

PETER LEE OLSON

Present Position: Professor of Geophysical Fluid Dynamics
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Date of Birth: August 8, 1950; Lincoln, Nebraska USA

RESEARCH INTERESTS:

Dynamics of the Earth's Mantle and Core
Planetary Magnetism and Geomagnetism
Laboratory Geodynamics Experiments
Composition and Evolution of Earth's Mantle and Core
Geophysical Fluid Dynamics
Core Formation in Terrestrial Planets
Slow Carbon Cycle

EDUCATION:

Ph.D. Geophysics, June 1977, University of California, Berkeley, California
M.A. Geophysics, June 1974, University of California, Berkeley, California
B.A. Geology, June 1972, University of Colorado, Boulder, Colorado
Ph.D. Thesis: Internal Waves and Hydromagnetic Induction in the Earth's Core

PREVIOUS POSITIONS:

Geophysicist, Petty Geophysical Company, San Antonio, Texas (1970)
Geophysicist, Amoco Production Company, Denver, Colorado (1971)
Research Assistant, United States Geological Survey, Denver, Colorado (1972)
Visiting Assistant Professor, University of California, Berkeley (1980)
Assistant Professor of Geophysical Fluid Dynamics, Johns Hopkins
University, Baltimore, Maryland (1977-1982)
Research Scientist, Chesapeake Bay Institute (1982-1986)
Associate Professor of Geophysical Fluid Dynamics, Johns Hopkins
University, Baltimore, Maryland (1982-1986)
Chair, Department of Earth and Planetary Sciences, Johns Hopkins
University (7/01-7/04)
Interim Chair, Department of Earth and Planetary Sciences, Johns Hopkins
University (12/06-2/07)

AWARDS AND HONORS:

University of California Regents Fellow, 1976
 American Geophysical Union Frontiers of Geophysics Lecturer, 1988
 W. Keck Scholar, Woods Hole Oceanographic Institution, 1990
 Visiting Professor, Ecole Normale Supérieure, 1995
 Fellow, American Geophysical Union, 1997
 Honorary Fellow, European Union of Geosciences, 1999
 Gauss Visiting Professor, Gottingen, 2001-2002
 Morton K. Blaustein Professor, JHU, 2001-2004
 Fellow, American Academy of Arts & Sciences, 2005
 Member, U.S. National Academy of Sciences, 2007
 Bullard Lecture, American Geophysical Union, 2007
 Frontiers Lecturer, Oregon State University, 2010
 Edison Lecturer, Notre Dame University, 2011
 Petrus Peregrinus Medal, European Geosciences Union, 2011
 American Geophysical Union, Excellence in Refereeing Citation, 2013
 Inge Lehmann Medal, American Geophysical Union, 2015

MEMBERSHIP AND COMMITTEES:**Currently (partial listing):**

American Geophysical Union
 American Physical Society
 American Association Advancement Science
 European Geosciences Union
 AGU SEDI Committee; CIG Geodynamo Users Group
 National Research Council Committee on Seismology and Geodynamics
 JHU Distinguished Awards Committee
 American Geophysical Union Fleming Medal Committee
 Kavli Institute for Theoretical Physics Advisory Committee
 American Civil Liberties Union; The Sierra Club; Nature Conservancy;
 The Wilderness Society; Oxfam; National Wildlife Federation; National
 Arbor Day Federation; National Parks Conservation Association; Trout
 Unlimited; Audubon Society...18 additional organizations and societies

Previously (partial listing):

Ethics Board; Graduate Board, Johns Hopkins University
 Program Chairman, American Geophysical Union, Tectonophysics Section
 Scientific Advisory Board, Maryland Power Plant Siting Program
 Scientific Steering Panel, NASA GRM mission
 University Corporation for Atmospheric Research Representative
 IASPEI Committee on Geodynamics; National Research Council NROES Committee
 AGU EOS Editorial Board
 U.S. National Committee on Studies of Earth's Deep Interior
 NSF Geophysics/Seismology Panel; AGU Focus Group Fellows Committee

SEDI International; Los Alamos IGPP Advisory Board
 NSF CSEDI Panel; President, Tectonophysics Section of American Geophysical Union
 Cooperative Institute for Deep Earth's Interior Science Steering Committee
 Computational Infrastructure in Geodynamics Science Steering Committee Chair
 Computational Infrastructure in Geodynamics Executive Committee Chair
 AGU GRL Editors Search Committee Chair
 Natl Acad Sci Sect Solid Earth Subsection Chair

EDITORIAL AND OTHER OFFICES:

Reviewing Editor, *Science* (8/86-1/88)
 Associate Editor, *Journal of Geophysical Research* (10/86-12/89)
 Associate Editor, *Reviews of Geophysics* (5/88-5/91)
 Faculty Editorial Board, The Johns Hopkins University Press (9/88-9/91)
 Editor, *Geophysical Research Letters* (1/91-1/94)
 Associate Editor, *G-Cubed* (10/99-10/01)
 Associate Editor, *Treatise on Geophysics* (9/04-11/07)
 Editorial Board, *EOS* (3/08-14)
 Occasional Editor for Geophysics *PNAS* (6/12-)

