

EMILIO MAYORGA
CURRICULUM VITAE

CONTACT INFORMATION

Applied Physics Laboratory
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EDUCATION

2004 Ph.D., University of Washington, Chemical Oceanography
1997 M.S., University of Washington, Chemical Oceanography
1992 B.S., Massachusetts Institute of Technology (MIT), Civil Engineering Department

PROFESSIONAL EXPERIENCE

2009- present Oceanographer and Data Manager, University of Washington Applied Physics Laboratory, Seattle, WA
2007- 2008 Research Associate, Rutgers Institute of Marine & Coastal Sciences, New Brunswick, NJ
2001- 2006 Principal GIS Analyst, Surface Water Management Division, Snohomish County Public Works, Everett, WA
1993 - 2001 Research Assistant, University of Washington School of Oceanography, Seattle, WA

TEACHING EXPERIENCE

Spring 1999 Teaching Assistant, "Climate Extremes", University of Washington, Seattle, WA.
Spring 1998 Teaching Assistant, "Chemical Oceanography", University of Washington, Seattle, WA.
1989 - 1990 Physics Tutor, Experimental Study Group and Project Excel, Massachusetts Institute of Technology, Cambridge, MA.

SYNERGISTIC ACTIVITIES

2010 – present REgional Carbon Cycle Assessment and Processes (RECCAP), Rivers and Continental Waters working group.
2010 – present Carbon in Tropical Rivers, part of NSF-funded Research Coordination Network (RCN) led by the Organization for Tropical Studies (OTS).
2009 – present Northwest Association of Networked Ocean Observing Systems (NANOOS), the US Pacific Northwest Regional Coastal Ocean Observing System for the US NOAA Integrated Ocean Observing System (IOOS).
2008 – present GEOSS/GEO Water Quality focus group
2007 – present Global Nutrient Export from Watersheds (NEWS), a working group of UNESCO's Intergovernmental Oceanographic Commission
2008 Rutgers Climate and Environmental Change in Latin America Conference (Coordination and planning committee; September, 2008)
2007 NASA Carbon Cycle Science Panel Review member (Regional studies of global significance, and Decision-support systems for carbon management)
2006 Technical advisory committee member, Washington Dept. of Fish & Wildlife State

May 17, 2011

Emilio Mayorga

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- Habitat Work Schedule Database (for projects on salmon conservation and habitat restoration)
- 1998 – 2007 Co-founder and coordinator, Central American Ecology and Environment Group (<http://staff.washington.edu/emiliom/centamer/>)
- 1999 – 2002 Working group member, Merging terrestrial and aquatic perspectives of biogeochemistry, National Center for Ecological Analysis and Synthesis (NCEAS)

PROFESSIONAL AFFILIATIONS

American Geophysical Union (AGU), American Society of Limnology and Oceanography (ASLO), Ecological Society of America (ESA), Washington Urban and Regional Information Systems Association (WAURISA; 2005–2006, 2009)

