

JOHN A. WHITEHEAD

SHORT VITA AND PUBLICATIONS

17 January, 2017

Scientist Emeritus, Department of Physical Oceanography

Faculty, Geophysical Fluid Dynamics Summer School

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Woods Hole Oceanographic Institution

Woods Hole, Massachusetts 02543

Date of Birth: April 21, 1941

B.S., Tufts University, 1963, M.S., Yale University, 1965, Ph.D., 1968

SCIENTIFIC INTERESTS:

Geophysical Fluid Dynamics: analytical and laboratory studies of fluid mechanics problems in oceans, atmospheres, and planetary interiors.

HONORS

American Society of Mechanical Engineers "Old Guard" Undergraduate Research Project Competition, Division I Winner (Northeast United States) 1963.

Senior Postdoctoral Fellowship, Advanced Study Program, National Center for Atmospheric Research, Boulder, Colorado, Dec. 1, 1977 - June 15, 1978.

John Simon Guggenheim Memorial Fellow, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, England, 1982-83.

Fellow, American Physical Society, 1982 *"For the development of basic understanding of convection and rotating flows"*

Fellow, American Geophysical Union, 1997

"For his numerous contributions to understanding fundamental fluid dynamical processes in the Earth's mantle and oceans, including mantle conduit and hotspot dynamics and the development of rotating hydraulics and its application to oceanic flows"

Alumni Achievement Award, Department of Mechanical Engineering, Tufts University, 1999

Fellow, American Academy of Arts and Sciences, 2002

Fellow, American Meteorological Society, 2007

Henry M. Stommel Research Award, American Meteorological Society, 2007

"For his fundamental contributions to Geophysical Fluid Dynamics and Physical Oceanography, for which his laboratory and observational studies of rotating hydraulic flows have been particularly illuminating."

Maurice Ewing Medal, American Geophysical Union, 2014 *"For significant Original Contributions to the scientific understanding of the processes in the ocean"*

Publications

Book

Pratt, L. J. and J. A. Whitehead, 2007 Rotating Hydraulics- Nonlinear topographic effects in the ocean and atmosphere, Springer-Verlag, Berlin, 608pp.

Research articles, Refereed

PDFs of any article will be supplied upon request. Most refereed articles are available for your personal use in the publications section of my personal site (<http://www.whoi.edu/hpb/Site.do?id=2553>)

Chen, Michael M. and John A. Whitehead, 1968. Evolution of two-dimensional periodic Rayleigh convection cells of arbitrary wave-numbers. *Journal of Fluid Mechanics*, 31(1), 1--15.

Schubert, G. and J. A. Whitehead, 1969. Moving flame experiment with liquid mercury: possible implications for the Venus atmosphere. *Science*, 163, 71--72.

Newell, A. C. and J. A. Whitehead, 1969. Finite bandwidth, finite amplitude convection. *Journal of Fluid Mechanics*, 38, 279--303.

Howard, L. N., W. V. R. Malkus and J. A. Whitehead, 1970. Self-convection of floating heat sources: a model for continental drift. *Geophysical Fluid Dynamics*, 1, 123--142.

Whitehead, J. A. and Michael M. Chen, 1970. Thermal instability and convection of a thin fluid layer bounded by a stably stratified region. *Journal of Fluid Mechanics*, 40, 549--576.

Busse, F. H. and J. A. Whitehead, 1971. Instabilities of convection rolls in a high Prandtl number fluid. *Journal of Fluid Mechanics*, 47, 305--320.

Whitehead, J. A., 1971. Upon boundary conditions imposed by a stratified fluid. *Geophysical Fluid Dynamics*, 2, 289-298.

Whitehead, J. A., Jr., 1971. The generation of mean flows by a negative Reynolds stress. In: *Environmental and Geophysical Heat Transfer*, C. J. Cremers, F. Kreith and J. A. Clark, editors, Heat Transfer Division Vol. 4, American Society of Mechanical Engineers, New York; pp. 20--25.

Newell, A. C. and J. A. Whitehead, 1971. Review of the finite bandwidth concept. In: *Instability of Continuous Systems*, H. Leipholz, editor, Springer-Verlag, New York; pp. 284--289.