RESEARCH GRANTS & CONTRACTS, 1980-present, EXAMPLES

<u>Title</u>	<u>Agency Sponsor</u>
Geomagnetism and Core Motions	NSF
Hydrodynamics of Baltimore Harbor	MD Dept. Natural Resources
Channel Dredging Effects in Baltimore Harbor	MD Dept. Natural Resources
Causes and Consequences of Subtidal Variability in Chesapeake Bay Circulation	MD Dept Natural Resources Power Plant Siting
A Study of Some Convective Processes in the Earth's Core and Mantle	NSF
A Study of Convective Processes in the Earth's Mantle and Core	NSF
Supercomputers	NSF
Acquisition of a VAX-11/750 computer system	NSF
Patuxent River Circulation	MD DHMH
Prospecting for Mantle Plumes Using Satellite Geoid and Gravity Data	NASA
Boundary Layer Dynamics in the Earth's Mantle	NSF
Dynamo Models of Paleomagnetic Secular Variation	NSF
Subsolidus Convection in the Earth's Interior	IGPP
Long Term Numerical Simulations of the Patuxent Estuary Hydrodynamics	MD Dept. of Energy
Three-dimensional estuarine circulation	MD Dept. of Energy
Mantle Convection With Surface Plates	IGPP

Mantle Plume Dynamics in the Terrestrial Planets	NASA
Experimental Geodynamics	NSF
Convection in a Rapidly Rotating Sphere	IGPP
Rotating Convection with Precession	NSF
Experimental Geodynamics	NSF
Magnetoconvection in the Earth's Core	IGPP
Cooperative Research on Earth's Deep Interior	NSF
Seismodynamics of the Lithosphere	NSF
Causes and Consequences of Geomagnetic Dipole Moment Change	NSF
Geomagnetic Polarity Reversals and the Geodynamo	NSF
Core-Mantle Interactions and Evolution of the Geodynamo	NSF
Fluid Dynamics Experiments on Core Formation	NSF

Current:

Open Earth Systems: Whole planet models for global processes and major events in Earth's history (FESD)	NSF
	NSF

UNIVERSITY COURSES TAUGHT:

General Undergraduate Courses:

Planet Earth
Earth's Environments
Our Changing Planet
Introduction to Global Environmental Change Science
Freshman Seminar in the Earth Sciences
Oceans and Atmospheres

Upper Division Undergraduate Courses:

Introduction to Seismology
Geodynamics
Oceanography
Principles of Natural Catastrophes
Planets, Life, Universe

Graduate Courses:

Geophysical Fluid Dynamics
Fluid Dynamics of the Earth and Planets
Time Series Methods in Geophysics
Earth's Core and the Geodynamo
Planetary Interiors
Mechanics of Earth's Interior
Dynamics of the Earth's Mantle
Special Topics in Geophysics

PREVIOUS Ph.D. STUDENTS (partial list with current affiliations):

Mario Viera (USNA; ret.); Robert Edmonds, Michael Shore (DARPA; ret.),
 Harvey Singer (George Mason Univ.), Virginia Lee Hagee, Andrew Jephcoat (Oxford),
 Chris Kincaid (GSO-URI), Stuart Weinstein (NOAA), Philippe Cardin (Univ. Grenoble),
 Moritz Heimpel (Univ. Alberta), Daniel Brito (Univ. de Pau), Jim Buttles (UT Austin),
 Jonathan Aurnou (UCLA), Hagay Amit (Univ. Nantes), Peter Driscoll (Carnegie DTM.),
 Benjun Wu (Nanjing Univ.)

RECENT GRADUATE STUDENTS and POST-DOCS

Lijun Liu (Univ. Ill), Christina King (Ore.St. Univ.), Renaud Deguen (Univ. Lyon),
 Maylis Landeau (JHU Postdoc)

CURRENT GRADUATE STUDENTS:

Nathan Towles, Eshwan Ramudu; JHU EPS

CONSULTING (Previously):

Maryland State Office of Environmental Programs
 Martin Marietta Corporation
 Los Alamos National Laboratory
 Universities Space Research Association

PUBLICATIONS

(Google Scholar: [h_index=48](https://scholar.google.com/citations?user=Oel6S2cAAAAJ&hl=en); September 2015)

[http://scholar.google.com/citations?user=Oel6S2cAAAAJ&hl=en](https://scholar.google.com/citations?user=Oel6S2cAAAAJ&hl=en)

ARTICLES:

1. Olson, P., Internal Waves in the Earth's Core, *Geophys. J.R. Astr. Soc.*, **51**, 183-215, 1977.
2. Olson, P., A Flux Line Method for Numerical Studies of Kinematic Dynamos, *Woods Hole Ocean. Inst. Tech. Rep.*, **78-67**, 150-151, 1978.
3. Elsasser, W.M., P. Olson, and B.D. Marsh, The Depth of Mantle Convection, *J. Geophys. Res.*, **84**, 146-155, 1979.
4. Olson, P. and G.M. Corcos, A boundary layer model for mantle convection with surface plates, *Geophys. J.R. Astr. Soc.*, **62**, 195-219, 1980.
5. Olson, P., Mantle convection with spherical effects, *J. Geophys. Res.*, **86**, 4881-4891, 1981.
6. Olson, P., A simple physical model for the terrestrial dynamo, *J. Geophys. Res.*, **86**, 10785-10882, 1981.
7. Olson, P. and D.A. Yuen, Thermochemical Plumes and Mantle Phase Transitions, *J. Geophys. Res.*, **87**, 3993-4002, 1982.
8. Boicourt, W.D. and P. Olson, A Hydrodynamic Study of the Baltimore Harbor System, Part I: Observations on the Circulation and Mixing in Baltimore Harbor, Chesapeake Bay Inst. Bulletin #1, 120 pp., 1982.

