Peter A. Raymond
Professor of Ecosystem Ecology
http://environment.yale.edu/raymond/
School of Forestry & Environmental Studies
Birthplace: 06/08/1971, Denver CO

College and Graduate Education:

1995 – 1999	Ph.D., Doctor of Philosophy in Marine Science, Physical Sciences Department, Virginia Institute of Marine Science, College of William and Mary, Ph.D. Advisor: James Bauer
1993	Institute of Ecosystem Studies, Tibor T Polgar Fellow
1989 – 1993	Marist College, Environmental Chemistry major with Minor in Biology

Summary of Professional Career:

2010- present	Professor of Ecosystem Ecology, School of Forestry & Environmental Studies, Yale University
2014-present	Professor, Geology and Geophysics, Yale University
Spring 2013	Visiting Professor, Laboratoire des Sciences du Climat et de l'Environnement IPSL-LSCE, CEA-CNRS-UVSQ, Gif sur Yvette France
2007 – 2010	Associate Professor of Ecosystem Ecology, School of Forestry & Environmental Studies, Yale University
Spring 2009	Visiting Scientist, Smithsonian Tropical Research Institute, Bocas del Toro, Panama
2002 – 2007	Assistant Professor of Ecosystem Ecology, School of Forestry & Environmental Studies, Yale University
2002	Post Doctoral Scientist, Applied Ocean Physics and Engineering, Woods Hole Oceanographic Institution
1999 – 2001	Post Doctoral Scientist, Ecosystems Center, Marine Biological Laboratory
1993-1995	Institute of Ecosystem Studies, Research Assistant

Professional Honors or Recognition:

2009	Presented in the Oregon State Universities Visiting Scholar Frontiers Series

2006	Awarded NSF CAREER Grant for Faculty Early Career Development
2005	Estuarine Research Federation's Cronin Award for Young Scientist
2005	Lindeman Speaker, University of Minnesota EEB Department
2001	Contributor, Dissertation Initiative for Advancement of Limnology and Oceanography (DIALOG IV)
1993	Hudson River Foundation, Tibor T Polgar Fellow

Refereed Publications:

62. Butman, D.E., Wilson, H.F., Barnes, R.T., Xenopoulos, M.A., and Raymond, P.A. (in press). Increased mobilization of aged carbon to rivers by human disturbance. *Nature Geoscience*.
61. Ciais, P., Dolman, A.J., Bombelli, A., Duren, R., Peregon, A., Rayner, P.J., Miller, C., Gobron, N., Kinderman, G., Marland, G., Gruber, N., Chevallier, F., Andres, R.J., Balsamo, G., Bopp, L., Breon, F.M., Broquet, G., Dargaville, R., Battin, T.J., Borges, A., Bovensmann, H., Buchwitz, M., Butler, J., Canadell, J.G., Cook, R.B., Defries, R., Engelen, R., Gurney, K.R., Heinze, C., Heimann, M., Held, A., Henry, M., Law, B., Luyssaert, S., Miller, J., Moriyama, T., Moulin, C., Myneni, R.B., Nussli, C., Obersteiner, M., Ojima, D., Pan, Y., Paris, J.D., Piao, S.L., Poulter, B., Plummer, S., Quegan, S., Raymond, P., Reichstein, M., Rivier, L., Sabine, C., Schimel, D., Tarasova, O., Valentini, R., Wang, R., Van Der Werf, G., Wickland, D., Williams, M., and Zehner, C. (2014). Current systematic carbon-cycle observations and the need for implementing a policy-relevant carbon observing system. *Biogeosciences* 11**,** 3547-3602.
60. Carlson, K.M., Curran, L.M., Ponette-Gonzalez, A.G., Ratnasari, D., Ruspita, Lisnawati, N., Purwanto, Y., Brauman, K.A., and Raymond, P.A. (2014). Influence of watershed-climate interactions on stream temperature, sediment yield, and metabolism along a land use intensity gradient in indonesian borneo. *Journal of Geophysical Research-Biogeosciences* 119**,** 1110-1128.
59. Fellman, J.B., Hood, E., Spencer, R.G.M., Stubbins, A., and Raymond, P.A. (2014). Watershed glacier coverage influences dissolved organic matter biogeochemistry in coastal watersheds of southeast alaska. *Ecosystems* 17**,** 1014-1025.
58. Fellman, J.B., Spencer, R.G.M., Raymond, P.A., Pettit, N.E., Skrzypek, G., Hernes, P.J., and Grierson, P.F. (2014). Dissolved organic carbon biolability decreases along with its modernization in fluvial networks in an ancient landscape. *Ecology* 95**,** 2622-2632.
57. Spencer, R.G.M., Guo, W.D., Raymond, P.A., Dittmar, T., Hood, E., Fellman, J., and Stubbins, A. (2014). Source and biolability of ancient dissolved organic matter in glacier and lake ecosystems on the tibetan plateau. *Geochimica Et Cosmochimica Acta* 142**,** 64-74.
56. Schmitz, O. J., Raymond, P. A., Estes, J. A., Kurz, W. A., Holtgrieve, G. W., Ritchie, M. E., Schindler, D. E., Spivak, A. C., Wilson, R. W., Bradford, M. A., Christensen, V.,

Deegan, L., Smetacek, V., Vanni, M. J. & Wilmers, C. C. 2014. Animating the carbon cycle. Ecosystems, **17,** 344-359.

