

## CURRICULUM VITAE

### CHARLES JOSEPH VÖRÖSMARTY

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Nationality: US Citizen  
Date of Birth: 16 February 1955

#### (i) PROFESSIONAL PREPARATION

Cornell University	Biological Sciences	Bachelor of Science, 1977
University of New Hampshire	Civil Engineering	Master of Science, 1983
University of New Hampshire	Engineering Systems Design	PhD in Engineering, 1991

#### (ii) APPOINTMENTS

2001 – Present	Research Full Professor (University of New Hampshire)
1998 – 2001	Research Associate Professor (University of New Hampshire)
1991 – 1998	Research Assistant Professor (University of New Hampshire)
1977 – 1991	Research Scientist (University of New Hampshire)

#### (iii) PROFESSIONAL ORGANIZATIONS AND COMMITTEES

##### a) United States

- United States Arctic Research Commission.
  - *Commissioner, White House appointment (2006-08).*
- National Academy of Sciences.
  - *NRC Panel on Water Resources and the Global Hydrologic Cycle of the Earth Science Observations from Space Study (2005-06).*
  - *NRC Polar Research Board, Committee to Review NASA's Polar Geophysical Data Sets (2000-01).*
- National Science Foundation.
  - *Arctic Community Hydrology Synthesis Workshop, Convening Committee Co-Chair (2000).*
  - *Arctic-CHAMP (Community-wide Hydrological Analysis and Monitoring Program), Steering Committee Co-Chair (2002-present).*
  - *Arctic-CHAMP/Freshwater Initiative (FWI), Science Management Office, located at UNH and coordinating 24 NSF-funded projects, Co-Director (2002-present).*
  - *ARCSS (ARctic System Science) Program, Steering Committee (2003-present) and Data Advisory and Modeling Working Group lead (2005-present).*
  - *National Environmental Observing Network (NEON), Review Committee (2004).*
  - *Cyberinfrastructure Directorate Steering Committee (2006-present).*
  - *Arctic Hydrology Workshop, Steering Committee Chair (1999).*
- National Aeronautics and Space Administration.
  - *NASA Socioeconomic Data and Applications Center (SEDAC), User Working Group (2005-present).*
  - *NASA/Oak Ridge National Laboratory Earth Observing System Distributed Active Archive Center (ORNL-DAAC), User Working Group (1996-2002).*
  - *Land Surface Hydrology Mission, Steering Committee Member (1999).*

- *Surface Water Working Group, Participating Member (1999-present).*
- *SeaWIFs Science Team, Member (1997-2005).*
- *TRMM Science Team, Member (1997-2005).*
- Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI).
  - *Standing Committee on Synthesis (2003).*
  - *Working Group Chair on Global Water Sciences (2005).*
- New England Coastal Basins (NECB) National Water-quality Assessment Program (NAWQA) Study. -
  - *Liaison Committee Member (1998-2000).*
- American Geophysical Union, current member.
- Estuarine Research Federation, current member.
- Water Pollution Control Federation, past member.

## **b) International**

- Global Water System Project (Earth System Science Partnership Project).
  - *Co-Chair (2004-present).*
  - *Scoping Team and Framing Committee (2001-2004).*
  - *Co-Convener and Host, GWSP Open Science Conference, Portsmouth NH (2003).*
- International Global Observing System Partnership, Global Earth Observation System of Systems.
  - *IGWCO (Integrated Global Water Cycle Observations), Science Steering Committee (2004-present).*
  - *IGOS-P Water/GEOSS Advisor & Contributor (2003-2004).*
- International Council of Scientific Unions.
  - *Member, Preparatory Committee & Member of Scientific and Technological Delegation to the UN Commission on Sustainable Development (CSD) (2004, 2005).*
- International Association of Hydrological Sciences (IAHS).
  - *ICASVR, International Committee on Atmosphere-Soil-Vegetation Relations, Secretary (1994-2000) and President (2000-04).*
  - *Hydrological Sciences Journal, Associate Editor (October 2001-present).*
  - *Working group on Global Data Sets, Member (1997-present).*
  - *IAHS Assembly: Global Data Set Workshop, Convener (1997-1999).*
- IGBP (International Geosphere-Biosphere Programme) Core Project: Biospheric Aspects of the Hydrological Cycle (BAHC).
  - *Scientific Steering Committee (1993-2002).*
  - *Project Leader: Modeling the Fluvial Transport of Water and Constituents (1993-2000).*
  - *Inter-Project Task Force on Freshwater (1995-1999).*
  - *AFRICAN-GAIM Global Change Modeling Activity, International Organizing Committee (1997).*
  - *PAGES Committee on Land Use and Climate Impacts on Fluvial Systems during the Period of Agriculture, BAHC Liaison (1994).*
- International Polar Year (IPY)
  - *Arctic-HYDRA: The Arctic Hydrological Cycle Monitoring, Modelling and Assessment Program, Co-leader (2005-present).*

- Northern Eurasia Earth Science Partnership Initiative (NEESPI).
  - *Focus Research Center on Hydrology (2005-present)*.
  - *Steering Committee (2004-present)*.
  - *Review Committee Chair (2003)*.
- International SCOPE Nitrogen Project, Working Group #1 (Regional and Landscape-Scale Nitrogen Budgets), Member (1999-present).
- US-French National Academy of Sciences, Hydrology Workshop. Member, US Delegation (1999).
- GEMS-Water, WHO/UNEP Expert Panel on Land-Based Sources of Global Pollution (June 1995).
- Second International Conference on Climate and Water, Rapporteur, Theme 2d: Water Balances of Large River Basins (1998).
- US-Russian Earth Sciences Joint Working Group (Gore-Chernomyrdin Protocols), US Representative to the 8<sup>th</sup> Meeting (September 1995).

## **PUBLISHED WORKS:**

### **(iv) JOURNAL ARTICLES**

- Vörösmarty, C.J., J.P. Ericson, S.L. Dingman, L.G. Ward, and M. Meybeck. 2007. Future impacts of fresh water resource management: Sensitivity of coastal deltas. *Water Quality and Sediment Behaviour of the Future: Predictions for the 21<sup>st</sup> Century (IUGG Symposium Proceedings)*, IAHS Publ. 314.
- Vörösmarty, C.J., A.D. McGuire, L. Hinzman, M. Holland, M. Murray, J. Schimel, W. Warnick, J. Weatherly, and H. Wiggins. 2007. New perspectives through data discovery and modeling: Arctic System Synthesis Workshop. *Eos Transactions* 88: 278.
- D’Almeida, C., C. Vörösmarty, G. Hurtt, J. Marengo, S.L. Dingman, and B. Kiem. 2007. The effects of deforestation on the hydrological cycle in Amazonia: A review on scale and resolution. *International Journal of Climatology*, in press.
- Gutowski, W.J., H. Wei, C.J. Vörösmarty, and B.M. Fekete. 2007. Influence of Arctic wetlands on Arctic atmospheric circulation. *Journal of Climate* 20: 4243-4254.
- Ericson, J.P., C.J. Vörösmarty, S.L. Dingman, L.G. Ward, and M. Meybeck. 2006. Effective sea-level rise in deltas: sources of change and human-dimension implications. *Global & Planetary Change* 50: 63-82.
- Oczkowski, A.J., C.W. Hunt, T.C. Loder, W.M. Wollheim, B.A. Pellerin, and C.J. Vörösmarty. 2006. The role of snowmelt and Spring rainfall in inorganic nutrient fluxes from a large temperate watershed, the Androscoggin River Basin (Maine and New Hampshire). *Biogeochemistry* 80:3, 191-203.
- Rawlins, M.A., C.J. Willmott, A. Shiklomanov, S. Frolking, and C.J. Vörösmarty. 2006. Evaluation of trends in derived snowfall and rainfall across Eurasia and linkages with discharge to the Arctic Ocean. *Geophysical Research Letters* 33: L07403 doi:10.1029/2005GL025231.
- Shiklomanov, I.A., T. I. Yakovleva, R. B. Lammers, I.Ph. Karasev, C. J. Vörösmarty, and E. Linder. 2006. Cold region river discharge uncertainty—estimates from large Russian rivers. *Journal of Hydrology*

326: 231–256.