9. Olson, P., W.D. Boicourt, and T.O. Najarian, A Hydrodynamic Study of the Baltimore Harbor System, Part II: A Numerical Model of the Baltimore Harbor Circulation, Chesapeake Bay Inst. Bulletin #2, 152 pp., 1982.
10. Bougault, H., S.C. Cande, J.-G. Schilling, P. Olson, and D.L. Turcotte, Mantle Heterogeneity and Convection, *Nature*, **305**, p. 278, 1983.
11. Olson, P., Geomagnetic Polarity Reversals in a Turbulent Core, *Phys. Earth Planet. Inter.*, **33**, 260-274, 1983.
12. Olson, P., D.A. Yuen, and D. Balsiger, Mixing of Passive Heterogeneities by Mantle Convection. *J. Geophys. Res.*, **89**, 425-436, 1984.
13. Singer, H. and P. Olson, Dynamo Action in a Stably Stratified Core, *Geophys. J.R. Astr. Soc.*, **78**, 371-387, 1984.
14. Olson, P., An Experimental Approach to Thermal Convection in a Two-Layered Mantle, *J. Geophys. Res.*, **89**, 11293-11301, 1984.
15. Olson, P. A Spectral Model for Subtidal Variability in the Chesapeake Bay, *Maryland Academy of Sciences PPRP-89*, 59 pp., 1984.
16. Olson, P., D.A. Yuen, and D. Balsiger, Convective mixing and the fine structure of mantle heterogeneity, *Phys. Earth Planet. Inter.*, **36**, 291-304, 1984.
17. Olson, P. and H. Singer, Creeping Plumes, *J. Fluid Mech.*, **158**, 509-529, 1985.
18. Silver, P.G., R.W. Carlson, P. Olson, and P. Bell, Mantle Structure and Dynamics, *Eos Transactions American Geophysical Union*, **66**, 1193-1198, 1985.
19. Olson, P. and I.S. Nam, The Formation of Sea Floor Swell by Mantle Plumes, *J. Geophys. Res.*, **91**, 7181-7191, 1986.
20. Olson, P. and U. Christensen, Solitary Wave Propagation in a Fluid Conduit Within a Viscous Matrix, *J. Geophys. Res.*, **91**, 6367-6374, 1986.
21. Olson, P., The Spectrum of Subtidal Variability in Chesapeake Bay Circulation, *Estuarine, Coastal and Shelf Sciences*, **23**, 527-550, 1986.
22. Olson, P. and V.L. Hagee, Dynamo Waves and Paleomagnetic Secular Variation, *Geophys. J.R. Astr. Soc.*, **88**, 139-159, 1987.
23. Jephcoat, A.P. and P. Olson, Is the Inner Core Pure Iron?, *Nature*, **325**, 332-335, 1987.
24. Olson, P., G. Schubert, and C.A. Anderson, Plume Formation in the D"-Layer and the Roughness of the Core-Mantle Boundary, *Nature*, **327**, 409-413, 1987.
25. Olson, P., Drifting Mantle Hotspots, *Nature*, **327**, 559-560, 1987.
26. Olson, P., A Comparison of Heat Transfer Laws for Mantle Convection at Very High Rayleigh Numbers, *Phys. Earth & Planet. Int.*, **48**, 153-160, 1987.
27. Lund, S.P. and P. Olson, Historic and Paleomagnetic Secular Variation and the Earth's Core Dynamo Processes, *Rev. Geoph. Space Phys.*, **25**, 917-918, 1987.
28. Kincaid, C. and P. Olson, An Experimental Study of Subduction and Slab Migration, *J. Geophys. Res.*, **92**, 13832-13840, 1987.
29. Olson, P., Fate of Subducted Lithosphere, *Nature*, **331**, 113-114, 1988.
30. Weinstein, S.A., D.A. Yuen, and P. Olson, Evolution of crystal settling in magma chamber convection, *Earth. & Planet. Sci. Lett.*, **87**, 237-248, 1988.
31. Silver, P.G., R.W. Carlson, and P. Olson, Deep Slabs, Geochemical Heterogeneity and the Large-Scale Structure of Mantle Convection: Investigation of an Enduring Paradox, *Ann. Rev. Earth Planet. Sci.*, **16**, 477-452, 1988.

