

CONTACT INFORMATION	Los Alamos National Laboratory MS B296 Los Alamos, NM 87545	<i>phone:</i> (505) 667-7399 <i>e-mail:</i> mpetersen@lanl.gov
RESEARCH INTERESTS	numerical methods for ocean models; climate change assessment using global climate models; Lagrangian-averaged Navier-Stokes alpha turbulence model; direct numerical simulation of shock-turbulence interaction; forcing methods for compressible turbulence; quasi-geostrophic turbulence; planetary formation in protoplanetary disks; education in science and engineering	
EDUCATION	<p>Ph.D., Applied Mathematics, 2004, University of Colorado at Boulder Dissertation Topic: Study of Geophysical and Astrophysical Turbulence using Reduced Equations Advisors: Keith Julien (Applied Math), Jeffrey B. Weiss (PAOS), Glen R. Stewart (LASP)</p> <p>M.S., Atmospheric and Oceanic Science, 2002, University of Colorado at Boulder</p> <p>M.S., Mathematics and Statistics, 2000, University of Nebraska-Lincoln</p> <p>B.S., Environmental Engineering, 1995, University of Nebraska-Lincoln</p>	
PROFESSIONAL EXPERIENCE	<p>Technical Staff Member 2007–present <i>Los Alamos National Laboratory, Computer and Computational Science Division</i></p> <ul style="list-style-type: none"> • HyPOP ocean model developer. Responsibilities include vertical diffusion schemes, regridding and remapping infrastructure, and correct operation of ALE grid. • Developing LANS-alpha model formulation in POP so that it may be used with realistic topography. • Conducting high resolution study of compressible turbulence, where dilatational energy and turbulent Mach number are systematically varied. • Developing novel forcing methods for compressible turbulence simulations. • Investigation of shock-turbulence interactions using direct numerical simulations. <p>Postdoctoral research associate 2005–2007 <i>Los Alamos National Laboratory,</i> <i>Center for Nonlinear Studies; and Computer and Computational Science Division</i></p> <ul style="list-style-type: none"> • Implemented the LANS-alpha turbulence parameterization in the POP ocean model. • Published papers on vortex dynamics in protoplanetary disks. • Simulated statistics of extreme temperature events. <p>Project Engineer, Air Pollution Control Systems 1996 - 1998 <i>U.S. Filter/RJ Environmental, San Diego, CA</i></p> <ul style="list-style-type: none"> • Responsible for emergency chlorine scrubbers and packed-tower odor control systems, including design, fabrication details, installation, and training of new engineers. 	
RELEVANT PUBLICATIONS	<p>* indicates corresponding author</p> <p>Hecht, M.W., E. Hunke, M.E. Maltrud, M.R. Petersen, B.A. Wingate: 2008, Lateral mixing in the eddy regime and a new broad-ranging formulation, in <i>Ocean Modeling in an Eddy Regime</i>, AGU, Washington D.C.</p> <p>Hecht, M.W., D.D. Holm, M.R. Petersen*, B.A. Wingate: 2008, The LANS-alpha and Leray turbulence parameterizations in primitive equation ocean modeling <i>J. Physics A</i>, 41 344009</p> <p>Hecht, M.W., D.D. Holm, M.R. Petersen*, B.A. Wingate: 2008, Implementation of the LANS-alpha turbulence model in a primitive equation ocean model, <i>J. Comp. Physics</i>, 227 5691</p> <p>M.R. Petersen, M.W. Hecht, B.A. Wingate: 2008, Efficient form of the LANS-alpha turbulence model in a primitive-equation ocean model, <i>J. Comp. Physics</i>, 227, 5717</p>	

Petersen, M.R., K. Julien, and G.R. Stewart: 2007, Baroclinic Vorticity Production in Protoplanetary Disks; Part I: Vortex Formation, *The Astrophysical Journal*, **658**, 1236

Petersen, M.R., G.R. Stewart, and K. Julien: 2007, Baroclinic Vorticity Production in Protoplanetary Disks; Part II: Vortex Growth and Longevity *The Astrophysical Journal*, **658**, 1252

Redner, S., M.R. Petersen: 2006, On the Role of Global Warming on the Statistics of Record-Breaking Temperatures, *Physical Review E*, **74**, 061114

Petersen, M.R., K. Julien, and J.B. Weiss: 2006, Vortex cores, circulation cells, and filaments in quasi-geostrophic turbulence, *Physics of Fluids*, **18**, 026601