- Douglas, E. M., D. Niyogi, S. Frohking, J. B. Yeluripati, R. A. Pielke, Sr., N. Niyogi, C. J. Vörösmarty, and U. C. Mohanty. 2006. Changes in moisture and energy fluxes due to agricultural land use and irrigation in the Indian Monsoon Belt. *Geophysical Research Letters* 33, L14403, doi:10.1029/2006GL026550.
- Douglas, E. M., S. Wood, K. Sebastian, and C. J. Vörösmarty. 2006. Policy implications of a pan-tropic assessment of the simultaneous hydrological and biodiversity impacts of deforestation. *Water Resources Management*. In press.
- Oczkowski, A.J., B.A. Pellerin, C. W. Hunt, W.M. Wollheim, C.J. Vörösmarty, and T.C. Loder. 2006. The role of snowmelt and spring rainfall in inorganic nutrient fluxes from a large temperate watershed, the Androscoggin River basin (Maine and New Hampshire). *Biogeochemistry* 80:3, 191-203.
- Fekete, B.M., J.A. Gibson, P. Aggarwal, and C. J. Vörösmarty. 2006. Application of isotope tracers in continental scale hydrological modeling. *Journal of Hydrology*. In press.
- Wollheim, W.M. C.J. Vörösmarty, B. J. Peterson, S. P. Seitzinger, and C. S. Hopkinson. 2006. Relationship between river size and nutrient removal. *Geophysical Research Letters* VOL. 33, L06410, doi:10.1029/2006GL025845, 2006.
- Gutowski, W.J., H. Wei, C.J. Vörösmarty, and B.M. Fekete. 2006. Influence of arctic wetlands on arctic atmospheric circulation. *Journal of Climate*. In press.
- Meybeck, H. H. Dürr, C. J. Vörösmarty. 2006. Global coastal segmentation and its river catchment contributors: A new look at land-ocean linkage. *Global Biogeochemical Cycles* 20, GB1S90, doi:10.1029/2005GB002540, 2006.
- Pellerin, B.A., W.M. Wollheim, X. Feng, and C.J. Vörösmarty. 2006. The role of surface runoff in urban stormflow generation: Inferences from chemical and isotopic hydrograph separation. *Hydrological Processes*. In press.
- Pellerin, B.A., W.M. Wollheim, C.J. Vörösmarty, W H. McDowell, and C. S. Hopkinson. 2006. Watershed characteristics influencing stream nutrient concentrations across a rural-to-urban land use gradient. *Environmental Management*. In review.
- Wollheim, W. M., C. J. Vörösmarty, B. J. Peterson, P. A. Green, S. Seitzinger, J. Harrison, A. F. Bouwman, M. Meybeck, and J. P. M. Syvitski. 2006. A spatially distributed FRamework for Aquatic Modeling of the Earth System (FrAMES). *Global Biogeochemical Cycles*. In review.
- Boyer, E.W., R.W. Howarth, J.N. Galloway, F.J. Dentener, P. Green, and C.J. Vörösmarty. 2006. Riverine nitrogen export from the continents to the coasts. *Global Biogeochemical Cycles* 20, GB1S91, doi:10.1029/2005GB002537, 2006.
- Vörösmarty, C.J., E.M. Douglas, P.A. Green, and C. Revenga. 2005. Geospatial indicators of emerging water stress: An application to Africa. *Ambio* 34: 230-236.
- Syvitski, J.P.M., C.J. Vörösmarty, A.J. Kettner, and P. Green. 2005. Impact of humans on the flux of terrestrial sediment to the global coastal ocean. *Science* 308: 376-380.
- Hunt, C.W., T. Loder, and C.J. Vörösmarty. 2005. Spatial and temporal patterns of inorganic nutrient concentrations in the Androscoggin and Kennebec Rivers, Maine. *Water, Air, and Soil Pollution* 163: 303–323.
- Rawlins, M.A., K.C. McDonald, S. Frohking, R. B. Lammers, M. Fahnestock, J. S. Kimball, C.J. Vörösmarty. 2005. Remote sensing of snow thaw at the pan-Arctic scale using the SeaWinds

- Scatterometer. *Journal of Hydrology* 312: 294-311.
- Harrison, J.A., S.P. Seitzinger, A.F. Bouwman, N.F. Caraco, A.H.W. Beusen, and C.J. Vörösmarty. 2005. Dissolved inorganic phosphorus export to the coastal zone: Results from a spatially explicit, global model. *Global Biogeochemical Cycles* 19:4.
- Meybeck, M. and C.J. Vörösmarty. 2005. Fluvial filtering of land to ocean fluxes: from natural Holocene variations to Anthropocene. *Comptes Rendus* 337: 107–123.
- Wollheim, W. M., B. A. Pellerin, C. J. Vorosmarty, and C. S. Hopkinson. 2005. N retention in urbanizing headwater catchments. *Ecosystems* 8: 871-884.
- Overpeck, J.T. et al. 2005. Arctic system on trajectory to new, seasonally ice-free state. *AGU Eos Transactions* 86: 309-316.
- Fekete, B.M., C.J. Vörösmarty, J. Roads, and C. Willmott. 2004. Uncertainties in precipitation and their impacts on runoff estimates. *Journal of Climate* 17: 294-304.
- Green, P., C. J. Vörösmarty, M. Meybeck, J. Galloway, and B.J. Peterson. 2004. Pre-industrial and contemporary fluxes of nitrogen through rivers: A global assessment based on typology. *Biogeochemistry* 68: 71-105.
- Salisbury, J.E., J. W. Campbell, E. Linder, L. D. Meeker, Frank E. Müller-Karger, and C. J. Vörösmarty. 2004. On the seasonal correlation of surface particle fields with wind stress and Mississippi discharge in the northern Gulf of Mexico. *Deep Sea Research Part II*, 51: 1187-1203.
- Galloway, J.N., F.J. Dentener, D.G. Capone, E.W. Boyer, R.W. Howarth, S.P. Seitzinger, G. Asner, C. Cleveland, P. Green, E. Holland, D.M. Karl, A.F. Michaels, J. Porter, A. Townsend, and C. Vörösmarty. 2004. Global and regional nitrogen cycles: Past, present and future. *Biogeochemistry* 70: 153-226.
- Pellerin, B.A., W. Wollheim, C.S. Hopkinson, W.H. McDowell, M.R. Williams, C.J. Vörösmarty, and M.L. Daley. 2004. Role of wetlands and developed land use on dissolved organic nitrogen concentrations and DON/TDN in northeastern U.S. rivers and streams. *Limnology and Oceanography* 49: 910–918.
- Bjerklie, D.M., S.L. Dingman, C.J. Vörösmarty, C.H. Bolster, and R.G. Congalton. 2003. Evaluating the potential for measuring river discharge from space. *Journal of Hydrology* 278: 17-38.
- Federer, C.A., C.J. Vörösmarty, and B. Fekete 2003. Sensitivity of annual evaporation to soil and root properties in two modes of contrasting complexity. *Journal of Hydrometeorology* 4: 1276-1290.
- Rawlins, M.A., R.B. Lammers, S. Froking, B.M. Fekete, C.J. Vörösmarty. 2003. Simulating pan-Arctic runoff with a macro-scale terrestrial water balance model. *Hydrological Processes* 17: 2521-2539.
- Vörösmarty, C.J., M. Meybeck, B. Fekete, K. Sharma, P. Green, and J. Syvitski. 2003. Anthropogenic sediment retention: Major global-scale impact from the population of registered impoundments. *Global and Planetary Change* 39: 169-190.
- Vörösmarty, C.J. 2002. Global change, the water cycle, and our search for Mauna Loa. *Hydrological Processes* 16: 1335-1339.
- Vörösmarty, C.J. 2002. Global water assessment and potential contributions from earth systems science. *Aquatic Sciences* 64: 328-351.

- Peterson, B.J., R.M. Holmes, J.W. McClelland, C.J. Vörösmarty, R.B. Lammers, A.I. Shiklomanov, I.A. Shiklomanov, and S. Rahmstorf. 2002. Increasing river discharge to the Arctic Ocean. *Science* 298: 2171-2173.
- Wei, H., W.J. Gutowski, C.J. Vörösmarty, and B. Fekete. 2002. Calibration and validation of a regional climate model for pan-Arctic hydrologic simulation. *Journal of Climate* 15 (22): 3222-3236.
- Fekete, B.M., C.J. Vörösmarty, and W. Grabs. 2002. High resolution fields of global runoff combining observed river discharge and simulated water balances. *Global Biogeochemical Cycles* 6(3), doi:10.1029/1999GB001254.
- Gutowski, W.J., C.J. Vörösmarty, M. Person, Z. Ötles, B. Fekete, and J. York. 2002. A coupled land-atmosphere simulation program (CLASP): Calibration and validation. *Journal of Geophysical Research* 107: D16.
- Luo, T., R.P. Neilson, T. Hanqin, C.J. Vörösmarty, H. Zhu, and S. Liu. 2002. A model for seasonality and distribution of leaf area index of forests and its application to China. *Journal of Vegetation Science* 13: 817-830.
- Meybeck, M., P. Green, and C.J. Vörösmarty. 2001. A new typology for mountains and other relief classes: An application to global continental water resources and population distribution. *Mountain Research and Development* 21: 34-45.
- Fekete, B.M., C.J. Vörösmarty, and R.B. Lammers. 2001. Scaling gridded river networks for macroscale hydrology: Development, analysis, and control of error. *Water Resources Research* 37: 1955-1967.
- Lammers, R.B., A.I. Shiklomanov, C.J. Vörösmarty, B.M. Fekete, and B.J. Peterson. 2001. Assessment of contemporary Arctic river runoff based on observational discharge records. *Journal of Geophysical Research - Atmospheres* 106 (D4): 3321-3334.
- Vörösmarty, C.J., P. Green, J. Salisbury, and R. Lammers. 2000. Global water resources: Vulnerability from climate change and population growth. *Science* 289: 284-288.
- Vörösmarty, C.J., B. M. Fekete, M. Meybeck, and R. Lammers. 2000. Geomorphometric attributes of the global system of rivers at 30-minute spatial resolution (STN-30). *Journal of Hydrology* 237: 17-39.
- Vörösmarty, C.J., B.M. Fekete, M. Meybeck, and R. Lammers. 2000. Global system of rivers: Its role in organizing continental land mass and defining land-to-ocean linkages. *Global Biogeochemical Cycles* 14: 599-621.
- Vörösmarty, C.J. and D. Sahagian. 2000. Anthropogenic disturbance of the terrestrial water cycle. *BioScience* 50: 753-65.
- Holmes, R.M., B.J. Peterson, V.V. Gordeev, A.V. Zhulidov, M. Meybeck, R.B. Lammers, and C.J. Vörösmarty. 2000. Flux of nutrients from Russian rivers to the Arctic Ocean: Can we establish a baseline against which to judge future changes? *Water Resources Research* 36: 2309-2320.
- McGuire, A.D., J.S. Clein-Curley, J.M. Melillo, D.W. Kicklighter, R.A. Meier, and C.J. Vörösmarty. 2000. Modeling carbon responses of tundra ecosystems to historical and projected climate: Part II. The sensitivity of pan-Arctic carbon storage to temporal and spatial variation in climate. *Global Change Biology* 6:1 141-159.
- Tian, H., J.M. Melillo, D.W. Kicklighter, A.D. McGuire, J. Helfrich III, B. Moore III and C.J. Vörösmarty. 2000. Climatic and biotic controls on annual carbon storage in Amazonian ecosystems. *Global Ecology and Biogeography* 9:315-336.