Whitehead, J. A., Jr., 1971. The generation of mean flows by a negative Reynolds stress. In: *Environmental and Geophysical Heat Transfer*, C. J. Cremers, F. Kreith and J. A. Clark, editors, Heat Transfer Division Vol. 4, American Society of Mechanical Engineers, New York; pp. 20--25.

Whitehead, J. A., Jr., 1971. Cellular convection. *American Scientist*, 59(4), 444--451.

Whitehead, J. A., 1972. Observations of rapid mean flows produced in mercury by a moving heater. *Geophysical Fluid Dynamics*, 3, 161--180.

Whitehead, J. A., 1972. Moving heaters as a model of continental drift. *Physics of the Earth and Planetary Interiors*, 5, 199--212.

Whitehead, John A., Jr., 1973. Observations of the dynamics of Rayleigh-Benard convection. *Proceedings of the 13th International Congress of Theoretical and Applied Mechanics*, Izdatel'stra 'Nauka', Moscow, U.S.S.R. (in Russian).

*Whitehead, J. A., A. Leetmaa and R. A. Knox, 1974. Rotating hydraulics of strait and sill flows. *Geophysical Fluid Dynamics*, 6, 101--125.

Whitehead, J. A. and Roger F. Gans, 1974. A new, theoretically tractable earthquake model. *Geophysical Journal of the Royal Astronomical Society*, 39, 11--28.

Busse, F. H. and J. A. Whitehead, 1974. Oscillatory and collective instabilities in large Prandtl number convection. *Journal of Fluid Mechanics*, 66, 67--80.

*Whitehead, John A., Jr., and Douglas S. Luther, 1975. Dynamics of laboratory diapir and plume models. *Journal of Geophysical Research*, 80, 705--717.

Whitehead, John A., Jr., 1975. Mean flow generated by circulation on a β -plane: An analogy with the moving flame experiment. *Tellus*, 27(4), 358--364.

Bye, John A. T. and John A. Whitehead, Jr., 1975. A theoretical model of the flow in the mouth of Spencer Gulf, South Australia. *Estuarine and Coastal Marine Science*, 3, 477--481.

Whitehead, J. A., Jr., 1975. A survey of hydrodynamic instabilities. *Proceedings of the NATO Advanced Study Institute "Physics of Nonequilibrium Systems: Fluctuations, Instabilities and Phase Transitions"*, Tormod Riste, editor, Plenum Press, New York; pp. 153--180.

Whitehead, J. A., Jr., and Gerald Chan, 1976. Stability of Rayleigh-Benard convection rolls and bimodal flow at moderate Prandtl number. *Dynamics of Atmospheres and Oceans*, 1, 33--49.

Sambuco, E. and J. A. Whitehead, Jr., 1976. Hydraulic control by a wide weir in a rotating fluid. *Journal of Fluid Mechanics*, 73, 521--528.

Whitehead, J. A., Jr., 1976. The propagation of dislocations in Rayleigh-Benard rolls and bimodal flow. *Journal of Fluid Mechanics*, 75, 715--720.

Whitehead, John A., Jr., 1976. Convection models: Laboratory versus mantle. *Tectonophysics*, 35, 215--228.

Whitehead, John A. and David L. Porter, 1977. Axisymmetric critical withdrawal of a rotating fluid. *Dynamics of Oceans and Atmospheres*, 2, 1--18.

Whitehead, J. A., Jr. and Barry Parsons, 1978. Observations of convection at Rayleigh numbers up to 760,000 in a fluid with large Prandtl number. *Geophysical and Astrophysical Fluid Dynamics*, 9, 201--217.

Skilbeck, John N. and John A. Whitehead, Jr., 1978. Formation of discrete islands in linear island chains. *Nature*, 272(5653), 499--501.

Members of Committee on Geodesy, 1978. *Geodesy: Trends and Prospects*, National Research Council; author of Chapters 3.3, *Ocean Dynamics*, pp. 25--27 and 5.2, *Ocean Instrumentation*, pp. 62--65; National Academy of Sciences, Washington, D.C., 86 pp.

Whitehead, J. A., Jr., 1978. Problems in determining sea surface topography. *Proceedings of the Ninth GEOP (Geodesy/Solid-Earth and Ocean Physics) Research Conference, An International Symposium on the Applications of Geodesy to Geodynamics*, Oct. 2--5, 1978, Dept. of Geodetic Science Report No. 280, The Ohio State University, Columbus, OH; pp. 233--236.