55. Valentini, R., Arneth, A., Bombelli, A., Castaldi, S., Gatti, R. C., Chevallier, F., Ciais, P., Grieco, E., Hartmann, J., Henry, M., Houghton, R. A., Jung, M., Kutsch, W. L., Malhi, Y., Mayorga, E., Merbold, L., Murray-Tortarolo, G., Papale, D., Peylin, P., Poulter, B., Raymond, P. A., Santini, M., Sitch, S., Laurin, G. V., van der Werf, G. R., Williams, C. A. & Scholes, R. J. 2014. A full greenhouse gases budget of africa: Synthesis, uncertainties, and vulnerabilities. Biogeosciences, **11,** 381-407.
54. Bauer, J. E., W. J. Cai, P. A. Raymond, T. S. Bianchi, C. S. Hopkinson and P. A. G. Regnier. 2013. The changing carbon cycle of the coastal ocean. Nature **504**: 61-70, DOI: 10.1038/nature12857.
53. Raymond, P. A., J. Hartmann, R. Lauerwald, S. Sobek, C. McDonald, M. Hoover, D. Butman, R. G. Striegl, E. Mayorga, C. Humborg, P. Kortelainen, H. Durr, M. Meybeck, P. Ciais and P. Guth. 2013. Global carbon dioxide emissions from inland waters. Nature **503**: 355-359, DOI: 10.1038/nature12760
52. Grimm, N. B., F. S. Chapin, B. Bierwagen, P. Gonzalez, P. M. Groffman, Y. Q. Luo, F. Melton, K. Nadelhoffer, A. Pairis, P. A. Raymond, J. Schimel and C. E. Williamson. 2013. The impacts of climate change on ecosystem structure and function. Frontiers in Ecology and the Environment **11**: 474-482, DOI: 10.1890/120282.
51. Bianchi, T. S., F. Garcia-Tigreros, S. A. Yvon-Lewis, M. Shields, H. J. Mills, D. Butman, C. Osburn, P. Raymond, G. C. Shank, S. F. DiMarco, N. Walker, B. K. Reese, R. Mullins-Perry, A. Quigg, G. R. Aiken and E. L. Grossman. 2013. Enhanced transfer of terrestrially derived carbon to the atmosphere in a flooding event. Geophysical Research Letters **40**: 116-122, DOI: 10.1029/2012gl054145.
50. Collins, J. R., P. A. Raymond, W. F. Bohlen and M. M. Howard-Strobel. 2013. Estimates of New and Total Productivity in Central Long Island Sound from In Situ Measurements of Nitrate and Dissolved Oxygen. Estuaries and Coasts **36**: 74-97, DOI: 10.1007/s12237-012-9560-5.
49. Lauerwald, R., J. Hartmann, N. Moosdorf, S. Kempe and P. A. Raymond. 2013. What controls the spatial patterns of the riverine carbonate system? - A case study for North America. Chemical Geology **337**: 114-127, DOI: 10.1016/j.chemgeo.2012.11.011.
48. Patra, P. K., J. G. Canadell, R. A. Houghton, S. L. Piao, N. H. Oh, P. Ciais, K. R. Manjunath, A. Chhabra, T. Wang, T. Bhattacharya, P. Bousquet, J. Hartman, A. Ito, E. Mayorga, Y. Niwa, P. A. Raymond, V. Sarma and R. Lasco. 2013. The carbon budget of South Asia. Biogeosciences **10**: 513-527, DOI: 10.5194/bg-10-513-2013.
47. Regnier, P., P. Friedlingstein, P. Ciais, F. T. Mackenzi, N. Gruber, I. A. Janssens, L. G. Goulven, R. Lauerwald, S. Luyssaert, A. J. Anderson, S. Arndt, C. Arnosti, A. V. Borges, A. W. Dale, A. Gallego-Sala, Y. Godderis, N. Goosens, J. Hartman, C. Heinze, T. Ilyina, F. Joos, D. E. LaRowe, J. Leifeld, F. J. R. Meysman, G. Munhoven, P. A. Raymond, R. Spahni, P. Suntharalingam and M. Thullner. 2013. Anthropogenic pertubation of the carbon fluxes from land to ocean. Nature Geoscience **6**: 597-607.
46. Wilson, H. F., J. E. Saiers, P. A. Raymond and W. V. Sobczak. 2013. Hydrologic Drivers and Seasonality of Dissolved Organic Carbon Concentration, Nitrogen Content, Bioavailability, and Export in a Forested New England Stream. Ecosystems **16**: 604-616, DOI: 10.1007/s10021-013-9635-6.

45.Yoon, B. and P.A. Raymond, Dissolved organic matter export from a forested watershed during Hurricane Irene. Geophysical Research Letters, 2012. **39**.
44.Stubbins, A., et al., Anthropogenic aerosols as a source of ancient dissolved organic matter in glaciers. Nature Geoscience, 2012.
43.Luyssaert, S., et al., The European land and inland water CO2, CO, CH4 and N2O balance between 2001 and 2005. Biogeosciences, 2012. **9**(8): p. 3357-3380.
42.Butman, D., et al., Relationships between Delta C-14 and the molecular quality of dissolved organic carbon in rivers draining to the coast from the conterminous United States. Global Biogeochemical Cycles, 2012. **26**.
41.Amon, R.M.W., et al., Dissolved organic matter sources in large Arctic rivers. Geochimica Et Cosmochimica Acta, 2012. **94**: p. 217-237.
40. Butman, D. and P. A. Raymond (2011). Significant efflux of carbon dioxide from rivers and streams in the temperate US. Nature Geoscience. 4: 839-842. Doi.10.1038/ngeo1294
39. Raymond, P.A., et al., Scaling the gas transfer velocity and hydraulic geometry in streams and small rivers. Limnology and Oceanography Fluids and Environments, 2012. **2**: p. 41-53.
38. Griffith, D. R. and P. A. Raymond (2011). Multiple-source heterotrophy fueled by aged organic carbon in an urbanized estuary. Marine Chemistry 124: 14-22.
37. Brantley, S. L., J. P. Megonigal, F. N. Scatena, Z. Balogh-Brunstad, R. T. Barnes, M. A. Bruns, P. Van Cappellen, K. Dontsova, H. E. Hartnett, A. S. Hartshorn, A. Heimsath, E. Herndon, L. Jin, C. K. Keller, J. R. Leake, W. H. McDowell, F. C. Meinzer, T. J. Mozdzer, S. Petsch, J. Pett-Ridge, K. S. Pregitzer, P. A. Raymond, C. S. Riebe, K. Shumaker, A. Sutton-Grier, R. Walter and K. Yoo (2011). Twelve testable hypotheses on the geobiology of weathering. Geobiology DOI: 10.1111/j.1472-4669.2010.00264.x. 9: 140-165.
36. Aufdenkampe, A. K., E. Mayorga, P. A. Raymond, J. M. Melack, S. C. Doney, S. R. Alin, R. E. Aalto and K. Yoo (2011). Rivering coupling of biogeochemical cycles between land, oceans and atmosphere. Front. Ecol. Environ. 9: 23-60.
35. Barnes, R. T. and P. A. Raymond (2010). Land-use controls on sources and processing of nitrate in small watersheds: insights from dual isotopic analysis. Ecological Applications 20: 1961-1978.
34. Raymond, P. A. and J. E. Saiers (2010). Event controlled DOC export from forested watersheds. Biogeochemistry DOI: 10.1007/s10533-010-9416-7.
33. Caraco, N., J. E. Bauer, J. J. Cole, S. Petsch and P. Raymond (2010). Millennial-aged organic carbon subsidies to a modern river food web. Ecology 91: 2385-2393.
32. Crump, B.C., B.J. Peterson, P.A. Raymond, R.M.W Amon, A. Rhinehart, J.W. McClelland, R.M. Holmes. 2009. Circumpolar Synchrony in Big River Bacterioplankton. Proc. Nat. Acad. Sci., 106:21208-21212
31. Barnes, R.T. and Raymond, P.A., 2009. The contribution of agricultural and urban activities to inorganic carbon fluxes within temperate watersheds. Chem. Geol. 266:327-336
30. Griffith, D.R., Barnes, R.T. and Raymond, P.A., 2009. Inputs of fossil carbon from wastewater treatment plants to U.S. Rivers and Oceans. Env. Sci. Technol., DOI:10.1021/es9004043
29. Raymond, P.A. and Oh, N.H., 2009. Long term changes of chemical weathering in rivers heavily impacted from Acid Mine Drainage: Insights on the impact of coal mining on

