

CURRICULUM VITAE
ALEXANDER F. SHCHEPETKIN

Office Address:	Revision date:	September 2011
Institute of Geophysics and Planetary Physics	Phone:	(310)-206-9381
University of California at Los Angeles	Fax:	(310)-206-3051
Geology Bldg. Room 3637,	e-mail:	alex@atmos.ucla.edu
595 Charles E. Young Drive East,	http://www.atmos.ucla.edu/~alex	
Los Angeles, CA 90095-1567		

Education

- 1992 Ph.D. in *Mechanics of Gas, Fluid and Plasma*, Moscow Institute of Physics and Technology – P. P. Shirshov Institute of Oceanology Joint Program, Moscow, Russia
- 1988 Degree of engineer-physicist, Moscow Institute of Physics and Technology, Moscow, Russia

Professional experience

- July 2008/ /present Project Scientist, Institute of Geophysics and Planetary Physics (I.G.P.P.), University of California at Los Angeles (UCLA).
- Oct 1998– –June 2008 Specialist (Associate Specialist until October 2003) in Geophysical Modeling. Center for Earth Systems Research (CESR), I.G.P.P., UCLA. Primary developer of ROMS.
- May 1995– –Sept 1998 Programmer Analyst for Prof. J. C. McWilliams, I.G.P.P., UCLA. Research in advanced computational methods in geophysical fluid dynamics; application of multigrid methods; parallel computing on both distributed and shared memory environments; development of parallel codes for plasma magnitohydrodynamics; nonlinear multigrid solvers of balance equations and simulations of finite-Rossby-, high-Reynolds numbers geophysical turbulence; started involvement in ROMS ocean modeling code design.
- Jan 1994– –May 1995 Post-doctoral fellow, Center for Ocean and Atmosphere Prediction Studies (COAPS), Florida State University (adviser Prof. J. J. O'Brien). Interests in nonlinear dynamics of equatorial waves; high-order-accurate upstream-biased computational schemes for shallow water equations; interaction of geophysical turbulent flows with bottom topography.
- Aug 1992– –Dec 1993 Post-doctoral fellow, Department of Oceanography, Florida State University (adviser Prof. S. P. Meacham). Work on intrathermocline mesoscale vortex dynamics; quasi-geostrophic theory of continuously stratified rotating fluids; analytical and numerical study; three-dimensional pseudo-spectral primitive equation simulations.
- 1982–1992 Undergraduate and graduate student of Moscow Institute of Physics and Technology – P. P. Shirshov Institute of Oceanology Joint Program. Theoretical geophysical fluid mechanics. Numerical simulation of the upper mixed layer dynamics under the conditions of turbulent pumping from above and heating by the downward irradiance absorbed by suspended particles. Work on airborne LIDAR experiment for sampling concentration of suspended particles in the upper sea layer.

Scientific interests: Ocean modeling on basin-, regional-, and local (up to sub-kilometer resolution) scales; Nonlinear processes in geophysical fluid dynamics; Vortex dynamics; Numerical splitting and stability; High-order, oscillation-controlled numerical algorithms in geophysical flows; Multi-grid methods and their applications in fluid mechanics; Biological and ecosystem modeling; High-performance parallel computing in both shared- and distributed memory environments; Linux cluster computing.

Current ongoing project: Development of Regional Ocean Modeling System (ROMS). This is a terrain following coordinate ocean modeling code using advanced numerical methods and physical parameterizations, intended to expand capabilities of the existing family of SPEM/SCRUM/POM models in terms of numerical/computational performance, grid resolution, degree of realism in simulating ocean. From the computer engineering point of view the code employs explicit, coarse-grained parallelization approach based on a two-level hierarchical subdomain partitioning (blocking) in both horizontal dimensions, and using either multi-threaded (for shared-memory architectures), or MPI (for distributed), or both simultaneously (hybrid, running Open MP threads within each MPI subdomain) implementation to ensure affinity with the architecture of modern computing hardware – Linux clusters of SMP nodes with multi-core CPUs.

Grant and Funding History: Participated as Co-Principal Investigator (Co-PI) in several research grants under guidance of Prof. McWilliams. The most recent one is "Development of Advanced Numerical Algorithms and Physical Parameterizations within the Regional Ocean Modeling System (ROMS)" funded by Office of Naval Research (ONR).

Reviewer for *Ocean Modeling*, *Journal of Computational Physics*, *Journal of Geophysical Research*, *Journal of Physical Oceanography*, *Monthly Weather Review*, *Journal of Fluid Mechanics*, *Journal of Atmospheric and Oceanic Technology*, *Quarterly Journal of Royal Meteorological Society*.