32. Kincaid, C. and P. Olson, A Numerical Investigation of Circulation and Salt Distribution in the Patuxent River Estuary, *in Understanding the Estuary: Advances in Estuary Research*, Chesapeake Research Consortium, pp. 323-351, 1988.
33. Olson, P. and V. Grano, Changes in Circulation and Salinity from Increased Channel Depth in the Baltimore Harbor, *in Understanding the Estuary: Advances in Chesapeake Bay Research*, Chesapeake Research Consortium, pp. 302-322, 1988.
34. Olson, P., G. Schubert, and C. Anderson, Plume Formation and Lithosphere Erosion: A Comparison of Laboratory and Numerical Experiments, *J. Geophys. Res.*, **93**, 15065-15084, 1988.
35. Hagee, V.L. and P. Olson, Evidence for wave propagation in the Holocene paleomagnetic field, *in Geomagnetism and Paleomagnetism*, F.J. Lowes et al., eds., 107-121, 1989.
36. Weinstein, S.A. and P. Olson, The Proximity of Hotspots to Convergent and Divergent Plate Boundaries, *Geophys. Res. Lett.*, **16**, 433-436, 1989.
37. Weinstein, S.A., P. Olson, and D.A. Yuen, Time Dependent Large Aspect Ratio Thermal Convection in the Earth's Mantle, *Geophys. Astr. Fluid Dyn.*, **47**, 157-197, 1989.
38. Blankenbach, B., F. Busse, U. Christensen, L. Cserepes, U. Hansen, H. Harder, G. Jarvis, M. Koch, G. Marquardt, D. Moore, P. Olson, H. Schmeling, and T. Schnaubelt, A Benchmark Comparison for Mantle Convection Codes, *Geophysical Journal*, **98**, 23-28, 1989.
39. Olson, P., G. Schubert, C. Anderson, and P. Goldman, Solitary Waves in Mantle Plumes, *J. Geophys. Res.*, **94**, 9523-9532, 1989.
40. Olson, P. Toroidal flow in the outer core and the thermal regime below the core-mantle boundary, *Geophys. Res. Lett.*, **16**, 613-616, 1989.
41. Olson, P., Mantle Convection and Plumes *in Encyclopedia of Geophysics*, D.E. James, ed., Van Nostrand Reinhold, 788-802, 1989.
42. Hagee, V.L. and P. Olson, An Analysis of Paleomagnetic Secular Variation in the Holocene, *Phys. Earth & Planet. Int.*, **56**, 266-284, 1989.
43. Kincaid, C. and P. Olson, Numerical Model of Patuxent River Estuary Hydrodynamics, *Geophysical Fluid Dynamics Technical Report*, **89-1**, 135 pp., 1990.
44. Olson, P., P.G. Silver, and R.W. Carlson, The large-scale structure of convection in the Earth's mantle, *Nature*, **344**, 209-215, 1990.
45. Olson, P. and V.L. Hagee, Geomagnetic polarity reversals, transition field structure and convection in the outer core, *J. Geophys. Res.*, **95**, 4609-4620, 1990.
46. Weinstein, S.A. and P. Olson, Planforms in thermal convection with internal heat sources at large Rayleigh and Prandtl numbers, *Geophys. Res. Lett.*, **17**, 239-242, 1990.
47. Travis, B., S.A. Weinstein, and P. Olson, Three-dimensional convection planforms with internal heat generation, *Geophys. Res. Lett.*, **17**, 243-246, 1990.
48. Travis, B., P. Olson, and G. Schubert, The transition from two-dimensional to three-dimensional planforms in infinite Prandtl number thermal convection, *J. Fluid Mech.*, **216**, 71-91, 1990.
49. Olson, P., Hotspots, Swells and Mantle Plumes, *in Magma Transport and Storage*, M.P. Ryan, ed., John Wiley and Sons, N.Y., 33-51, 1990.
50. Lay, T., T.J. Ahrens, P. Olson, J. Smyth, and D. Loper, Studies of the Earth's deep interior: Goals and trends, *Physics Today*, **10**, 44-52, 1990.
51. Travis., B.J., C. Anderson, T. Baumgardner, D.W. Gable, B.H. Hager, R. O'Connell,

- P. Olson, A. Raefsky, and G. Schubert, A benchmark comparison of numerical methods for infinite Prandtl number thermal convection in two-dimensional Cartesian geometry, *Geophys. Astrophys. Fluid Dyn.*, **55**, 137-160, 1990.
52. Olson, P. and C. Kincaid, Experiments on the Interaction of Thermal Convection and Compositional Layering at the Base of the Mantle, *J. Geophys. Res.*, **96**, 4347-4354, 1991.
53. Hagee, V.L. and P. Olson, Dynamo models with permanent dipole fields and secular variation, *J. Geophys. Res.*, **96**, 11673-11688, 1991.
54. Olson, P. and D. Bercovici, On the equipartition of kinetic energy in plate tectonics, *Geophys. Res. Lett.*, **18**, 1751-1754, 1991.
55. Larson, R.L. and P. Olson, Mantle plumes control magnetic reversal frequency, *Earth Planet. Sci. Lett.*, **107**, 437-447, 1991.
56. Olson, P., Superplumes from the deep mantle, *Physics News*, Amer. Inst. Physics, 46-47, 1991.
57. Cardin, P. and P. Olson, An experimental approach to thermochemical convection in the Earth's core, *Geophys. Res. Lett.*, **19**, 1995-1998, 1992.
58. Weinstein, S.A. and P. Olson, Thermal convection with non-Newtonian plates, *Geophys. J. Int'l.*, **111**, 515-530, 1992.
59. Rubin, H. and P. Olson, Walter M. Elsasser, *Physics Today*, pp. 98-99, February 1993.
60. Olson, P., G. Schubert, and C. Anderson, Structure of axisymmetric mantle plumes, *J. Geophys. Res.*, **98**, 6829-6844, 1993.
61. Glatzmaier, G. and P. Olson, Highly supercritical thermal convection in a rotating spherical shell, *Geophys. Astrophys. Fluid Dyn.*, **70**, 113-136, 1993.
62. Solomatov, V., P. Olson, and D. Stevenson, Entrainment of Particles in Convective Layers, *Earth Planet. Sci. Lett.*, **120**, 387-393, 1993.
63. Cardin, P. and P. Olson, Chaotic convection in a rapidly rotating spherical shell: Consequences for flow in the outer core, *Phys. Earth Planet. Int.*, **82**, 235-259, 1994.
64. Travis, B. and P. Olson, Convection with internal heat sources and thermal turbulence in the Earth's mantle, *Geophys. J. Int'l.*, **118**, 881-901, 1994.
65. Olson, P., Mechanics of flood basalt magmatism, *in Magmatic Systems*, M.P. Ryan, ed., Academic Press, pp. 1-18, 1994.
66. Heimpel, M. and P. Olson, Buoyancy-driven dike propagation through the lithosphere: Models and experiments, *in Magmatic Systems*, M.P. Ryan, ed., Academic Press, pp. 223-240, 1994.
67. Cardin, P. and P. Olson, The influence of toroidal magnetic field on thermal convection in the core, *Earth Planet. Sci. Lett.*, **132**, 167-181, 1995.
68. Guillou-Frotier, L., J. Buttles, and P. Olson, Laboratory experiments on the structure of subducted lithosphere, *Earth Planet. Sci. Lett.*, **133**, 19-34, 1995.
69. Olson, P. and G.A. Glatzmaier, Magnetoconvection in a rotating spherical shell: Structure of flow in the outer core, *Phys. Earth Planet. Inter.*, **92**, 109-118, 1995.
70. Vanyo, J., P. Wilde, P. Cardin, and P. Olson, Experiments on Precessing Flows in Earth's Liquid Core, *Geophys. J. Int'l.*, **121**, 136-142, 1995.
71. Olson, P. and G.A. Glatzmaier, Magnetoconvection and thermal coupling of Earth's core and mantle, *Proc. Roy. Soc. London*, **354**, 1413-1424, 1996.
72. Manneville, J.-B. and P. Olson, Convection in a rotating fluid sphere and the banded structure of the Jovian atmosphere, *Icarus*, **122**, 242-250, 1996.