regional and global carbon and sulfur budgets. Earth and Planetary Science Letters, 28450-56

28. Barnes, R.T., Raymond, P.A. and Casciotti, K.L., 2008. Dual isotope analyses indicate efficient processing of atmospheric nitrate by forested watersheds in the northeastern US. Biogeochemistry, 90(1): 15-27 10.1007/s10533-008-9227-2
27. Cooper, L.W. et al., 2008. Flow-weighted values of runoff tracers (delta 18O, DOC, Ba, alkalinity) from the six largest Arctic rivers. Geophysical Research Letters, 35(18): L18606 10.1029/2008gl035007
26. Holmes, R.M., McClelland, J.W., Raymond, P.A., Frazer, B.B., Peterson, B.J. and Stieglitz, M., 2008. Lability of DOC transported by Alaskan rivers to the arctic ocean. Geophysical Research Letters, 35(3): L03402 10.1029/2007gl032837
25. McClelland, J.W., Holmes, R.M., Peterson, B.J., Amon, R., Brabets, T., Cooper, L.W., Gibson, J.J., Gordeev, V., Guay, C.K., Milburn, D., Staples, R., Raymond, P.A., Shiklomanov, I., Striegl, R.G., Zhulidov, A.V., Gurtovaya, T.Y. and Zimov, S., 2008. Development of a pan-Arctic database for river chemistry. EOS Transactions, 89217-218
24. Raymond, P.A., Oh, N.H., Turner, R.E. and Broussard, W., 2008. Anthropogenically enhanced fluxes of water and carbon from the Mississippi River. Nature, 451(7177): 449-452
23. Butman, D., Raymond, P., Oh, N.H. and Mull, K., 2007. Quantity, C-14 age and lability of desorbed soil organic carbon in fresh water and seawater. Organic Geochemistry, 38(9): 1547-1557 10.1016/j.orggeochem.2007.05.011
22. Longworth, B.E., Petsch, S.T., Raymond, P.A. and Bauer, J.E., 2007. Linking lithology and land use to sources of dissolved and particulate organic matter in headwaters of a temperate, passive-margin river system. Geochimica Et Cosmochimica Acta, 71(17): 4233-4250
21. Raymond, P.A., McClelland, J.W., Holmes, R.M., Zhulidov, A.V., Mull, K., Peterson, B.J., Striegl, R.G., Aiken, G.R. and Gurtovaya, T.Y., 2007. Flux and age of dissolved organic carbon exported to the Arctic Ocean: A carbon isotopic study of the five largest arctic rivers. Global Biogeochemical Cycles, 21(4): Gb4011 10.1029/2007gb002934
20. Raymond, P.A. and Oh, N.H., 2007. An empirical study of climatic controls on riverine C export from three major U.S. watersheds. Global Biogeochemical Cycles, 21(2): Gb2022 10.1029/2006GB002783
19. Striegl, R.G., Dornblaser, M.M., Aiken, G.R., Wickland, K.P. and Raymond, P.A., 2007. Carbon export and cycling by the Yukon, Tanana, and Porcupine rivers, Alaska, 2001-2005. Water Resources Research, 43(2): W02411 10.1029/2006WR005201
18. Zappa, C.J., McGillis, W.R., Raymond, P.A., Edson, J.B., Hintsa, E.J., Zemmelink, H.J., Dacey, J.W.H. and Ho, D.T., 2007. Environmental turbulent mixing controls on air-water gas exchange in marine and aquatic systems. Geophysical Research Letters, 34(10): L10601 10.1029/2006GL028790
17. McGillis, W.R., Dacey, J.W.H., Ware, J.D., Ho, D.T., Bent, J.T., Asher, W.E., Zappa, C.J., Raymond, P.A., Wanninkhof, R. and Komori, S., 2006. Air-water flux reconciliation between the atmospheric CO2 profile and mass balance techniques. In: C.S. Garbe, R.A. Handler and B. Jahne (Editors), International Workshop on Transport at the Air Sea Interface, Heidelberg, GERMANY, pp. 181-192.