2001 *JGR* Editors Citation for Excellence in Refereeing (nominated by John Klink).

Computer skills and experience: Parallel computing in shared- and distributed-memory environments (incl. clusters of SMP); Open MP, MPI (incl. simultaneous use), FORTRAN77/90 (incl. code performance tuning and optimization); UNIX/Linux (incl. system administration, networking, cluster administration, shell programming) also building, maintaining (incl. hardware selection, negotiation with vendors, hardware setup and diagnostics) individual workstations, servers, mass-storage systems, a computer lab/classroom, a Linux cluster (incl. setting up Infiniband interconnect). Overall ~ 90 systems/nodes, and $\geq 100\text{TBytes}$ of storage aggregate.

Sea-going experience: During student years participated in cruises aboard of research vessels of the Russian Academy of Sciences in 1987, 1990 and 1991. Installation of autonomous moored current meter stations, CTD measurements; data processing; overall more than 7 month in the ocean.

Recent Collaborators: Jim McWilliams (UCLA); Xavier Capet (UCLA; Univ. of San Paulo, Brazil; now at IFREMER, France); Yusuke Uchiyama (UCLA, now at University of Kobe, Japan); Jeroen Molemaker (UCLA); Hernan Arango (ICMS, Rutgers Univ.); Evan Mason (Universidad de Las Palmas de Gran Canaria; UCLA; now at Inst. de Ciencias del Mar, Barcelona, Spain); Yuliya Kanarska (UCLA; now at LLNL); Paul Budgell (IMR, Norway; now at Univ. of Saint Jones, Canada); Emanuele Di Lorenzo (SIO, UCSD; now at Georgia Tech. Inst.); Pierrick Penven (UCLA; now IRD, France); Tal Ezer (GFDL, Princeton Univ.); John Moisan (Goddard Space Center, NASA); Wesley Jones (SGI, SCD, NCAR); Irad Yavneh (Techicon, Israel);

Ph. D. Thesis

Shchepetkin, A. F., Dynamics of ellipsoidal quasigeostrophic mesoscale vortices in a stratified ocean (1992).

PUBLICATIONS

Peer-Reviewed Articles:

[each ★ indicates at least 50 citations of that article; sources:
www.isiknowledge.com, www.sciencedirect.com]

- Mason, E., F. Colas, J. Molemaker, A. F. Shchepetkin, C. Troupin, J. C. McWilliams, and P. Sangrà (2011), Seasonal variability of the Canary Current: a numerical study, *J. Geophys. Res., Oceans*, **116**, C06001, doi:10.1029/2010JC006665
- Shchepetkin, A. F. and J. C. McWilliams, 2011: Accurate Boussinesq oceanic modeling with a practical, “stiffened” equation of state. *Ocean Modeling*, **38**, pp. 41-70, doi:10.1016/j.ocemod.2011.01.010
- Mason, E., J. Molemaker, A. F. Shchepetkin, F. Colas, J. C. McWilliams, and P. Sangrà, 2010: Procedures for offline grid nesting in regional ocean models *Ocean Modeling*, **35**, pp. 1-15, doi:10.1016/j.ocemod.2010.05.007
- Uchiyama, Y., J. C. McWilliams, and A. F. Shchepetkin, 2010: Wave-current interaction in an oceanic circulation model with a vortex-force formalism: Application to the surf zone. *Ocean Modeling*, **34**, (1-2), pp. 16-35. doi:10.1016/j.ocemod.2010.04.002
- Shchepetkin, A. F. and J. C. McWilliams, 2009: Correction and Commentary for “Ocean Forecasting in Terrain-Following Coordinates: Formulation and Skill Assessment of the Regional Ocean Modeling System” by Haidvogel et al., *J. Comp. Phys.* **227**, pp. 3595-3624. *J. Comput. Phys.*, **228**, pp. 8985-9000, doi:10.1016/j.jcp.2009.09.002
- McWilliams, J. C., E. Huckle, and A. F. Shchepetkin, 2009: Buoyancy effects in a stratified Ekman Layer *J. Phys. Oceanogr.*, **39**, pp. 2581-2599. doi:10.1175/2009JPO4130.1
- Colas, F., X. Capet, J. C. McWilliams, and A. Shchepetkin, 2008: 1997-1998 El Nino off Peru: A numerical study. *Progress in Oceanogr.*, **79**, No 2-4, pp. 138-155, doi:10.1016/j.pocean.2008.10.015
- Shchepetkin, A. F. and J. C. McWilliams, 2008: Computational kernel algorithms for fine-scale, multi-process, long-term oceanic simulations. In: *Handbook of Numerical Analysis, Vol. XIV: Computational Methods for the Ocean and the Atmosphere*, P. G. Ciarlet, editor, R. Temam & J. Tribbia, guest eds., Elsevier Science, pp. 121-183, doi:10.1016/S1570-8659(08)01202-0
- ★ Capet, X., J. C. McWilliams, M. Molemaker, and A. F. Shchepetkin, 2008: Mesoscale to submesoscale transition in the California current system. Part I: Flow structure, eddy flux, and observational tests. *J. Phys. Oceanogr.*, **38**, pp. 29-43, doi:10.1175/2007JPO3671.1
- Capet, X., J. C. McWilliams, M. Molemaker, and A. F. Shchepetkin, 2008: Mesoscale to submesoscale transition in the California current system. Part II: Frontal processes. *J. Phys. Oceanogr.*, **38**, pp. 44-64, doi:10.1175/2007JPO3672.1
- Capet, X., J. C. McWilliams, M. Molemaker, and A. F. Shchepetkin, 2008: Mesoscale to submesoscale transition in the California current system. Part III: Energy balance and flux. *J. Phys. Oceanogr.*, **38**, pp. 2256-2269, doi:10.1175/2008JPO3810.1
- Kanarska, Y., A. Shchepetkin, and J. C. McWilliams, 2007: Algorithm for non-hydrostatic dynamics in ROMS. *Ocean Modeling*, **18**, pp. 143-174. doi:10.1016/j.ocemod.2007.04.01