WORKSHOP PARTICIPATION

- 2011 CZO (Critical Zone Observatories) Cyberinfrastructure Meeting, Logan, UT, 8-9 Feb.
- 2010 Carbon in Tropical Rivers, Organization for Tropical Studies (OTS) Research Coordination Network, La Selva Biological Station, Costa Rica, 15-17 Apr.
- 2009 GEOSS/GEO Americas workshop and GEOSS Coastal Zone Community of Practice meeting, Washington, DC, 20 Nov.
- 2009 ESA (Ecological Society of America) Coupled Biogeochemical Cycles workshop, Albuquerque, NM, 4-5 Aug.
- 2009 National Water Quality Monitoring Council meeting, Portland, OR, 21 July.
- 2009 PaCOOS workshop (Pacific Coast Ocean Observing System): Zooplankton Data and Information Infrastructure for the California Current Large Marine Ecosystem, La Jolla, CA, 9-10 June.
- 2009 West Coast Coastal Atlas Workshop, Seattle, WA, 23-24 April.
- 2008 OBIS Technology Workshop, Ocean Biogeographic Information System, New Brunswick, NJ, 18-19 Apr.
- 2006 Denitrification modeling across terrestrial, freshwater and marine systems. Denitrification Research Coordination Network Workshop, Millbrook, NY, 28-30 Nov.
- 2006 GERM Workshop (Geochemical Earth Reference Model), New York, 29-31 May.
- 2003 LTER All Scientists Meeting (Long Term Ecological Research network), Seattle, WA, 18-21 Sep.
- 2002 MODIS Vegetation Workshop, University of Montana, Missoula, Montana, 15-19 Jul.
- 2000 ISLSCP Workshop (International Satellite Land Surface Climatology Project), NASA Goddard Space Flight Center, Greenbelt, MD, 15-17 Nov.
- 1998 LBA Ecology Regional Modeling Workshop, San Francisco, CA, 5 Dec.
- 1998 NASA HDF-EOS Workshop II, Raytheon Information Technology and Scientific Services Corporation, Landover, MD, 22-24 Sep.

FOREIGN LANGUAGES

Spanish (native speaker), Portuguese, French.

REVIEWING

Journals: Biogeochemistry, Biogeosciences, Ecosystems, Global Biogeochemical Cycles, Hydrological Processes, Limnology and Oceanography, Nature. *Proposals, Research Programs:* NSF, NASA, USGS.

PUBLICATIONS AND PRESENTATIONS

Publications

- Aufdenkampe, A.K., **E. Mayorga**, P.A. Raymond, J. Melack, S.C. Doney, S.R. Alin, R.E. Aalto and K. Yoo. 2011. Riverine coupling of biogeochemical cycles between land, oceans and atmosphere. *Frontiers in Ecology & Environment* **9(1)**: 53-60, doi:10.1890/100014
- Fekete, B.M., D. Wisser, C. Kroeze, **E. Mayorga**, L. Bouwman, W.M. Wollheim and C. Vörösmarty. 2010. Millennium Ecosystem Assessment scenario drivers (1970-2050): Climate and hydrological alterations. *Global Biogeochemical Cycles* **24**: GB0A12, doi:10.1029/2009GB003593
- Harrison, J., A.F. Bouwman, **E. Mayorga** and S. Seitzinger. 2010. Magnitudes and sources of dissolved inorganic phosphorus inputs to surface fresh waters and the coastal zone: A new global model. *Global Biogeochemical Cycles* **24**: GB1003, doi:10.1029/2009GB003590
