



Geoffrey W. Cowles

Assistant Professor

Department of Fisheries Oceanography
School for Marine Science and Technology
University of Massachusetts Dartmouth

Research Interests

My research interests are centered on the application of numerical methods to problems in fluid and ecosystem dynamics. They include both scheme development, focused on implicit time stepping and adaptive methods, as well as applications, including sediment transport and near bottom flow, larval dispersal, individual based modeling, and the use of circulation models to improve estimates of fish movement.

Current Research

- 10/1/07 – 9/30/10 *NSF Collaborative Research*: Effects of a warming climate on Arctic Shelf and Basin *Calanus* populations.
- 4/1/08 – 3/31/09 *NOAA*. Development of a modeling infrastructure for NERCOOS.
- 2/1/08 – 1/31/11 *KAUST*. Coastal and atmospheric modeling.
- 2/1/08 – 1/31/09 *WHOI Sea Grant*: A measurement and modeling study of waves and currents in the coastal zone off of southeastern Massachusetts.
- 2/1/09 – 1/31/10 *MIT Sea Grant*: An assessment of the tidal kinetic energy resource off the Massachusetts coast and potential impacts of extraction.
- 2/1/09 – 1/31/11 *ONR*: An investigation of the dynamical processes influencing sediment transport and morphological change in Skagit Bay using an unstructured grid coastal ocean model.

Recent Publications

- Chen, C., L. Zhao, **G. Cowles**, and B. Rothschild, 2008 (in press). Tide-, buoyancy- and wind-driven circulation in Narragansett Bay. Book chapter in *Ecosystem-Based-Management of A Southern New England Estuary: A Case Study of Narragansett Bay*, edited by A. Desbonnet and B.A. Costa-Pierce, Springer-Verlag, NY.
- Cowles, G.**, S. L. Lentz, C. Chen, R. C. Beardsley, and Q. Xu, 2008. Comparison of observed and model-computed low frequency circulation and hydrography on the New England Shelf. *J. Geophys. Res.* 113, C09015, doi:10.1029/2007JC004394.
- Helenbrook, B. T., and **G. W. Cowles**, 2008. Preconditioning for dual-time-stepping simulations of the shallow water equations including Coriolis and bed friction effects. *J. Comput. Phys.* 227, 4425-4440.
- Hu, S., D. W. Townsend, C. Chen, **G. Cowles**, R. C. Beardsley, R. Ji, and R.W. Houghton, 2008 (in press). Tidal pumping onto Georges Bank: A process-oriented modeling study of nutrient flux. *J. Mar. Syst.*
- Huang, H., C. Chen, **G. W. Cowles**, C. D. Winant, R. C. Beardsley, K. S. Hedstrom and D. B Haidvogel, 2008. FVCOM validation experiments: comparisons with ROMS for three idealized barotropic test problems. *J. Geophys. Res.* 113, C07042, doi: 10.1029/2007JC004557.
- Zhao, L., C. Chen, and **G. Cowles**, 2008 (in press). Tidal flushing and eddy formation in Mount Hope Bay and Narragansett Bay: An application of FVCOM. *J. Geophys. Res.*
- Cowles, G.**, 2007. Parallelization of the FVCOM coastal ocean model. *Int. J. High Perform. C.* 22(2) 177-193.
- Huret, M., J. Runge, C. Chen, **G. Cowles**, Q. Xu, and J. Pringle, 2007. Dispersal modeling of fish early life stages: Sensitivity analysis with application to Atlantic cod in the western Gulf of Maine. *Mar. Ecol.-Prog. Ser.* 347, 261-274.
- Chen, C., R.C. Beardsley, and **G. Cowles**, 2006. An unstructured grid, finite-volume coastal ocean model (FVCOM) system. *Oceanography*, 19(1), 78-89.
- Cowles, G.**, and L. Martinelli, 2003. Control-theory based shape design for the incompressible Navier-Stokes equations. *Int. J. Comput. Fluid D.*, 17:499-514.

Recent Publications

- Chen, C., L. Zhao, **G. Cowles** and B. Rothschild, 2008. Critical issues for modeling studies of Narragansett Bay and Mount Hope Bay. Book chapter in *Science for Ecosystem-based Management, Narragansett Bay in the 21st Century*, 10.1007/978-0-387-35299-2, 281-300.
- Chen, C., P. Xue, P. Ding, R.C. Beardsley, Q. Xue, M. Xianmou, G. Gao, J. Qi, C. Li, H. Lin, **G. Cowles**, and M. Shi, 2007. Physical mechanism for offshore detachment of the Changjiang diluted water in the East China Sea. *J. Geophys. Res.* *113*, C02002, doi: 10.1029/2006JC003994.
- Chen, C., H. Huang, R. Beardsley, H. Liu, Q. Xu, and **G. Cowles**, 2007. A finite-volume numerical approach for coastal ocean circulation studies: Comparisons with finite-difference models. *J. Geophys. Res.*, *112*, C03018, doi:10.1029/2006JC003485.