16. Oh, N.H. and Raymond, P.A., 2006. Contribution of agricultural liming to riverine bicarbonate export and CO2 sequestration in the Ohio River basin. Global Biogeochemical Cycles, 20(3): GB3012 10.1029/2005GB002565
15. Cooper, L.W., Benner, R., McClelland, J.W., Peterson, B.J., Holmes, R.M., Raymond, P.A., Hansell, D.A., Grebmeier, J.M. and Codispoti, L.A., 2005. Linkages among runoff, dissolved organic carbon, and the stable oxygen isotope composition of seawater and other water mass indicators in the Arctic Ocean. Journal of Geophysical Research-Biogeosciences, 110(G2): G02013 10.1029/2005JG000031
14. Raymond, P.A., 2005. The composition and transport of organic carbon in rainfall: Insights from the natural (C-13 and C-14) isotopes of carbon. Geophysical Research Letters, 32(14): L14402 10.1029/2005GL022879
13. Striegl, R.G., Aiken, G.R., Dornblaser, M.M., Raymond, P.A. and Wickland, K.P., 2005. A decrease in discharge-normalized DOC export by the Yukon River during summer through autumn. Geophysical Research Letters, 32(21): L21413 10.1029/2005GL024413
12. Raymond, P.A., Bauer, J.E., Caraco, N.F., Cole, J.J., Longworth, B. and Petsch, S.T., 2004. Controls on the variability of organic matter and dissolved inorganic carbon ages in northeast US rivers. Marine Chemistry, 92(1-4): 353-366
11. Raymond, P.A. and Cole, J.J., 2003. Increase in the export of alkalinity from North America's largest river. Science, 301(5629): 88-91
10. Raymond, P.A. and Hopkinson, C.S., 2003. Ecosystem modulation of dissolved carbon age in a temperate marsh-dominated estuary. Ecosystems, 6(7): 694-705
9. Zappa, C.J., Raymond, P.A., Terray, E.A. and McGillis, W.R., 2003. Variation in surface turbulence and the gas transfer velocity over a tidal cycle in a macro-tidal estuary. Estuaries, 26(6): 1401-1415
8. Raymond, P.A. and Bauer, J.E., 2001. DOC cycling in a temperate estuary: A mass balance approach using natural C-14 and C-13 isotopes. Limnology And Oceanography, 46(3): 655-667
7. Raymond, P.A. and Bauer, J.E., 2001. Riverine export of aged terrestrial organic matter to the North Atlantic Ocean. Nature, 409(6819): 497-500
6. Raymond, P.A. and Bauer, J.E., 2001. Use of C-14 and C-13 natural abundances for evaluating riverine, estuarine, and coastal DOC and POC sources and cycling: a review and synthesis. Organic Geochemistry, 32(4): 469-485
5. Raymond, P.A. and Cole, J.J., 2001. Gas exchange in rivers and estuaries: Choosing a gas transfer velocity. Estuaries, 24(2): 312-317
4. Raymond, P.A. and Bauer, J.E., 2000. Bacterial consumption of DOC during transport through a temperate estuary. Aquatic Microbial Ecology, 22(1): 1-12
3. Raymond, P.A., Bauer, J.E. and Cole, J.J., 2000. Atmospheric CO2 evasion, dissolved inorganic carbon production, and net heterotrophy in the York River estuary. Limnology And Oceanography, 45(8): 1707-1717
2. Caraco, N.F., Cole, J.J., Raymond, P.A., Strayer, D.L., Pace, M.L., Findlay, S.E.G. and Fischer, D.T., 1997. Zebra mussel invasion in a large, turbid river: Phytoplankton response to increased grazing. Ecology, 78(2): 588-602
1. Raymond, P.A., Caraco, N.F. and Cole, J.J., 1997. Carbon dioxide concentration and atmospheric flux in the Hudson River. Estuaries, 20(2): 381-390

Non-Refereed Publications

Raymond, P.A., 2005. The Age of the Amazon's Breath. Nature, 436 469-470.

Extramural Grants

2014- National Science Foundation- DEB. Collaborative Research: Linking microbial diversity, gene expression, and the transformation of terrestrial organic matter in major U.S.rivers. $1,532,000. Co-PI, with Byron Crump (lead, University of Oregon), Aron Stubbins (Skiddaway), and George Aikent (USGS)

2014- National Science Foundation- Biological Sciences, MacroSystems Biology. Collaborative Research: RUI: The Pulse-Shunt Concept: A conceptual framework for quantifying and forecasting watershed DOM fluxes and transformations at the MacroSystem scale. $2,400,000. Lead PI, with James Saiers (Yale FES), Bill Sobczak (Holy Cross), Aron Stubbins (Skiddaway), and Jon Morrison, Jamie Shanley, Brian Pellerin (USGS)

2013- National Science Foundation- DEB. The Pulse-Shunt Hypothesis: Predicting the Evolution of DOM Composition and DOM Subsidies in Drainage Networks. $600,000. Lead PI, with James Saiers (Yale-FES)

2012- National Science Foundation- DEB. Collaborative research: Is the export of ancient, labile carbon from glacial ecosystems driven by the deposition of fossil fuel combustion byproducts? $706,000. With Aron Stubbins (Lead PI) and Marc Friscer (lead-Skiddaway), Robert Spencer (WHRC), and Eran Hood and Jason Fellman (Univ.Alaska Southeast).

2012- National Science Foundation- Arctic Science Division. The Arctic Great Rivers Observatory. $2,633,299. With Robert Holmes (lead PI- WHRC), Bruce Peterson (MBL), James McClelland (U-Texas Austin)

2011- National Aeronautics and Space Administration- Carbon Cycle Science Program. United States Stream and River CO_2 Evasion. $507,000. Lead PI, with Karen Seto (Yale FES) and Yongtao Guan (Yale School of Public Health)

2008-2011. National Science Foundation-Polar Observing Systems. Collaborative Research: IPY: Arctic Great Rivers Observatory (Arctic-GRO). $1,544,000. With Bruce Peterson (MBL, Lead PI), Max Holmes (WHRC) and Jim McClelland (U-Texas, Austin)

2006 – 2011 National Science Foundation-Ecosystems. CAREER: The Lateral Transport of Watershed Atmospheric Carbon by Rivers. $580,000. Lead PI.

2005 – 2009 National Science Foundation-Physical Oceanography. Collaborative Research: Determining the Air-Water CO2 Flux in Coastal Systems. $671,000. With C. Zappa (Lamont, lead PI) and Wade McGillis (Lamont)

2004 – 2007 National Science Foundation-Ecosystems. Collaborative Research: Aquatic Plant Beds as Biogeochemical Hot Spots in a Large River Ecosystem. $60,000 subcontract. With N Caraco (lead PI- IES), S Findlay (IES), S Macintyre (UC-Santa Barbara), W McGillis (Lamont)

2004 – 2007 National Science Foundation-Integrated Carbon Research EAR. Collaborative Research: Assessing the Variability and Modification of Age, Character and Reactivity of Organic Carbon Delivered by Rivers and Estuaries to an Ocean Margin. $847,000. With J Bauer (lead PI-William & Mary), J Cole (IES), N Caraco (IES), S Petsch (Umass-Amherst).

2004 – 2006 NOAA. O2 and O2 air-water exchange in Florida Bay: Hydrodynamic controls on the gas transfer velocity and linkages to net ecosystem metabolism. $37,000 subcontract. With W McGillis (Lamont, lead PI), J E Boyer (FIU).

2004 – 2007 National Science Foundation-Ecosystems. Collaborative Research: Delivery and Fate of Old Terrestrial Organic Matter in a Riverine Ecosystem. $847,000. With J Cole (lead PI, IES), J Bauer (William & Mary), N Caraco (IES).