- Mayorga, E.**, T. Tanner, R. Blair, A.V. Jaramillo, N. Lederer, C.M. Risien and C. Seaton. 2010. The NANOOS Visualization System (NVS): Lessons learned in data aggregation, management and reuse, for a user application. *Proc. MTS/IEEE Oceans'10*
- Mayorga, E.**, S.P. Seitzinger, J.A. Harrison, E. Dumont, A.H.W. Beusen, A.F. Bouwman, B. Fekete, C. Kroeze and G. Van Drecht. 2010. Global Nutrient Export from WaterSheds 2 (NEWS 2): Model development and implementation. *Environmental Modeling & Software* **25**: 837-853, doi:10.1016/j.envsoft.2010.01.007
- Seitzinger, S., **E. Mayorga**, A.F. Bouwman, C. Kroeze, A.H.W. Beusen, G. Billen, G. Van Drecht, E. Dumont, B.M. Fekete, J. Garnier and J.A. Harrison. 2010. Global nutrient river export: A scenario analysis of past and future trends. *Global Biogeochemical Cycles* **24**: GB0A08, doi:10.1029/2009GB003587
- Thieu, V., **E. Mayorga**, G. Billen and J. Garnier. 2010. Subregional and downscaled global scenarios of nutrient transfer in river basins: Seine-Somme-Scheldt case study. *Global Biogeochemical Cycles* **24**: GB0A10, doi:10.1029/2009GB003561
- Yan, W., **E. Mayorga**, X. Li, S.P. Seitzinger and A.F. Bouwman. 2010. Increasing anthropogenic nitrogen inputs and riverine DIN exports from the Changjiang River basin under changing human pressures. *Global Biogeochemical Cycles* **24**: GB0A06, doi:10.1029/2009GB003575
- Yasin, J.A., C. Kroeze and **E. Mayorga**. 2010. Nutrients export by rivers to the coastal waters of Africa: Past and future trends. *Global Biogeochemical Cycles* **24**: GB0A07, doi:10.1029/2009GB003568
- Harrison, J., R. Maranger, R. Alexander, A. Giblin, P.A. Jacinthe, **E. Mayorga**, S. Seitzinger, D. Sobota and W. Wollheim. 2009. The regional and global significance of nitrogen removal in lakes and reservoirs. *Biogeochemistry* **93**: 143-157
- Liu, K.-K., S. Seitzinger, **E. Mayorga**, J. Harrison and V. Ittekkot. 2009. Fluxes of nutrients and selected organic pollutants carried by rivers, p. 141-167. In: Urban Jr., E.R., B. Sundby, P. Malanotte-Rizzoli and J.M. Melillo (eds.), *Watersheds, Bays and Bounded Seas: The science and management of semi-enclosed marine systems*. SCOPE 70. Island Press
- Risien, C.M., J.C. Allan, R. Blair, A.V. Jaramillo, D. Jones, P.M. Kosro, D. Martin, **E. Mayorga**, J.A. Newton, T. Tanner and S.A. Uzcakaj. 2009. The NANOOS Visualization System: Aggregating, displaying and serving data. *Proc. MTS/IEEE Oceans'09*
- Vörösmarty, C.J., D. Conley, P. Döll, J. Harrison, P. Letitre, **E. Mayorga**, J. Milliman, S. Seitzinger, J. van der Gun and W. Wollheim. 2009. Chapter 10: The Earth's natural water cycles, pp 166-180. In: World Water Assessment Programme. *The United Nations World Water Development Report 3: Water in a Changing World (WWDR-3)*. Paris: UNESCO, and London: Earthscan. <http://www.unesco.org/water/wwap/wwdr/wwdr3/>