- Sharma, K.P., B. Moore III, and C.J. Vörösmarty. 2000. Anthropogenic, climatic, and hydrologic trends in the Kosi Basin, Himalaya. *Climatic Change* 47: 141-165.
- Sharma, K.P., B. Moore III, and C.J. Vörösmarty. 2000. Sensitivity of the Himalayan hydrology to land-use and climatic changes. *Climatic Change* 47: 117-139.
- Xiao, X., C.J. Vörösmarty, J. Melillo, D.W. Kicklighter, H. Tian, A.D. McGuire, Y. Pan, and Z. Yang. 1999. Transient climate change and potential croplands of the world in the 21st century. *Sistema Terra* 8: 96-109. (Also in Italian).
- Vörösmarty, C.J., C.A. Federer and A. Schloss. 1998. Potential evaporation functions compared on U.S. watersheds: Implications for global-scale water balance and terrestrial ecosystem modeling. *Journal of Hydrology* 207: 147-69.
- Tian, H., J.M. Melillo, D.W. Kicklighter, A.D. McGuire, B. Moore III, and C.J. Vörösmarty. 1998. Effect of climate variability and increasing atmospheric CO<sub>2</sub> on carbon storage in undisturbed Amazonian Ecosystems. *Nature* 396:664-667.
- Vörösmarty, C.J. K. Sharma, B. Fekete, A.H. Copeland, J. Holden, J. Marble, and J.A. Lough. 1997. The storage and aging of continental runoff in large reservoir systems of the world. *Ambio* 26: 210-19.
- Vörösmarty, C.J., M. Meybeck, B. Fekete, and K. Sharma. 1997. The potential impact of neo-Castorization on sediment transport by the global network of rivers. In: D. Walling and J.-L. Probst (eds.), *Human Impact on Erosion and Sedimentation*, pp. 261-72. IAHS Press, Wallingford UK.
- McGuire, A.D., J.M. Melillo, D.W. Kicklighter, Y. Pan, X. Xiao, J. Helfirch, B. Moore III, C.J. Vörösmarty, and A.L. Schloss. 1997. Equilibrium responses of global net primary production and carbon storage to doubled atmospheric carbon dioxide: Sensitivity to changes in vegetation nitrogen concentration. *Global Biogeochemical Cycles* 11: 173-189.
- Szillágyi, J. and C.J. Vörösmarty. 1997. Modeling unconfined aquifer level reductions in the area between the Danube and Tisza Rivers in Hungary. *J. Hydrol. Hydromech.* 45: 328-47.
- Vörösmarty, C.J., C.J. Willmott, B.J. Choudhury, A.L. Schloss, T.K. Stearns, S.M. Robeson, and T.J. Dorman. 1996. Analyzing the discharge regime of a large tropical river through remote sensing, ground-based climatic data, and modeling. *Water Resources Research* 32: 3137-50.
- Federer, C.A., C.J. Vörösmarty, and B. Fekete. 1996. Intercomparison of methods for potential evapotranspiration in regional or global water balance models. *Water Resources Research* 32: 2315-21.
- Vörösmarty, C.J. and T.C. Loder. 1994. Spring-neap tidal contrasts in marsh-dominated estuaries. *Estuaries* 17:537-551.
- McGuire, A.D., L.A. Joyce, D.W. Kicklighter, J.M. Melillo, G. Esser, and C.J. Vörösmarty. 1993. Productivity response of climax temperate forests to elevated temperature and carbon dioxide: A North American comparison between two global models. *Climatic Change* 24: 287-310.
- Melillo, J.M., A.D. McGuire, D.W. Kicklighter, B. Moore, C.J. Vörösmarty, and A.L. Schloss. 1993. Global climate change and terrestrial net primary production. *Nature* 363: 234-40.
- McGuire, A.D., J.M. Melillo, L.A. Joyce, D.W. Kicklighter, A.L. Grace, B. Moore, and C. J. Vörösmarty. 1992. Interactions between carbon and nitrogen dynamics in estimating net primary productivity for potential vegetation in North America. *Global Biogeochemical Cycles* 6:101-24.

- Vörösmarty, C.J. and B. Moore III. 1992. Distributed parameter models of water balance and fluvial transport for use in global change studies. *Vízügyi Közlemények (VITUKI)* 74:297-318. Budapest (HUNGARY). (In Hungarian).
- Vörösmarty, C.J. and B. Moore III. 1991. Modeling basin-scale hydrology in support of physical climate and global biogeochemical studies: An example using the Zambezi River. *Studies in Geophysics* 12: 271-311.
- Vörösmarty, C.J., B. Choudhury, A. Grace, B. Moore III, and C.J. Willmott. 1991. A strategy to study regional hydrology and terrestrial ecosystem processes using satellite remote sensing, ground-based data and computer modeling. *Acta Astronautica* 25: 785-92
- Bowden, W.B., C.J. Vörösmarty, J. Morris, J. Hobbie, B. Moore, B. Peterson, and P. Steudler. 1991. Transport and processing of nitrogen in a tidal freshwater marsh. *Water Resources Research* 27: 389-408.
- Raich, J., E. Rastetter, J. Melillo, B.J. Peterson, D. Kicklighter, P.A. Steudler, B. Moore, C.J. Vörösmarty, and A. Grace. 1991. Potential net primary productivity in South America: Application of a global model. *Ecological Applications* 1:399-429.
- Vörösmarty, C.J., B. Moore, M.P. Gildea, B. Peterson, J. Melillo, D. Kicklighter, J. Raich, E. Rastetter, and P. Steudler. 1989. A continental-scale model of water balance and fluvial transport: Application to South America. *Global Biogeochemical Cycles* 3: 241-65.
- Hall, C.A.S., R. Howarth, B. Moore, and C.J. Vörösmarty. 1978. Environmental impacts of industrial energy systems in the coastal zone. *Annual Review of Energy* 3: 395– 475.

#### **(v) CONTRIBUTIONS TO BOOKS**

- Vörösmarty, C.J., E. Douglas, and S. Glidden. 2006. Indicator mapping and accompanying text, on selected water-related indicators associated with WWDR Theme areas. In: *Water: A Shared Responsibility. World Water Development Report 2*, World Water Assessment Programme. UNESCO, Paris. 584 pp.
- Esty, D.C., M.A. Levy, T. Srebotnjak, A. deSherbinin, C.H. Kim, and B. Anderson. 2006. *Pilot 2006 Environmental Performance Index*. Yale Center for Environmental Policy and Law, New Haven. 349 pp. *Provided computed water and water quality statistics and derived indices*.
- Vörösmarty, C.J., C. Leveque, C. Revenga (Convening Lead Authors). 2005. Chapter 7: Fresh Water, pages 165-207 in: *Millennium Ecosystem Assessment, Volume 1: Conditions and Trends Working Group Report*, (with R. Bos, C. Caudill, J. Chilton, E. M. Douglas, M. Meybeck, D. Prager, P. Balvanera, S. Barker, M. Maas, C. Nilsson, T.Oki, C. A. Reidy). Island Press. 966 pp.
- Douglas, E. M., K. Sebastian, C. J. Vörösmarty and S. Wood. 2005. *The Role of Tropical Forests in Supporting Biodiversity and Hydrologic Integrity*. World Bank Policy Research Working Paper No. 3635, Social Science Research Network, Washington, DC., 2005, available on-line at <http://econ.worldbank.org>.
- Vörösmarty, C.J. and M. Meybeck. 2004. Responses of continental aquatic systems at the global scale: New paradigms, new methods. Pages 375-413 in: P. Kabat, 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, and S. Lutkemeier (eds.), *Vegetation, Water, Humans and the Climate*. Springer, Heidelberg. 566 pp.
- Meybeck, M. and C.J. Vörösmarty, editors. 2004. The integrity of river and drainage basin systems: Challenges from environmental change. Section D in: P. Kabat, 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, and S. Lutkemeier (eds.), *Vegetation, Water, Humans and the Climate*. Springer, Heidelberg. 566 pp.
- UN World Water Development Report. 2003. Contributor to Chapter 3 (pp. 29-60), Signing progress: Indicators mark the way. *Water for People, Water for Life. First World Water Development Report*. World Water Assessment Programme. UNESCO, Paris.
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(vii) **PRESENTATIONS AND LEADERSHIP ROLES BEFORE PROFESSIONAL GROUPS AND WORKSHOPS** (selections as primary presenter since 2000; total 182 presentations from 1983)

“The Science of Global Hydrology: Lessons from the US Northeast Corridor.” Invited presentation, Cornell University Speaker Series, Ithaca, New York. September 2007.