Whitehead, John A., Jr., and A. R. Miller, 1979. Laboratory simulation of the gyre in the Alboran Sea. *Journal of Geophysical Research*, 84(C7), 3733--3742.

Tapley, B. D., G. H. Born, H. H. Hagar, J. Lorell, M. E. Parke, J. M. Diamante, B. C. Douglas, C. C. Goad, R. Kolenkiewicz, J. G. Marsh, C. F. Martin, S. L. Smith III, W. F. Townsend, J. A. Whitehead, H. M. Byrne, L. S. Fedor, D. C. Hammond and N. M. Mognard, 1979. Seasat altimeter calibration: Initial results. *Science*, 204, 1410--1412.

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Gershenfeld, Neil A., Robert E. Frazel and John A. Whitehead, Jr., 1981. Rotating flume with uniformly flowing, linearly stratified water. *Reviews of Scientific Instruments*, 52(10), 1556--1559.

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Stern, Melvin E., John A. Whitehead and Bach-Lien Hua, 1982. The intrusion of a density current along the coast of a rotating fluid. *Journal of Fluid Mechanics*, 123, 237--265.

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*Whitehead, John A., Jr., and L. V. Worthington, 1982. The flux and mixing rates of Antarctic Bottom Water within the North Atlantic. *Journal of Geophysical Research*, 87(C10), 7903--7924.

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368, Elsevier Publishing Company, New York. The volume is from the workshop on "Formation of Deep Waters in the Ocean," Monterey CA. March 1990.

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Hart, S. R., E. H. Hauri, L. A. Oschmann, and J. A. Whitehead, 1992. Mantle plumes and entrainment: Isotopic Evidence. *Science* 256, 517-520.

Hunkins, Kenneth, and J. A. Whitehead, 1992. Laboratory simulation of exchange through Fram Strait. *Journal of Geophysical Research*, 97, 11299-11321.

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Whitehead, J. A. 1993. A laboratory Model of Cooling over the Continental Shelf. *J. Physical Oceanography*, 23, #11, 2412-2427.

Whitehead, J. A. and Peter Kelemen, 1994. Fluid and Thermal dissolution instabilities in Magmatic Systems, 355-379 in *Magmatic Systems*, Michael P. Ryan, Editor, 355-379, Academic Press, New York.

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Park, Young Gyu, J. A. Whitehead, and Anand Gnanadesikan, 1994. Turbulent Mixing in Stratified Fluids: Layer Formation and Energetics. *J. Fluid Mech.*, 279, 279-312.

Whitehead, J. A. and Ryuji Kimura, 1994. Rotating Hydraulic Models of Fronts at the Continental Shelf Break and in Circular Eddies. *Geophysical and Astrophysical Fluid Dynamics*, 76, 1-27.

*Hauri, Eric H., John. A. Whitehead, and Stanley R. Hart, 1994. Fluid dynamic and geochemical aspects of entrainment in mantle plumes *J. Geophys. Res.*, 99, 24275-24300.

Marshall, John, J. A. Whitehead, and Tom Yates, 1994. Laboratory and numerical experiments in oceanic Convection, P. Malanotte-Rizzoli and A. R. Robinson, (eds.) *Ocean Processes in Climate Dynamics: Global and Mediterranean Examples*, 173-201. Kluwer Academic Publishers.

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*Pedlosky, Joseph, J. A. Whitehead and Graham Veitch 1997 Thermally driven motions in a rotating stratified fluid: theory and experiment, *J. Fluid Mech.* 339, 391-411.

*Hall, Melinda M., Michael McCartney and J. A. Whitehead 1997 Antarctic Bottom Water Flux in the Equatorial Western Atlantic *J. Physical Oc.* 27, 1903-1926.

Borenas, K. M. and J. A. Whitehead 1998. Upstream separation in a rotating channel flow. *J. Geophys Res.* 103, C4 7567-7578.

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*Whitehead J. A. 2003 Constant Potential vorticity hydraulically controlled flow-complexities from passage shape. *J. Physical Oceanography*, 33, 305-312.

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