73. Heimpel, M. and P. Olson, A seismodynamical model of lithosphere deformation: Development of continental and oceanic fault networks, *J. Geophys. Res.*, **101**, 16155-16176, 1996.
74. Aurnou, J.M., J.L. Buttes, G.A. Neumann, and P. Olson, Electromagnetic core-mantle coupling and paleomagnetic reversal paths, *Geophys. Res. Lett.*, **23**, 2705-2708, 1996.
75. Aurnou, J.M., D. Brito, and P. Olson, Mechanics of inner core super-rotation, *Geophys. Res. Lett.*, **23**, 3401-3404, 1996.
76. Brito, D., P. Cardin, H-C Nataf, and P. Olson, Experiments on Joule heating and the dissipation of energy in the Earth's core, *Geophys. J. Intl.*, **127**, 339-347, 1996.
77. Olson, P., Probing Earth's Dynamo, *Nature*, **389**, 337-338, 1997.
78. Aurnou, J.M., D. Brito, and P. Olson, Anomalous rotation of the inner core and the toroidal magnetic field, *J. Geophys. Res.*, **103**, 9721-9738, 1998.
79. Christensen, U., P. Olson and G.A. Glatzmaier, A dynamo model interpretation of geomagnetic field structures, *Geophys. Res. Lett.*, **25**, 1565-1568, 1998.
80. Buttes, J. and P. Olson, A laboratory model of subduction zone anisotropy, *Earth Planet. Sci. Lett.*, **164**, 245-262, 1998.
81. Brito, D., J.M. Aurnou, and P. Olson, Can heterogeneous core-mantle electromagnetic coupling control geomagnetic reversals?, *Phys. Earth Planet. Inter.*, **112**, 159-170, 1998.
82. Olson, P., U. Christensen, and G.A. Glatzmaier, Numerical modeling of the geodynamo: Mechanisms of field generation and equilibration, *J. Geophys. Res.*, **104**, 10,383-10,404, 1999.
83. Christensen, U., P. Olson and G.A. Glatzmaier, Numerical modelling of the geodynamo: a systematic parameter study, *Geophys. J. Intl.*, **138**, 393-409, 1999.
84. Tackley, P., J.R. Baumgardner, G.A. Glatzmaier, P. Olson and T. Clune, Three-dimensional spherical simulations of convection in Earth's mantle and core using massively-parallel computers, *Proc. High. Performance Computing Symposium-HPC'99* 95-100, 1999.
85. Olson, P. and J. Aurnou, A polar vortex in the Earth's core, *Nature*, **402**, 170-173, 1999.
86. Sumita, I. and P. Olson, A laboratory model for the convection in the Earth's core driven by a thermally heterogeneous mantle, *Science*, **286**, 1547-1549, 1999.
87. Aurnou, J. and P. Olson, Control of inner core rotation by electromagnetic, gravitational and mechanical torques, *Phys. Earth Planet. Inter.*, **117**, 111-121, 2000.
88. Sumita, I. and P. Olson, Laboratory experiments on high Rayleigh number thermal convection in a rapidly rotating hemispherical shell, *Phys. Earth Planet. Inter.*, **117**, 153-170, 2000.
89. Aurnou, J. and P. Olson, Experiments on Rayleigh-Benard convection, magnetoconvection and rotating magnetoconvection in liquid gallium, *J. Fluid Mech.*, **430**, 283-307, 2001.
90. Aurnou, J. and P. Olson, Strong zonal winds generated by thermal convection in rotating spherical shells, *Geophys. Res. Lett.*, **28**, 2557-2559, 2001.
91. Olson, P., Mantle convection and plumes, in *Encyclopedia of Physical Science and Technology*, 3rd ed., R. A. Meyers, ed. **9**, 77-94, 2002.
92. Brito, D., Elbert, D. and P. Olson, Experimental crystallization of gallium: ultrasonic measurements of elastic anisotropy and implications for the inner core