“The UNH Earth Systems Observatory and the White Water-to-Blue Water Analysis of Regional Ecosystem State, w/B. Braswell, B. Fekete, A. Magill, S. Glidden, and H. Hartmann.” Oral presentation in IAHS Symposium HW2006: New Avenues for Contemporary Water Resources Management. International Union of Geodesy and Geophysics (IUGG), Perugia, Italy. July 2007.

“Geospatial Indicators to Support Water Resource and Water Security Assessments, w/E.M. Douglas.” Oral presentation in IAHS Symposium HW2006: Changes in Water Resources Systems – Methodologies to Maintain Water Security and Ensure Integrated management, International Union of Geodesy and Geophysics (IUGG), Perugia, Italy. July 2007.

“Northern Eurasia Earth Science Partnership Initiative (NEESPI): Integrated Approach to Regional Climate and Environment Change Studies I.” Convener, Global Environmental Change (GC07) Session, American Geophysical Union (AGU) Fall Meeting, San Francisco, California. December 2006.

“Use of Scenarios to Decipher Key Determinants of Change in the Water Cycle w/R. Lammers, A. Shiklomanov, X. Xiao, M. Rawlins, W. Wollheim, G. Hurtt, L. Smith, D. Wisser, and B. Fekete.” Oral presentation in Session H37: Scenario Planning for Water Resources Management. American Geophysical Union (AGU) Fall Meeting, San Francisco, California. December 2006.

“The UNH Earth Systems Observatory: A Regional Application in Support of GEOSS Global-Scale Objectives, w/B. Braswell, B. Fekete, S. Glidden, H. Hartmann, A. Magill, A. Prusevitch, W. Wollheim, D. Blaha, D. Justice, G. Hurtt, J. Jacobs, S. Ollinger, W. McDowell, B. Rock, F. Rubin, and A. Schloss.” Oral presentation in Session IN14: Exemplifying eGY Principles: eGY Showcase Projects. American Geophysical Union (AGU) Fall Meeting, San Francisco, California. December 2006.

“How can Earth System and Socio-economic Information be used to Better Understand and Manage the Local and Remote Effects Controls on Regional Water Resources?” Co-convener, Global Environmental Change: Regional Challenges, Earth System Science Partnership (ESSP) Global Environmental Change Open Science Conference, Beijing, China. November 2006.

“Insights from the Earth System Sciences for improved Water Management.” Oral presentation, Earth System Science Partnership (ESSP) Global Environmental Change Open Science Conference, Beijing, China. November 2006.

“The African Water System as a Constraint on the African Food System.” Oral presentation, Earth System Science Partnership (ESSP) Global Environmental Change Open Science Conference, Beijing, China. November 2006.

“Synthesis Studies to Improve Understanding of the State and Degree of Change in the Pan-Arctic Water System.” Poster presentation, Earth System Science Partnership (ESSP) Global Environmental Change Open Science Conference, Beijing, China. November 2006.

“Delta Systems at Risk: Articulating the Role of Freshwater Resource Management.” Poster presentation, Earth System Science Partnership (ESSP) Global Environmental Change Open Science Conference, Beijing, China. November 2006.

“Linkages to Water System Studies.” Presentation at the Northern Eurasia Earth Science Partnership Initiative (NEESPI) Workshop of the Regional Focus Research Center on Dry Land Processes Studies, Beijing, China. November 2006.

Chief Facilitator, NOAA Coastal Response Research Center’s Fall Institute: Innovative Coastal Modeling for Decision Support: Integrating Physical, Biological and Toxicological Models. Durham, New Hampshire. September 2006.

“NRC Decadal Study.” Oral presentation at the SocioEconomic Data and Applications Center (SEDAC) User Working Group Meeting, New York, New York. August 2006.

“Global Water Crisis.” Invited keynote presentation, Summer Institute, IAEA and Institute of Nuclear Science and Engineering, World Nuclear University (WNU), Stockholm, Sweden. July 2006.

"The Global Water System Project: Its Agenda for Integrative Water Studies." Invited keynote presentation. Conference on Hydrological Sciences for Managing Water Resources in the Asian Developing World. Guangzhou, China. June 2006.

2nd GWSP-Asia Regional Global Water System Project Workshop. Co-organizer and facilitator. Guangzhou, China. June 2006.

International Commission on Large Dams (ICOLD). Briefings to three ICOLD Technical Committees on collaborative GWSP activities. Barcelona, Spain. June 2006.

"UNH Water Systems Analysis Group: A Portfolio of Recent Activities." Overview briefing for The Netherlands Environmental Assessment Agency. Bilthoven, The Netherlands. June 2006.

National Science Foundation Arctic System Science Research Program (NSF-ARCSS), Freshwater Initiative All-Hands Meeting, Co-Convener, w/ L. Hinzman. Estes Park, Colorado. June 2006.

Congressional Science Briefing on Systematic Arctic Environmental Change, Thresholds, Feedbacks: Oral presentation with M. Sturm, M. Serrze, and J. Schimel. Dirksen Senate Office Building, Washington DC. May 2006.

"Humans and Their 21st Century Hydrosphere: A Global Perspective." Invited speech. Robbins Memorial Symposium, Phillips Exeter Academy, Exeter, New Hampshire. April 2006.

Global Water System Project/Nature Conservancy Global Dam and Reservoir Workshop. Chief organizer and facilitator. Washington, DC. March 2006.

"Scope of Water Management Problems: Global Perspectives on Emerging Research & Educational Needs." Invited presentation to the Conference on Research & Education Needs for Water Management. National Academies of Sciences and Engineering, Keck Center, Washington DC. March 2006.

e-Town Meeting: "Data and Modeling Strategies." Oral presentation w/ J. Francis, M. Holland, J. Overpeck, M. Serreze, and J. Weatherly. ARCUS, Fairbanks, Alaska. March 2006.

"The Global Water System Project." Briefing to the Joint Steering Committee of the WCRP and IGBP. Pune, India. March 2006.

"Linkages to GWSP." Oral presentation. IGWCO-CEOP Joint Workshop. UNESCO, Paris. February 2006.

"Water Resource Variability and the Origin of Internal Conflict." Invited oral presentation w/ M. Levy, C. Thorkelson, E.M. Douglas, M. Humphreys. Special Session: Science and the End to Poverty. AAAS Annual Meeting, St. Louis. February 2006.

"Integrating and Synthesizing Climate Research Activities: Lessons from the NSF FreshWater Integration (FWI) Study." S.T. Lee Lecture in Arctic Studies (Invited), University of Alaska, Fairbanks. February 2006.

"NEESPI-GWSP Links." Oral presentation. Northern Eurasian Earth System Partnership Initiative. Laxenburg, Austria. February 2006.

"Global Water System Project: Liaison Activities with GEWEX." GEWEX Science Steering Committee Meeting. Dakar, SENEGAL. January 2006.

U.S. Interagency Briefing on Arctic-HYDRA: International Pan-Arctic Water Cycle Study for the International Polar Year (IPY), 2007-08. Chief organizer w/ Á. Snorrason (Iceland). US National Academy of Sciences, Keck Center. Washington, DC. January 2006.

"News Flash: Humans Transforming the Global Water Cycle." Invited presentation to the NASA Socioeconomic Data and Applications Center (SEDAC) User Working Group Meeting, New York, New York. December 2005.

"The Mississippi Delta in the Light of Hurricane Katrina." Oral presentation w/J. Syvitski, AGU Fall Meeting, San Francisco, California. December 2005.

"Analysis of Variability in Spring Maximum Discharge across Arctic Drainage basin of Eurasia." Poster presentation w/A. Shiklomanov, AGU Fall Meeting, San Francisco, California. December 2005.

"Changes in Moisture and Energy Fluxes due to Groundwater-based Irrigation in the Indian Monsoon Belt." Poster presentation w/E. Douglas, AGU Fall Meeting, San Francisco, California. December 2005.

"Water System Studies." Presentation to the International Geosphere-Biosphere Programme (IGBP) at the NASA Northern Eurasian Earth Science Partnership Initiative (NEESPI) Meeting. San Francisco, California. December 2005.

NSF Arctic CHAMP Science Steering Committee Meeting, Co-Convener (w/Larry Hinzman). AGU Fall Meeting, San Francisco, California. December 2005.

International Polar Year-HYDRA and Second International Conference on Arctic Research Planning (ICARP II) Meetings, Breakout Group participant. Copenhagen, Denmark. November 2005.

Global Risk Programme Workshop, Expert Panelist on the Environment. Sponsored by the World Economic Forum, Swiss Re, Merrill-Lynch, and Marsh and McLennan Companies, New York, New York. November 2005.

Pilot Environmental Performance Index (EPI) Expert Workshop, Panelist. New Haven, Connecticut. October 2005.

“Infrastructure and Support for Funded Programs: Freshwater.” ARCSS Committee Meeting, Arlington, Virginia. October 2005.

“The U.S. Global Water Science Working Group.” National Science Foundation, National Center for Hydrological Synthesis Reverse Site Visit, Washington, DC. September 2005.

“GWSP: Its science agenda and support to water management.” NASA Energy and Water Study (NEWS) Kick-Off Meeting, Goddard Institute for Space Studies, New York, New York. September 2005.

International Association of Hydrologic Research (IARC), Permafrost Hydrology Workshop, Co-convener w/L. Hinzman. Fairbanks, Alaska. August 2005.