2002 – 2003 Hudson River Foundation. Measurements and Modeling of the Gas Transfer Velocity in the Hudson River Estuary, $92,000. with Wade McGillis (Lamont)

Invited Seminars and Symposia

2014 University of Florida. The Pulse-Shunt-Concept: A new conceptual framework for understanding the biogeochemistry of drainage basins.

2014. Boston University. The Pulse-Shunt-Concept: A new conceptual framework for understanding the biogeochemistry of drainage basins.

2014 Northeastern University. The carbon chemistry of rivers.

2014 Duke University. Inland waters and global carbon.

2013 The University of Alabama. The Pulse-Shunt-Concept: A new conceptual framework for understanding the biogeochemistry of drainage basins.

2013 Global CO2 emissions from inland waters. 9th International Carbon Dioxide Conference. Beijing, China

2013 Global CO2 Emissions from Inland Waters. CNRS, France.

2012 AGU Fall Meeting, Warming Waters: Role of Freshwaters in Regional and Global Carbon and nutrient cycling session. San Francisco CA

2012 Frontier Talk, SOM-5 International Workshop. The Pulse-Shunt-Concept: A new

conceptual framework for understanding DOM fluxes and reactions in drainage basins. Ascona, Switzerland

2012 Ocean Carbon and Biogeochemistry Workshop. Land-ocean transport and linkages with global change session. Woods Hole, MA.

2012 Keynote speaker. Goldschmidt Conference, Montreal. The dynamics of continental weathering session

2012 LSCE, France. Dissolved organic Carbon Export from Streams.

2012 IGBP, France. Anthropogenic Impacts on Dissolved Inorganic Carbon River Fluxes.

2012 MBL Ecosystems Center Seminar Series

2011 Woods Hole Oceanographic Geodynamics Seminar Series.

2011 Lehigh University Foster Hewitt Lecture Series.

2011 University of Rhode Island Ecology Seminar Series

2010 AGU Fall Meeting, Managing Water Resources Risks session. San Francisco, CA

2010 Wesleyan Earth and Environmental Sciences Seminar

2010 AGU Summer meeting, session Inland and Littoral Waters as a Land-Ocean-Atmosphere Interface in the Global Carbon Cycle.

2009 AGU Fall meeting, session Manmade Global Change and Material Cycles. San Francisco, CA.

2009 Oregon State University Frontiers Visiting Scholar Series, Corvallis OR

2009 Oregon State College of Ocean and Atmospheric Sciences, Corvallis OR

2009 Ecosystems Center, Woods Hole MA.

2008 Purdue, Department Earth and Atmospheric Sciences, West Lafayette IN

2008 University of Montana, Center for Ethics, Missoula MT

2008 University of Connecticut, Avery Point Campus, Groton CT.

2007 Catchment Science Gordon Conference. New London N.H.

2007	MIT, Department of Earth and Planetary Sciences. Boston MA.
2007	Columbia, Lamonty Doherty Earth Observatory, Palisades N.Y.
2006	Univ. South Carolina, Marine Sciences Program, Columbia S.C.
2006	Rutgers, Institute of Marine and Coastal Sciences, New Brunswick N.J.
2006	Organic Geochemistry Gordon Conference, Plymouth N.H.
2006	Goldschmidt Conference (Keynote), Melbourne Australia
2006	Geochemical Earth Reference Model Workshop (Plenary), Columbia NYC
2006	Institute of Ecosystem Studies, Millbrook N.Y
2005	Carnegie Institution of Plant Biology, Stanford CA
2005	Univ. Minnesota, Dept. EE&B (Lindeman speaker), St. Paul MN
2004	University of Connecticut Avery Point Marine Campus, Groton CT.
2004	University of Massachusetts/Amherst, Geology Department, Amherst MA
2003	Symposium on new approaches in marine organic biogeochemistry, Friday Harbor Laboratory, Seattle WA
2002	AGU (invited talk), San Francisco CA
2002	Yale School of Forestry and Environmental Studies, New Haven CT
2002	Stroud Water Research Center, Avondale PA.
2001	DIALOG IV, Bermuda
2000	WHOI, Applied Ocean Physics and Engineering department, Woods Hole MA
2000	Lawrence Livermore National Laboratory, Livermore CA
1999	Estuarine Research Federation annual meeting (invited talk), New Orleans LA

External Service and Effort

2013-present	Study Manager for Connecticut Academy of Sciences and Engineering study to define phosphorus limits and set management goals for inland waters of

	Connecticut (Working Group 2 from CT Public Act 12-155). In charge of formulated recommendations to measure impacts of phosphorus on inland waters for the purpose of policy development.
2013-present	Member NEON Science Symposia and Workshop committee
2010-present	Associate Editor, Journal of Geophysical Research- Biogeosciences
2012-2013	Steering Committee for 9th International Carbon Dioxide Conference- Beijing
2011-2013	Lead Author of Technical input report "Impacts of climate change on biodiversity, ecosystems and ecosystem services" to 2013 U.S. National Climate Assessment
2011-2014	Contributing author to IPCC AR5 Assessment Report: The Physical Science Basis
2011-2013	Contributor to RECCAP component of Global Carbon Project
2011-2012	Member of the National Climate Assessments Ecosystems, Biodiversity, and Ecosystem Services: Assessing Climate Change Impacts and Evaluating Responses Working Group
2007-2012	Member of the United States Carbon Cycle Scientific Steering Group (CCSSG)
2010-2012	Assistant Chair United States Carbon Cycle Scientific Steering Group
2009	Invited participant in the second workshop of the "Site and Regional Continental Interim Synthesis of the North American Carbon Program". Oak Ridge TN, November 2009
2009	Invited participant in NSF sponsored workshop on "Frontiers in Exploration of the Critical Zone II: The Geobiology of Weathering and Erosion". Washington DC, October 2009.
2009	Invited participant in the Coupled Biogeochemical Event at the Ecological Society of America's annual meeting, August 2009
2008-present	Contributed to the Coastal Interm Synthesis activities of the North American Carbon program
2008	Invited participated and presented at Terrestrial and Coastal Carbon Fluxes in the Gulf of Mexico scoping workshop in St. Petersburg Florida
2007	External reviewer of the EPA's "Estuarine Nutrient Criteria Development: State of the Science" document

2005 Participant ORION regional planning meeting, Avery Point CT

2005 Invited participant in North American Continental Margins (NACM) workshop, Boulder

2005 International Scientific Steering Committee for the 37th International Colloquium on Ocean Dynamics session on Gas Transfer at Water Surfaces, Leige