- Phys Earth Planet Inter.*, **129**, 325-346, 2002.
93. Sumita, I. and P. Olson, Rotating thermal convection in a hemispherical shell With heterogeneous boundary heat flux: implications for the Earth's core, *J Geophys. Res.*, **107**, 10.1029/2001JB000548, 2002.
 94. Olson, P., The disappearing dipole, *Nature* **416**, 590-591, 2002.
 95. Olson, P., I. Sumita and J. Aurnou, Diffusive magnetic images of core upwellings, *J. Geophys. Res.*, **107**, 10.1029/ JB000384, 2002.
 96. Olson, P., and U.R. Christensen, The time averaged magnetic field in numerical dynamos with nonuniform boundary heat flow, *Geophys. J. Int.*, **151**, 809-823, 2002.
 97. Olson, P. Thermal interaction of the core and mantle, *Earth's Core and Lower Mantle*, C. A. Jones, A. M. Soward and K. Zhang, eds., Taylor and Francis, London, 1-38, 2003.
 98. Aurnou, J., Andreadis, S., Zhu, L. and P. Olson, Experiments on convection in Earth's core tangent cylinder, *Earth Planet Sci Lett*, **212**, 119-134, 2003.
 99. Christensen, U.R. and Olson, P., Secular variation in numerical geodynamo models with lateral variations of boundary heat flow, *Phys Earth Planet Inter.*, **138**, 39-54, 2003.
 100. Sumita, I. and P. Olson, Experiments on highly supercritical thermal convection in a rapidly rotating hemispherical shell, *J. Fluid Mech.*, **492**, 271-287, 2003.
 101. Wicht, J. and P. Olson, A Detailed study of the polarity reversal mechanism in a numerical dynamo model, *Geochemistry, Geodynamics, Geosystems*, **5**, doi 10.1029/2003GC000602, 2004.
 102. Schubert, G., G. Masters, P. Tackley and P. Olson, Superplumes or plume clusters?, *Phys. Earth Planet. Inter.*, doi:10.1016/j.pepi.2003.09.025, 2004.
 103. Amit, H. and P. Olson, Helical core flow from geomagnetic secular variation, *Phys. Earth Planet. Inter.*, **147**, 1-25, 2004.
 104. Glatzmaier, G. and P. Olson, Probing the Geodynamo, *Scientific American*, **292**, 50-57, 2005 (republished in Our Ever Changing Earth, Special Volume **15**, 28-35, 2005.)
 105. Amit, H. and P. Olson, Time-average and time-dependent parts of core flow, *Phys Earth Planet Inter.*, **155**, 120-139, 2006.
 106. Olson, P and H. Amit, Changes in Earth's Dipole, *Naturwissenschaften*, **93**, 519-542, doi.org/10.1007/s00114-006-0138-6, 2006.
 107. Olson, P., and U.R. Christensen, Dipole Moment Scaling for Convection-Driven Planetary Dynamos, *Earth and Planetary Science Letters*, **250**, 561-571, 2006
 108. Olson, P. Thermal Wind, in *Encyclopedia of Geomagnetism and Paleomagnetism*, eds. D. Gubbins & E. Herrero-Bervera, Springer, Dordrecht, 495-497, 2007.
 109. Olson, P. John Verhoogen, in *Encyclopedia of Geomagnetism and Paleomagnetism*, eds. D. Gubbins & E. Herrero-Bervera, Springer, Dordrecht, 979-980, 2007.
 110. Amit, H., P. Olson and U. Christensen, Tests of core flow imaging methods using numerical dynamo models, *Geophys J. Int.*, **168**, 27-39, 2007.
 111. Christensen, U.R., J. Aubert, and P. Olson, Convection-driven planetary dynamos. *Proceedings IAU Symposium*, **239**, 1-8, 2007.
 112. Courtillot, V. and P. Olson, Mantle Plumes Link Magnetic Superchrons to Phanerozoic Mass Depletion Events, *Earth Planet Sci. Lett.* **260**, 495-504, 2007.
 113. Olson, P. Overview on Core Dynamics, Chapter 8.01 in Volume 8 of the *Treatise on Geophysics* (G. Schubert, main ed.) Elsevier, Amsterdam, 1-31, 2007.