“Emerging Changes in the Hydrosphere: Climate and Other Parts of a Global Puzzle.” Invited keynote presentation, International Association of Meteorology and Atmospheric Sciences (IAMAS) Scientific Assembly, Beijing CHINA. August 2005.

“Hydrological Process and Water Security Related to Climate Change and Human Activity.” Chair, Afternoon Session in the joint symposium with IAHS, IAMAS, and ICCL, International Association of Meteorology and Atmospheric Sciences (IAMAS) Scientific Assembly, Beijing CHINA. August 2005.

“Present Advances of GWSP and Its Links to the Chinese Case Study.” Invited presentation, Working Meeting for Chinese National Committee of the GWSP, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing CHINA. August 2005.

"Regional Modeling to Support the National Environmental Observing Network (NEON)." Perspectives offered to the NEON Modeling Workshop, Woods Hole, Massachusetts. July 2005.

“Global Water Crisis.” Invited keynote presentation, Summer Institute, IAEA and Institute of Nuclear Science and Engineering, World Nuclear University (WNU), Idaho Falls, Idaho. July 2005.

“GWSP: Its Science Agenda and Support to Water Management.” Invited presentation, Fifth International Scientific Conference on the Global Energy and Water Cycle (GEWEX), Costa Mesa, California. June 2005.

“Predictions for Water Management.” Theme 2 Chair, Fifth International Scientific Conference on the Global Energy and Water Cycle (GEWEX), Costa Mesa, California. June 2005.

National Science Foundation Arctic System Science Research Program (NSF-ARCSS), Freshwater Initiative All-Hands Meeting, Co-Convener, w/ L. Hinzman. Seattle, Washington. June 2005.

“Evolution of NSF-ARCSS and its Synthesis Strategy.” Freshwater Initiative All-Hands Meeting, NSF Arctic System Science Research Program. Seattle, Washington. June 2005.

“Water Resource Issues,” Global Water System Project Indicators Meeting. Wallingford, UK. May 2005.

“Hydrological Modeling.” Invited presentation. Summer School on Environmental Modeling of Amazonia, Rio de Janeiro BRAZIL. April 2005.

“GWSP: Contributions toward Hydrology 2020 (poster).” International Association of Hydrological Sciences (IAHS) Scientific Assembly, Foz do Iguacu BRAZIL. April 2005.

“Feasibility of Surface Water Monitoring using Satellite Sensors.” International Association of Hydrological Sciences (IAHS) Scientific Assembly, Foz do Iguacu BRAZIL. April 2005.

“Role of River Networks in Processing Anthropogenic Nitrogen Loads.” International Association of Hydrological Sciences (IAHS) Scientific Assembly, Foz do Iguacu BRAZIL. April 2005.

“Water Indicators.” Millennium Challenge Account Meeting, Columbia University, Palisades, New York. April 2005.

“Data Needs of the GWSP and GWSP Report.” Coordinated Enhanced Observing Period (CEOP) and Integrated Global Water Cycle Observations (IGWCO) Joint Meeting, Tokyo JAPAN. February-March 2005.

“GWSP: A new Earth System Science partnership project,” w/J. Alcamo. International Conference on Integrated Assessment of Water Resources and Global Change: A North-South Analysis, Bonn GERMANY. February 2005.

“Water resource analysis: Emerging data challenges and opportunities.” International Conference on Integrated Assessment of Water Resources and Global Change: A North-South Analysis, Bonn GERMANY. February 2005.

“Land-to-ocean linkage in the Eurasian hydrological system”, w/ R. Lammers. AGU Fall Meeting, San Francisco, California. December 2004.

“NSF-ARCSS Freshwater Initiative (FWI): Synthesis as coordination of thought to discover emergent system properties”, w/ L. Hinzman, J. Pundsack. AGU Fall Meeting, San Francisco, California. December 2004.

“State of knowledge: Impact of sea level rise”. NSF-ARCSS Arctic Synthesis Retreat. Lake Tahoe, California. August 2004.

“Hydroclimatology of the 2001 Lena River flood: Analysis and geophysical data framework for pan-Arctic environmental studies”, w/ M. A. Rawlins, A.I. Shiklomanov, R. B. Lammers, S. Frolking, M. Serreze, K. McDonald. AGU Spring Meeting, Montreal CANADA. May 2004.

“NSF-ARCSS Freshwater Initiative (FWI): Key Issues for Synthesis of the Arctic Hydrologic Cycle”, w/ L. Hinzman, J. Pundsack. AGU Spring Meeting, Montreal CANADA. May 2004.

NSF Arctic System Science Research Program, Freshwater Initiative All-Hands Meeting, Co-Convener, w/ L. Hinzman. Woods Hole, Massachusetts. May 2004.

“Introduction and synthesis strategies”, NSF Arctic System Science Research Program, Freshwater Initiative All-Hands Meeting. Woods Hole, Massachusetts. May 2004.

“The freshwater cycle and its role in the pan-Arctic system.” Keynote address of the Arctic Research Consortium of the United States Open Science Conference. Seattle, Washington. October 2003.

“Potential factors contributing to long-term increases in discharge from large Eurasian drainage basins: A preliminary analysis.” Arctic Research Consortium of the United States Open Science Conference. Seattle, Washington. October 2003.

“A ‘wiring diagram’ approach to synthesis”. NSF-ARCSS Arctic Synthesis Retreat, Big Sky, Montana. August 2003.

“Arctic-CHAMP: The NSF pan-Arctic community-wide hydrological analysis and monitoring program.” IUGG 2003 Meeting. Sapporo JAPAN. July 2003.

“River discharge strategies from space,” w/D.M. Bjerklie, S.L. Dingman, B. Fekete, C. Birkett, C.H. Bolster, R.G. Congalton, and W. Kirby. PUB, an International and Interdisciplinary Research Initiative for Prediction in Ungauged Basins. EGS-AGU Joint Assembly, Nice FRANCE. April 2003.

“RIM-Shot: A regional, integrated monitoring system for pan-Arctic water cycle studies.” Natural Resources and Earth Systems Science (NRESS) Environmental Sciences Seminar Series. University of New Hampshire, Durham. February 2003.

“Overview of Arctic-RIMS Project.” First International PARTNERS (Pan-Arctic River Transport of Nutrients, Organic Matter, and Suspended Sediments) Workshop. Woods Hole, Massachusetts. February 2003.

NSF Arctic System Science Research Program, Freshwater Initiative All-Hands Meeting, Co-Convener, w/ L. Hinzman. University of Boulder, Boulder, Colorado. February 2003.

NASA, NOAA, WCRP Integrated Global Observing Strategy (IGOS) Water Cycle Workshop. Joint Office for Science Support, Boulder, Colorado. January 2003.

“Arctic-RIMS & E-RIMS: Regional Integrated Monitoring System for pan-Arctic water cycle studies.” American Geophysical Union Fall Meeting. San Francisco, California. December 2002.

“Continental runoff, the Arctic, and the declining number of gauges.” NASA River and Wetland Processes Working Group Meeting. Chicago, Illinois. November 2002.

“Pan-Arctic community-wide hydrological analysis and monitoring program (Arctic-CHAMP).” ARCSS Committee Meeting. Arlington, Virginia. October 2002.

NSF Town Meeting: The Hydrologic Cycle and its Role in Arctic and Global Environmental Change, w/ L. Hinzman (Co-presenter). AGU 2001 Fall Meeting, San Francisco, California. Dec 2001.

“A Regional, Integrated Monitoring System for the hydrology of the pan-Arctic land mass.” NASA/NOAA GAPP and Hydrology PI Meeting. Potomac, Maryland. May 2001.

“The Global Hydrologic Archive and Analysis System: Its Application to Global Water Assessment.” World Water Assessment Program Data Base Workshop, Geneva SWITZERLAND. January 2001.

NSF-Arctic Systems Science Hydrology Workshop, Co-Chair and Co-Convener, w/ L. Hinzman, National Center for Ecological Analysis and Synthesis (NCEAS). Santa Barbara, California. September 2000.

Training in Use of LBA-HydroNET Hydrometeorological Network Database in Support of the Large-Scale Biosphere-Atmosphere Experiment in Amazonia. CPTEC, Cachoeira Paulista BRAZIL. December 2000.

“Typological Approaches to Estimation of Global Suspended Sediment Flux,” IGBP Water/Sediments Workshop. Boulder, Colorado. September 2000.

“The Arctic Regional Integrated Monitoring Systems (RIMS),” NSF-Arctic Systems Science Hydrology Workshop. Santa Barbara, California. September 2000.

NSF-Arctic Systems Science Hydrology Workshop, Chair and Convener, National Center for Ecological Analysis and Synthesis (NCEAS). Santa Barbara, California. September 2000.

Demonstration of GIS-based Software and Global Data Products for Water Resources Assessment. Second World Water Forum and Ministerial Conference. The Hague, THE NETHERLANDS. March 2000.

“BAHC Core Project Activities in Support of the Newly formed IGBP Water Group: TYGRIS-BAHC,” IGBP Water Group Meeting. Stockholm SWEDEN. February 2000.

“River Basin Typologies,” IGBP-Land Ocean Interactions in the Coastal Zone 4th Open Science Meeting. Bahia Blanca, ARGENTINA. November 1999.

“Post-2002 Surface Water Monitoring Mission,” NASA Earth Science Enterprise Land Surface Hydrology Program Investigator Meeting. Columbia MD. November 1999.

“Altimetry Project Presentation,” NASA Earth Science Enterprise Land Surface Hydrology Program Investigator Meeting. Columbia MD. November 1999.