Dong, C., J. C. McWilliams and A. F. Shchepetkin 2007: Island wakes in deep water, *J. Phys. Oceanogr.*, **37**, pp. 962-981. doi:10.1175/JPO3047.1

***** Shchepetkin, A. F. and J. C. McWilliams, 2005: The regional ocean modeling system (ROMS): A split-explicit, free-surface, topography-following-coordinate oceanic model. *Ocean Modeling* **9/4**, pp. 347-404. doi:10.1016/j.ocemod.2004.08.002

** Shchepetkin, A. F. and J. C. McWilliams, 2003: A method for computing horizontal pressure-gradient force in an oceanic model with a nonaligned vertical coordinate, *J. Geophys. Res.*, **108(C3)**, p. 3090, doi:10.1029/2001JC001047.

*** Marchesiello, P., J. C. McWilliams, and A. Shchepetkin, 2003: Equilibrium structure and dynamics of the California Current System. *J. Phys. Oceanogr.*, **33** (4), pp. 753-783. doi:10.1175/1520-0485(2003)33<753:ESADOT>2.0.CO;2

* Ezer, T., H. Arango, and A. F. Shchepetkin, 2002: Developments in terrain-following ocean models: inter-comparison of numerical aspects. *Ocean Modeling* **4**, pp. 249-267. doi:10.1016/S1463-5003(02)00003-3

**** Marchesiello, P., J. C. McWilliams, and A. F. Shchepetkin, 2001: Open boundary condition for long-term integration of regional oceanic models. *Ocean Modeling* **3**, pp. 1-20. doi:10.1016/S1463-5003(00)00013-5

Hardenberg, von J., J. C. McWilliams, A. Provenzale, A. Shchepetkin, and J. B. Weiss, 2000: Vortex merging in quasi-geostrophic flows. *J. Fluid Mech.*, **412**, pp. 331-353.

**** Haidvogel, D. B., H. Arango, K. Hedstrom, A. Beckmann, P. Rizzoli, and A. F. Shchepetkin, 2000: Model evaluation experiments in the North Atlantic Basin: Simulations in non-linear terrain-following coordinates. *Dyn. Atmos. Oceans*, **32**, pp. 239-281, doi:10.1016/S0377-0265(00)00049-X

** Shchepetkin, A. F. and J. C. McWilliams, 1998: Quasi-monotone advection schemes based on explicit locally adaptive dissipation, *Monthly Weather Rev.*, **126**, pp. 1541-1580, doi:10.1175/1520-0493(1998)126<1541:QMASBO>2.0.CO;2

Yavneh, I., A. F. Shchepetkin, J. C. McWilliams, and L. P. Graves, 1997: Multigrid solution of rotating, stably stratified flows: The balance equations and their turbulent dynamics; *J. Comp. Phys.*, **136**, pp. 245-262, doi:10.1006/jcph.1997.5775

Shchepetkin, A. F. and J. J. O'Brien, 1996: A physically consistent formulation of lateral friction in shallow water equation ocean models, *Monthly Weather Review*, **124**, pp. 1285-1300, doi:10.1175/1520-0493(1996)124<1285:APCFOL>2.0.CO;2

Meacham, S. P., K. K. Pankratov, A. F. Shchepetkin, and V. V. Zhmur, 1994: The interaction of arbitrarily oriented ellipsoidal vortices in a continuously stratified fluid with background shear and strain flows, *Dyn. Atmos. Oceans*, **21**, pp. 167-212, doi:10.1016/0377-0265(94)90008-6

Zhmur, V. V. and A. F. Shchepetkin, 1992: Interaction between two quasigeostrophic vortices: tendency to come together and merge. *Atmos. Oceanic Phys., Russ. Acad. of Sci.*, **28**, 407-416.