114. Cardin, P. and P. Olson, Experiments on Core Dynamics, Chapter 8.11 in Volume 8 of the *Treatise on Geophysics* (G. Schubert, main ed.) Elsevier, Amsterdam, 319-345, 2007.
115. Olson, P., Gravitational Dynamos and the Low Frequency Geomagnetic Secular Variation, *Proc. Nat. Acad. Sci.*, **04 (51)** 20159-20166, doi:10.1073/pnas.0709081104, 2007.
116. Amit, H. and P. Olson, Geomagnetic dipole tilt changes induced by core flow, *Phys. Earth Planet. Inter.*, **166**, 226-238, doi:10.1016/j.pepi.2008.01.007, 2008.
117. Amit, H., Aubert, J., Hulot, G. and P. Olson, A simple model for mantle-driven flow at the top of Earth's core *Earth Planet. Space*, **60**, 1-10, 2008.
118. Aubert, J., Amit, H., Hulot, G., and Olson, P., Thermo-chemical wind flows couple Earth's inner core growth to mantle heterogeneity, *Nature*, **454**, 758-762, 2008.
119. Olson, P., and Weeraratne, D. Experiments on metal-silicate plumes and core formation, *Phil. Trans. Roy. Soc. London A*, **366**, 4253-4271, 2008.
120. Olson, P., Planetary Magnetism, in *Dynamos*, Ph. Cardin, L.F. Cugilandolo, eds. Les Houches Session LXXXVIII: 2007, pp137-249, Elsevier B.V. ISBN: 978-0-0805-4812-8, 2008.
121. Olson, P., Driscoll, P., Amit, H., Dipole collapse and reversal precursors in a numerical dynamo, *Phys. Earth. Planet. Inter.* **173**, 121-140, 2009.
122. Liu L., and P. Olson, Geomagnetic dipole moment collapse by convective mixing in the core, *Geophys. Res. Lett.*, **36** doi:10.1029/2009GL038130, 2009.
123. Driscoll, P. and P. Olson, Polarity reversals in geodynamo models with core evolution, *Earth Planet. Sci. Lett.* **282**, 24-33, 2009.
124. Olson, P. Tectonics in the Earth's core, *Nature Geosci.* **2**, 379-380, 2009.
125. Driscoll, P. and P. Olson, Effects of buoyancy and rotation on the polarity reversal frequency of gravitationally-driven numerical dynamos, *Geophys. J. Int.*, **178**, 1337-1350, 2009.
126. Arkani-Hamed, J. and P. Olson, Giant impact stratification of the Martian core, *Geophys. Res. Lett.*, **37**, L02201, doi: 10.1029/2009GL041417, 2010.
127. Olson, P.L., Coe, R.S., Driscoll, P.E., Glatzmaier, G.A., and Roberts, P.H., Geodynamo reversal frequency and heterogeneous core-mantle boundary heat flow, *Phys. Earth Planet. Inter.*, **180**, 66-79, 2010.
128. Amit, H., and P. Olson, A cascade interpretation of the geomagnetic dipole decrease, *Geophys. J. Int.*, **181**, 1411-1427, 2010.
129. Arkani-Hamed, J. and P. Olson, Giant impacts, core stratification, and failure of the Martian dynamo, *J. Geophys. Res.*, **115**, E07012, doi:10.1029/2010JE003579, 2010.
130. Olson, P.L., Glatzmaier, G.A., and Coe, R.S., Complex polarity reversals in a geodynamo model. *Earth Planet. Sci. Lett.*, **304**, 168-179, 2011.
131. King, C., and P. Olson, Heat partitioning in metal-silicate plumes during Earth differentiation. *Earth Planet. Sci. Lett.*, **304**, 577-586, 2011.
132. Driscoll, P. and P. Olson, Optimal dynamos in the cores of terrestrial exoplanets: Magnetic field generation and detectability. *Icarus*, **213**, 12-23, 2011.
133. Driscoll, P. and P. Olson, Superchron cycles driven by variable core heat flow. *Geophys. Res. Lett.*, **L09304**, doi:10.1029/2011GL046808, 2011.
134. Olson, P., Owen Martin Phillips, Memoir, *EOS Transactions Amer. Geophys. Un.* **92**, 8, 2011.