“LBA-HydroNET Data Repository to Support Large-scale Biosphere-Atmosphere Experiment in Amazonia,” NASA Earth Science Enterprise LBA Investigator Meeting. Columbia MD. November 1999.

“An Integrated System for Water Budget Closure over the Pan-Tropical Land-Mass: A TRMM Validation Effort.” TRMM/GPM Meeting. Green Belt MD. October 1999.

“IGBP Water Initiative,” Workshop on Sustainability of Freshwater Resources in Africa. (UNEP, IGBP-BAHC, EU, MEDIAS, PASS), UNEP Headquarters. Nairobi, KENYA. October 1999.

“Humans as an Integral Component of the Global Freshwater Cycle,” Centre for Climate and Global Change Research, McGill University. Montreal, CANADA. October 1999.

“Use of Satellite Altimetry for Monitoring Inland Water Systems,” NASA-USGS Workshop on Remote Sensing of River Stage and Discharge. Herndon VA. September 1999.

“Global Water Resource Assessment Using High Resolution Spatial Data Sets and Analysis Tools,” World Resources Institute. Washington DC. September 1999.

SCOPE Nitrogen Initiative, Working Group 1 Meeting. Santa Barbara CA. May 1999.

IGBP Congress, Inter-Core Programme Element Meetings and SSC of IGBP-BAHC. Shonan Village, JAPAN. May 1999.

“Storage and Aging of Continental Runoff in Large Reservoir Systems,” Yamanashi Prefecture University and also at the University of Tokyo. Tokyo, JAPAN. May 1999.

“Human Imprints on the Global Terrestrial Water Cycle,” Princeton Environmental Institute, Princeton University. Princeton NJ. April 1999.

“Overview of Surface Water Monitoring,” NASA Post-2002 Land Surface Hydrology Mission Planning Workshop. Irvine CA. April 1999.

Joint French/US National Academy of Sciences Workshop on Hydrology and Water Resources. April 1999.

“Contemporary Water and Constituent Balances for the Pan-Arctic Drainage System: Continent to Coastal Ocean Fluxes,” w/ B.J. Peterson, R. Holmes (presenter), R. Lammers, A. Shiklomanov, I. Shiklomanov, V. Gordeev, and A. Zhulidov. Water and Watersheds Review Meeting. Easton MD. April 1999.

“Contemporary Water and Constituent Balances for the Pan-Arctic Drainage System: Continent-to-Coastal Ocean Fluxes,” NSF Arctic Systems Science, Land-Atmosphere-Ice Interactions Program 1999 Planning Meeting. Seattle WA. March 1999.

“A Satellite Based System for Monitoring Biogeochemical Fluxes between the Continental Land Mass and the Coastal Oceans: A Focus on River Plumes,” w/ J. Campbell, L.D. Meeker, M. Meybeck, J. Salisbury (presenter), and T. Moore. SeaWiFS Annual Meeting. Monterey CA. March 1999.

Post-2002 Mission Planning Workshop (Scientific Expert), NASA Earth Science Enterprise. Easton MD. August 1998.

Water Balance of Large River Basins, Case Studies (Rapporteur). Second International Conference on Water and Climate. Espoo, FINLAND. August 1998.

“Storage and Aging of Runoff in Large Reservoirs.” American Society of Limnology and Oceanography / Ecological Society of America, invited. St. Louis MO. June 1998.

“Background of R-HydroNET Development and Some Hydrological Analysis.” First Working Meeting of the Regional, Electronic Hydrometeorological Data Network (R-HydroNET v1.0) for South America, Central America, and the Caribbean. Panama City, PANAMA. June 1998.

“An Overview of Remote Sensing Applications for Large Rivers,” w/ A.L. Schloss (presenter) and B. Moore. 1998. North American Benthological Society Meetings. Charlottetown, Prince Edward Island, CANADA. June 1998.

“UNESCO-based Hydrometeorological Data Activities in South America,” Global Hydrologic Validation Workshop. Dunwalke NJ. April 1998.

“Water Balance Modeling within a Drainage Basin and River Networking Context.” International Symposium on Hydrology in the Humid Tropic Environment. International Association of Hydrological Sciences. Kingston, JAMAICA. November 1997.

“Data Banks for Regional and Continental-scale Water Resources Assessment: Needs and Strategies for Implementation.” UNESCO Regional Offices for Science and Technology, Joint Steering Committee Meeting. Kingston, JAMAICA. November 1997.

“Global Change and Water Quantity and Quality.” M.I.T. Global Change Forum, (invited keynote). Boston MA. October 1997.

“Contemporary, Global Mapping of the Areal Distribution of Irrigation Land and Associated Rates of Water Consumption (IRRMAP-Globe),” w/ R. Lammers, B. Fekete. Working Group on Decision Systems for Water and Land Management. International Commission on Irrigation and Drainage (ICID). Oxford University, UK. September 1997.

“Pan-tropical Water Balance Studies: A TRMM Satellite Validation Effort,” w/ C.J. Willmott, J. Roads. Tropical Rainfall Monitoring Mission Science Workshop. NASA/Goddard Space Flight Center. Greenbelt MD. July 1997.

“The Aging of Runoff in Large Reservoirs of the Danube River Basin,” w/ E. Horvath (presenter), B. Fekete, G. Balint, K. Albert, I. Zsuffa. ICER TEMPUS 2nd International PhD Seminar on Investigation of Environmental Impacts on River Basin and/or Floodplain Management. Budapest, Hungary. July 1997.

“Anthropogenic Impacts on Global Sea Level”, w/ D. Sahagian (presenter), B.F. Chao. AGU Spring Meeting. Baltimore MD. May 1997.

“The potential impact of neo-Castorization on sediment transport by the global network of rivers,” w/ M. Meybeck, B. Fekete, and K. Sharma. Symposium on Human Impact on Erosion and Sedimentation. International Association of Hydrological Sciences General Assembly. Rabat, MOROCCO. April 1997.

IGBP African-GAIM Modelling Workshop. Instructor: Hydrology Modeling. Various lectures and leadership on discussions. Mombasa, KENYA. March 1997.

“Research-oriented Teaching: Pitfalls, Opportunities, and the Pygmalion Effect.” Lilly Conference on College Teaching, New England Division. Durham NH. September 1996.

“A Call for the Adoption of Protocols to Reinstate UNESCO Discharge Data Collection and Distribution Based on the Discharge of Selected Rivers of the World Series,” UNESCO International Hydrological Programme, 12th Intergovernmental Council Meeting. UNESCO, Paris, FRANCE. September 1996.

Planning Workshops for the Hydrological Component of the Large-scale Biosphere / Atmosphere Field Experiment for Amazonia. Short, untitled presentations. IGBP BAHC. Sao Jose dos Campos, BRAZIL. June 1996.

Teaching Excellence Workshop. UNH Education Department, Durham NH. June 1996.

“Regional Modeling of Coupled Land-Atmosphere Hydrologic Processes,” w/ W.J. Gutowski (lead), M. Person, Z. Ötles, B. Fekete, and J. York. Second International Conference on the Global Energy and Water Cycle (GEWEX). Washington DC. June 1996.

“Calibration and Validation Data Sets of NASA-EOS Water Balance Studies.” NASA Mission to Planet Earth EOS Calibration / Validation Workshop. Greenbelt MD. May 1996.

“A Large-scale Water Balance Model for Permafrost Terrain: Its Calibration and Validation Against Site Data,” w/ J.B. Holden (lead) and S. Frolking. AGU Spring Meeting. Baltimore MD. May 1996.

“Analyzing the Discharge Regime of a Large Tropical River through Remote Sensing, Ground-based Climate Data and Modeling,” w/ A. Schloss (lead), C.J. Willmott, and B.J. Choudhury. IGARSS '96. Lincoln NE. May 1996.

“Contemporary Water and Constituent Balances for the Pan-Arctic Drainage System: Continent-to-Coastal Ocean Fluxes,” w/ B.J. Peterson (lead), S. Frolking, C.J. Willmott, M. Serreze, M. Meybeck, V. Kimstach, I. Shiklomanov, and V.V. Gordeev. NSF Arctic Systems Science All Hands Workshop. Snowbird UT. May 1996.

“Impact of Land-Use and Climatic Changes on Hydrology of the Himalayan Basin: A Case Study of the Kosi Basin,” w/ K.P. Sharma (presenter) and B. Moore III. International Conference on Ecohydrology of High Mountain Areas. Kathmandu, NEPAL. March 1996.

“A Study of Pan-Arctic Drainage System Contributions to the Coastal Zone,” w/ B.J. Peterson (lead), S. Frolking, C.J. Willmott, M. Serreze, M. Meybeck, V. Kimstach, I. Shiklomanov, and V.V. Gordeev. NSF Land-Atmosphere-Ice Interactions (LAI) Workshop. Boulder CO. January 1996.

“Emerging Impacts of Anthropogenic Change on Global River Systems: The Chinese Example,” w/ C. Li, J. Sun, and Z. Dai. IGBP Scientific Advisory Committee IV. Beijing, CHINA. October 1995.

The Role of Drainage Basin Dynamics in Emerging Earth System Models,” w/ B.J. Peterson, B. Fekete, and A. Schloss. IGBP-GAIM First Science Conference. Garmisch-Partenkirchen, GERMANY. September 1995.