Zhmur, V. V. and A. F. Shchepetkin, 1991: Evolution of an ellipsoidal vortex in a stratified ocean in the f -plane approximation. *Atmos. Oceanic Phys., Russ. Acad. of Sci.*, **27**, pp. 331-346.

Unpublished, but known

Shchepetkin, A. F. and J. C. McWilliams, 2003: A family of finite-volume methods for computing pressure gradient force in an ocean model with topography-following vertical coordinate.

Conference Presentations

Shchepetkin, A. F.: Rethinking mode splitting, splitting in general, Boussinesq, non-Boussinesq, seawater EOS, and how it all comes together. *ROMS/TOMS User Workshop*, Honolulu, HI, April 5 - 8, 2010

Shchepetkin, A. F., J. Molemaker, F. Colas, E. Mason, Y. Uchiyama, J. Kurian, and J. C. McWilliams: Recent Developments of ROMS at UCLA. *Physical Oceanography Review Symposium* Chicago, IL, June 7-13, 2009

Shchepetkin, A. F.: 10 years of ROMS project: An overview with emphasis of what is overlooked, overdue, or missing. *ROMS/TOMS Workshop and Community Sediment Transport Modeling (CSTM) Meeting*, Los Angeles, CA, October 1-5, 2007.

Shchepetkin, A. F.: If-less KPP. *ROMS/TOMS Workshop: Adjoint Modeling and Applications*, La Jolla, CA, October 24-28, 2005.

Shchepetkin, A. F.: Overview of evolution of computational kernel of ROMS: How different things add up to make an ocean model. invited lecture at *ROMS/TOMS European Workshop*, CNR-ISMAR, Venice, Italy, 17-21 October, 2004.

Shchepetkin, A. F.: Poor Man's Computing Revisited *ROMS/TOMS European Workshop*, CNR-ISMAR, Venice, Italy, 17-21 October, 2004.

Shchepetkin, A. F.: KPP Implementation in ROMS. *POM/ROMS Users Workshop*, PMEL NOAA, Seattle, WA, August 4-6, 2003

Shchepetkin, A. F.: The New Computational Kernel of ROMS. *An invited lecture in 2001 Terrain-Following Ocean Models Workshop*, Boulder, CO, August, 20-22, 2001

Shchepetkin, A. F.: The Regional Ocean Modeling System (ROMS): Time stepping and time splitting algorithms. A presentation in *Layered Ocean Model Workshop*. Miami, FL, 26-28 February 2001.

Shchepetkin, A. F.: High-order accuracy, monotonic continuous field reconstruction on nonuniform grids. A presentation in *Layered Ocean Model Workshop*. Miami, FL, 26-28 February 2001.

Shchepetkin, A. F., 1995, Interaction of turbulent barotropic shallow-water flow with Topography, *1995 Proceedings of Hawaiian Winter Aha Huliko'a Workshop*, P. Müller and D. Henderson, editors, Honolulu, HI, pp. 225-237.

Shchepetkin, A. F. and S. P. Meacham, 1994, Interaction of intense mesoscale vortices in a continuously stratified ocean. *Annales Geophysicae, Part II, Oceans, Atmosphere, Hydrology and Nonlinear Geophysics*; Suppl. to vol. 12, p. C511, EGS Symp. Grenoble.

Shchepetkin, A.F., 1993, On instabilities of vortices in the background shear and strain flow. *Preprints of the Ninth Conference of Atmospheric and Oceanic Waves and Stability*, p. 78-81. San Antonio, TX, 10-14 May, 1993.

Zhmur V. V. and A. F. Shchepetkin, 1991, Nonlinear evolution of quasigeostrophic vortices in horizontal and vertical shear flow in a stratified ocean. *Abstracts of IAMAP Symposium*, M6, p. 103.

Zhmur V. V. and A. F. Shchepetkin, 1991, Interaction of baroclinic quasigeostrophic vortices in a continuously stratified ocean. *Abstracts of IAMAP Symposium*, Vienna, M6, p. 104.