2005 Invited participant Hudson River Foundation "State of Knowledge" workshop

2004 Invited participant River Dominated Ocean Margins (RioMAR) workshop, New Orleans

2003 Presenter Northeast Association of Forest Managers annual meeting

2003 Co-Chaired special session INQUA conference, Reno

2003 Co-Chaired special session ERF meeting, Seattle

University Service

2014-present Member Yale Committee of Natural Lands

2011-2012 Member of the Yale Climate and Energy Institutes Policy and Strategy Board

2011-2012 Member University Wide Committee on Sexual Misconduct

2010-present. Director Yale Earth Systems Center for Stable Isotopic Studies

2008-2012 Member of the Yale Climate and Energy Institute's executive committee

2008-present Member of the Yale Institute for Biospherical Studies faculty council

2007-2013 Participant in the Peabody Museum EVOLUTION's program

2002-2010 Member of Center Earth System Science Center for Stable Isotopes Studies faculty advisory board

Doctoral-Student Advising

Chair/Co-Chair

Rebecca Barnes (FES- 2009; received a NSF-Geosciences post doctoral fellowship), David Butman (FES, 2012), Maura Bozeman (FES, 2012), Yong Zhao (FES, in progress), Bryan Yoon (in progress)

Committee Member

Huiyan Hu (FES- 2006), Annika Walters (EEB-2009), Holly Jones (FES, 2010), Xin Zhang (FES, in progress), Brandon Barton (FES, 2010), Sarah Schillawski (William and Mary, in progress), Paul Wang (FES, 2010), Troy Hill (FES, in progress), Dwi Astiani (FES, in progress), Ashley Kaiser (in progress), Meredith Atwood (in progress)

Masters-Student Advising

FES MeSC

Alexandra Williamson (2004), Huiyan Zhao (2005). Rishi Das (2005), David Butman (2006), David Grifith (2007), Yong Zhao (2007), James Collins (in progress), Hui Wen Cheng (2010), Martin Bouda (2010), Bryan Yoon (2012).

Committee Member

Brett Longworth (2005-Umass Amherst)

Post Doctoral Associates

Neung Hwan Oh (2003-2005), Henry Wilson (2009-2011, co-advisor), LiQing Jiang (2010-2011,), David Butman (2011-), Jay Zarnetsky (2012-2013)

Post Graduates Associates

Mark Hoover (2011-2013)

Conference Presentations

Fellman, J.B., E.W. Hood, A. Stubbins, R.G. Spencer, P.A. Raymond, Changing glacial coverage influences stream DOM signatures in coastal watersheds of Alaska. Fall AGU 2012

Aiken, G., D.E. Butman, R.G. Spencer, P.A. Raymond, Dissolved organic matter composition and export from U.S. Rivers. Fall AGU 2012

Yoon, B., P.A. Raymond, Dissolved organic matter export from a forested watershed during Hurricane Irene. Fall AGU 2012

Tank, S., P.J. Mann, K. Hoering, E. Bulygina, R.G. Spencer, Z.A. Wang, J.W. McClelland, P.A. Raymond, R.M. Holmes. Rapid photomineralization of DOC flowing from large arctic rivers to the Arctic Ocean. Fall AGU 2012

Bauer, J.E., R.P. Moyer, P.A. Raymond, A.G. Grottoli. Divergence in global riverine DOC and POC ages: Implications for the carbon cycle. ASLO Aquatic Sciences 2011

Tank, S.E., P.A. Raymond, B.J. Peterson, R.M. Holmes, J. McClelland, R.G. Striegl, Dissolved inorganic carbon export from the world's largest circumpolar watersheds. ASLO Aquatic Sciences 2011

Zappa, C.J., P.A. Raymond, W.R. McGillis, The effect of atmospheric stability on gas transfer and regional estuarine CO2 flux. ASLO Aquatic Sciences 2011

Jiang, L.Q., P.A. Raymond, D. Butman. Carbonate mineral saturation states in rivers of the conterminous United States over the last 100 years. ASLO Aquatic Sciences 2011

Butman, D.E., P.A. Raymond, G. Aiken, K. Butler, Organic carbon quality and watershed characteristics separate the contribution of 14C of DOC to coastal systems of the U.S.. Fall AGU 2011.

Bauer, J.E., D.W. Perkey, P.A. Raymond, T.S. Bianchi, A.G. Grottoli, Y. Matsui. Divergent radiocarbon age distributions of carbon pools in a major temperate river: Implications for sources, reactivity and Land-Ocean exchanges. AGU Fall 2011

McClelland, J.W., R.M. Holmes, B.J. Peterson, S.E. Tank, P.A. Raymond, R.G. Striegl. Fluxes and Stable Isotopic Composition of Particulate Organic Matter in the Six Largest Rivers Draining the Pan-Arctic Watershed: Insights from Seasonally-Explicit Sampling Efforts. Fall AGU 2011

Tank, S.E., P.A. Raymond, R.G. Striegl, K.E. Frey, J.W. McClelland, R.M. Holmes, B.J. Peterson. Basin scale controls on the flux of DIC across diverse circumpolar watersheds. AGU Fall 2011

Butman, D.E., P.A. Raymond. US stream and river CO2 evasion from the bottom up. Fall AGU 2010.

Aufdenkampe, A.K. E. Mayorga, S.R. Alin, P.A. Raymond, J.M. Melack, S.C. Doney. Spatially and temporally distributed re-evaluation of global CO2 outgassing from inland waters: The tropics dominate global fluxes Fall AGU 2010.

Tank S.E., P.A. Raymond, B.J. Peterson, R.M. Holmes, J.W. McClelland, R.G. Striegl. The magnitude, source and implication of DIC flux from major pan-arctic rivers to the Arctic Ocean. Fall AGU 2010.

Zhao, Y., P.A. Raymond. Processes controlling carbon export from a New England salt marsh. CERF, Portland Oregon 2009.

Fellman, J.B., P.F. Grierson, P.A. Raymond, R. Spencer, N.E. Petit. Riverine export of dissolved organic matter from an old infertile landscape

B.E. Peich, P.A. Raymond, D.M. Post. Using *Mytilus edulis* $^{15}N/^{14}N$ ratios as tracers of sewage discharge in the Long Island Sound. CERF, Portland Oregon 2009

Crump. B.C., B.J. Peterson, P.A. Raymond, R.M. Amon, A. Rinehart, J.W. McClelland, R.M. Holmes, Cirumpolar synchrony in big river bacterioplankton. ASLO Aquatic Sciences Meeting 2009.