“The Role of the Nitrogen Cycle in the Global Response of Net Primary Production and Carbon Storage to Doubled Atmospheric Carbon Dioxide,” w/ A. McGuire (lead), J. Melillo, B. Moore III, D. Kicklighter, Y. Pan, A. Schloss, and X. Xiao. IGBP-GAIM First Science Conference. Garmisch-Partenkirchen, GERMANY. September 1995.

“Modeling Coupled Land-Atmosphere Hydrologic Processes,” w/ W. Gutowski (lead), M. Person, Z. Ötles, B. Fekete, and J. York. IGBP-GAIM First Science Conference. Garmisch-Partenkirchen, GERMANY. September 1995.

Workshop on Land-based Sources of Global Pollution. Short, untitled presentation. GEMS-Water/UNEP/WHO. Koblenz, GERMANY. June 1995.

Planning Workshop for the Hydrological Component of the Large-scale Biosphere / Atmosphere Field Experiment for Amazonia. Short, untitled presentation. IGBP BAHC. Paris, FRANCE. June 1995.

“Developing the Framework for an IGBP-BAHC Integrated Terrestrial Earth System Model,” w/ J. Russo and B. Bass. European Geophysical Society. Hamburg, GERMANY. April 1995. (Annales Geophysicae, Supplement II to Vol. 13: C509).

“Macro-scale Modeling of Water and Constituents.” US Geological Survey. Reston VA. March 1995.

“Modelling and Monitoring of Global Constituent Transport Processes.” NASA-HQ. Washington DC. March 1995.

"Continental-scale Models of Water and Nutrient Inputs to the Coastal Ocean," with B.J. Peterson. SCOPE Workshop on Estuarine Synthesis. Irvine CA. February 1995.

"A Framework for Developing Spatially-Explicit Models at the Continental Scale." IGBP Inter-Core Project Workshop on Modeling the Delivery of Terrestrial Materials to Freshwater and Coastal Ecosystems. Durham NH. December 1994.

"Data and Information Systems in Support of the LAMBADA/BATERISTA/AMBIACE Field Campaign." Planning Workshop for the Hydrological Component of LBA. Piracicaba, BRAZIL. November 1994.

"Water and Material Loadings from Drainage Basins to the Coastal Zone." NSF Land-Margin Ecosystem Research Workshop. Gloucester MA. October 1994.

"Modeling Continental Hydrology and Constituent Transport." US Global Change Research Program Earth Systems Modeling Workshop. Arlington VA. May 1994.

"The Terrestrial Water Balance and Estimates of its Modification by Anthropogenic Change." IGBP / GCTE, Open Science Conference. Woods Hole MA. May 1994.

“Drainage Basin Models for Water and Biogeochemical Cycling at Continental and Global Scales: Key Conceptual Issues,” w/ B.J. Peterson. 1994 North American Benthological Society Meetings. Orlando FL. May 1994.

IGBP BAHC / IGAC / GCTE, Inter-Core Project Steering Committee Meeting. Cambridge MA. February 1994.

IGBP PAGES Workshop on Fluvial Processes during the Period of Agriculture. Short, untitled presentation. Bern, SWITZERLAND. February 1994.

NASA Soil Moisture Workshop. NASA Mission to Planet Earth. Tiburon CA. January 1994.

"Coupled Land-Atmosphere Hydrology Models: The Drainage Basin Perspective, International Workshop on Hydrological Scaling." Robertson, NSW, AUSTRALIA. December 1993.

"Activities in Macro-scale Hydrology." CSIRO, Division of Water Resources. Adelaide, AUSTRALIA. December 1993.

"Hydrological Investigations Using a Nested Drainage Basin Approach." LAMBADA / BATERISTA Joint Planning Meeting. Sao Jose dos Campos, BRAZIL. September 1993.

“Hydrological Investigations in the Framework of a Large-Scale Biosphere-Atmosphere Field Experiment in the Amazon Basin. A Contribution to The Preliminary Science Plan of the LAMBADA/BATERISTA Field Campaign,” w/ A. Becker, M. Bonell and C. Fernández-Juáuregui. IGBP-BAHC / UNESCO-IHP / IAHS-ICASVR. Sao Jose dos Campos, BRAZIL. September 1993.

"Macroscale Modelling of the Hydrosphere." International Association of Hydrological Sciences Assembly, (invited keynote). Yokohama, JAPAN. July 1993.

"Experiments in Macro-scale Hydrology." Marshall Space Flight Center, Huntsville AL. March 1993.

"Tools for the Study of Biogeochemical Cycles and Anthropogenic Change." IGBP-Biospheric Aspects of the Hydrologic Cycle Open Science Meeting. Toulouse, FRANCE. November 1992.

"Continental-scale Biogeochemistry and the Water Cycle." University of Delaware Seminar Series. Newark DE. December 1992.

"Regional Water Resources and Global Change." Upper Tisza River Water Resources Management Commission. Miskolc, HUNGARY. August 1992.

"Macro-scale hydrologic models: Of benefit to water resources planning?" The EDAC Concept: A Partnership of Academia, Industry, and Government. Institute for the Study of Earth, Oceans, and Space, University of New Hampshire, Durham NH. May 1992.

"Continental-scale Models of Water Balance and Net Primary Productivity." All-Investigators Workshop: Global Change Research Program. USEPA. Athens GA. February 1992.

"Hydrologically-driven NPP Modeling." EPA Biospheric Modeling Workshop. National Center for Atmospheric Research. Boulder CO. February 1992.

"Macro-scale Hydrology Modeling." Clowes Foundation Seminar Series. Fort Collins CO. January 1992.

"Distributed Parameter Models to Analyze the Impact of Human Disturbance on the Surface Hydrology of a Large Tropical Drainage Basin in Southern Africa." International Association of Hydrological Sciences General Assembly. Vienna, AUSTRIA. August 1991.

"Macro-scale Hydrology Models and Tests on Two Tropical River Systems." WATERMATEX '91. International Association on Water Pollution Research and Control. Durham NH. June 1991.

"A Catchment-Scale Model of the Amazon/Tocantins River System for Use in Global Change Studies." Hydrology and Water Management of the Amazon Basin Symposium. International Water Resources Association. Manaus, BRAZIL. August 1990.

"The World Water Balance and Its Sensitivity to Climate Change." Joint US/USSR Conference on Global Environmental Hydrology and Hydrogeology. American Institute of Hydrology / Leningrad Mining Institute. Leningrad, USSR. June 1990.

"Linking Models of Large River Basins, Regional Climatology and Satellite Remote Sensing to Analyze Tropical Hydrology." Chapman Conference on Hydrologic Aspects of Global Climate Change. American Geophysical Union. Lake Chelan WA. June 1990.

"Tools for Analyzing the Global Hydrologic Cycle and Its Alteration Through Climate Change." XV General Assembly: Hydrology Programme. European Geophysical Society. Copenhagen, DENMARK. April 1990.

"American Agriculture at the Crossroads: US Farming and the Changing Biosphere." Illinois Soy-Corn Conference. Decatur IL. November 1989.

"Continental-scale Hydrology Modeling in South America with Particular Reference to Amazonia." International Institute of Applied Systems Analysis. Laxenburg, AUSTRIA. July 1989.

"Continental-scale Hydrology." Workshop on The Global Water Cycle – Past, Present, and Future. Earth System Science Center. College Park PA. July 1988.

“A Global, Georeferenced Model of Hydrology and Water Quality Applied to the Amazon Basin,” w/ B. Moore, M.P. Gildea, B. Peterson, J. Melillo, D. Kicklighter, J. Raich, E. Rastetter, and P. Steudler. AGU Chapman Conference on the Amazon Dispersal System. Charleston SC. March 1988.

“Modeling Tidal Ecosystems with Particular Reference to Altered Hydrology,” w/ J. Spiller, B. Moore, N.E. Kinner, T. Loder, R. Moynihan, and F. Short. First New England and Regional Coastal Engineering Conference. Rockport ME. October 1984.

“The Transport and Processing of Nitrogen in a Tidal, Freshwater Marsh and River Ecosystem: Modeling the Roles of Water Movement and Biotic Activity in Determining Water Quality,” w/ B. Moore, W.B. Bowden, J.E. Hobbie, and B.J. Peterson. Third Int'l Conference on State-of-the-Art in Ecological Modeling. Fort Collins CO. June 1983.

### **(viii) UNITED NATIONS-RELATED PROFESSIONAL ACTIVITIES**

- **UNESCO Ecohydrology Project**

2006-present: Scientific Advisory Committee, Member.

- **Invited Lecturer: World Nuclear University (IAEA, OECD, World Nuclear Association)**

2005, 2006: Vörösmarty, C.J., "Global Water Crisis"; Idaho Falls, Idaho (USA), Stockholm SWEDEN.

- **Invited Keynote: UNESCO 21st Century Talks**

2003: Vörösmarty, C.J., “Humans and the 21st Century Hydrosphere: A Challenge to the Earth Sciences.” 21st Century Talks: The Future of Water. January, with Michel Camdessus & Claude Allègre; Paris FRANCE.

- **UN-based Projects, Community Data Sets, Analysis Tools**

2003-2004: UNEP River Basin Information System (RBIS), Division of Early Warning and Assessment (*with P. Green, A. Proussevitch, S. Glidden*).

2002-2003: WWAP Prototype Data Synthesis System (DSS). Sponsored by UNESCO-IHP as a contribution to WWAP (*with P. Green, A. Proussevitch, S. Glidden*).