- Glibert, P.M., **E. Mayorga** and S. Seitzinger. 2008. *Prorocentrum minimum* tracks anthropogenic nitrogen and phosphorus inputs on a global basis: application of spatially explicit nutrient export models. *Harmful Algae* **8**: 33-38
- Mayorga, E.** 2008. Carbon cycle – Harvest of the century. *Nature* **451**: 405-406
- Seitzinger, S.P. and **E. Mayorga**. 2008. Linking watersheds to coastal systems: A global perspective on river inputs of N, P and C. *Ocean Carbon and Biogeochemistry News* **1**(1): 8-11
- Aufdenkampe, A.K., **E. Mayorga**, J.I. Hedges, C.A. Llerena, P.D. Quay, J. Gudeman, A.V. Krusche and J.E. Richey. 2007. Organic matter in the Peruvian headwaters of the Amazon: Compositional evolution from the Andes to the lowland Amazon mainstem. *Organic Geochemistry* **38**: 337-364
- Mayorga, E.**, A.K. Aufdenkampe, C.A. Masiello, A.V. Krusche, J.I. Hedges, P.D. Quay, J.E. Richey and T.A. Brown. 2005. Young organic matter as a source of carbon dioxide outgassing from Amazonian rivers. *Nature* **436**: 538-541
- Mayorga, E.**, M.G. Logsdon, M.V.R. Ballester and J.E. Richey. 2005. Extracting cell-to-cell land surface drainage paths from digital channel networks, with an application to the Amazon basin. *Journal of Hydrology* **315**: 167-182
- Richey, J.E., R.L. Victoria, **E. Mayorga**, L.A. Martinelli and R.H. Meade. 2004. Integrated analysis of a humid tropical region – The Amazon basin, p. 415-428. In: Kabat, P., M. Claussen, P.A. Dirmeyer, J.H.C. Gash, L. Bravo de Guenni, M. Meybeck, R.A. Pielke Sr., C.J. Vörösmarty, R.W.A. Hutjes & S. Lütke-meier (ed.), *Vegetation, water, humans and the climate: A new perspective on an interactive system*. Springer. Berlin
- Ballester, M.V., D.C. Victoria, A.V. Krusche, R. Coburn, R.L. Victoria, J.E. Richey, M.G. Logsdon, **E. Mayorga** and E. Matricardi. 2003. A Remote Sensing / GIS-based physical template to understand the biogeochemistry of the Ji-Paraná river basin (Western Amazonia). *Remote Sensing of Environment* **87**: 429-445
- Grimm, N.B., S.E. Gergel, W.H. McDowell, E.W. Boyer, C.L. Dent, P.M. Groffman, S.C. Hart, J.W. Harvey, C.A. Johnston, **E. Mayorga**, M.E. McClain and G. Pinay. 2003. Merging aquatic and terrestrial perspectives of nutrient biogeochemistry. *Oecologia* **442**: 485-501
- McClain, M.E., E.W. Boyer, C.L. Dent, S.E. Gergel, N.B. Grimm, P.M. Groffman, S.C. Hart, J.W. Harvey, C.A. Johnston, **E. Mayorga**, W.H. McDowell and G. Pinay. 2003. Biogeochemical hot spots and hot moments at the interface of terrestrial and aquatic ecosystems. *Ecosystems* **6**: 301-312
- Mayorga, E.** and A.K. Aufdenkampe. 2002. Processing of bioactive elements in the Amazon River system, p. 1-24. In: McClain, M. E. (ed.), *The Ecohydrology of South American Rivers and Wetlands*. IAHS Spec. Pub. no. 6, IAHS Press. Wallingford, UK
- Hedges, J.I., **E. Mayorga**, E. Tsamakis and others. 2000. Organic matter in Bolivian tributaries of the Amazon River: A comparison to the lower mainstem. *Limnology and Oceanography* **45**: 1449-1466
- McClain, M.E., **E. Mayorga**, M.G. Logsdon and J.E. Richey. 1996. A conceptual framework for modeling organic matter dynamics in large river systems, p. 323-326. In: S.H. Bottrell (ed.), *Fourth International Symposium on the Geochemistry of the Earth's Surface*. University of Leeds. Leeds