135. Olson, P., Owen Martin Phillips, Obituary *Physics Today*, **64(5)**, 60-61, 2011.
136. Olson, P., Laboratory experiments on the dynamics of the core. *Phys. Earth. Planet. Inter.* **187**, 1-18, 2011.
137. Olson, P., John Verhoogen. *Biographical Memoirs, National Academy of Sciences*, 14 pp., 2011.
138. Deguen, R., Olson, P. and Cardin, P., Experiments on turbulent metal-silicate mixing and chemical equilibration in a magma pool, *Earth Planet. Sci. Lett.* **310**, 303-313, 2011.
139. Wu, B., Olson, P. and Driscoll, P., A statistical boundary layer model for the mantle D''- region. *J. Geophys. Res.* **116**, B12112, 2011.
140. Olson, P., Christensen, U. and Driscoll, P., From superchrons to secular variation: A broadband dynamo frequency spectrum for the geomagnetic dipole. *Earth Planet. Sci. Lett.* **319-320**, 75-82, 2012.
141. Olson, P. and Deguen, R., Lopsided inner core growth and eccentricity of the geomagnetic dipole. *Nature Geoscience* **5(8)**, 565-569, 2012.
142. Turner, S.J. and Olson, P.L., Owen Martin Phillips, *Biogr. Mem. R. Soc.* **58**, 229-244, 2012.
143. Olson, P., Deguen, R., Hinnov, L.A., and Zhong, S., Controls on geomagnetic reversals and core evolution by mantle convection in the Phanerozoic, *Phys. Earth Planet. Inter.* **214**, 87-103, 2013.
144. Olson, P., Experimental dynamos, dynamics of planetary cores. *Ann. Rev. Earth Planet. Sci.* **41(1)**, 153-181, 2013.
145. Olson, P., The New Core Paradox. *Science* **342**, p.431, 2013.
146. Olson, P., The geodynamo's unique longevity. *Physics Today* **66(11)** 30-36, 2013; also translated into Japanese for *Parity* **6** 4-11, 2014.
147. Olson, P., Hinnov, L., Driscoll, P., Nonrandom geomagnetic reversal times and geodynamo evolution. *Earth Planet. Sci. Lett.* **388**, 9-17, 2014.
148. Deguen, R., Landeau, M., Olson, P., Turbulent metal-silicate mixing, fragmentation, and equilibration in magma oceans. *Earth Planet. Sci. Lett.* **391** 274-287, 2014.
149. Olson, P. and Amit, H., Magnetic reversal frequency scaling in dynamos with thermochemical convection. *Phys. Earth Planet. Inter.* **229** 122-133, 2014.
150. Landeau, M., Deguen, R., Olson, P., Experiments on the fragmentation of a buoyant liquid volume in another liquid. *J. Fluid Mechanics* **749**, 478-518, 2014.
151. Deguen, R., Olson, P., Reynolds, E., F-layer formation in the outer core with asymmetric inner core growth. *Comptes Rendus Geoscience*, **346**, 101-109, 2014.
152. Amit, H., Olson, P., Lower mantle superplumes excite geomagnetic reversals, *Earth Planet Sci Lett.*, **414**, 68-75, 2015.
153. Olson, P., Deguen, R., Rudolph, M.L., Zhong, S., Core evolution driven by mantle global circulation, *Phys. Earth Planet. Inter.*, **243**, 44-55, 2015.
154. Olson, P. Overview on Core Dynamics, Chapter 8.01 in Volume 8 of the *Treatise on Geophysics*, 2nd ed (G. Schubert, main ed.) Elsevier, Oxford, 1-31, 2015.
155. Cardin, P., Olson, P. Experiments on Core Dynamics, Chapter 8.13 in Volume 8 of the *Treatise on Geophysics*, 2nd ed (G. Schubert, main ed.) Elsevier, Oxford, 2015.
156. Olson, P., Amit, H., Mantle superplumes induce geomagnetic superchrons, *Frontiers in Earth Science* **3** (38) doi: 10.3389/feart.2015.00038, 2015.
157. Towles, N., Olson, P., Gnanadesikan, A., Scaling laws for perturbations to the ocean-

atmosphere system following large CO₂ emissions, *Climates of the Past*, **11**, 991-1007, 2015.

158. Goswami, A., Hinnov, L.A., Gnanadesikan, A., Olson, P., Global ocean bathymetry with generalized shelf-slope rises structures, *Geoscientific Model Development* **8**, 2735-2748, 2015.
159. Amit, H., Choblet, G., Olson, P., Monteaux, J., Dechamps, F., Langlais, B., Tobie, G., Exotic core-mantle boundary heat flux: a source of diversity in planetary dynamos *Progress in Earth and Planetary Science* **2:26** DOI 10.1186/s40645-015-0056-3, 2105.

ARTICLES IN REVIEW

Olson, P., Reynolds, E., Hinnov, L., Goswami, A., Variation of ocean sediment thickness with crustal age, *Geochem. Geophys. Geosyst.* (submitted)

Matsui, H.,Olson, P.,(21 authors) Performance benchmarks for a next generation numerical dynamo model, *Geochem. Geophys. Geosyst.* (submitted)

Ramudu, E., Hirsh, B.H., Olson, P., Gnanadesikan, A., Turbulent heat exchange between water and ice at an evolving ice-water interface. *J. Fluid Mech.* (submitted)

ARTICLES IN PREPARATION/REVISION:

Fleck, J.R., Weeraratne, D.S., Olson, P., Tharsis formation by chemical plumes during Mars Accretion

Olson, P., Landeau, M., Hirsh, B., Iron rain dynamo in the early Earth

Landeau, M., Olson, P., Deguen, R., Hirsh, B., Core merging and stratification after giant impacts

OTHER PUBLICATIONS: BOOKS, EDITED WORKS, ESSAYS, AND MAJOR REPORTS:

Quantitative Geodynamics-Lithospheric Processes, Convection and Global Dynamics, H.J. Neugebauer, and P. Olson, eds., *Phys. Earth Planet. Int.*, **36**, 231 pp., 1984.

Changes in Circulation and Salinity Caused by Channel Dredging Within the Baltimore Harbor System, Olson, P. and V. Grano, *Geophys. Fluid Dyn. Lab. Tech Rep.* **83-1**, 60 pp., 1983.

Incorporation of Irregular Bottom Topography into the Patuxent River Estuary Hydrodynamic Model, Olson, P., *Geophysical Fluid Dynamics Laboratory Technical Report* **86-1**, 24 pp., 1986.

Mantle Convection in the Earth and Planets, with G. Schubert and D. Turcotte, Cambridge University Press, 940 pp., 2001.

Core Dynamics, P. Olson, ed, Volume 8 of the *Treatise on Geophysics* (G. Schubert, main ed.) Elsevier, Amsterdam, B.V., 358 pp., 2007.

Grand Challenges in Geodynamics: Outstanding geodynamics problems and emerging research opportunities for the Earth Sciences. Report to the National Research Council
P. Olson (ed). 109 pp., 2010.

New Research Opportunities in the Earth Sciences at the National Science Foundation.
Co-authored report to the National Science Foundation by the National Research Council Committee on the Earth Sciences. 202 pp., 2011.

Core Dynamics, P. Olson, ed, Volume 8 of the *Treatise on Geophysics 2nd edition* (G. Schubert, main ed.) Elsevier, Amsterdam, B.V. (June 15 2015).