fa2008, Sp2010, Fa2011, Fa2018, Fa2021)

Introduction to the Oceans* (GEOG/EPS/IB c82: 2008, 2009, 2010)

Top Ten Global Environmental Problems (GEOG 137: Fa 2011, Fa2012, Sp 2015, Sp 2016, Sp2018)

Global Change Biogeochemistry (GEOG 143: Sp2005, Sp2006, Sp2009, Sp2013, Fa2014, Sp2017, Fa2019, Sp2022)

Communicating Ocean Science* (GEOG c146/EPSc100/IBc100: 2010, 2012, 2016, 2018)

Communicating Climate Science* (GEOG 147 (formerly 171): Fa 2014, Fa 2015, Fa 2017, Fa2020).

Intro to Environmental Sciences* (ESPM15 (formerly ES10): Sp2012, Sp2013, Fa2015, Fa2016, Sp2019)

GC-Maker Lab 1: Skills and Theory (GEOG/ESPM c179a: Fa 2016)

GC-Maker Lab 2: Instrument Development (GEOG/ESPM c179b: Sp 2017)

Graduate courses:

Topics in Biogeochemistry (GEOG 245: 2004, 2005, 2006, 2007, 2008)

Intro. to Lab & Field Methods in Earth System Science [§] (GEOG 248: 2004, 2006)

Advances in Environmental Change* (GEOG 243: 2005).

Effective Scientific Communication* (GEOG C302/ESPM C302: new 2007, 2009).

SYNERGISTIC ACTIVITIES

1. **Peer reviewer**: 100+ manuscripts for journals incl. *Atmospheric Environment, BAMS, Biogeochemistry, Biogeosciences, Chemosphere, Environmental Chemistry, Environmental Science & Technology, Geophysical Research Letters, Geochimica et Cosmochimica Acta, Geology, Global Biogeochemical Cycles, Global Change Biology, Journal of Atmospheric Chemistry, Journal of Geophysical Research, Marine Chemistry, Nature, New Phytologist, Phytochemistry, Plant Biology, Plant Physiology* and *PNAS*. NSF Panels: Ecosystems, Arctic Natural Sciences, NCAR site visit review.
2. **WMO Scientific Assessment of Ozone Depletion:** Contributor (2006). Co-author (Montzka *et al*., Ch. 1, "Ozone-Depleting Substances (ODSs) and Related Chemicals", 2010). Reviewer (2014, 2022). Co-author of *SPARC Report on the Mystery of Carbon Tetrachloride*. Report No. 7, WCRP-13/2016 (2016).
3. **Science education development and project involvement**:
   - OOI Ocean Data Labs Development Workshop, July 22-26, 2019: developed methods to bring Ocean Observatory Initiative data into undergraduate teaching.
   - Curriculum development and co-instructor for "*Communicating Climate Science*" and "*Communicating Ocean Sciences for Informal Audiences"*, NSF-sponsored with the Lawrence Hall of Science, 2010-present.
   - Lawrence Hall of Science Faculty advisory committee (Sept, 2016- present).
   - University Corporation for Atmospheric Research (UCAR) UC Berkeley Representative: Oct 2016-present.
4. **Outreach and conference organization:**
   - Meeting organizer, "Future of the Central Sierra Snow Laboratory", Sacramento, CA, Jan 23, 2020.
   - Co-Director, "Research Science Initiative at Tsinghua University", Beijing, China, July 12-July 31, 2015.
   - Weiss 70th Birthday Symposium, co-organizer, Scripps Institution of Oceanography, May 29, 2013
   - Workshop facilitator for "On the Cutting Edge Workshop for Geoscience Faculty: Early career faculty workshop", College of William and Mary, Williamsburg, VA, June 9-15, 2012.
   - Co-convenor of Fall 2011 AGU session: Biogeosciences B53A and B54A. Exchange Dynamics of Volatile Organic Compounds Between Plant Ecosystems and the Atmosphere, December, 2011.
   - Cal Day, UC Berkeley open house day with ~40k visitors (most events since 2008).
5. **Pedagogy** : Teaching program initiatives, awards, and committees
   - Berkeley Collegium Program Award (2015-2017) "Narrowing the Gap Between Teaching and Research"
   - *Tranforming STEM Teaching* - Faculty Learning Program (NSF-IUSE funded) (Fall, 2014)
   - UC Berkeley Presidential Chair Fellows Program (2012-2013)
   - Committee on Courses of Instruction (2012-13; 2014-2017)
   - Undergraduate advisor for physical geography (2005-2013)

GRADUATE AND POST-DOCTORAL ADVISORS – TOTAL 2

Ph.D. Advisor: Dr. Ray Weiss (UCSD, Scripps Institution of Oceanography)
Post-doctoral advisor: Dr. Eric Saltzman (UC-Irvine, Earth System Science)

POST-DOCTORAL AND VISITING SCHOLARS ADVISED – TOTAL 4

Dr. Yit Arn Teh (2005-2007, now on faculty at University of Aberdeen, UK), Dr. Olivier Mazéas (2006-2008), Dr. Md. Anwar Khan (visiting scholar, 2009-2011), Dr. Julian Deventer (2015-2017).

GRADUATE STUDENTS ADVISED – TOTAL 17

Completed PhD Dissertations (Chair): Daniel Schmidt (Geography, 2008); Mary Whelan (Geography, 2013); Yi Jiao (Geography, 2021).

Completed PhD Dissertations (Committee): Wendy Chou (ESPM, 2008); Daniela Cusack (ESPM, 2009); Wendy Yang (ESPM, 2010); Claudia Jones (EPS, 2011); Jacob Hendrickson (Masters, Geog, 2011); Lei Hu (Texas A&M Oceanography, 2012); Rachel O'Brien Sellon (Chem, 2012); Rebecca Ryals (ESPM, 2012); Steven Hall (ESPM, Fall 2013); Jun-Jian Wang (Clemson University; 2015); Elissa Sato (Education, 2015); Beth McBride (Education, 2018); Jeffrey Benca (Integrative Biology, 2018); Victor Reyes-Umana (MCB, 2021).

Qualifying exam committee for 30 graduate students

Masters exam committee for 4 students (EPS).

Undergraduates: Research advisor for **81 undergraduates** since 2003, including 9 senior theses.