Presentations (*Invited)

- 2011 *Newton, J., **E. Mayorga**, J. Allan, S. Rumrill, A. Lanier, C. Bernthal, G. Galasso, E. Bowlby and J. Hennessey. IOOS' role in contributing to national and regional capability for Coastal Marine Spatial Planning: A view from the NANOOS Regional Association. ASLO Aquatic Sciences Meeting, San Juan, Puerto Rico, Feb 13-18.
- 2010 *S.P. Seitzinger, **Mayorga, E.**, A.F. Bouwman, A.H.W. Beusen, J.A. Harrison, C. Kroeze and E.

- Dumont. Global river nutrient export: Scenario analysis of past and future trends. American Geophysical Union, San Francisco, CA, 13-17 Dec. [Wrote and delivered presentation]
- 2010 ***Mayorga E.** and D. Jones. Using IOOS to increase efficiencies in offshore fisheries: The NANOOS Pacific NW experience. First Energy Use in Fisheries Symposium: Improving Efficiency and Technological Innovations from a Global Perspective, Seattle, Nov 14-17.
- 2010 ***Mayorga, E.** Global river nutrient export to coastal zones: Current impacts and scenarios of future transformations (In Spanish). Fifth Nicaraguan Biotechnology Conference, Managua, Nicaragua, 22 Apr.
- 2010 **Mayorga, E.**, D. Jones and R. Blair. Regional to local IOOS data management and interoperability: Perspective from the trenches (NANOOS, US Pacific NW). 2010 Ocean Sciences Meeting, Portland, OR, 22-26 Feb.
- 2010 ***Mayorga, E.** Global river nutrient export: Overview, and scenario analysis of past and future trends. Departmental Seminar, Department of Earth System Science, University of California, Irvine, CA, 27 Jan.
- 2008 ***Mayorga, E.** Freshwater (bio)-geochemical and water quality data: Local and global data integration, technologies, and trends. Stroud Water Research Center, Avondale, PA, 9 Jun.
- 2007 ***Mayorga, E.**, A. Aufdenkampe, C. Masiello, A. Krusche, P. Quay, J. Richey and S. Seitzinger. Rejuvenation and aging of carbon in rivers: Sources, exports and interactions among fractions in the Amazon and other systems. American Geophysical Union, San Francisco, CA, 10-15 Dec.
- 2007 Seitzinger, S., **E. Mayorga**, A. Beusen and others. Past, current and future trajectories of watershed nutrient sources, forms and exports: A Global NEWS application to the Millennium Ecosystem Assessment scenarios. American Geophysical Union, San Francisco, CA, 10-15 Dec.
- 2007 **Mayorga, E.**, S. Seitzinger, A. Beusen, A. Bouwman, E. Dumont, J. Harrison, C. Kroeze, R. Lee and D. Wisser. Scenarios of watershed nutrient sources, forms and exports: A Millennium Ecosystem Assessment "Global NEWS" application. Estuarine Research Federation, Providence, RI, 4-8 Nov.
- 2007 Seitzinger, S., **E. Mayorga**, A. Beusen, A. Bouwman, E. Dumont, B. Fekete, J. Harrison, C. Kroeze, R. Lee, C. Vorosmarty and D. Wisser. Past, current and future trajectories of watershed nutrient sources, forms and exports: A Global NEWS application to the Millennium Ecosystem Assessment scenarios. INI International Nitrogen Conference, Brazil, 1-5 Oct.
- 2007 Aufdenkampe, A.K., **E. Mayorga**, P.J. Hernes and P.A. Bukavekas. Mineral complexation as a primary control on organic matter composition in large rivers. 3rd Int. Conference on Mechanisms of Organic Matter Stabilisation and Destabilisation in Soils and Sediments (SOM3), Australia, 23-26 Sept.
- 2006 **Mayorga, E.** Snohomish County surface water fee assessment: A system for routine data entry, query, and analysis integrating GIS and a relational database. Wash. URISA GIS Conference, Tacoma, WA, 9-11 May.
- 2005 Aufdenkampe, A.K., **E. Mayorga**, J.I. Hedges and others. From the Andes to the Atlantic: The evolution of organic matter in the Amazon River system. American Geophysical Union, New Orleans, LA, 23-27 May.
- 2005 **Mayorga, E.** and Britsch, S. Automation and integration of drainage outfall monitoring data for assessing NPDES water quality compliance. Wash. URISA GIS Conference, Seattle, 9-11 May.
- 2005 **Mayorga, E.**, A.K. Aufdenkampe, C.A. Masiello and others. Origin and cycling of dissolved inorganic carbon in the Amazonian river network: Isotopic perspective (¹³C and ¹⁴C) (In Spanish). Central American Water Resource Management Network (CARA) 2005 Congress, Managua, Nicaragua, 7-11 Mar.
- 2004 **Mayorga, E.**, A.K. Aufdenkampe, A.V. Krusche, C.A. Masiello, P.D. Quay and J.E. Richey. ¹⁴C and ¹³C constraints on CO₂ cycling in pristine and deforested lowland Amazonian rivers.