Striegl, R.G. G.R. Aiken, P.A. Raymond, R.G. Spencer, M.A. Walvoord, K.P. Wickland. Effects of permafrost thaw and glacial meltwater on carbon yields from the Yukon River Basin. ASLO Aquatic Sciences Meeting 2009.

Barnes, B.T., P.A. Raymond. Land use controls on the delivery, processing and removal of nitrogen from small watersheds: Insights from the dual isotopic composition of stream nitrate. AGU Fall Meeting 2008.

Raymond, P.A. The impact of hydrologic events on watershed DOC export. AGU Fall Meeting 2008.

Bauer J.E., P.A. Raymond, E.J. Kesee, D.W. Perkey, K. Mull. Transformations of organic matter in a major U.S. east coast estuary: Implications for identifying DOM and POM source and age signatures in ocean margins. Ocean Sciences, Orlando 2008.

McClelland, J.W., R.M. Holmes, B.J. Peterson, R. Amon, L. Cooper, B. Crump, J. Gibson, C.Guay, P.A. Raymond, R. Striegl, A. Zhulidov, S. Zimov. The PARTNERS data set: Highlights from an extradordinary field program encompassing the six largest rivers in the pan-arctic watershed. Ocean Sciences, Orlando 2008

Oh, N-H, P.A. Raymond. Changes in N and P fluxes due to agricultural land use in the Mississippi River system. AGU Fall meeting 2007.

Butman D.E., P.A. Raymond, R. Geerken. Controls on DOC export through time along the eastern coast of the U.S. AGU Fall meeting 2007.

Raymond P.A., N-H Oh, G. Turner, W Broussard. Anthropogenic alteration of riverine water and carbon fluxes. AGU Fall meeting 2007.

Raymond P.A., R. Holmes, J. McClelland, B. Peterson., G. Aiken, R. Striegl. A carbon isotopic study of the flux of organic carbon to the Arctic Ocean. ERF, Providence 2007

Barnes, R., P.A. Raymond. Scaling up the whole: using nitrate isotopic signatures to assess processing and export. ERF, Providence 2007

Griffith, D., P.A. Raymond, The upside-down Hudson River estuary. ERF, Providence 2007

Zhao, Y. P.A. Raymond, Carbon export from a New England Salt marsh, ERF, Providence 2007

Bauer, J.E., P.A. Raymond, J.J. Cole, S.T. Petsch, B.E. Longworth, N.F. Caraco, E.J. Keesee. Regional Variability in the Ages and Reactivities of Riverine Dissolved and Particulate Organic Matter Exported to a Temperate Ocean Margin. ASLO Aquatic Sciences Meeting, Santa Fe, 2007

Raymond P.A., N.H Oh, R.E Turner, W. Broussard. A Large Scale Shift in Dissolved Inorganic Carbon Concentration and Export from the Misssissippi River: Results from a High Resolution 100 year Data Set ASLO Aquatic Sciences Meeting, Santa Fe, 2007

Barnes, R.T., P.A. Raymond. The Dual Isotopic Composition of Nitrate Exported from Small Temperate Watersheds of Different Land Uses. ASLO Aquatic Sciences Meeting, Santa Fe, 2007

Sobczak, W.V., P.A. Raymond, E.R. Boose, S. Singh. Allochthonous Organic Matter Export from a Hemlock Dominated Watershed Threatened by an Invasive Forest Herbivore. ASLO Aquatic Sciences Meeting, Santa Fe, 2007

Griffith, D.R., P.A. Raymond. Carbon Cycling Dynamics in a Highly Urbanized Estuary. ASLO Aquatic Sciences Meeting, Santa Fe, 2007

Frazer, B. B., J.W. McCleland, R.M. Holmes, P.A. Raymond. The Lability of Dissolved Organic Carbon in Arctic Rivers on the North Slope of Alaska. AGU Fall Meeting, San Francisco 2006.

Barnes, R.T., P. A. Raymond. The Dual Isotopic Composition of Nitrate Exported from Temperate Watersheds of Different Land Use. AGU Fall Meeting, San Francisco 2006.

Raymond P.A., R.M. Holmes, J.W. McClelland, R. Striegl, B. Peterson, G. Aiken, A. Zhulidov. The flux and 14C age of Riverine Organic Carbon Exported to the Arctic Ocean. AGU Fall Meeting, San Francisco 2006.

McClelland J. W., R. M. Holmes, P.A. Raymond, B.J. Peterson. River Exports and Productivity in Arctic Coastal Waters: A Challenge to Conventional Wisdom. AGU Fall Meeting, San Francisco 2006.

Aiken G.R., R.G. Striegl, K. P. Wickland. M.M Dornblaser, P.A. Raymond. Dissolved Organic Carbon in the Yukon, Tanana and Porcupine Rivers, Alaska. AGU Fall Meeting, San Francisco 2006.

Bent J. D., W.R. McGillis, P A Raymond, J L Boyer. Aqueous pCO2 Measurements in Florida Bay. ASLO/AGU Ocean Science Meeting, Honolulu 2006

Bauer J., J.J Cole, N Caraco, P A Raymond, E Keesee, S Fernald, K Mull. Variability in the Character, Age and Reactivity of Organic Matter Exported from Rivers and Estuaries to Ocean Margins. ASLO/AGU Ocean Science Meeting, Honolulu 2006

Petsch S. T., E.S. Gordon, B. Longworth, S. E. Schillawki, P.A. Raymond. Sources Age and Composition of Dissolved and Particulate Organic Matter Delivered to a Passive Margin River System. ASLO/AGU Ocean Science Meeting, Honolulu 2006.

Peucker-Ehrenbrink, B., B. D. Walker, C. E. Martin, F. Marcantonio, P.Raymond, R. M. Holmes, Reevaluating the Surficial Rhenium Cycle, ASLO/AGU Ocean Science Meeting, Honolulu 2006

Raymond P.A., W.R. McGillis, J. Bauer, N.F. Caraco, J.J. Cole. An Investigation of Accurate Gas Exchange Measurements for Determining a Large River Carbon Isotope Mass Balance. 37th Liège International Colloquium on Gas Transfer at Water Surfaces

Caraco, N.F., J.J. Cole, P.A. Raymond, J.E. Bauer, Organic Matter Inputs and Metabolism in a Large River Estuary (The Hudson): Insights from Natural Abundance Isotopes and Whole System Metabolism. American Society of Limnology and Oceanography. Salt Lake 2005.