1999-2002: LBA-HydroNET, *Hydrometeorological Data Compendium for the Amazon Region*. Sponsored by UNESCO Regional Science Office, Montevideo URUGUAY and NASA (*with C. D'Almeida, S. Glidden, B. Fekete, L. Bravo, S. Webber*).

1998-2000: *R-HydroNET: Regional Hydrometeorological data compendium for Latin America and the Caribbean*. Sponsored by UNESCO Regional Science Office, Montevideo URUGUAY (*with S. Glidden, B. Fekete, S. Webber*).

1998: “Background of R-HydroNET Development and Some Hydrological Analysis.” First Working Meeting of the Regional, Electronic Hydrometeorological Data Network (R-HydroNET v1.0) for South America, Central America, and the Caribbean. Panama City PANAMA (*C.J. Vörösmarty*).

1998: “UNESCO-based Hydrometeorological Data Activities in South America,” Global Hydrologic Validation Workshop. Dunwalke, New Jersey (*C.J. Vörösmarty*).

1997-present. Electronic version of *River Discharge Database, Version 1.0 (RivDIS v1.0), Volumes 0 through 6, distributed by the Oak Ridge National Laboratory Distributed Active Archive Center (DAAC)*; user metrics show RivDIS to be one of the ORNL-DAAC's most requested data sets.

1996: *UNESCO Publication: Vörösmarty, C.J., B. Fekete, B.A. Tucker, River Discharge Database, Version 1.0 (RivDIS v1.0), Volumes 0 through 6*. A contribution to IHP-V Theme 1. Technical Documents in Hydrology Series. UNESCO, Paris.

- **United Nations Multi-Agency World Water Assessment Programme: Documentation, seminars, and training on indicator data sets and tools**

2004-06: Indicator mapping and accompanying text, on selected water-related indicators associated with WWDR Theme areas. In: *Water: A Shared Responsibility. World Water Development Report 2*,

- World Water Assessment Programme. UNESCO, Paris. (Data publicly available at <http://wwdrii.sr.unh.edu/>) (with E. Douglas and S. Glidden).
- 2004: "Proposed Indicator Suite: WWDR-II", WWAP Indicators Workshop, Paris FRANCE (C.J. Vörösmarty).
- 2003: Contributor to Chapter 3 (pp. 29-60), Signing progress: Indicators mark the way. *Water for People, Water for Life. First World Water Development Report*, World Water Assessment Programme. UNESCO, Paris (C.J. Vörösmarty).
- 2002: Regional Training Session for Data Synthesis System (DSS); Cairo EGYPT, sponsored by UNESCO-IHP as a contribution to WWAP (with A. Prusvitch, P. Green).
- 2002: Regional Training Session for Data Synthesis System (DSS); Nairobi KENYA, sponsored by UNESCO-IHP as a contribution to WWAP (with P. Green).
- 2002: "Geospatial Water Resource Analysis", WWAP Indicators Workshop, Rome ITALY (C.J. Vörösmarty).
- 2002-2005: Vulnerability and Risk of the Population to Precipitation Anomalies in South America, Sponsored by UNESCO Regional Science Office, Montevideo URUGUAY. Joint with Simon Bolivar University, Caracas VENEZUELA (with L. Bravo, W. Wollheim).
- 2001: "The Global Hydrologic Archive and Analysis System: Its Application to Global Water Assessment." World Water Assessment Program Data Base Workshop, Geneva SWITZERLAND (C.J. Vörösmarty).
- 2000: Training in Use of LBA-HydroNET Hydrometeorological Network Database in Support of the Large-Scale Biosphere-Atmosphere Experiment in Amazonia. CPTEC, Cachoeira Paulista BRAZIL (with C. D'Almeida, B. Fekete, M. Routhier).
- 1999: Training Workshop for R-HydroNET Hydrometeorological Network Database. Simon Bolivar University, Caracas VENEZUELA (with M. Routhier, S. Webber).
- 1999: "LBA-HydroNET Data Repository to Support Large-scale Biosphere-Atmosphere Experiment in Amazonia," NASA Earth Science Enterprise LBA Investigator Meeting. Columbia, Maryland (with B. Fekete, S. Webber, S. Glidden).
- **UNESCO-International Hydrological Programme Strategic Planning**  
1999-2000: IHP 6th Phase Task Force; framer of Global Hydrology portfolio of activities (Theme 1).
  - **UNESCO-Intergovernmental Oceanographic Commission**  
2003-present: Nutrient Export from WaterSheds (IOC-NEWS), Working Group Member, supplying key hydrology models and data sets to the community-based effort.

**(ix) FUNDING HISTORY**

- Current Funding

*Humans Transforming the Water Cycle: Community-Based Activities in Hydrologic Synthesis.* NSF Continental Hydrology Program, \$874,744: 2006-2010.

*Collaborative Research: Understanding the Scaling of N Cycle Controls throughout a River Network* (w/MBL), NSF DEB, \$349,427: 2007-2009.

*The Role of Land Cover and Land Use Change in the Hydrology of the Eurasian Pan-Arctic.* NASA ROSES LCLUC, \$599,431: 2006-2009.

*A Water Cycles Solution Network* (PI: P. Houser). NASA NEWS, \$353,668: 2006-2009.

*Collaborative Research: Understanding Change in the Climate and Hydrology of the Arctic Land Region: Synthesizing the Results of the ARCSS Freshwater Initiative Project* (PI: E. Wood). NSF OPP, \$309,916: 2006-2009.

*Collaborative Research: Hydrology and Social Interactions: A Focus on Conflict in Africa* (PI: M. Levy). NSF HSD, \$131,000: 2006-2009.

*Arctic-CHAMP Project Office: The Arctic Community-Wide Hydrological Analysis and Monitoring Program.* NSF ARC, \$737,815: 2006-2009.

*The UNH Earth Systems Observatory: Assessing Coastal Ecosystem Impacts through a White Water to Blue Water Continuum.* NOAA ORR, \$936,431: 2006-2008.

*Contributions of Changes in Land Use Land Cover, Water Use and Climate to the Hydrological Cycle across the Central Asian States.* NASA NEWS, \$598,725: 2006-2008.

*The Global Water System Project (GWSP) Co-Chair Support.* NASA, \$151,663: 2005-2008.

*Collaborative Research: Humans and Hydrology at High Latitudes (PI: R. Lammers).* NSF OPP/SASS, \$466,575: 2005-2008.

*Plum Island Sound Comparative Ecosystem Study.* NSF LTER, \$407,544: 2004-2010.

*Understanding the Changing Carbon, Nitrogen and Water Cycles in the Earth System.* NASA IDS, \$150,000: 2004-2007.

*Assessment of Recent Hydrologic Change over the Arctic Terrestrial Drainage System.* NASA IDS, \$445,461: 2004-2007.

*Collaborative Research: An Integrated Assessment of the pan-Arctic Freshwater System – Analysis of Retrospective and Contemporary Conditions (w/M. Steele and M. Serezze).* NSF OPP, \$1,222,391: 2003-2008.

*A Prototype Hydrological Data Assimilation System Using Remotely Sensed Precipitation Fields.* NASA GPM, \$303,403: 2003-2006.

- Pending Grants

*Further Tests on a Modeling Framework to Detect and Analyze Changes in Land-to-Coastal Fluxes of Freshwater and Constituents.* NASA IDS, \$1,199,388: 2006-2009.

*Integration of High Latitude Data Streams for Understanding the Arctic Hydrological Cycle: A Contribution to the International Polar Year (IPY).* NASA ROSES NEWS, \$610,709: 2006-2009.

*Suburbanization, Water-Use, Nitrogen Cycling and Eutrophication in the 21<sup>st</sup> Century: Interactions, Feedbacks and Uncertainties in a Massachusetts Coastal Zone.* NSF BCS w/Clark University, \$1,442,930: 2007-2010.

- Previous Funding

*The Arctic Community-Wide Hydrological Analysis and Monitoring Program (Arctic-CHAMP) Project Office.* NSF OPP Arctic System Science Program, \$404,238: 2002-2006.

*Global Indicators for the World Water Development Report II.* UNESCO, \$40,000: 2004-2005.

*Vulnerability and Risk of the Population to Precipitate Anomalies in South America.* UNESCO/Uruguay, \$23,500: 2004.

*A Global Rapid Integrated Monitoring System for Water Cycle and Water Resource Assessment (GLOBAL-RIMS).* NASA, \$276,900: 2002-2005.

*A Satellite-Based System for Monitoring Biogeochemical Fluxes between the Continental Land Mass and the Coastal Oceans: A Renewal Proposal with a Focus on Plumes.* NASA, \$494,275: 2002-2005.

*A Water Budget Closure System to Support LBA Hydrometeorology and Ecology Studies.* NASA, \$106,288: 2002-2004.

*Development of a Global River Basin Information System Prototype.* UNEP-START, \$51,250: 2002-2003.

*Pan-Tropic Physical Hydrology.* ICRAF, \$49,500: 2002-2003.

*Collaborative Research: Modeling the Role of High Latitude Terrestrial Ecosystems in the Arctic System: A Retrospective Analysis of Alaska as a Regional System (Arctic-WALE).* NSF OPP, \$254,845: 2001-2005.

*Assessment of Extreme Rainfall Vulnerability for South America.* UNESCO/R-HydroNET, \$7,000: 2001-2003.

*A Pan-African Digital Water Resources Atlas.* UNESCO/WWAP, \$50,000: 2001-2002.

*Sediment Flux to the Coastal Zone: Predictions for the Navy.* US DOD – ONR, \$134,000: 2001-2002.

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