- American Geophysical Union, San Francisco, CA, 13-17 Dec.
- 2004 Aufdenkampe, A.K., **E. Mayorga**, A.V. Krusche, C.A. Masiello, J.I. Hedges, P.D. Quay and J.E. Richey. Isotopic constraints on organic and inorganic carbon cycling in the Amazon river system. LBA Science Meeting, Brasilia, Brazil, 27-29 Jul.
- 2004 Aufdenkampe, A.K., **E. Mayorga**, A.V. Krusche, S. Alin and J.E. Richey. The need for accessible, flexible relational databases for river biogeochemistry data. LBA Science Meeting, Brasilia, Brazil, 27-29 July.
- 2004 Victoria, D.C., J.E. Richey, M. Costa-Cabral, A.V. Santiago, A.R. Pereira, **E. Mayorga**, R.L. Victoria and M.V.R. Ballester. Recent progress in modeling surface hydrology across the Amazon Basin using a Variable Infiltration Capacity approach. LBA Science Meeting, Brasilia, Brazil, 27-29 Jul.
- 2004 Richey, J.E., Aufdenkampe, A.K., Krusche, A.V. and **E. Mayorga**. ROMBUS: A model of DOM mobilization and reaction. Ocean Research Conference, American Society of Limnology and Oceanography, Honolulu, Hawaii, 15-20 Feb.
- 2002 Aufdenkampe, A.K., **E. Mayorga**, C.A. Masiello and others. Carbon dynamics within waters of the Amazon basin: Stable and radio-isotope constraints on sources of outgassed carbon. LBA Science Meeting, Manaus, Brazil, 7-10 Jul.
- 2002 **Mayorga, E.**, A.K. Aufdenkampe, C.A. Masiello and others. DIC cycling from ^{14}C and ^{13}C isotopes in mountain and lowland rivers in the Amazon basin. Summer Meeting, American Society of Limnology and Oceanography, Victoria, British Columbia, Canada, 10-14 Jun.
- 2002 ***Mayorga, E.**, A.K. Aufdenkampe and C.A. Masiello. Origin and transformation of carbon in the Amazonian fluvial network: An isotopic perspective from natural ^{13}C and ^{14}C (In Spanish). First Nicaraguan Biotechnology Conference, Managua, Nicaragua, 18-20 Apr.
- 2001 ***Mayorga, E.** The global carbon cycle: Principal components, greenhouse effect, terrestrial ecosystems, and the role of the tropics (In Spanish). Universidad Autónoma de Nicaragua, León, Nicaragua, 29 Aug.
- 1999 **Mayorga, E.**, J.E. Richey and A. Aufdenkampe. Towards a mechanistic, remote-sensing driven model of organic matter cycling linking the land surface and river system in the Amazon basin. International Symposium on Hydrological and Geochemical Processes in Large Scale River Basins, Manaus, Brazil, 15-19 Nov.
- 1998 **Mayorga, E.** and J.E. Richey. Patterns of water cycling and net primary production over the Amazon Basin: Model estimates from nine years of AVHRR-GAC measurements. Spring Meeting, American Geophysical Union, Boston, MA, 26-29 May.

Posters

- 2004 **Mayorga, E.** and A.K. Aufdenkampe. Modeling the linked carbon cycle between terrestrial ecosystems and the riverine systems draining them: Issues and challenges, focusing on the Amazon basin. Earth System Scholars Network Symposium, Adelphi, MD, 27-29 Sept.
- 2000 **Mayorga, E.** and J.E. Richey. Carbon cycling in the Amazon basin: Fine-resolution model estimates from eighteen years of AVHRR-GAC measurements. American Geophysical Union, San Francisco, CA, 15-19 Dec.
- 1999 **Mayorga, E.** Coupling land-surface and riverine water and carbon cycles in the Amazon Basin: Development of a multi-scale model driven by remote sensing observations. Gordon Conference on the Hydrology and Biogeochemistry of Forested Catchments, Andover, NH, 18-23 Jul.
- 1997 **Mayorga, E.** Basin-scale controls on organic carbon exports from mesoscale to large Amazonian rivers. Aquatic Sciences Meeting, American Society of Limnology and Oceanography, Santa Fe, NM, 10-14 Feb.