McGillis W.R., P.A. Raymond. Gas Exchange in a Large River: The Relationship Between Wind, Tides, Surface Turbulence and the Gas Transfer Velocity in the Hudson River. American Society of Limnology and Oceanography. Salt Lake 2005.

Raymond P.A., R. Holmes, R. Striegl, J. McClelland and B. Peterson. A Preliminary Evaluation of Carbon Sources and Ages Exported by Major Arctic Rivers. American Society of Limnology and Oceanography. Salt Lake 2005.

Raymond, P.A., J McClelland, R Striegl, R Holmes, B Peterson, G Aiken. A Preliminary evaluation of Carbon Sources and Ages Exported By Major Arctic Rivers. American Geophysical Union. San Francisco 2004.

L W Cooper, R Benner, J McClelland, B Peterson, R Holmes, P A Raymond, D A Hansell, J M Grebmeier, L A Codispoti, Linking River to Ocean Through Temporal and Spatial Variation in Run-off Tracers in the Arctic Ocean. . American Geophysical Union. San Francisco 2004.

Ho N-H, P.A Raymond. The Role of Land Use in Chemical Weathering and the Transport of Inorganic Carbon to Rivers in the Ohio River Basin. Soil Science Society of America International Meeting. Seattle 2004

Longworth, B., P Raymond, S Petsch. Ancient Organic Matter Sources to the Hudson-Mohawk River System: Implications of Riverine Transport of Ancient Organic Matter for the Global Biogeochemical. American Geophysical Union (AGU). San Francisco, 2003

Petsch S., P Raymond. Geochemical Short Circuits: How Recycled Ancient Organic Matter Impacts the Biogeochemical Carbon Cycle. American Geophysical Union (AGU). San Francisco, 2003

Raymond, P.A., C Hopkinson. Metabolism in the Plum Island Estuary. Estuarine Research Federation, Seattle 2003

Raymond, P.A., J Bauer, J Cole, N Caraco. Variability in the age of riverine organic matter from rivers of the East Coast of the United States GSA, INQUA XVI Congress, Reno 2003.

Raymond, PA, J Cole. Increase in the export of alkalinity from North America's largest river: Climate and land use controls on alkalinity export from the Mississippi River. GSA, INQUA XVI Congress, Reno 2003.

Raymond, P.A., C. Hopkinson. Ecosystem modulation of dissolved carbon age in a temperate marsh dominated estuary. ASLO, Salt Lake City 2003.

C J Zappa, P A Raymond, W R McGillis, E A Terray. Variation in Surface Turbulence and the Gas Transfer Velocity in a Macro-Tidal Estuary. AGU San Francisco, 2002.

Ruppel, C., G. Schultz, C. Tobias, P. Raymond. Coupled physical and chemical constraints on groundwater flow across the upland-estuary interface in peat and clastic settings. Geological Society of America, Boston MA, 2001.

Raymond, P.A., W.R. McGillis, C.J. Zappa, E. Terray. Measurements of the gas exchange coefficient and atmospheric exchange of CO_2 over a tidal cycle in the Plum Island Estuary using the Gradient Flux Technique. ASLO Aquatic Sciences Meeting, Albuquerque, N.M., 2001

Raymond, P.A., J. Bauer. Riverine export of organic ^{14}C to the North Atlantic Ocean. AGU Fall Meeting, San Francisco, 2000

Zappa, C.J., W.R. McGillis, P.A. Raymond, E. Terray. Surface processes effecting Aquatic atmospheric transfer in estuarine systems. AGU Fall Meeting, San Francisco, 2000

Bauer, J., P.A. Raymond, D. Wolgast, C.S. Hopkinson. ^{14}C and ^{13}C evidence for the utilization of terrigenous DOC in estuaries. ASLO Aquatic Sciences Meeting, Santa Fe, NM. 1999

Raymond, P.A., J.Bauer. Estimation of net metabolism in the York River Estuary using inorganic carbon measurements. ASLO Aquatic Sciences Meeting, Santa Fe, NM. 1999

Raymond, P., J. Bauer, D. Wolgast. Stable and radiocarbon isotopic composition of DOC in the York River Estuary, Virginia. Ocean Sciences Meeting, San Diego, CA. 1998

Raymond, P., J. Bauer, D. Wolgast. Sources and micro-heterotrophic utilization of DOM in the York River Estuary, Virginia. ASLO Aquatic Sciences Meeting, Santa Fe, NM. 1997

Profesional Affiliations (last 5 years)

American Geophysical Union
American Society of Limnology and Oceanography
Estuarine Research Federation
American Association for the Advancement of Science

Peer Review Service

Journals (38)

Limnology & Oceanography, Marine Chemistry, Archiv fuer Hydrobiolobie, Estuaries, Proceedings of the National Academy, Estuary and Coastal Shelf Science, Hydrobiologia Deep Sea Research II, Aquatic Microbial Ecology, Nature, Journal of Geophysical Research- Oceans, Global Biogeochemical Cycles, Geophysical Research Letters, Biogeosciences, Ecol Monogr., Science, Chemical Geology, Geochimica et Cosmochimica Acta, Limnology and Oceanography Methods, Journal of Geophysical Research-Earth Surfaces, European Journal of Soil Science, Ecology , Ecosystems, Marine Geology, Applied Geochemistry, Nature-Geoscience, Oceanography, Global Change Biology, Earth and Planetary Science Letters, Journal of Geophysical Sciences-Biogeosciences, Nature Science Reports, Limnology and Oceanography: Fluids and Environments, Inland Waters, Proceedings of the National Academy of Sciences, Environmental Fluid Mechanics, Environmental Science and Technology, Northeaster Naturalist.

Books

Chapters: Biogeochemistry of Estuaries

Proposals

National Science Foundation (Ecosystems, Chemical Oceanography, Physical Oceanography, Integrated Carbon Cycle Research, Hydrology, Low Temperature Geochemistry, Margins, Geomorphology and Land-Use Dynamics Program), CALFED, American Chemical Society, Fonds de recherché- Quebec, SeaGrant, Swedish Research Council

Panel Service. NSF IGERT pre-proposal (2002), NSF Ecosystems (2005, 2007 and 2008). NSF Ecosystems pre-proposal (2014).